SUMMARY OF ENVIRONMENTAL IMPACT ASSESSMENT

&

ENVIRONMENTAL MANAGEMENT PLAN

FOR

(Public Hearing Document, English)

As per EIA Notification, 2006

OF

SASTI EXPANSION OC MINE

(Ballarpur Area, WCL)

for

Increase in ML area from 919.69 ha to 1120.48 ha
With existing production capacity of 2.50 MTPA
(No change in production capacity)

(Prepared as per ToR granted vide MoEF&CC Letter No. J-11015/435/2006-IA.II (M) dated 02.01.2021)

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Prepared by

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Executive Summary of EIA-EMP Report of Sasti Expansion OC

1.0 INTRODUCTION

The Sasti OC mine is an operating mine of Western Coalfield Limited. It is located near Sasti village in the Rajura tehsil of Chandrapur district of Maharashtra state. The mine commenced operation in 1985-86 and coal production started from 1986-87. After promulgation of Environment (Protection) act, 1986, the environment clearance for production capacity of 1.0 MTPA was obtained from MoEF&CC vide its letter no J-11015/24/88-IA dated 3rd April, 1989. The environment clearance for increase in production capacity from 1.0 MTPA to 1.60 MTPA was obtained in 2005 as per EIA Notification 1994. Production capacity was further enhanced from 1.60 MTPA to 2.50 MTPA in 2007 as per EIA Notification, 2006.

At present the mine is operating with the Environmental Clearance granted by MoEF&CC vide ref no. J-11015/435/2006-IA.II (M) in May, 2007 for 2.50 MTPA production capacity within land area of 919.69 ha.

The coal reserves are likely to be exhausted in the existing mine. Considering the demand of coal in the country, it is necessary to continue the production from existing mine based on techno-economic feasibility. In this project, the coal reserves are available in the dip side of the project. It was found to be techno-economically feasible to extract coal up to 200 meters of depth in this expansion proposal. The major advantage of continuing production from the existing mines is availability of previous mine void for dumping of overburden. This significantly reduces the demand of additional requirement of land for external dumping. In the existing project for which environment clearance was granted in 2007, the backfilling was 29.72 % only. However, in present proposal, the meticulous project planning has paved the way for 93% backfilling. With sequential planning, more than 350 ha of land is being saved from degradation due to external overburden. Moreover, this project does not face any major constraints such as involvement of forest land and village rehabilitation.

Based on the approved Project Report, the Form-I application was submitted to MoEF&CC in December, 2020. The ToR was issued by MoEF&CC vide Letter No. J-11015/435/2006-IA.II(M) dated 02.01.2021. The approved project report, 2020 envisaged the working of mine with mining technology of Shovel Dumper combination and Dragline. In order to adopt the environment friendly Surface Miner technology in the Sasti OC mine, it was proposed to prepared revised mining plan. The revised

mining plan was approved by WCL Board vide Ref: WCL/Office of CS/BM-345/2022-23/499 dated 27.09.2022. In approved mining plan it was proposed to adopt surface miner for coal extraction, survey off existing dragline and keeping the Gauri Nallah diversion as per existing environment clearance dated 17th May, 2007.

This report is prepared based on the ToR issued by MoEF&CC vide Letter No. J-11015/435/2006-IA.II(M) dated 02.01.2021.

1.1 Location

The proposed Sasti Expansion OC mine is located near Sasti village in Rajura Tehsil of Chandrapur district of Maharashtra State. The Rajura and Ballarpur townships are located at approx. 4 kms from the project. The Chandrapur district township is located at the distance of about 23 km from the mine.

The mine is bounded by Latitude N 19^0 47' 18.24" and 19^0 49' 59.41" and Longitude E 79^0 17' 50.89" and 79^0 20' 1.17". It is covered in the survey of India Toposheet No. - 56 M/5 (RF: 1: 50000). Toposheet plan showing the project area is given as Plate-II.

1.2 Communication

The project is approachable from Rajura town (4km) via Sasti Colliery and from Ballarpur (4km) by road. Rajura is located in south east side of the project. The Ballarpur is located in north of the project across Wardha River. Nearest Railway station is Ballarshah Railway Station on Delhi-Chennai Railway line about 7 kms from mine and nearest airport is Nagpur airport at about 180 km.

1.3 Topography & Drainage

The area is characterized by gently undulating topography. This region is covered by agriculture land with black cotton soil. The project area has in general gentle slope towards north and south i.e. towards Sasti and Mathara nalla. The altitude of the area ranges between 171.69 m and 189.74 m from mean sea level.

The main drainage of the area is controlled by the Wardha River, which is flowing southerly and is located about 1 km north-east from the project area. The distance of Wardha River from quarry of Sasti OC is 2 kms.

The Gauri Nallah controls the local drainage system. In the existing project, it was proposed to divert Gauri nallah flowing within the project area along the mine boundary in north and deepen the Sakhari nallah. In this proposal same alignment of Gauri Nallah is considered.

Additionally, Sasti (Shivalan) Nallah flowing in the area proposed for extension, is proposed for diversion. The existing length of Sasti (Shivalan) Nallah flowing from the

proposed mining area is nearly 2.8 kms. The diverted length of Sasti (Shivalan) Nallah will be 2.0 kms till its confluence in Mathara Nallah. Sasti (Shivalan) Nallah is flowing over the proposed expansion area of the project and it is proposed in the mine plan to divert the existing Sasti (Shivalan) Nallah and merge it into Mathara Nallah in the dip side as shown in the Quarry & Surface layout plan.

1.4 Climate & Rainfall

The area can be characterized as sub-tropical with the day temperatures in summer season rising to 48^0C and the mercury falling to 10^0C in winter. The annual rainfall in the area generally varies from 571 mm (1991-92) to 2041 mm (2013-14), June to September being the wettest months. The wind direction varies from north easterly in November to westerly in June.

2.0 PROJECT DESCRIPTION

2.1 Geo-Mining Parameters

The geo-mining parameters of the Sasti Expansion OC mine are tabulated below:

Geo-Mining Parameters

Sl. No.	Particulars	Details
1.	Area of the Quarry	
a)	On floor (ha)	416.47 (134.40 in Expn. part)
b)	On surface (ha)	544.79 (194.85 in Expn. part)
2.	Depth (m) (Incl. Sasti OC)	
a)	Initial	30m
b)	Final	200
3.	Gradient of Seam	1 in 7.4 to 1 in 18 due SE
4.	Average thickness range of seams (m)	11.84 to 19.73
5.	Average Strike length (m)	1650
6.	Width on surface (m) [dip rise] (Expn Area)	725
7.	Width on floor (m) [dip rise]	650

Sl. No.	Particulars	Details
	(Expn. Area)	
8.	Grade and GCV (kCal/kg) (considering 0.10 m dilution at Roof & Floor of seam)	G9 (4850 kCal/kg) By Surface Miner
9.	Mineable Reserves (Mt) (As on 01.04.2022)	24.12
10.	Total OB (Mm^3)	228.38
11.	Average stripping ratio (m^3/t)	9.47

2.2 Type and Method of Mining Operations

It is an existing opencast mine with shovel dumper combination and dragline for part overburden removal. In this proposal, it is envisaged to expand the quarry in southern dip side as well as western side of existing quarry of Sasti OC mine. In this expansion proposal use of surface miner for excavation of coal is proposed. This will eliminate the three dust generation sources from coal excavation i.e. drilling, blasting and crushing of coal.

3.0 DESCRIPTION OF ENVIRONMENT AND ANTICIPATED IMPACT

This is an existing coal mine running since more than 3 decades. The Gauri OC, Pauni OC, Pauni-II Expansion OC and Ballarpur OC are other running opencast coalmines located adjacent to the Sasti OC. This region is very important in meeting the coal demand of western and southern thermal power plants.

The project proponent has carried out extensive plantation in the project area. The plantation has become this extensive plantation carried out for more than 2 decades has become self-sustainable and self - rejuvenating. This afforested area helps in providing clean environment in this coal mining dominated region. This has been also seen the in the baseline data generated for the project.

The summary of baseline data generated to know the existing status of air quality, water quality, noise level, soil quality, flora-fauna and socio-economic is provided below.

3.1 Micrometeorology

Meteorological data was collected during the study period October 2020 to December 2020 (Post Monsoon season) reveals the following status:

Wind Speed/Direction

Generally, moderate to stronger winds prevailed throughout the season. Daily average wind speed readings were ranging from 0.43 m/sec to 1.36 m/sec. The seasonal average wind speed was observed to be 0.69 m/sec. The wind pattern of the study period is presented below:

The analysis of wind pattern during the season showed that the predominant wind directions were from East and South East (Blowing from).

Temperature

Daily average temperature values ranged between 19.27^{O}C to 28.85^{O}C. The seasonal average temperature value during this period was found to be 24.73^{O}C.

Relative Humidity

The daily average relative humidity values were in the range of 57.47% to 95.85%. The seasonal average humidity value was found to be 71.47%.

Cloud Cover

Mostly clear sky was predominant during the study period except few days of October month.

3.2 Air Environment

The baseline ambient air quality status was generated during the post monsoon season (Oct'20 – Dec'20) at 12 locations. 1 nos of samples in upwind direction, 1 nos in core zone of project, 2 in cross-wind direction and 8 station in downwind directions has been chosen to monitor the ambient air quality of the area for the purpose of baseline data generation.

Concentration of PM_{10} was found to be maximum within core zone at Managers Office. In buffer zone maximum concentration 84 µg/m^3 was found to be at Gowari Village due to its proximity to the coal mines and its location in downwind direction.

Summary of Air Quality Data (in µg/m3)

Parameter	**Name of Method**	**Name of Monitoring Station**	**Min.**	**Max.**	**Average**	**98th percentile**	**Permissible Limit**
PM_{10}	**IS 5182 (Part –**	Manager Office	46	110	61.33	88.84	300
		GM office	41	67	56.71	66.08	300
		Sasti Village	32	46	40.17	45.08	100

Parameter	Name of Method	Name of Monitoring Station	Min.	Max.	Average	98th percentile	Permissible Limit
	IV) : 1973	Mathara Village	34	64	42.96	59.86	100
		Manoli Village	38	52	44.33	51.08	100
		Antargaon Village	39	52	43.96	51.08	100
		Goyegaon Village	40	63	48.21	62.54	100
		Gowari Village	73	84	78.79	84	100
		Arvi village	38	68	53.5	67.54	100
		Chandan vahi village	36	69	51.92	67.16	100
		Aheri village	40	72	60.33	72.00	100
		Charli Village	36	69	51.29	68.54	100
$PM_{2.5}$	$PM_{2.5}$ (USEPA METHOD)	Manager Office	24	45	35.21	44.08	60
		GM office	20	39	32.13	39	60
		Sasti Village	18	27	22.46	27	60
		Mathara Village	18	30	22.83	29.54	60
		Manoli Village	16	32	23.79	31.08	60
		Antargaon Village	18	36	27.46	35.08	60
		Goyegaon Village	17	36	27.83	35.54	60
		Gowari Village	28	44	37.21	44	60
		Arvi village	17	36	27.5	36	60
		Chandan vahi village	17	39	27.75	38.54	60
		Aheri village	20	36	28.21	35.54	60
		Charli Village	16	38	26.21	37.08	60
NO_X	IS 5182 (Part-II) : 1969 West & Gaeke Method	Manager Office	14	20	16.29	19.54	120
		GM office	12	20	15.25	19.54	120
		Sasti Village	11	15	12.5	14.54	80
		Mathara Village	11	16	12.42	15.08	80
		Manoli Village	11	16	13.21	16	80
		Antargaon Village	11	16	12.79	15.08	80
		Goyegaon Village	11	18	13.58	17.08	80
		Gowari Village	17	22	18.71	22	80
		Arvi village	12	18	14.5	18	80
		Chandan vahi village	8	28	17.96	28	80
		Aheri village	10	30	18.71	29.08	80
		Charli Village	8	28	17.96	28	80

Parameter	Name of Method	Name of Monitoring Station	Min.	Max.	Average	98th percentile	Permissible Limit
SO_2	IS 5182 (Part VI) : 1975 Jacobs & Hochheiser	Manager Office	11	13	11.73	12.8	120
		GM office	11	12	11.43	12	120
		Sasti Village	BDL	BDL	BDL	BDL	80
		Mathara Village	BDL	BDL	BDL	BDL	80
		Manoli Village	BDL	BDL	BDL	BDL	80
		Antargaon Village	BDL	BDL	BDL	BDL	80
		Goyegaon Village	BDL	BDL	BDL	BDL	80
		Gowari Village	BDL	BDL	BDL	BDL	80
		Arvi village	BDL	BDL	BDL	BDL	80
		Chandan vahi village	BDL	BDL	BDL	BDL	80
		Aheri village	BDL	BDL	BDL	BDL	80
		Charli Village	BDL	BDL	BDL	BDL	80

Observation

The ambient air quality parameters were found to be within permissible limits in Core Zone and Buffer Zone. It was observed that most of the dust generated due to the mining operation has impact only within the core zone. The SOx and NOx levels were found to be much lower than the prescribed standards.

3.3 Water Quality

Any adverse impact or pollution consequence of water will have serious effect on the environment. Hence, it becomes important to assess the water quality periodically in the mining area. The water samples of the surface water, ground water, mine discharge water and ETP discharge water has been collected and analyzed in compliance of ToR condition (14) issued for Sasti Expansion OC.

The baseline water quality characterization has been conducted by collecting water samples during post-monsoon season i.e. Oct'20 to Dec'20. Total 12 water samples were monitored during the above period.

As it is an existing mine, water samples from the mine discharge water and ETP discharge were analyzed. The surface water samples were collected in upstream and downstream from the Gauri Nallah flowing from the project area and Wardha River flowing in the buffer zone of the project. The Wardha River controls the drainage of

the region. The samples of ground water were collected from nearby Sasti Village, Mathara Village, Gowari Village and Pauni Village.

The different sources of water were identified for water quality characterization depending on their use for potable/industrial purposes and considering likely impact on these sources due to project activities.

Observations

All water quality parameters were found to be within prescribed limit for mine discharge water. The quality of mine discharge water was recorded slightly basic with pH of 8.1 found during analysis. The quality of outlet water from ETP was also found to be within prescribed standards. In general, the water quality in Wardha River (Upstream & Downstream) were found to be satisfactory. The pH in upstream was found to be 7.97 and in downstream 8.18. The TDS was found to be 530 mg/l and 564 mg/l in upstream and downstream respectively. Dissolved oxygen was found to be 4.9 mg/l and 4.6 mg/l in upstream and downstream respectively.

Similarly, the water quality in upstream and downstream of Gauri Nallah was found to be satisfactory. The TDS was found to be 430 mg/l and 480 mg/l in upstream and downstream respectively.

Within Groundwater samples, the maximum Total Hardness as $CaCO_3$ of 528 mg/l was found in Mathara Village. Similarly maximum TDS of 965 mg/l was also found in the Mathara Village.

3.4 Hydrogeological Quality

The range of water levels (2021), measured from the core (2 km) and buffer zone (10 km) of Sasti OC Mine are given below:

Range of water level (2021) in core and buffer zone of Sasti OC Mine

Pre monsoon (June-21 to July'-21)	Core Zone	6.60m to 8.60m
	Buffer zone (area between 2 to 10 km radius)	2.32m to 12.50m
Post monsoon (Nov-21 to Dec'-21)	Core Zone	3.90m to 6.48m
	Buffer zone	0.98m to 9.83m

3.5 Noise levels

Baseline noise levels at day time and night time is being generated at eight locations. An integrated Sound Level Meter was used for sound level data collection on fortnightly basis from Oct'20 to Dec'20.

All noise levels values are found to be within the prescribed limits.

3.6 Land Use

Present Land use of the land required for Expansion of Sasti OC mine is given below:

Present Land use of the land required for Sasti OC Exapnsion mine

Sl. No.	Land Type	Land already acquired in Sasti OC mine	Proposed to be transferred to Dhuptala OC mine (As per approved PR of Dhuptala OCM)	Proposed to be transferred From Dhuptala OC mine (In expansion PR of Sasti OCM)	Additional Land acquisition proposed in Sasti Expn. OC mine	Total Land (ha)
1	Tenancy Land	899.44	37.70	11.70	212.54	1085.98
2	Govt. Land	20.20	2.00	-	16.30	34.50
3	Forest Land	-	-	-	-	-
	Total	**919.64**	**39.70**	**11.70**	**228.84**	**1120.48**

Note: No forest land is involved in this project.

The land use of the project during mining is as follows:

During Mining Land Use Pattern

Sl. No.	Particulars	Area (ha) As per Existing EC	Area (ha) As per Present Proposal
1	Entire Quarry Area	344.00	544.79

Sl. No.	Particulars	Area (ha) As per Existing EC	Area (ha) As per Present Proposal
2	External OB dump including top soil dump	235.30	202.52
3	Infrastructure including Railway Siding and Road	57.92	79.52
4	Embankment	32.72	37.80
5	Area needed for rationalization including safety and blasting zone	233.15	239.25
6	Outside ML area	16.60	16.60
	Total Land	**919.69**	**1120.48**

The land use at the end of the mine would be as follows: -

Land use at the end of the mine

Sl. No.	Land use during mining	Land use (ha)				
		Plantation	Water Body	Public use	Undisturbed	Total
1	External OB Dump	149.54	-	-	-	149.54
2	Top Soil Dump	52.98	-	-	-	52.98
3	Excavation	275.89	268.90	-	-	544.79
4	Roads	5.00	-	15.00	-	20.00
5	Built up area (Infrastructure)	20.00	-	39.52	-	59.52
6	Undisturbed Area (Including safety zone of blasting, OB Dump & Area under rationalization)	172.000	-	-	67.25	239.25

Sl. No.	Land use during mining	Land use (ha)				
		Plantation	Water Body	Public use	Undisturbed	Total
7	Embankment around quarry	10.00	-	27.80	-	37.80
8	Outside ML Area	1.000	-	15.600	-	16.60
	Total	**686.41**	**268.90**	**97.92**	**67.25**	**1120.48**

3.7 Socio Economic

The project does not involve any R&R of village. The land outsees due to acquisition of land will be suitable compensation as per R&R policy of Coal India Limited. Positive impacts on socio-economic environment are expected due to creation of direct and indirect employment opportunities and development of infrastructure such as roads, schools, hospitals etc. The social infrastructure will be continued to be developed under the CSR.

4.0 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

To have a close watch on the environmental condition and implementation of various measures suggested, a multi- disciplinary approach is essential.

4.1 Air Quality

Prediction of fugitive dust level in the surrounding is carried out (for 24 hours average) with the help of by using AERMOD version 16216r Air Quality Model. The predicted air quality was found to be within prescribed limit.

This is an existing mine in which many pollution control measures are already implemented. The major technological changes have been proposed for air pollution control in approved Mining plan is introduction of Surface Miner for cutting of Coal, which will remove the need of drilling, blasting and crushing of coal. The details of existing and proposed mitigation measures along with provision of capital is provided below.

Mitigation Measures

Particular/Location	Existing Mitigation Measures	Mitigation Measures proposed	Capital Provision made in Project Report of Expansion Proposal (in Lakhs)
Mobile Water Sprinklers along Haul road, Coal stockyard, Weigh bridge, Coal transportation road	Total 4 mobile water sprinklers are deployed a) 1 nos of 28 KL and b) 1 nos of 18 KL capacity. c) 2 nos. hired 16KL capacity each	Provision for 2 Nos of 28 KL Mobile Water Sprinklers is made (Replacement) Hiring of mobile water sprinklers will be continued in future also.	408.26
Fixed Water Sprinklers along Haul road, Coal stockyard, Weigh bridge, Coal transportation road	35 Nos of Fixed Sprinklers Provided	Provision made for Additional Fixed Sprinklers and Fogging Machine	80.00
Road Sweeping Machine	To be provided	It is proposed to introduce road sweeping machine for removal of dust from coal transportation route	43.11
Fogging Machine	To be Provided	For suppression of dust, fogging machine is proposed in the mine	60.00
Greenbelt	5.15 lakhs nos of trees has been	The greenbelt in the dip side along the	70.00

Particular/Location	Existing Mitigation Measures	Mitigation Measures proposed	Capital Provision made in Project Report of Expansion Proposal (in Lakhs)
	planted with as part of greenbelt and reclamation.	area of expansion will be developed.	
Continuous Ambient Air Quality Monitoring Station	1 nos of CAAQMS has been installed in nearby mine Pauni-II Expansion OC.	1 nos of CAAQMS is proposed to installed for Sasti Expansion OC Mine.	75.00
Total Capital Provision made in Project Report			736.37

In case the air quality monitoring indicates increase in pollution level, additional fixed sprinklers and mobile water sprinklers will have to be provided by the project proponent.

Plantation to Check Air Pollution

Total 169.50 ha area has been planted. As this plantation has been carried out since 1993, it has become self-sustaining and self-rejuvenating. As per Satellite imagery of 2022, nearly 321.0 ha of the area under plantation at Sasti OC mine. The plantation acts as green barrier and tool for air pollution control.

The green barrier formed due to the plantation reduces the particulate matter in the ambient air significantly. This has been observed during baseline data generation also. The average concentration of PM_{10} in core zone (area of highest impact) was observed to be 61.33 µg/m^3. It is much lower than the permissible limit of 600 µg/m^3 applicable to the core zone. It can be concluded that the green barrier created within the ML area in last 3 decades is effective in controlling air pollution. As per the latest satellite imagery of 2022, the area under plantation is 321.0 ha. It is 29% of the total proposed ML area.

Similar to the existing plantation, green barrier in the dip side will also be created. Thus, effectively entire mine be surrounded by the green belt in next 3 years. Local species will continue to be planted in consultation with the forest department.

4.2 Water Quality

4.2.1 Anticipated Impact

Mining and its associated activities not only use a lot of water but also likely to affect the hydrological regime of the area. The major impact of deep and large mines is of natural groundwater table. Lowering of water table may result in reduced groundwater availability. Extraction of different minerals is known to lead to water pollution due to heavy metal, acid discharges and increased suspended solids. Regular water quality monitoring is carried out in the existing Sasti OC mine. The water quality has been found to be within prescribed standards in regular monitoring as well as during baseline data generation period. No issues of acid mine discharge have been observed in this mine as well in any of the nearby mine. So, in future also it is unlikely to get acid mine discharge in Sasti OC. However, it is essential to continually monitor the mine water discharge quality. In case if acid mine discharge is reported at any point of time, necessary action should be taken to treat the acid mine discharge.

Salient controls measure to be taken to reduce water pollution are as follows:

4.2.2 Mitigation Measures

Salient controls measure to be taken are as follows:

i) Industrial Effluent

The waste-water from workshop, which normally remain laden with oil and grease, suspended and dissolved solids etc is treated in the Effluent Treatment Plant (ETP). The wastewater is generated due to washing of HEMM. A 150 KL Effluent Treatment plant is installed at Sasti Expansion OC. Clear water coming out from the treatment plant is taken into the closed water circuit and recycled for its reuse. All parameter of ETP waste discharge are monitored regularly as per Env. (Protection) Amendment Rule, 2000. In present proposal, the production capacity will remain unchanged. As per the approved Mining Plan, the water requirement in the present proposal for washing of dumpers will be 162 KL. Considering the 10 % losses and rest 90% collection, the existing ETP of 150KL will be sufficient for treatment of effluent generated from workshop. Capital provision of 25 lakh has been kept for upgradation/Repair of existing ETP in case of requirement.

ii) Mine Water

Most of the suspended particles are settled in the sump located in the quarry and the supernatant water is pumped out to the sedimentation tank present on surface. This water is passed through sedimentation pond on surface, before being reused or

discharged in to River. A sedimentation tank of 40 mtr x 10 mtr x 1.50 mtr is working in existing Sasti OC mine. As the mine is now proposed to extend further in the dip side. It is proposed to construct another sedimentation tank near to the working quarry area in south. A capital provision of 25 Lakhs has been kept for construction of additional sedimentation tank.

iii) Sewage Water

The treatment of sewage generated from the households is necessary to keep clean the nearby waterbodies. In the residential complex housing manpower of Sasti OC, erstwhile Sasti UG and other mine of Ballarpur area, 1 MLD sewage treatment plant has been provided. As there is no increase in the manpower envisaged in the Mining Plan, the existing STP will be sufficient to cater the requirements. In order to upgrade/repair or construct additional Sewage Treatment Plan, capital provision of 75 Lakhs has been made in the approved Project Report. In case of availability of better technology, new Sewage Treatment Plant can also be constructed as per requirement.

iv) Surface Run-off

Adequate numbers of vegetation have been grown on the top surface and slopes of the dumps in order to arrest the erosion of soil. It will be continued during the expansion of the mine in dip side. The vegetation reduces surface run-off, which helps averting siltation of natural water courses. Garland drains and catch drains has been constructed for surface run-off.

Garland drain of appropriate different sizes of 3.00x2.00, 2.00x1.50 and 1.50x1.00 meters for a length of more than 12 kms have been provided along the periphery of excavated area as well as overburden dumps.

4.3 Hydro-Geology

4.3.1 Impact on Hydro-Geological Regime

In the opencast mines, the different aquifers overlying the working coal seam would be contributing groundwater to the mine by gravity drainage since they are exposed/removed at the mine. The anticipated groundwater inflow to the mine is to the tune of 7879 m^3/day (approx.). As such due to this pumping/gravity drainage, cone of depression would be formed. The shape and extent of the cone would depend on mainly hydraulic conductivity and specific yield of aquifers, mine depth & area etc.

Generally steep drawdown cone would be formed in poor potential aquifers, thereby the influence area will be limited to small distance and reverse is established in respect of aquifers with high hydraulic conductivity.

The radius of mine influence area estimated for the Sasti Expansion OC is 890 m respectively based on the above-mentioned aquifer. The stage of ground water development in the buffer zone (10 km from the periphery of the core zone) of Sasti Expansion OC mine comes to about 29.74%.

4.3.2 Conservation Measures

1. The mine discharge will be utilized to meet the mine's domestic, dust suppression, firefighting and other industrial water needs.
2. The artificial recharge by water conservation structures in the outside mine influence areas will check water level lowering. The impact on ground water level is being minimized by artificial recharge by spreading of pumped out water, creation and filling of ponds with mine water and construction of rainwater harvesting structure.
3. After the cessation of mining, with copious rainfall and abundant groundwater recharge, the water levels will recoup and attain normalcy. Thus, the impact of mining on groundwater system may be considered as a temporary phenomenon. The old mine workings also work as water pools and improves the resource availability in the area.
4. The discharged mine water would be available for the local people to utilize in irrigation and domestic use. Thereby the mine water will be a resource for many of the local villagers.
5. Monitoring of water quality of mine water discharge, local river/Nallah and domestic water (dug well/hand pumps) will be done under routine monitoring. On analyzing the field data if any area receiving the maximum impact, suitable controls measures will be adopted by the project authorities.

4.4 Noise Quality

The existing mine is having effective green belt to reduce the noise pollution. This green belt will be further strengthened in the area of future expansion. Monitoring of the noise control will continue to be carried out on regular basis as per the Environment (Protection) Amendment Rule 2000. While planning for an effective noise attenuation measure, the concept of source, path and receiver has been considered.

4.5 Impact on Land and Land Reclamation

This proposal envisages increase in ML area from 919.69 ha to 1120.48 ha. It is proposed in this Expansion project to extend the mine in western side upto Fault F8-F8 & in the dip side upto 200m depth which will require additional 228.84 ha land (including around 9.00 ha of Govt land of Sakhari Nallah and Gauri Nallah to maintain

a common mine boundary between Sasti OC mine and Dhuptala OC mine). Around 39.70 ha land is proposed to be transferred from Sasti OC mine to Dhuptala OC mine. In this proposed Expansion of Sasti OC mine 11.70 ha land is proposed to be transferred from Dhuptala OC mine to Sasti OC mine. Hence total area within the mine boundary of proposed Sasti Expansion OC mine will be 1120.48 ha (919.64 – 39.70 + 11.70 + 228.84). The transfer of land is necessary to keep the mine geometry feasible and reducing leftover coal reserves in the mine barrier.

The land use in expansion area is mainly agricultural land. So the major impact on land will degradation of agriculture land in the mining area. The mine has been planned keeping the minimum impact on the land. No additional land is required for keeping external overburden dump. Additional overburden generated during expansion proposal will kept as internal dump and spreading over the existing external dumps.

The following activities have been proposed for reclamation of land.

1. Creation of garland drains in order to arrest the silt load, due to erosion, to enter into natural watercourses during surface run-off.
2. Grass, legumes and different types of plants etc. will be planted on such reclaimed land in order to make it, as far as possible, conducive to agricultural growth.
3. Technical and biological reclamation of external OB dump and rehandling at the end of mine life. The density of trees will be around 2500 plants/ha.

4.6 Rehabilitation & Resettlement

No rehabilitation of any village is involved in this project. 212.54 ha of additional private land will be required for the proposed expansion project. All the Project Affected Families will be suitably compensated as per As the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and resettlement Act, 2013. There is no shifting of village is envisaged in approved Project Report.

4.7 Progressive Mine Closure Plan

For the Mine Closure activities, a corpus fund is created by opening an escrow account with the coal controller organization in nationalized bank. For opencast mine, an amount @ Rs 9.00 lakhs per Ha of the project area is required to be deposited in this escrow account for final mine closure after adjustment for WPI on the date of computation. This amount is deposited in the escrow account every year after escalating @ 5% per annum.

In existing Sasti OC mine Rs. 8014.92 Lakhs has already been deposited in the escrow account. Additionally, Rs 5785.56 Lakhs will be deposited in remaining period of mine life.

5.0 ENVIRONMENTAL MONITORING PROGRAMME

The Environmental Monitoring Programme will be carried out as per statutory requirements and detailed in the chapter – IV of the EIA report.

Environment Management Cell

WCL, has an Environment Deptt. Headed by General Manager (Env.) at its HQ. The department provides necessary support that are required for environmental management of various mining projects under the jurisdiction of the company. At area level, Area General Manager co-ordinates the activities of various disciplines in the area to render all necessary assistance at the implementing level i.e. the Project level. Nodal Officer (Environment) of the area monitors all aspects of environment on behalf of the Area General Manager. He takes suitable steps for generation of environmental data along with CMPDI team for its analysis and interpretations.

6.0 ENVIRONMENTAL COST PROJECTION

A capital provision of Rs. 1250.06 lakhs has been made against environment protection. Rs. 6.00/t of coal has been provided to absorb environmental related cost in the project.

7.0 PROVISION FOR CSR WORK

The fund for the CSR will be allocated based on 2% of the average net profit of the Company for the three immediate preceding financial years or Rs 2.00 per Tonne of Coal Production of the previous year whichever is higher.

8.0 CONCLUSION

The mining sequence has been planned in a way to maximise internal dumping so that no additional area is required for external OB dumping. The project authorities need to follow the mitigation measures strictly as given in the EIA & EMP report. This will minimise the impact on environment.

The project for expansion of Sasti OC may be granted environmental clearance so that the project can continue to meet the coal requirement of the country.