

**Annual Environmental Statement**  
**(Form – v)**  
**of**  
**Mandamarri Area**  
for the financial year 2024-25  
(In compliance with Rule 14 of E(P) Rules, 1986  
under section 6 and 25 of the E(P)Act, 1986  
(29 of 1986))



THE SINGARENI COLLIERIES COMPANY LIMITED  
(A GOVT COMPANY)  
ENVIRONMENT DEPARTMENT  
MANDAMARRI AREA

**FOR**  
**KALYAN KHANI-5 (KK-5) INCLINE**  
**UNDERGROUND COAL MINE EXPANSION PROJECT**  
**OF MANDAMARRI AREA**

(For financial year ending of 31<sup>st</sup> March 2025)

Consent Order Number : 240525266137  
Date : 23.08.2024  
Valid upto : 30.09.2029



**THE SINGARENI COLLIERIES COMPANY LIMITED**  
(A Government company)  
**MANDAMARRI AREA**

Kalyankhani No.5 Incline  
Mandamarri – 504 231  
Mancherla District  
Telangana

Phone : 08736 256495  
Email : env\_mmr@scclmines.com

Ref: MMR/ENV/R/001/2025/262

Date: 11.09.2025

To  
The Member Secretary,  
Telangana State Pollution Control Board,  
Paryavaran Bhavan,  
A-3, Industrial Estate,  
Sanath Nagar,  
**HYDERABAD** – 500 018.

Dear Sir,

Subject : Environment Statement of Kalyan Khani-5 (KK-5) Incline Underground Coal mine Expansion Project of Mandamarri Area, SCCL for the financial 2024 – 25 in Form – V (Rule No. 14 of the Environment (Protection) Rules, 1986 – Reg.


CFO No: Consent Order No. 210822203107, Date: 23.05.2022.

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With reference to the above, please find enclosed the Environment Statement of Kalyan Khani No.5 incline Underground Coal mine Expansion Project of Mandamarri Area, SCCL for the financial year 2024 - 25 in Form – V (Rule No. 14 of the E (P) Rules, 1986), in compliance of the consent order cited.

This is for your information and further necessary action.

Yours sincerely,

  
General Manager  
Mandamarri Area.  
The Singareni Collieries Co.Ltd.  
General Manager  
The Singareni Collieries Co. Ltd  
MANDAMARRI AREA  
P.O. KALYANI KHANI- 504 231,  
Mancherla (Dist), Telangana.

- Cc:
1. Joint Chief Environmental Engineer,  
Zonal Office, 25-35/11, Tulasi Reddy Complex,  
2<sup>nd</sup> Floor, Opp: Mandal Office,  
Post: Ramachandrapuram,  
Dist: MEDAK – 502032.
  2. The Environmental Engineer,  
6-2-166/A, Subhash Nagar,  
TG Pollution Control Board,  
Regional Office, NIZAMABAD – 503002.
  3. GM(ENV), Corporate



**MANDAMARRI AREA**  
**Environmental Statement of Kalyankhani No.5 Incline**  
**for the financial year ending the 31<sup>st</sup> March 2025**

**1. Introduction:**

The Singareni Collieries Company Limited (SCCL) is a joint undertaking of State and Central governments. SCCL is the only Coal producer in the entire South India. The coal mining activities are spread over 6 Districts of Telangana State in Godavari Valley Coalfield. The Company functions as 11 administrative areas in 3 Regions comprising of 22 UG mines and 15 Opencast mines. Productions achieved in SCCL during 2024-25 financial year is 69.01 Million Tonnes.

Kalyankhani No.5 incline falls in Mandamarri area of Bellampalli region in Mancherial District. In addition, two opencast mines namely Ramakrishnapur Opencast Project phase-1, Kalyankhani Opencast Project and another Underground mines namely Kalyankhani No.1 incline, Ravindrakhani No.1A incline, Kasipet incline, Kasipet-2 incline and Shantikhani Longwall Project are in operation in Mandamarri area. Besides supporting facilities such as Stores, Area workshop and coal handling plant also exist.

**2. About Kalyan khani No.5 incline:**

**2.1 Location:**

KK No.5 incline mine falls in Somagudem and Indaram coal belt of Godavari valley coal field in Mancherial District of Telangana state. The mine area falls between North Latitudes 18<sup>o</sup> 56' 00" to 18<sup>o</sup> 58' 30" and East Longitudes 79<sup>o</sup> 28' 00" to 79<sup>o</sup> 30' 00" covered in survey of India Topo sheet no.56M/8.

The Project is located near Mandamarri town in Mandamarri Mandal of Mancherial District, Telangana State.

**2.2 Communication:**

Mandamarri area is being an industrially developed belt is well connected by both road and rail to all important places within the Telangana State. A branch railway line from Kazipet junction to Mandamarri Railway station connects to the Kazipet junction – Ballarshah of South Central Railway main line.

**Topography:**

The area within 10km radius of the block is of gentle sloping plains with local undulations. The erosional hills in the west side of this area are of beveled cuesta type, with intervening depressions. The plains are sandy that are imperfectly drained. The local relief varies from 120 m above mean sea level in the south central part to 270 m above mean sea level in the northern part, with an average slope of 5.7 m /km. towards Godavari River flowing in the south central part.

### **2.3. Climate:**

The area experiences a sub – tropical climate with three distinct seasons, a hot dry summer from April to mid June, with occasional thunder showers, a good monsoon spreading from mid June to the end of September and mild winter from October and February.

### **2.4. Township:**

The employees of the project were provided residential accommodation in common townships namely Market area, Pranahitha colony in Mandamarri.

### **2.5. Environmental clearance & Consent For Operation:**

The MoEF accorded environmental clearance vide its letter number. J-11015/383/2007-IA.II(M), Date: 27<sup>th</sup> October 2008. The project is having valid CFO obtained from TSPCB vide consent order number.210822203107, Date: 23.05.2022.

### **3. A brief note on different processes involved in underground mining operations and allied activities:**

Unlike in other industries, no chemical process and burning of fuel are involved in coal extraction process. Dust is the only common pollutant generated in mines and allied activities.

Mining operations do not result into any point sources of gaseous emission. Dust emission sources are extensive and fugitive in nature like plying of vehicles, coal loading and unloading operation, coal screening and handling operation.

The coal from this project is transported to the RKP Coal Handling Plant (RKPCHP) through trucks from where it is loaded into railway wagons for transporting to the customers.

Brief description of different mining process involved in underground mining operation area as follows.

#### **Underground Mining**

Underground coal mining involves reaching the coal seams by making tunnels, inclines, shafts and extracting the coal by suitable methods depending on the local conditions. Sequence of operations involved in underground mining is as follows.

- Drilling of holes in coal faces
- Charging of holes with explosive material
- Blasting of coal
- Lifting of broken coal with Side Discharge Loaders (SDLs) and transporting the coal to surface bunkers with help of series of haulage roadways / belt conveyors.
- Transporting the coal from surface bunker to Ramakrishnapur Coal Handling Plant through trucks from where it is loaded into railway wagons for transporting to the customers.

[FORM – V]

(See rule 14)

Environmental Statement for the financial year ending the  
31<sup>st</sup> March, 2025

**PART – A**

Sl. No	DESCRIPTION	
01	Name and address of the owner/occupier of the industry Operation or process	N.RADHAKRISHNA, GENERAL MANAGER, The Singareni Collieries Company Limited, Mandamarri area, Kalyankhani -Post Mancherial – District, TELANGANA STATE PIN: 504231, Tel.No: 08736-256523
02	Industry Category	Coal Mining(Red Non- Hazardous)
03	Production Capacity – Units	500000 tonnes per Annum
04	Year of establishment	1958
05	Date of the last environmental statement submitted	18.09.2024.

**PART – B**

**Water and Raw Material Consumption**

- (1) Water consumption m<sup>3</sup>/day: 950 m<sup>3</sup>/day
- (2) Unlike in other industries, no chemical process in coal extraction process however the water is used for Drinking, dust suppression, plantation etc.

Name of the products	Process Water consumption per unit of product out put	
	During the previous financial year 2023-24	During the current financial year 2024-25
Domestic	800 KLD	400 KLD
Industrial (Drinking+ Dust suppression+ Plantation)	1920 KLD	550 KLD

1. Substituted by Rule 2 (b) of the Environment (protection) Amendment Rules, 1993 notified vide G.S.R 3'6 (E) dated 22.04.1993

**Raw Material Consumption: Enclosed as annexure-I**

Name of raw materials	Name of products	Consumption of raw material per unit of output	
		During the previous financial year 2023-24	During the current year 2024-25
	<b>Coal</b>	--	--

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

**PART – C**

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

(1) Pollution	Quantity of pollutants Discharged (mass/day)	Concentration of pollutants in discharges (mass/volume)	Percentage of variation from prescribed standards with reasons
(a) Air (b) Water	Unlike in other industries, no chemical process and burning of fuel are involved in coal extraction process. The parameters are monitored as per the Consent order and the results are enclosed. <b>Enclosed as Annexure –II</b> <b>Enclosed as Annexure-III</b>		

**PART – D**

**Hazardous Waste**

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

Hazardous Waste	Total Quantity (Kg)	
	During the previous financial year 2023-24	During the current financial year 2024-25
(a) From Process	<b>Not applicable</b>	
(b) From pollution control facility	<b>Not applicable</b>	

## **PART – E**

### **Solid Waste**

Solid Waste	Total Quantity (Tonnes)	
	During the previous financial year 2023-24	During the current financial year 2024-25
(a) From process	541.90 tonnes of shale and sand stone generated from the mine.	124.10 tonnes of shale and sand stone generated from the mine.
(b) From Pollution Control facility	Nil	Nil
(c):		
1) Quantity recycled or re-utilized within the unit	541.90 Tonnes	124.10 Tonnes
2) Solid	Nil	Nil
3) Disposed	Nil	Nil

**Note:** In underground mining, no chemical or manufacturing process is involved. Solid wastes generated in underground mining are mainly the rejects separated from coal at the coal handling plants, scrap iron of various and scrap generated at mine stores. The waste so generated is being re used for filling of low lying areas, roof stitching & fencing arrangements with old discarded rope and timber as haulage track sleepers.

## **PART – F**

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

### **Characterization of Solid Wastes and Disposal Practice:**

Solid waste generated at the underground mine is mainly stone, clay and shale. These waste materials are picked out from the coal by manually at the picking platforms when coal is passing on slow moving belts. After picking, these wastes are being transported by trucks and dumped for filling in low lying areas of the mining lease area.

## **PART – G**

*(Impact of the pollution abatement measures are taken on conservation of natural resources and on the cost of production.)*

Post project monitoring for air and water quality is being carried out as per the MoEF guidelines of coal mines vide GSR 742 (E) dated 25.09.2000. The post project monitoring data of air and water quality data are enclosed as **Annexure - II & III.**

Expenditure towards the environmental protection for the year 2024-25 is furnished as below:

**ENVIRONMENTAL EXPENDITURE FROM APRIL 2024 TO MARCH 2025**

SI. No	Description	Expenditure (in Rs.)
1	Air Pollution (Prevention & Control)	5429117
2	Water Pollution (Prevention & Control)	12440901
3	Plantation (Block & Avenue)	4130751
4	Water spraying arrangements	1218277
5	CFO	1031786
<b>Grand Total:</b>		<b>24250832</b>

**PART – H**

**Additional measures/investment has been taken up for environmental protection including abatement of pollution and also prevention of pollution.**

1. Provision of quarters along with civil amenities.
2. Provision of play grounds, recreation and cultural centers and clubs.
3. Incentives for family planning and population control.
4. Communication facilities like rail, road, bus services, telephone, telex, fax, internet, etc, are there.
5. Provisional of LP Gas cylinders to company employees on free of cost.
6. Construction of community latrines (Sulabh Toilets) to work persons who are residing outside the company quarters.
7. Green belt development is being taken up in mine premises, in large blocks of stabilized subsidized areas, townships, CSP, Workshops, along mine colony roads and around fan houses.
8. Asphaltting of the entire colony roads and mine are being taken up in the phased manner to reduce dust generation.
9. Noise source in the mining activity is at the mines and CSP, Proper care is being taken to reducing noise levels by proper lubrication of machinery, restricting falling height of coal at CSP and lining the sides wherever necessary and Green belt development around noise generating sources.
10. Mist and dry fog dust control system is being maintained at CSP and also water spraying with water tankers along roads is provided in three shifts regularly.

## PART – I

### **Any other particulars for improving the quality of the environment:**

1. Oil & Grease trap is constructed in area workshop.
2. 60 Nos. of Rain water harvesting pits have been constructed in departments, colonies, schools, and Roadsides etc.
3. Compost pits are being used at mines and colonies for disposal of Bio-degradable solid wastes.
4. Colony development committees are being formed to educate the people towards clean & green.
5. Awareness towards plastic hazards, water and energy conservation is being brought among workmen and students through posters, pamphlets slogans and by conducting Quiz, Essay and Elocution competitions.
6. Parks and gardens developed in the colonies.
7. Clubs, libraries and swimming pool is being maintained in the colonies.
8. Plastic waste is being collected from colonies, mines and depts. and disposed for recycling.
9. 40 nos. hand bore wells has been provided in the surrounding villages for drinking purpose.
10. Distribution of fruit bearing plants, shady and flower plants in the surrounding villages on free of cost.
11. Total 2 nos solar power plants has been installed at Mandamarri area.
  - a) 1 no. 15MW capacity solar power plant at Muthyampalli village, Kasipet Mandal, Mancherial district near Kasipet mine.
  - b) 1 no 28 MW capacity solar power plant at Mandamarri town, Mancherial district near Kalyankhani no.5 incline.
  - c) Further total 67 MW capacity solar power plants installation work under progress.

  
Agent/Project Officer  
KK Group of Mines  
**Agent**  
KK Group of Mines

## Annexure-I

### RAW MATERIAL CONSUMPTION DETAILS

No chemical process is involved in the process of coal mining as in cases of other industries like chemicals, metals, alloys etc. However, the following raw materials have been used in the process of coal extraction, transportation, handling, running and maintenance of various plant and machinery used in the project.

Sl. No	Description of the item	Unit/per annum	During the financial year 2023-24	During the financial year 2024-25
1	Steel	MTN	7.144	56.538
2	Explosives	KGS	82250	92165
	Detonators	NOS	144500	158425
	Nonels	MTRS	NIL	NIL
	Detonating Fuse	MTRS	NIL	NIL
3	Lubricants			
	i)Oils	LTRS	17010	16970
	ii)Grease	KGS	728	728
	iii)Diesel	LTRS	NIL	100
4	Cement	BAGS	1222	1950

#### **Air Pollution Control Measures:**

- Adequate water spraying arrangements have been made at all working coal faces and galleries. Water spraying is regularly done at loading and unloading places of tippers and bunkers at pit head on surface.
- Water spraying is regularly done by tractor mounted water tanker exclusively engaged to serve the purpose.
- As on date 137.98 ha of plantation is done.
- The underground workings of the mine are well ventilated by adequate ventilation arrangements. The requirements and standards specified in this regard by Director General of Mines Safety (DGMS).

**Water pollution control Measures:**

- The mine discharge water, which may contain coal fines, needs sedimentation, before discharge into the natural water course / open land. The treatment facilities such as sedimentation, filtration and chlorination was provided for mine discharge, so as to conform to the effluent standards as prescribed by the MoEF&CC
- The effluents from service building is being collecting by a sewage system and treatment by means of septic tanks and soak pits. Sewage is discharging after treatment.
- Sewage is being treated by Sewage Treatment plants which were constructed at Pranahitha Colony, Nagarjuna Colony, Bharath Colony and Area Hospital Ramakrishnapur at Mandamarri Area.

**Annexure-II****Air quality monitoring data****Ambient Air Quality Monitoring data from April, 2024 to March, 2025****Air Monitoring Locations**

<b>Station Code</b>	<b>Name of the Stations</b>	<b>Latitude</b>	<b>Longitude</b>
<b>CORE ZONE</b>			
CA2	KK-5 Incline Site Office	N 18° 58' 36.0"	E 79° 29' 49.7"
<b>BUFFER ZONE</b>			
BA1	Mandamarri Colony	N 18° 58' 56.7"	E 79° 29' 05.9"
BA2	Shankarpalli	N 18° 58' 32.9"	E 79° 31' 08.5"
BA3	Pedda Dubbapalli	N 19° 00' 04.7"	E 79° 31' 12.9"
BA4	Sarangapalli	N 18° 56' 40.6"	E 79° 30' 46.2"





**Ambient Air Quality at Shankarpalli Village (BA2)**

**Area** : Mandamarri                      **Nature of Area** : Buffer Zone  
**Period of Monitoring** : April-2024 to March-2025                      **Sampling Duration** : 24hrs period

Sl. No.	Date of Sampling	PM <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>2</sub> (µg/m <sup>3</sup> )
<b>NAAQ Standards, CPCB Dated : 18.11.2009</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>
1.	05.04.2024	61	28.8	12.6	15.8
2.	22.04.2024	58	28.0	12.1	15.3
3.	07.05.2024	63	33.0	12.9	16.0
4.	21.05.2024	69	34.6	13.3	16.7
5.	06.06.2024	64	33.3	12.8	15.9
6.	22.06.2024	57	28.3	12.2	15.2
7.	05.07.2024	62	32.1	13.0	16.8
8.	24.07.2024	53	27.3	11.4	14.1
9.	06.08.2024	58	28	11.9	14.8
10.	22.08.2024	60	29.1	12.3	15.4
11.	06.09.2024	55	27.8	11.1	14.2
12.	23.09.2024	59	29.7	11.7	14.7
13.	07.10.2024	54	27.0	10.9	13.8
14.	21.10.2024	50	25.4	10.0	13.2
15.	06.11.2024	56	27.5	10.8	13.7
16.	21.11.2024	61	28.6	11.2	14.3
17.	06.12.2024	66	30.0	11.8	14.9
18.	20.12.2024	57	28.8	10.7	13.6
19.	07.01.2025	52	26.5	10.1	13.0
20.	21.01.2025	50	24.0	9.8	12.5
21.	06.02.2025	47	23.5	9.3	12.9
22.	20.02.2025	44	22.9	8.9	12.1
23.	06.03.2025	49	24.2	9.4	12.6
24.	21.03.2025	53	25.0	9.9	12.1
<b>Min</b>		<b>44</b>	<b>22.9</b>	<b>8.9</b>	<b>12.1</b>
<b>Max</b>		<b>69</b>	<b>34.6</b>	<b>13.3</b>	<b>16.8</b>
<b>Average</b>		<b>57</b>	<b>28.1</b>	<b>11.3</b>	<b>14.3</b>





**Summary of Ambient Air Quality Data Monitoring of KK 5 Mine, Mandamarri Area for  
April 2024 - March 2025**

Location code	Name of the location	PM <sub>10</sub> (mg/m <sup>3</sup> )			PM <sub>2.5</sub> (mg/m <sup>3</sup> )			SO <sub>2</sub> (mg/m <sup>3</sup> )			NO <sub>2</sub> (mg/m <sup>3</sup> )		
<b>Coal mine standards, GSR 742(E), Dated 25.09.2000</b>		<b>250</b>			<b>-</b>			<b>120</b>			<b>120</b>		
<b>Core Zone</b>		<b>Min</b>	<b>Max</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>Avg</b>
CA2	KK-5 Incline Site Office	142	187	168	53.2	84.3	68.9	12.1	17.0	14.5	15.0	20.7	17.6

**Summary of Ambient Air Quality Data Monitoring of KK 5 Mine, Mandamarri Area for  
April 2024 - March 2025**

Location code	Name of the location	PM <sub>10</sub> (µg/m <sup>3</sup> )			PM <sub>2.5</sub> (µg/m <sup>3</sup> )			SO <sub>2</sub> (µg/m <sup>3</sup> )			NO <sub>2</sub> (µg/m <sup>3</sup> )		
<b>NAAQ Standards, CPCB Dated : 18.11.2009</b>		<b>100</b>			<b>60</b>			<b>80</b>			<b>80</b>		
<b>Buffer Zone</b>		<b>Min</b>	<b>Max</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>Avg</b>
BA1	Mandamarri Colony	50	77	63	25.9	38.9	30.5	10.1	14.1	12.1	13.2	17.2	15.1
BA2	Shankarpalli	44	69	57	22.9	34.6	28.1	8.9	13.3	11.3	12.1	16.8	14.3
BA3	Pedda Dubbapalli	40	57	50	21.8	28.0	24.9	7.3	10.6	8.7	10.3	13.8	11.7
BA4	Sarangapalli	40	69	55	21.8	34.0	27.2	7.3	11.6	9.6	10.3	15.0	12.7

**Annexure-III**

**Effluents monitoring data**

**Effluents sampling locations**

Sl. No.	Sample code	Name of the Location	Latitude	Longitude
1	EW6	KK-5 Mine Discharge	N 18° 58' 29.3"	E 79° 29' 39.0"

**Characteristics of Effluents – KK 5 Mine Discharge (EW6)**

S. No.	Date of Sampling	pH	TSS at 105°C	TDS at 180°C	COD	BOD	Oil & Grease
Unit		--	mg/l	mg/l	mg/l	mg/l	mg/l
Test Method		4500-H <sup>+</sup> B	2540-D	2540-C	5220-D	IS 3025	5520-B
<b>MoEF GSR 742 (E) and GSR 801(E) Effluent Standards for coal mines</b>		<b>5.5 to 9.0</b>	<b>100</b>	<b>--</b>	<b>250</b>	<b>30</b>	<b>10</b>
1	15.04.2024	7.3	19	681	24	2.4	<1
2	30.04.2024	7.7	30	763	32	3.2	<1
3	15.05.2024	7.4	20	847	27	2.8	<1
4	30.05.2024	7.9	23	725	15	2.2	<1
5	13.06.2024	7.4	27	692	23	2.2	<1
6	28.06.2024	7.3	31	841	27	3.1	<1
7	12.07.2024	7.6	18	710	20	2.2	<1
8	30.07.2024	7.8	23	925	24	2.4	<1
9	14.08.2024	7.2	30	892	16	2.2	<1
10	30.08.2024	7.7	17	1015	28	3.2	<1
11	13.09.2024	8.1	25	776	32	4.2	<1
12	30.09.2024	7.6	34	844	27	3.2	<1
13	15.10.2024	7.2	20	752	23	2.4	<1
14	31.10.2024	6.9	31	642	20	3.1	<1
15	15.11.2024	7.8	16	783	31	4.2	<1
16	30.11.2024	7.6	27	893	28	3.2	<1
17	13.12.2024	7.5	34	756	36	4.6	<1
18	31.12.2024	7.7	24	592	23	3.5	<1
19	12.01.2025	7.8	20	633	20	2.2	<1
20	31.01.2025	7.9	31	541	31	3.6	<1
21	15.02.2025	7.2	26	785	38	4.1	<1
22	28.02.2025	7.4	18	694	24	2.8	<1
23	13.03.2025	7.5	27	587	28	3.2	<1
24	29.03.2025	7.3	35	744	32	4.2	<1

**Surface water quality monitoring data**

**Surface Water Sampling Locations**

SI. No.	Sampling code	Date of Sampling				Sampling Location	Latitude	Longitude
		1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter			
1	SW-3	12.06.2024	26.09.2024	30.12.2024	27.03.2025	Pala Vagu U/S	N 18°58'01.8"	E 79°29'44.8"
2	SW-4	12.06.2024	26.09.2024	30.12.2024	27.03.2025	Pala Vagu D/S	N 18°56'17.3"	E 79°27'04.2"

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

SI. No	Parameters	Unit	Test Method	CPCB Water Quality Criteria					RESULT							
				Class A	Class B	Class C	Class D	Class E	SW-3 Pala Vagu U/S				SW-4 Pala Vagu D/S			
									1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>
									Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter
1	pH	-	4500-H <sup>+</sup> B	6.5-8.5	6.5-8.5	6.0-9.0	6.5-8.5	6.0-8.5	8.2	7.8	8.1	7.7	8.4	8.1	8.3	7.7
2	Electrical Conductivity	µmhos/cm	2510-B	-	-	-	-	2250 µmhos/cm	845	420	988	1100	960	525	1172	980
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	-	6.0	6.1	5.8	5.9	6.4	5.9	5.7	5.2
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	-	-	2.8	2.6	3.3	2.5	3.0	3.0	3.4	2.6
5	Total Coliforms	MPN/100mL	9221B	50 or less	500 or less	5000 or less	-	-	220	220	540	170	220	240	280	220
6	Free Ammonia (as N)	mg/L	4500-NH <sub>3</sub> -F	-	-	-	1.2 mg/L or less	-	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
7	Boron as B	mg/L	3120-B	-	-	-	-	Less than 2 mg/L	0.16	0.09	0.09	0.09	0.1	0.12	0.08	0.12
8	SAR	-	-	-	-	-	-	Less than 26	1.47	0.58	1.36	0.96	1.56	0.57	1.57	1.10

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

S. No	Parameters	Unit	Test Method	SW-3 Pala Vagu U/S				SW-4 Pala Vagu D/S			
				1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter	1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter
1.	Colour	Hazen	2120. B	5	10	10	5	5	15	10	5
2.	Odour	TON	2150. B	No odour observed	No odour observed	No odour observed	No odour observed	No odour observed	No odour observed	No odour observed	No odour observed
3.	Temperature	°C	2550. B	25	25.7	25.8	26.6	25	25.7	25.8	26.6
4.	Turbidity	NTU	2130. B	3	7.4	4.41	1.2	5	8.6	2.32	1.32
5.	Total Dissolved Solids at 180° C	mg/L	2540.C	505	250	590	662	572	318	695	590
6.	Total Suspended Solids at 105° C	mg/L	2540. D	18	15	20	18	22	18	16	12
7.	Chemical Oxygen Demand	mg/L	5220. D	14	20	32	40	12	24	28	36
8.	Calcium as Ca	mg/L	3500-Ca.B	56	44	74	92	62	48	78	90
9.	Magnesium as Mg	mg/L	3500-Mg.B	38	17	45	54	45	28	57	40
10.	Sodium as Na	mg/L	3500-Na.B	58	18	60	47	66	20	75	50
11.	Potassium as K	mg/L	3500-K.B	8.8	2	6.85	5.5	9.4	1.9	3.8	6.9
12.	Chlorides as Cl <sup>-</sup>	mg/L	4500-Cl <sup>-</sup> .B	96	35	107	105	99	40	105	105
13.	Sulphates as SO <sub>4</sub> <sup>2-</sup>	mg/L	4500-SO <sub>4</sub> <sup>2-</sup> .E	98	38	129	194	100	50	163	107
14.	Fluoride as F <sup>-</sup>	mg/L	4500-F <sup>-</sup> .C	0.33	0.55	0.88	0.29	0.5	0.38	0.46	0.33
15.	Nitrates as NO <sub>3</sub>	mg/L	4500-NO <sub>3</sub> <sup>-</sup> .B	6.2	5.4	2	1.01	9.5	5.2	4.5	1.4
16.	Nitrites as NO <sub>2</sub>	mg/L	4500-NO <sub>2</sub> <sup>-</sup> .B	BDL	0.04	BDL	BDL	BDL	BDL	BDL	BDL

S. No	Parameters	Unit	Test Method	SW-3 Pala Vagu U/S				SW-4 Pala Vagu D/S			
				1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter	1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter
17.	Total Phosphates	mg/L	4500-P-D	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18.	Ammonical Nitrogen as NH <sub>3</sub> -N	mg/L	4500-NH <sub>3</sub> -C	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19.	Phenolic compounds as C <sub>6</sub> H <sub>5</sub> OH	mg/L	5530-D	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20.	Oil & Grease	mg/L	5520. B	<1	<1	<1	<1	<1	<1	<1	<1
21.	Carbonates as CO <sub>3</sub>	mg/L	2320. B	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
22.	Bi-carbonates as HCO <sub>3</sub>	mg/L	2320. B	220	145	260	255	290	200	330	300
23.	Fecal Coliforms	MPN/100mL	9221 E	33	21	110	21	46	17	94	27
24.	Zinc as Zn	mg/L	3120. B	0.12	0.13	0.18	0.1	0.18	0.1	0.23	0.16
25.	Iron as Fe	mg/L	3120. B	0.53	0.47	0.41	0.29	0.59	0.61	0.35	0.36
26.	Arsenic as As	mg/L	3120. B	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27.	Lead as Pb	mg/L	3120. B	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28.	Cadmium as Cd	mg/L	3120. B	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29.	Total Chromium as Cr	mg/L	3120. B	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
30.	Nickel as Ni	mg/L	3120. B	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
31.	Copper as Cu	mg/L	3120-B	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
32.	Selenium as Se	mg/L	3120-B	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

## Ground water Quality

### Groundwater Sampling Locations

Sl. No.	Sampling code	Date of Sampling				Sampling Location	Latitude	Longitude
		1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter			
1	GW-1	12.06.2024	26.09.2024	30.12.2024	27.03.2025	Sarangapalli	N 18°56'42.5"	E 79°30'38.7"
2	GW-4	12.06.2024	26.09.2024	30.12.2024	27.03.2025	Sandronpalli	N 18°57'55.6"	E 79°29'55.6"

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

#### 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 Sarangapalli				GW-4 Sandronpalli			
						1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter	1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter
1.	Colour	Hazen	2120. B	5	15	5	<5	5	5	5	<5	5	5
2.	Odour	TON	2150. B	Agreeable	Agreeable	Agree.	Agree.	Agree.	Agree.	Agree.	Agree.	Agree.	Agree.
3.	pH	-	4500-H <sup>+</sup> B	6.5 to 8.5	No relaxation	7.8	7.2	7.1	7.4	7.3	7.3	7.4	7.2
4.	Taste	FTN	2160. B	Agreeable	Agreeable	Agree.	Agree.	Agree.	Agree.	Agree.	Agree.	Agree.	Agree.
5.	Turbidity	NTU	2130. B	1	5	0.03	0.2	0.26	0.15	0.03	0.1	0.36	0.28
6.	Total Dissolved Solids at 180° C	mg/l	2540.C	500	2000	590	775	644	700	670	782	580	450

**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 Sarangapalli				GW-4 Sandronpalli			
						1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter	1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter
.1	Calcium as Ca	mg/l	3500-Ca.B	75	200	63	114	55	60	76	70	40	58
2	Magnesium as Mg	mg/l	3500-Mg.B	30	100	56	52	40	40	51	91	29	32
3	Chlorides as Cl-	mg/l	4500-Cl-.B	250	1000	133	132	143	132	110	129	96	66
4	Sulphates as SO42-	mg/l	4500-SO42- .E	200	400	92	65	66	72	106	50	67	65
5	Fluoride as F-	mg/l	4500-F-.C	1.0	1.5	1.1	0.55	0.68	0.84	0.4	0.86	0.92	0.75
6	Nitrates as NO3	mg/l	4500-NO3-.B	45	No relaxation	15	50	48	44	23	43	37	18
7	Total Alkalinity as CaCO3	mg/l	2320. B	200	600	275	450	280	360	350	535	300	255
8	Total Hardness as CaCO3	mg/l	2340. C	200	600	388	499	302	315	400	550	220	277
9	Sulphide as H <sub>2</sub> S	mg/l	4500-S2-F&D	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
10	Total Ammonia-N	mg/l	IS 3025 (Part 34)	0.5	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11	Phenolic compounds as C6H5OH	mg/l	5530-D	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
12	Residual free chlorine	mg/l	4500-Cl-.B	0.2	1.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

S. No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT							
						GW-1 Sarangapalli				GW-4 Sandronpalli			
						1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter	1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter
13	Mineral oil	mg/l	IS:3025 (part 39)	1.0	No relaxation	absent	absent	absent	absent	absent	absent	absent	absent
14	Anionic Detergents (as MBAS)	mg/l	IS:13428:2005K	0.2	1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
15	Aluminium as Al	mg/l	3120-B	0.03	0.2	BDL	0.1	BDL	BDL	BDL	BDL	BDL	BDL
16	Barium as Ba	mg/l	3120. B	0.7	No relaxation	0.25	0.22	0.15	0.13	0.12	0.21	0.18	0.09
17	Boron as B	mg/l	3120-B	0.5	2.4	0.14	0.10	0.08	0.06	0.21	0.09	0.09	0.05
18	Iron as Fe	mg/l	3120-B	1.0	No relaxation	0.57	0.58	0.53	0.61	0.67	0.39	0.55	0.39
19	Zinc as Zn	mg/l	3120-B	5	15	0.13	0.07	0.13	0.11	0.17	0.19	0.09	0.15
20	Copper as Cu	mg/l	3120-B	0.05	1.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Manganese as Mn	mg/l	3120-B	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Selenium as Se	mg/l	3120-B	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Silver as Ag	mg/l	3120. B	0.1	No relaxation	BDL	BDL	BDL	BDL	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 Sarangapalli				GW-4 Sandronpalli			
						1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter	1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter
1.	Cadmium as Cd	mg/l	3120-B	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2.	Cyanide as CN-	mg/l	4500-CN.F	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
3.	Lead as Pb	mg/l	3120-B	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
4.	Molybdenum as Mo	mg/l	3120. B	0.07	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
5.	Nickel as Ni	mg/l	3120-B	0.02	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
6.	Total Arsenic as As	mg/l	3120-B	0.01	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
7.	Total Chromium as Cr	mg/l	3120-B	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
8.	Mercury as Hg	µg/l	3500-Hg.B	0.001	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
9.	<b>Pesticides</b> : 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	ND	ND	ND	ND
	2,4-D, Carbaryl (Carbonate) Malathion Methyl Parathion Anilophos, Chloropyriphos	Qualitative analysis	6630. D	Absent	0.001	ND	ND	ND	ND	ND	ND	ND	ND
10.	<b>Polyaromatic Hydrocarbons (PAH's)</b> :Acenaphthene, Acenaphthylene, Anthracene,	µg/l	6440.C	-	-	ND	ND	ND	ND	ND	ND	ND	ND

S. No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT							
						GW-1 Sarangapalli				GW-4 Sandronpalli			
						1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter	1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter
	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												

**Bacteriological Quality of Drinking water**

S. No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT							
						GW-1 Sarangapalli				GW-4 Sandronpalli			
						1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter	1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter
1.	Total Coliforms	MPN/100 ml	9221 B	-	-	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
2.	Fecal Coliforms	MPN/100 ml	9221 E	-	-	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8

*NTU – Nephelometric Turbidity Unit; BDL – Below Detection Limit*

*Detection Limits of Aluminium (Al), Antimony (Sb), Arsenic (As), Barium (Ba), Boron (B), Cadmium (Cd), Chromium (Cr)/Total Chromium, Cobalt (Co), Copper (Cu), Iron (Fe), Lead (Pb), Magnesium (Mg), Manganese (Mn), Molybdenum (Mo), Nickel (Ni), Nickel (Ni), Selenium (Se), Silver (Ag), Vanadium (V), Zinc (Zn), Phenols is 0.01mg/l. Detection Limit of Mercury (Hg), Phosphates/Total Phosphates, Nitrites NO<sub>2</sub>, Free Ammonia, Total Ammonia is 0.02mg/l. Detection Limits of Potassium (K), Sodium (Na) is 0.03mg/l. Detection Limits of Cyanide (CN), Sulfide (S<sub>2</sub>), Hexavalent Chromium Cr+6 is 0.05mg/l. Detection Limits of Nitrates as NO<sub>3</sub>, Fluoride is 0.1mg/l. Detection Limits of Residual Free chlorine, Free Available chlorine, O&G is 1mg/l. Detection Limits of Sulfate SO<sub>4</sub><sup>-2</sup>, Ammonical Nitrogen, Total Kjeldhl Nitrogen (TKN), COD, Total Nitrogen (TN) is 5mg/l. BOD-3mg/l. ND-Not Detected; Detection Limit: Pesticides– 0.1 ppm; PAHs – 1 ppm.*