

**ईस्टर्न कोलफील्ड्स लिमिटेड**  
(कोल इंडिया लिमिटेड का एक अंग)  
महाप्रबंधक (पर्यावरण एवं वन)  
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To  
Director (IA – Non Coal Mining Division)  
Ministry of Environment, Forests and Climate Change  
Indira Pariavarana Bhawan  
Jor Bagh Road, New Delhi- 110003

Subject: Composite Sand Mining Plan in Ajoy & Damodar Riverbed, Eastern Coalfields Ltd.-reg

Dear Sir,

The EIA & EMP Report prepared for the Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Ajoy River & Damodar River for the purpose of sand stowing in underground mines of ECL in Raniganj Coalfield was presented before the EAC in the 39th EAC (Non – coal mining sector) Meeting on 27.10.2015 under Agenda No. 2.23 & 2.22 respectively. A supplementary note has been prepared and attached herewith in compliance to the observation given by EAC.

Encl: As above

Yours faithfully,

  
General Manager (Environment & Forest)

## 1.0 Background

The EIA & EMP Report prepared for the Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for the purpose of sand stowing in underground mines of ECL in Raniganj Coalfield was presented before the EAC in the 39<sup>th</sup> Meeting of the EAC (Non – coal mining sector) on 27.10.2015 under Agenda No. 2.22.

The EAC made the following observations –

- i. The Committee noted that the Consultant has not prepared the EIA/EMP Report in-line with the Annexure-III of EIA Notification, 2006. The EIA/EMP report needs to be revised
- ii. The Committee noted that the Project Proponent has monitored wrong base line season data and also before issuance of TOR and is of the view the PP shall monitor a complete baseline data as per IMD viz. March – May; October – December; and December – February.
- iii. As the mine lease located in three Districts, all the proceedings of Public Hearings shall incorporate in the EIA/EMP Report along with their budgetary provisions on the issues raised during Public Hearing;
- iv. Disaster management plan is not adequate and needs to be revised;
- v. The EIA/EMP report along with Annexures are not legible;
- vi. Certified location map and distance certificate from the State Government with respect to protected areas has not been submitted;
- vii. List of flora/fauna and endangered species are not accurate; Plant species w.r.t. river bed are not explored; and
- viii. Copy of approved mining plan from the Competent Authority needs to be submitted.

This supplementary note has been prepared in compliance to the above observations which has been dealt, observation – wise, hereinafter.

## 2.0 Observation – wise Compliance

2.1 The Committee noted that the Consultant has not prepared the EIA/EMP Report in-line with the Annexure-III of EIA Notification, 2006. The EIA/EMP report needs to be revised

Compliance: The EIA & EMP Report has been structurally revised in line with the generic structure provided in the Annexure – III of the EIA Notification, 2006 without making any change to the original content. Both hard and soft copies of the revised report are being submitted alongwith.

2.2 The Committee noted that the Project Proponent has monitored wrong base line season data and also before issuance of TOR and is of the view the PP shall monitor a complete baseline data as per IMD viz. March – May; October – December; and December – February.

Compliance: Fresh baseline data for Ambient Air Quality for the period October – December, 2015 (Post – Monsoon) has been generated and is provided as Annexure – 1.

2.3 As the mine lease located in three Districts, all the proceedings of Public Hearings shall incorporate in the EIA/EMP Report along with their budgetary provisions on the issues raised during Public Hearing

Compliance: The sand mining leases with respect to Damodar Riverbed are located in 3 (three) districts and hence as many Public Hearings, one for each of the said districts, have been conducted as per schedule reproduced below –

Sl No.	Riverbed	District	Name of Mouza	Number of Sand Mining Stations	Sand extraction per year (in Mm <sup>3</sup> )	Area (in Acre)	Date of Public Hearing
1	Damodar	Bankura	Gopalpur, Ardhagram, Gopalganj, Majit, Sahebdanga, Bhara, Anandpur	7	0.76	113.50	10 <sup>th</sup> July, 2015
2		Burdwan	Ramprasadpur, Baska, Napur, Madanpur,	7	0.59	83.86	14th July,

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

		Narayankuri, Sitalpur, Chinakuri				2015
3	Purulia	Parebelia	1	0.10	16.50	24 <sup>th</sup> July, 2015
	Total		15	1.45 (Peak 1.50 Mm <sup>3</sup> )	213.86 (86.58 Ha)	

The proceedings of the above public hearings have been incorporated in the structurally - revised EIA & EMP in Chapter – 6 on Additional Studies (Chapter – 8 on Public Consultation in the report submitted earlier) wherein all specific issues have been dealt with along with provisions and time – frame.

An action plan with budgetary provisions is enclosed as Annexure – 2

#### 2.4 Disaster Management Plan is not adequate and needs to be revised

Compliance: A comprehensive Safety and Disaster Management Plan has been prepared and attached as Annexure – 3 to this supplementary note.

#### 2.5 The EIA/EMP report along with Annexures are not legible

Compliance: The annexures have been re-scanned and are now legible. The same have been provided with the EIA & EMP Report.

#### 2.6 Certified location map and distance certificate from the State Government with respect to protected areas has not been submitted

Compliance: It has been certified by the consultant that there is no protected area within 10km radius of the project. The same has been submitted to concerned the DFOs for vetting.

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Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

2.7 List of flora / fauna and endangered species are not accurate. Plant species w.r.t. river bed are not explored

Compliance: The list of flora and fauna including plant species w.r.t. the riverbed is appended as Annexure – 4.

2.8 Copy of approved mining plan from the Competent Authority needs to be submitted

Compliance: The mining plan has been approved by the ECL board in its 281<sup>st</sup> meeting on 28<sup>th</sup> July 2015, communicated by the Company Secretary, ECL (Copy enclosed in Annexure-5). The letter from Ministry of Coal Certifying ECL board as competent authority is enclosed in Annexure-6.

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Annexure – 1

Baseline Data for Ambient Air Quality for post monsoon season (October - December, 2015)

Baseline data generation for Ambient Air Quality during post monsoon season (October - December, 2015) was generated at the following 22 stations –

Sl. No.	Location Name	Location Code	Remarks
Core Zone – Since core zone is the riverbed, no stations were fixed			
Buffer Zone –			
Locations situated within 500m the river bank			
1.	Parbelia	A1	UG mine near the river
2.	Sodepur	A2	Habitation near the river
3.	Chinakuri – I	A3	UG mine near the river
4.	Chinakuri – III	A4	-do-
5.	Amritnagar	A5	-do-
6.	Tirat	A6	-do-
7.	Kuardih	A7	-do-
8.	Nimcha	A8	-do-
9.	Mahabir	A9	-do-
10.	Bakulia	A10	Habitation near the river
Locations situated beyond 500m of the river bank but within the Study Area			
11.	Dubeswari	A11	Habitation near the river
12.	Bejdih	A12	-do-
13.	Hirakhun	A13	-do-
14.	Patmohana	A14	-do-
15.	Ratibati	A15	UG mine near the river
16.	Chalbalpur	A16	-do-
17.	J K Nagar	A17	-do-
18.	Jemehari	A18	-do-
19.	Lachhipur	A19	-do-
20.	Central Kajora	A20	-do-
21.	Madhujore	A21	-do-
22.	Ghansyampur	A22	-do-

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Post Monsoon

Location: Parbelia UG (A1)

Week	Date	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>x</sub> µg/m <sup>3</sup>
I	06.10.2015	75	23	9.3	19.3
	07.10.2015	77	24	8.3	18.2
II	13.10.2015	78	26	8.9	19.6
	14.10.2015	79	24	9.5	19.8
III	20.10.2015	80	28	8.7	18.7
	21.10.2015	75	26	6.2	19.5
IV	27.10.2015	74	23	6.0	18.2
	28.10.2015	76	29	6.2	18.7
V	03.11.2015	79	24	7.4	17.3
	04.11.2015	74	27	6.5	17.5
VI	10.11.2015	75	26	7.3	18.2
	11.11.2015	76	28	8.0	18.2
VII	17.11.2015	79	30	8.7	18.5
	18.11.2015	78	31	8.2	18.7
VIII	24.11.2015	80	29	8.0	19.0
	25.11.2015	81	28	8.6	18.8
IX	03.12.2015	82	30	6.6	10.8
	04.12.2015	84	32	6.5	10.5
X	10.12.2015	84	29	6.2	10.2
	11.12.2015	85	26	6.6	11.0
XI	17.12.2015	80	28	6.3	9.5
	18.12.2015	81	27	6.9	9.4
XI	24.12.2015	79	23	6.3	9.5
	25.12.2015	77	26	6.4	9.7
CPCB LIMIT		100	60	80	80

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Post Monsoon

Location: Sodepur UG (A2)

Week	Date	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>	NOx µg/m <sup>3</sup>
I	06.10.2015	75	23	7.8	19.1
	07.10.2015	77	21	8.2	18.8
II	13.10.2015	76	22	7.5	19.6
	14.10.2015	79	24	8.0	19.9
III	20.10.2015	80	26	7.7	18.3
	21.10.2015	82	27	8.2	18.4
IV	27.10.2015	74	28	7.5	18.8
	28.10.2015	76	25	6.2	19.9
V	03.11.2015	77	29	8.0	24.7
	04.11.2015	79	28	8.8	24.4
VI	10.11.2015	71	23	8.3	24.1
	11.11.2015	73	20	8.5	24.5
VII	17.11.2015	70	19	7.7	24.7
	18.11.2015	69	23	7.6	24.5
VIII	24.11.2015	75	22	6.5	25.2
	25.11.2015	74	21	6.3	23.6
IX	03.12.2015	77	23	6.0	9.3
	04.12.2015	79	20	6.8	10.0
X	10.12.2015	75	19	7.4	10.5
	11.12.2015	73	21	7.9	9.6
XI	17.12.2015	80	26	7.3	8.4
	18.12.2015	81	27	8.6	9.2
XI	24.12.2015	85	25	8.7	9.4
	25.12.2015	84	27	8.3	9.6
CPCB LIMIT		100	60	80	80

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Post Monsoon

Location: Chinakuri – I UG (A3)

Week	Date	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>x</sub> µg/m <sup>3</sup>
I	06.10.2015	76	23	6.6	22.8
	07.10.2015	77	24	6.8	23.6
II	13.10.2015	79	25	6.4	24.5
	14.10.2015	74	29	7.3	23.7
III	20.10.2015	75	28	7.6	23.9
	21.10.2015	73	27	7.0	23.6
IV	27.10.2015	71	26	7.2	23.9
	28.10.2015	70	25	7.3	21.7
V	03.11.2015	69	28	7.1	21.5
	04.11.2015	74	24	7.0	21.4
VI	10.11.2015	78	26	6.2	21.2
	11.11.2015	80	30	6.8	23.5
VII	17.11.2015	81	31	6.8	23.2
	18.11.2015	82	33	6.6	24.7
VIII	24.11.2015	80	32	7.2	24.1
	25.11.2015	83	34	7.5	24.4
IX	03.12.2015	85	29	8.8	9.3
	04.12.2015	84	30	8.0	9.0
X	10.12.2015	82	27	8.7	9.4
	11.12.2015	80	29	8.0	9.8
XI	17.12.2015	79	24	7.3	10.6
	18.12.2015	76	26	7.8	10.3
XI	24.12.2015	81	30	7.1	10.4
	25.12.2015	84	32	7.3	10.2
CPCB LIMIT		100	60	80	80

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Post Monsoon

Location: Chinakuri – III UG (A4)

Week	Date	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>x</sub> µg/m <sup>3</sup>
I	06.10.2015	70	23	10.5	25.5
	07.10.2015	68	22	9.3	25.2
II	13.10.2015	65	21	9.8	25.9
	14.10.2015	66	24	9.0	25.3
III	20.10.2015	68	25	9.2	25.5
	21.10.2015	69	26	9.1	25.3
IV	27.10.2015	70	23	8.0	25.0
	28.10.2015	71	20	7.8	26.4
V	03.11.2015	74	19	8.1	25.6
	04.11.2015	73	18	8.3	26.1
VI	10.11.2015	69	21	7.9	26.0
	11.11.2015	68	19	9.8	27.2
VII	17.11.2015	65	25	10.1	27.4
	18.11.2015	69	26	10.5	27.1
VIII	24.11.2015	70	23	9.7	27.4
	25.11.2015	74	24	9.8	27.2
IX	03.12.2015	77	23	6.6	12.8
	04.12.2015	75	22	6.8	12.9
X	10.12.2015	70	28	6.0	12.5
	11.12.2015	71	24	6.9	12.8
XI	17.12.2015	80	26	7.9	13.2
	18.12.2015	76	20	7.3	13.1
XI	24.12.2015	69	22	7.0	13.4
	25.12.2015	72	19	7.3	13.2
CPCB LIMIT		100	60	80	80

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Post Monsoon

Location: Amritnagar UG (A5)

Week	Date	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>x</sub> µg/m <sup>3</sup>
I	06.10.2015	77	23	9.6	27.0
	07.10.2015	74	26	8.5	26.9
II	13.10.2015	75	25	7.7	26.7
	14.10.2015	79	29	10.3	27.0
III	20.10.2015	76	28	10.3	26.7
	21.10.2015	77	26	10.1	27.2
IV	27.10.2015	76	25	10.7	26.6
	28.10.2015	79	27	10.0	26.9
V	03.11.2015	80	23	8.1	21.5
	04.11.2015	81	26	8.1	20.9
VI	10.11.2015	82	30	5.9	20.6
	11.11.2015	79	31	5.5	21.5
VII	17.11.2015	78	29	6.4	21.5
	18.11.2015	75	27	7.0	20.5
VIII	24.11.2015	74	26	6.6	19.9
	25.11.2015	78	25	7.4	19.6
IX	03.12.2015	82	30	7.5	13.8
	04.12.2015	84	32	7.6	11.9
X	10.12.2015	84	29	8.3	12.2
	11.12.2015	85	26	8.1	12.8
XI	17.12.2015	80	28	8.9	13.8
	18.12.2015	81	27	8.3	12.2
XI	24.12.2015	79	23	8.1	12.1
	25.12.2015	77	26	8.0	11.6
CPCB LIMIT		100	60	80	80

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Post Monsoon

Location: Tirat UG (A6)

Week	Date	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>x</sub> µg/m <sup>3</sup>
I	06.10.2015	69	23	7.0	21.5
	07.10.2015	68	22	6.9	20.9
II	13.10.2015	67	24	6.8	21.5
	14.10.2015	62	26	7.2	21.9
III	20.10.2015	64	27	6.1	21.6
	21.10.2015	69	25	7.5	20.6
IV	27.10.2015	67	20	6.9	21.9
	28.10.2015	65	19	6.5	22.6
V	03.11.2015	63	18	6.7	24.9
	04.11.2015	60	19	6.2	24.6
VI	10.11.2015	65	20	5.9	24.4
	11.11.2015	61	21	8.8	23.4
VII	17.11.2015	62	26	8.5	24.6
	18.11.2015	63	24	6.9	24.5
VIII	24.11.2015	65	27	7.8	24.6
	25.11.2015	68	28	5.6	23.9
IX	03.12.2015	70	26	8.8	10.5
	04.12.2015	69	25	8.7	10.1
X	10.12.2015	74	29	6.5	10.0
	11.12.2015	72	27	6.3	10.2
XI	17.12.2015	67	30	7.1	10.1
	18.12.2015	70	28	7.2	11.2
XI	24.12.2015	72	24	7.0	10.9
	25.12.2015	70	23	7.1	10.6
CPCB LIMIT		100	60	80	80

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Post Monsoon

Location: Kuardih UG (A7)

Week	Date	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>x</sub> µg/m <sup>3</sup>
I	06.10.2015	75	25	7.8	17.1
	07.10.2015	74	26	8.0	17.2
II	13.10.2015	76	24	8.2	17.8
	14.10.2015	78	26	7.1	18.1
III	20.10.2015	71	23	8.1	17.5
	21.10.2015	73	20	7.5	17.4
IV	27.10.2015	75	21	7.2	17.7
	28.10.2015	77	24	7.5	17.5
V	03.11.2015	79	26	8.7	18.1
	04.11.2015	80	28	8.8	18.2
VI	10.11.2015	81	29	8.5	18.5
	11.11.2015	82	27	8.3	19.1
VII	17.11.2015	79	30	8.1	20.1
	18.11.2015	76	31	7.5	18.5
VIII	24.11.2015	75	23	7.3	18.4
	25.11.2015	73	24	7.2	17.9
IX	03.12.2015	75	29	10.0	18.8
	04.12.2015	77	28	10.0	18.7
X	10.12.2015	79	30	11.6	18.1
	11.12.2015	78	27	11.2	17.3
XI	17.12.2015	80	30	12.4	17.2
	18.12.2015	82	31	13.9	17.0
XI	24.12.2015	84	33	10.7	17.7
	25.12.2015	80	30	10.9	17.2
CPCB LIMIT		100	60	80	80

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Post Monsoon

Location: Nimcha UG (A8)

Week	Date	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>x</sub> µg/m <sup>3</sup>
I	06.10.2015	74	23	7.0	17.8
	07.10.2015	75	22	6.9	17.4
II	13.10.2015	77	21	6.7	17.3
	14.10.2015	78	20	7.5	17.5
III	20.10.2015	74	24	7.3	17.4
	21.10.2015	75	26	6.4	17.5
IV	27.10.2015	76	25	7.2	17.2
	28.10.2015	73	28	7.3	16.9
V	03.11.2015	70	29	6.6	19.3
	04.11.2015	69	24	6.8	19.4
VI	10.11.2015	74	26	8.0	18.0
	11.11.2015	71	28	6.9	18.3
VII	17.11.2015	78	29	7.9	17.7
	18.11.2015	79	30	7.3	17.6
VIII	24.11.2015	80	21	7.0	17.9
	25.11.2015	82	26	7.3	17.7
IX	03.12.2015	84	30	6.6	16.3
	04.12.2015	81	29	6.8	16.4
X	10.12.2015	80	27	8.0	16.0
	11.12.2015	79	26	6.9	16.3
XI	17.12.2015	77	28	7.9	16.7
	18.12.2015	78	30	7.3	16.6
XI	24.12.2015	76	24	8.0	16.9
	25.12.2015	73	22	8.3	16.7
CPCB LIMIT		100	60	80	80

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Post Monsoon

Location: Mahabir UG (A9)

Week	Date	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>x</sub> µg/m <sup>3</sup>
I	06.10.2015	69	20	7.5	18.3
	07.10.2015	70	21	7.6	18.4
II	13.10.2015	71	26	7.3	18.7
	14.10.2015	74	24	7.1	19.3
III	20.10.2015	77	25	7.9	19.3
	21.10.2015	75	28	7.3	18.7
IV	27.10.2015	76	29	7.1	18.6
	28.10.2015	73	21	7.0	18.1
V	03.11.2015	74	20	6.8	18.0
	04.11.2015	71	19	6.7	17.6
VI	10.11.2015	70	21	6.5	19.5
	11.11.2015	69	24	6.3	19.7
VII	17.11.2015	71	26	6.1	19.6
	18.11.2015	74	25	6.2	19.7
VIII	24.11.2015	75	27	6.0	19.4
	25.11.2015	76	25	6.1	19.1
IX	03.12.2015	77	29	8.5	16.3
	04.12.2015	75	27	8.6	16.4
X	10.12.2015	71	24	8.3	16.7
	11.12.2015	69	23	8.1	14.3
XI	17.12.2015	67	20	8.9	14.3
	18.12.2015	69	22	8.3	14.7
XI	24.12.2015	76	28	8.1	14.6
	25.12.2015	74	26	8.0	14.1
CPCB LIMIT		100	60	80	80

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Post Monsoon

Location: Bakulia UG (A10)

Week	Date	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>x</sub> µg/m <sup>3</sup>
I	06.10.2015	69	19	9.5	20.5
	07.10.2015	65	17	8.5	18.4
II	13.10.2015	66	18	9.1	17.8
	14.10.2015	68	19	9.7	18.0
III	20.10.2015	69	20	8.9	18.9
	21.10.2015	70	22	6.4	19.7
IV	27.10.2015	72	24	6.2	18.4
	28.10.2015	74	25	6.4	18.9
V	03.11.2015	75	27	7.6	17.5
	04.11.2015	78	20	6.7	17.7
VI	10.11.2015	76	21	7.5	18.4
	11.11.2015	77	24	8.2	18.4
VII	17.11.2015	73	26	8.9	18.7
	18.11.2015	75	27	8.4	18.9
VIII	24.11.2015	76	29	8.2	19.2
	25.11.2015	78	30	8.8	19.0
IX	03.12.2015	76	24	7.8	14.0
	04.12.2015	79	25	7.7	15.6
X	10.12.2015	80	29	7.5	15.5
	11.12.2015	84	30	7.3	15.7
XI	17.12.2015	82	29	7.1	15.6
	18.12.2015	83	28	6.2	15.7
XI	24.12.2015	89	32	6.0	15.4
	25.12.2015	86	31	6.1	15.1
CPCB LIMIT		100	60	80	80

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Post Monsoon

Location: Dubeswari UG (A11)

Week	Date	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>x</sub> µg/m <sup>3</sup>
I	06.10.2015	65	16	8.0	19.3
	07.10.2015	66	18	8.4	19.0
II	13.10.2015	64	19	7.7	20.8
	14.10.2015	63	17	8.2	20.1
III	20.10.2015	62	19	7.9	18.5
	21.10.2015	60	20	8.4	18.6
IV	27.10.2015	66	21	7.7	20.0
	28.10.2015	65	22	6.4	20.1
V	03.11.2015	68	25	9.0	23.8
	04.11.2015	70	26	8.0	21.7
VI	10.11.2015	71	19	8.6	21.1
	11.11.2015	72	21	9.2	21.3
VII	17.11.2015	74	24	8.4	22.2
	18.11.2015	75	25	5.9	23.0
VIII	24.11.2015	77	23	5.7	22.7
	25.11.2015	74	22	5.9	23.2
IX	03.12.2015	77	25	5.6	10.8
	04.12.2015	79	26	5.8	10.9
X	10.12.2015	73	22	7.0	11.5
	11.12.2015	74	24	5.9	11.8
XI	17.12.2015	70	22	6.9	11.2
	18.12.2015	69	23	6.3	11.1
XI	24.12.2015	69	23	6.0	11.4
	25.12.2015	67	19	6.3	12.2
CPCB LIMIT		100	60	80	80

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Post Monsoon

Location: Bejdih Village (A12)

Week	Date	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>x</sub> µg/m <sup>3</sup>
I	08.10.2015	70	23	7.1	21.8
	09.10.2015	71	21	6.2	22.0
II	15.10.2015	72	22	7.0	22.7
	16.10.2015	74	24	7.7	22.7
III	22.10.2015	75	25	8.4	23.0
	23.10.2015	71	27	7.9	23.2
IV	29.10.2015	70	28	7.7	23.5
	30.10.2015	69	24	8.3	23.3
V	05.11.2015	72	22	7.5	23.6
	06.11.2015	75	20	7.9	22.3
VI	12.11.2015	74	19	7.2	22.1
	13.11.2015	73	23	7.7	22.4
VII	19.11.2015	72	24	7.4	22.8
	20.11.2015	70	26	7.9	22.9
VIII	26.11.2015	69	27	7.2	22.3
	27.11.2015	68	25	5.9	22.4
IX	05.12.2015	77	23	6.5	12.8
	06.12.2015	79	24	6.6	12.9
X	12.12.2015	78	26	6.3	12.2
	13.12.2015	74	21	6.1	12.8
XI	19.12.2015	70	20	6.9	13.8
	20.12.2015	73	22	6.3	12.2
XI	26.12.2015	72	24	6.1	12.1
	27.12.2015	69	20	6.0	11.6
CPCB LIMIT		100	60	80	80

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Post Monsoon

Location: Hirakhun Village (A13)

Week	Date	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>x</sub> µg/m <sup>3</sup>
I	08.10.2015	78	29	5.6	10.8
	09.10.2015	79	28	6.5	10.5
II	15.10.2015	77	26	4.2	10.2
	16.10.2015	75	27	4.6	11.0
III	22.10.2015	76	25	4.3	8.5
	23.10.2015	74	27	3.9	8.4
IV	29.10.2015	76	26	4.3	8.5
	30.10.2015	78	27	4.4	8.7
V	05.11.2015	80	28	5.0	9.3
	06.11.2015	81	30	4.8	8.0
VI	12.11.2015	82	31	4.4	7.5
	13.11.2015	84	32	3.9	6.6
VII	19.11.2015	80	30	7.3	8.4
	20.11.2015	83	33	6.6	9.2
VIII	26.11.2015	82	29	6.7	9.4
	27.11.2015	81	32	5.3	9.6
IX	05.12.2015	80	30	9.3	19.3
	06.12.2015	82	26	9.3	18.2
X	12.12.2015	84	29	9.9	19.6
	13.12.2015	85	26	9.5	19.8
XI	19.12.2015	80	29	8.7	18.7
	20.12.2015	81	27	7.2	19.5
XI	26.12.2015	81	25	7.2	18.7
	27.12.2015	84	30	7.2	19.9
CPCB LIMIT		100	60	80	80

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Post Monsoon

Location: Patmohana Village (A14)

Week	Date	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>x</sub> µg/m <sup>3</sup>
I	08.10.2015	71	26	5.8	9.3
	09.10.2015	72	21	7.0	8.0
II	15.10.2015	73	22	6.7	6.4
	16.10.2015	75	24	7.0	9.8
III	22.10.2015	76	25	6.3	10.6
	23.10.2015	74	26	5.8	10.3
IV	29.10.2015	76	23	6.1	10.4
	30.10.2015	77	20	6.3	10.2
V	05.11.2015	79	21	5.6	10.8
	06.11.2015	78	24	5.8	10.9
VI	12.11.2015	80	25	7.0	11.5
	13.11.2015	79	26	5.9	12.8
VII	19.11.2015	73	27	7.9	11.2
	20.11.2015	75	28	7.3	12.1
VIII	26.11.2015	76	29	7.0	11.4
	27.11.2015	77	26	7.3	11.2
IX	05.12.2015	79	29	5.8	11.5
	06.12.2015	77	27	5.7	11.1
X	12.12.2015	74	26	5.5	11.0
	13.12.2015	71	22	7.3	13.2
XI	19.12.2015	70	21	7.1	13.1
	20.12.2015	68	17	7.2	13.2
XI	26.12.2015	76	24	7.0	12.9
	27.12.2015	78	26	7.1	13.6
CPCB LIMIT		100	60	80	80

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Post Monsoon

Location: Ratibati UG (A15)

Week	Date	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>x</sub> µg/m <sup>3</sup>
I	08.10.2015	77	20	7.5	12.8
	09.10.2015	75	21	7.6	11.9
II	15.10.2015	76	22	8.3	12.2
	16.10.2015	74	24	8.1	12.8
III	22.10.2015	72	26	8.9	13.8
	23.10.2015	70	25	8.3	12.2
IV	29.10.2015	69	23	8.1	12.1
	30.10.2015	73	21	8.0	11.6
V	05.11.2015	75	26	8.8	13.5
	06.11.2015	78	28	8.7	13.1
VI	12.11.2015	80	29	5.5	13.0
	13.11.2015	81	30	6.3	13.2
VII	19.11.2015	76	21	6.1	13.1
	20.11.2015	75	22	6.2	11.2
VIII	26.11.2015	73	26	6.0	10.9
	27.11.2015	70	29	6.1	10.6
IX	05.12.2015	75	26	9.0	23.8
	06.12.2015	77	27	8.0	24.7
X	12.12.2015	80	29	8.6	24.1
	13.12.2015	84	30	9.2	21.3
XI	19.12.2015	81	30	8.4	22.2
	20.12.2015	86	32	6.9	23.0
XI	26.12.2015	87	34	6.7	22.7
	27.12.2015	88	35	6.9	23.2
CPCB LIMIT		100	60	80	80

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Post Monsoon

Location: Chalbalpur Village (A16)

Week	Date	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>x</sub> µg/m <sup>3</sup>
I	08.10.2015	65	19	10.0	17.8
	09.10.2015	63	16	10.0	17.7
II	15.10.2015	62	18	11.6	17.1
	16.10.2015	60	15	11.2	16.3
III	22.10.2015	63	17	12.4	16.2
	23.10.2015	64	20	13.9	16.0
IV	29.10.2015	66	22	10.7	16.7
	30.10.2015	68	21	10.9	16.2
V	05.11.2015	70	24	9.1	16.8
	06.11.2015	64	26	9.2	15.0
VI	12.11.2015	68	25	9.0	15.7
	13.11.2015	65	23	10.7	15.7
VII	19.11.2015	66	24	10.4	15.0
	20.11.2015	69	26	11.9	15.2
VIII	26.11.2015	70	28	11.7	15.5
	27.11.2015	68	24	11.3	15.3
IX	05.12.2015	70	20	6.1	21.8
	06.12.2015	69	19	6.2	22.0
X	12.12.2015	64	17	7.0	24.7
	13.12.2015	66	16	7.7	24.7
XI	19.12.2015	67	20	8.4	24.0
	20.12.2015	68	18	7.9	24.2
XI	26.12.2015	65	19	7.7	24.5
	27.12.2015	63	17	8.3	24.3
CPCB LIMIT		100	60	80	80

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Post Monsoon

Location: J K Nagar UG (A17)

Week	Date	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>x</sub> µg/m <sup>3</sup>
I	08.10.2015	77	26	11.5	15.6
	09.10.2015	78	24	10.9	16.3
II	15.10.2015	76	28	10.2	16.1
	16.10.2015	79	29	10.7	16.4
III	22.10.2015	75	23	8.4	17.8
	23.10.2015	74	26	8.9	17.9
IV	29.10.2015	80	25	8.2	17.3
	30.10.2015	81	27	9.9	17.4
V	05.11.2015	82	28	5.6	10.8
	06.11.2015	80	29	5.8	10.9
VI	12.11.2015	83	30	7.0	11.5
	13.11.2015	79	31	5.9	11.8
VII	19.11.2015	77	32	6.9	11.2
	20.11.2015	80	30	6.3	11.1
VIII	26.11.2015	81	29	6.0	11.4
	27.11.2015	79	28	6.3	11.2
IX	05.12.2015	80	29	5.8	11.5
	06.12.2015	84	27	5.7	13.1
X	12.12.2015	84	28	5.5	13.0
	13.12.2015	85	26	5.3	13.2
XI	19.12.2015	80	24	5.1	13.1
	20.12.2015	83	29	5.2	12.2
XI	26.12.2015	86	30	5.0	12.9
	27.12.2015	87	32	5.1	12.6
CPCB LIMIT		100	60	80	80

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Post Monsoon

Location: Jemehari UG (A18)

Week	Date	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>x</sub> µg/m <sup>3</sup>
I	08.10.2015	65	23	6.5	11.8
	09.10.2015	67	22	6.6	11.9
II	15.10.2015	68	21	6.3	12.2
	16.10.2015	69	24	6.1	12.8
III	22.10.2015	70	25	6.9	13.8
	23.10.2015	72	27	6.3	12.2
IV	29.10.2015	69	28	6.1	12.1
	30.10.2015	71	30	6.0	11.6
V	05.11.2015	77	26	5.8	11.5
	06.11.2015	74	28	5.7	11.1
VI	12.11.2015	75	25	5.5	11.0
	13.11.2015	71	27	5.3	11.2
VII	19.11.2015	70	29	5.1	11.1
	20.11.2015	73	26	5.2	11.2
VIII	26.11.2015	74	25	5.0	10.9
	27.11.2015	76	23	5.1	10.6
IX	05.12.2015	77	26	6.6	12.8
	06.12.2015	76	25	6.8	13.9
X	12.12.2015	80	28	6.0	14.5
	13.12.2015	81	27	5.9	15.8
XI	19.12.2015	82	30	5.9	12.2
	20.12.2015	84	31	5.3	14.1
XI	26.12.2015	79	28	5.0	15.4
	27.12.2015	81	30	5.3	10.5
CPCB LIMIT		100	60	80	80

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Post Monsoon

Location: Lacchipur UG (A19)

Week	Date	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>x</sub> µg/m <sup>3</sup>
I	08.10.2015	77	24	10.0	17.8
	09.10.2015	75	25	10.0	17.7
II	15.10.2015	74	26	11.6	17.1
	16.10.2015	73	28	11.2	16.3
III	22.10.2015	78	29	12.4	16.2
	23.10.2015	79	27	13.9	16.0
IV	29.10.2015	80	23	10.7	16.7
	30.10.2015	78	26	10.9	16.2
V	05.11.2015	77	24	9.1	16.8
	06.11.2015	79	26	9.2	15.0
VI	12.11.2015	81	30	9.0	15.7
	13.11.2015	82	31	10.7	15.7
VII	19.11.2015	79	28	10.4	15.0
	20.11.2015	80	29	11.9	15.2
VIII	26.11.2015	76	24	11.7	15.5
	27.11.2015	79	26	11.3	15.3
IX	05.12.2015	80	29	5.5	11.8
	06.12.2015	82	27	5.6	11.9
X	12.12.2015	84	26	6.3	10.2
	13.12.2015	85	28	6.1	10.8
XI	19.12.2015	80	29	6.9	10.8
	20.12.2015	83	27	6.3	11.2
XI	26.12.2015	85	25	7.1	10.6
	27.12.2015	84	30	7.0	10.6
CPCB LIMIT		100	60	80	80

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Post Monsoon

Location: Central Kajora UG (A20)

Week	Date	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>x</sub> µg/m <sup>3</sup>
I	08.10.2015	65	17	11.5	15.6
	09.10.2015	63	20	10.9	16.3
II	15.10.2015	62	21	10.2	16.1
	16.10.2015	60	18	10.7	16.4
III	22.10.2015	59	19	8.4	17.8
	23.10.2015	62	16	8.9	17.9
IV	29.10.2015	61	18	8.2	17.3
	30.10.2015	58	17	9.9	17.4
V	05.11.2015	60	16	9.0	23.8
	06.11.2015	62	18	8.0	21.7
VI	12.11.2015	63	21	8.6	21.1
	13.11.2015	64	22	9.2	21.3
VII	19.11.2015	65	20	8.4	22.2
	20.11.2015	67	23	5.9	23.0
VIII	26.11.2015	68	24	5.7	22.7
	27.11.2015	66	25	5.9	23.2
IX	05.12.2015	69	21	7.8	11.5
	06.12.2015	66	20	7.7	13.1
X	12.12.2015	70	23	5.5	13.0
	13.12.2015	71	24	5.3	14.2
XI	19.12.2015	65	19	5.1	15.1
	20.12.2015	64	17	7.2	13.2
XI	26.12.2015	68	18	7.0	14.9
	27.12.2015	69	20	7.1	15.6
CPCB LIMIT		100	60	80	80

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Post Monsoon

Location: Madhujore UG (A21)

Week	Date	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>x</sub> µg/m <sup>3</sup>
I	08.10.2015	75	23	7.1	21.8
	09.10.2015	77	25	6.2	22.0
II	15.10.2015	79	26	7.0	22.7
	16.10.2015	76	24	7.7	22.7
III	22.10.2015	72	28	8.4	23.0
	23.10.2015	74	27	7.9	23.2
IV	29.10.2015	70	29	7.7	23.5
	30.10.2015	71	26	8.3	23.3
V	05.11.2015	69	25	7.5	23.6
	06.11.2015	71	21	7.9	22.3
VI	12.11.2015	68	20	7.2	22.1
	13.11.2015	67	23	7.7	22.4
VII	19.11.2015	66	25	7.4	22.8
	20.11.2015	68	26	7.9	22.9
VIII	26.11.2015	70	24	7.2	22.3
	27.11.2015	71	27	5.9	22.4
IX	05.12.2015	84	30	9.3	19.3
	06.12.2015	87	32	8.3	18.2
X	12.12.2015	89	35	8.9	19.6
	13.12.2015	88	34	9.5	19.8
XI	19.12.2015	81	30	8.7	18.7
	20.12.2015	84	33	6.2	19.5
XI	26.12.2015	80	28	6.0	18.2
	27.12.2015	79	25	6.2	18.7
CPCB LIMIT		100	60	80	80

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Post Monsoon Location: Ghanshyampur UG (A22)

Week	Date	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>x</sub> µg/m <sup>3</sup>
I	08.10.2015	78	29	5.3	11.0
	09.10.2015	77	28	5.5	11.1
II	15.10.2015	79	27	6.7	11.7
	16.10.2015	80	29	5.6	12.0
III	22.10.2015	81	26	6.6	11.4
	23.10.2015	79	28	6.0	11.3
IV	29.10.2015	77	30	5.7	11.6
	30.10.2015	75	31	6.0	11.4
V	05.11.2015	80	32	6.2	12.0
	06.11.2015	82	33	6.3	12.1
VI	12.11.2015	83	34	6.0	12.4
	13.11.2015	84	36	5.8	13.0
VII	19.11.2015	81	30	6.6	14.0
	20.11.2015	83	32	6.0	12.4
VIII	26.11.2015	85	37	5.8	12.3
	27.11.2015	86	32	5.7	11.8
IX	05.12.2015	88	33	7.4	17.3
	06.12.2015	90	36	6.5	17.5
X	12.12.2015	91	37	7.3	18.2
	13.12.2015	87	34	8.0	18.2
XI	19.12.2015	85	32	8.7	18.5
	20.12.2015	88	35	8.2	18.7
XI	26.12.2015	83	30	8.0	19.0
	27.12.2015	86	33	8.6	18.8
CPCB LIMIT		100	60	80	80

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

### SUMMARY FOR DAMODAR RIVER

The baseline data for the period October to December, 2015 (Post – Monsoon) has been summarized in the following table:

All figures in µg/m<sup>3</sup>

Location name & code	Min	98 <sup>th</sup> Percentile	Max	AM	GM	Std. dev	NAAQS Limit
<b>PM<sub>10</sub></b>							
Parbelia (A1)	74.00	84.54	85.00	78.67	78.61	3.16	100
Sodepur (A2)	69.00	84.54	85.00	76.71	76.60	4.14	
Chinakuri – I (A3)	69.00	84.54	85.00	78.04	77.91	4.56	
Chinakuri – III (A4)	65.00	78.62	80.00	70.79	70.70	3.75	
Amritnagar (A5)	74.00	84.54	85.00	78.83	78.77	3.14	
Tirat (A6)	60.00	73.08	74.00	66.75	66.65	3.77	
Kuardih (A7)	71.00	83.08	84.00	77.46	77.39	3.27	
Nimcha (A8)	69.00	83.08	84.00	76.38	76.29	3.77	
Mahabir (A9)	67.00	77.00	77.00	72.63	72.57	2.99	
Bakulia (A10)	65.00	87.62	89.00	75.83	75.59	6.26	
Dubeswari (A11)	60.00	78.08	79.00	69.58	69.40	5.14	
Bejdih (A12)	68.00	78.54	79.00	72.38	72.32	2.95	
Hirakhun (A13)	74.00	84.54	85.00	80.13	80.07	3.01	
Patmohana (A14)	68.00	79.54	80.00	75.17	75.10	3.17	
Ratibati (A15)	69.00	87.54	88.00	77.17	77.00	5.31	
Chalbalpur (A16)	60.00	70.00	70.00	65.96	65.90	2.77	
J K Nagar (A17)	74.00	86.54	87.00	80.42	80.35	3.39	
Jemehari (A18)	65.00	83.08	84.00	74.21	74.03	5.19	
Lachhipur (A19)	73.00	85.00	85.00	79.58	79.52	3.31	
Central Kajora (A20)	58.00	70.54	71.00	64.46	64.36	3.60	
Madhujore (A21)	66.00	88.54	89.00	75.67	75.36	7.06	
Ghansyampur (A22)	75.00	90.54	91.00	82.83	82.73	4.30	
<b>PM<sub>2.5</sub></b>							
Parbelia (A1)	23.00	31.54	32.00	26.96	26.84	2.60	60
Sodepur (A2)	19.00	28.54	29.00	23.71	23.52	3.04	
Chinakuri – I (A3)	23.00	33.54	34.00	28.00	27.84	3.11	
Chinakuri – III (A4)	18.00	27.08	28.00	22.63	22.48	2.65	
Amritnagar (A5)	23.00	31.54	32.00	26.96	26.85	2.46	
Tirat (A6)	18.00	29.54	30.00	24.21	23.97	3.40	
Kuardih (A7)	20.00	32.08	33.00	26.88	26.66	3.39	
Nimcha (A8)	20.00	30.00	30.00	25.75	25.56	3.14	
Mahabir (A9)	19.00	29.00	29.00	24.17	23.97	3.09	
Bakulia (A10)	17.00	31.54	32.00	24.83	24.43	4.49	
Dubeswari (A11)	16.00	26.00	26.00	21.71	21.52	2.85	
Bejdih (A12)	19.00	27.54	28.00	23.33	23.21	2.46	
Hirakhun (A13)	25.00	32.54	33.00	28.42	28.33	2.28	
Patmohana (A14)	17.00	29.00	29.00	24.38	24.19	3.00	

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(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Location name & code	Min	98 <sup>th</sup> Percentile	Max	AM	GM	Std. dev	NAAQS Limit
Ratibati (A15)	20.00	34.54	35.00	26.50	26.18	4.23	
Chalbalpur (A16)	15.00	27.08	28.00	20.58	20.28	3.67	
J K Nagar (A17)	23.00	32.00	32.00	27.92	27.81	2.45	
Jemehari (A18)	21.00	30.54	31.00	26.42	26.28	2.67	
Lachhipur (A19)	23.00	30.54	31.00	26.96	26.87	2.18	
Central Kajora (A20)	16.00	24.54	25.00	19.88	19.71	2.63	
Madhujore (A21)	20.00	34.54	35.00	26.92	26.65	3.91	
Ghansyampur (A22)	26.00	37.00	37.00	31.83	31.68	3.13	
<b>SO<sub>2</sub></b>							
Parbelia (A1)	6.00	9.41	9.50	7.40	7.32	1.14	80
Sodepur (A2)	6.00	8.75	8.80	7.66	7.62	0.80	
Chinakuri – I (A3)	6.20	8.75	8.80	7.27	7.24	0.65	
Chinakuri – III (A4)	6.00	10.50	10.50	8.45	8.34	1.33	
Amritnagar (A5)	5.50	10.52	10.70	8.21	8.09	1.42	
Tirat (A6)	5.60	8.80	8.80	7.08	7.03	0.89	
Kuardih (A7)	7.10	13.21	13.90	9.02	8.85	1.88	
Nimcha (A8)	6.40	8.16	8.30	7.25	7.23	0.53	
Mahabir (A9)	6.00	8.76	8.90	7.35	7.29	0.89	
Bakulia (A10)	6.00	9.61	9.70	7.70	7.61	1.14	
Dubeswari (A11)	5.60	9.11	9.20	7.22	7.12	1.19	
Bejdih (A12)	5.90	8.35	8.40	7.08	7.03	0.77	
Hirakhun (A13)	3.90	9.72	9.90	6.25	5.97	1.98	
Patmohana (A14)	5.50	7.62	7.90	6.56	6.53	0.70	
Ratibati (A15)	5.50	9.11	9.20	7.59	7.51	1.13	
Chalbalpur (A16)	6.10	13.21	13.90	9.72	9.51	2.03	
J K Nagar (A17)	5.00	11.22	11.50	7.13	6.86	2.12	
Jemehari (A18)	5.00	6.85	6.90	5.85	5.82	0.60	
Lachhipur (A19)	5.50	13.21	13.90	9.37	9.04	2.44	
Central Kajora (A20)	5.10	11.22	11.50	8.00	7.79	1.85	
Madhujore (A21)	5.90	9.41	9.50	7.59	7.52	1.01	
Ghansyampur (A22)	5.30	8.65	8.70	6.60	6.53	1.03	
<b>NO<sub>x</sub></b>							
Parbelia (A1)	9.40	19.71	19.80	15.78	15.17	4.18	80
Sodepur (A2)	8.40	24.97	25.20	17.69	16.42	6.35	
Chinakuri – I (A3)	9.00	24.61	24.70	18.78	17.44	6.51	
Chinakuri – III (A4)	12.50	27.40	27.40	21.75	20.69	6.37	
Amritnagar (A5)	11.60	27.11	27.20	20.06	19.11	6.03	
Tirat (A6)	10.00	24.76	24.90	18.79	17.63	6.16	
Kuardih (A7)	17.00	19.64	20.10	17.96	17.95	0.74	
Nimcha (A8)	16.00	19.35	19.40	17.37	17.35	0.86	
Mahabir (A9)	14.10	19.70	19.70	17.64	17.53	1.96	
Bakulia (A10)	14.00	20.13	20.50	17.54	17.46	1.74	
Dubeswari (A11)	10.80	23.52	23.80	17.76	17.05	4.83	

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Location name & code	Min	98 <sup>th</sup> Percentile	Max	AM	GM	Std. dev	NAAQS Limit
Bejdih (A12)	11.60	23.55	23.60	19.31	18.61	4.92	
Hirakhun (A13)	6.60	19.85	19.90	12.43	11.55	5.01	
Patmohana (A14)	6.40	13.42	13.60	11.10	10.96	1.69	
Ratibati (A15)	10.60	24.42	24.70	15.96	15.21	5.27	
Chalbalpur (A16)	15.00	24.70	24.70	18.68	18.34	3.80	
J K Nagar (A17)	10.80	17.85	17.90	13.60	13.39	2.50	
Jemehari (A18)	10.50	15.62	15.80	12.34	12.26	1.50	
Lachhipur (A19)	10.20	17.75	17.80	14.42	14.18	2.60	
Central Kajora (A20)	11.50	23.52	23.80	17.68	17.30	3.76	
Madhujore (A21)	18.20	23.55	23.60	21.46	21.38	1.86	
Ghansyampur (A22)	11.00	18.91	19.00	14.07	13.76	3.12	

Observation:

It is observed that during the period of baseline data generation from October to December, 2015, the concentrations of PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub> and NO<sub>X</sub> at all stations were found within the limits specified in NAAQS, 2009.

**Action Plan for Issues Raised during Public Hearing held at Joplai High School Ground, PO-Joplai, District-**

**Birbhum for Sand Mining in the Riverbed of Ajoy River:-**

SI No.	Issues raised by the Public	Action Plan	Time Line	Budgetary provisions
1	During rainy season riverbank eroded, as a result land and habitation are damaging	As per the EIA study there is no such danger of erosion of river bank due to sand mining. We have told in the PH meeting that if such case comes to the notice of Dist. Authority present in the meeting to give a direction in this regard.	..	..
2	Road network in the local area particularly from Dubrajpur to Joydeb should be taken care of for improvement.	It will be done Under CSR Scheme after due consultation with district management.	April 2016 to September 2017	Rs. 35 Lakhs
3	CSR activities for improvement of the local primary health center.	Mobile medical Van loaded with medical officers and paramedical staff are being sent in the locality on the regular basis for fulfilling the basic medical requirements of the nearby villagers.	Implemented	Implemented
4	Excavation of sand at least 100 mtr. away from the river bank	It is done as per rules and taking care of all safety measures.	Implemented	Implemented
5	Sand should be transported only through covered truck	Covering of transportation trucks will be ensured	Implemented	
6	Strengthening of the irrigation canal of	Even if this not related to sand mining, Budget will be provided to state		

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Project Proponent  
GM JK Ropeways.

SI No.	Issues raised by the Public	Action Plan	Time Line	Budgetary provisions
7	Palashdanga village. Tree plantation of the area is not up to the mark	Authority for this work under CSR. Plantation shall be made after due consultation with villagers.	March 2018	Rs. 20 Lakhs
8	Improvement of ferry ghat in the river through their CSR activity.	It will be done Under CSR Scheme after due consultation with village community.	April 2016 to March 2017	Rs. 2 Lakhs
9	Employment for the local people.	Additional employment opportunities are created through contractual transport of sand which is being made through local people. At present 60 local resident have been given employment through contractual agreement for gathering and transport of sand and for security arrangement.	Implemented	

*20/11/18*  
*(initials)*

Project Proponent  
GM JK Ropeways.

**Action Plan for Issues Raised in Public Hearing held at Panchayat Samity Meeting Hall, District-Burdwan for Sand Mining in The Riverbed of Ajoy River:-**

SI No.	Issues raised by the Public	Action Plan	Time Line	Budgetary provisions
1	Air pollution generated during transport of sand by road and the detrimental effect of such heavy transport load as well as continuous dripping of water from such moist sand being transported on the local roads.	Covering of transportation trucks will be ensured through inclusion of the same in transport contract work order/Agreement. To avoid dripping of water instruction has been issued to the transport contractor for maintaining an idle time in between loading of sand and movement of trucks from the ghat.	Implemented	
2	Improvement of local road condition	It will be done Under CSR Scheme after due consultation with Village Panchayat.	1 Year	Rs. 10 Lakhs
3	The steps taken for maintaining biodiversity along the bank of the river so that it is not affected by their proposal sand mining activity.	CMPDI shall be asked to prepare a report on the impact of Sand Mining on bio diversity and necessary recommendations through this report shall be implemented at project cost.	6 month	
4	Replenishment of deposited sand is allowed between two successive mining seasons in order to avoid permanent damage to the riverbed leading to diversion of course of river.	The recommendations is being implemented.	Implemented	

*9/11/21*  
*Pranab*

## Annexure – 3

# RISK ASSESSMENT AND DISASTER MANAGEMENT PLAN

## 1.0 RISK ASSESSMENT

Risk assessment is the systematic study of uncertainties and risks encountered in various areas. Risk assessment seek to identify the risks involved in mining operations, to understand how and when they arise, and estimate the impact (financial or otherwise) of adverse outcomes. It also defines and analyzes the dangers to individuals, businesses and government agencies posed by potential natural and human-caused adverse events.

## 2.0 RISK PRIORITISATION

The following types of hazards are identified during mining operations:-

1. Accident during sand/mineral loading, transportation and dumping
2. Accident due to vehicular movement
3. Inundation/ Flooding
4. Quick Sand Condition

## 3.0 MITIGATION MEASURES

### 3.1 Measures to prevent accidents during loading

- a. The tipping trucks for loading shall be so placed as to provide ample space for movement of work persons deployed.
- b. The tipping trucks shall be placed in or moved out after making sufficient warning signals for the same.
- c. The tipping trucks shall be positioned on a stable location for loading in fully braked condition.
- d. The truck would be brought to a level so that the loading operation suits the ergonomic condition of the workers.
- e. Opening of the side covers (pattas) would be done carefully and with warning to prevent injury to the loaders.
- f. Operations will be carried out during daylight only.

Supplementary Note to the EIA & EMP for Sand Mining (Major Mineral) in the Riverbed of Ajoy River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield  
(21 Sand Mining Stations having total area of 414.36 Ha & Peak Sand Extraction Capacity of 2.0 Million m<sup>3</sup>/ year)

- g. The approach roads for movement of tipping trucks shall be maintained in stable condition with proper gradient.
- h. All necessary facilities like shelter, drinking water, safety equipment, First Aid etc. shall be provided to the contractual workers deployed for the collection of sand from the river bed.
- i. The entire operation of sand mining and allied activities shall be carried out under the supervision of competent supervisors deputed by the concerned Area of ECL on behalf of whom the contractor has been engaged for sand mining. To ensure proper supervision, at least 2 Nos. of supervisors shall be deputed throughout the period in which sand mining and the other allied activities continue in a particular sand gathering station. The place of work shall also be inspected by an authorised competent officer at regular intervals. The supervisors shall maintain a daily record in which all the essential and important notes pertaining to sand mining and allied activities shall be recorded and signed. The records shall be countersigned at intervals by the authorised officer also.
- j. Awareness on safety and ensure using of personal protective equipment (PPE) by workers like gloves, helmets, boots ear plugs and ear muff etc. to avoid injuries. The workers will be trained on using personal equipment as a precautionary measure & thereby preventing any infectious diseases. Workers will be periodically made aware of health & safety and various other risks.
- k. The contractors will abide by various provisions laid down under Mines Act, 1952, Mines Rules-1955, Mines & Minerals (Regulation and Development) Act-1957, MMR-1961, the State Minor Mineral Concession Rules and various labour and other applicable laws of the land.

### **3.2 Measures to prevent accidents during vehicular movement & transportation**

The following activities will be done to minimize the risk are:-

- a. Road worthiness of tipping trucks/tractors shall be periodically checked by a competent person authorised for the purpose and a record of such checks shall be kept with the respective truck.
- b. The trucks will be covered with tarpaulin and maintained to prevent any spillage.
- c. To avoid danger while reversing all areas for reversing would be made man free as far as possible.
- d. All transportation within the main working will be carried out directly under the supervision and control of the management.

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- e. Overloading will not be permitted and the maximum permissible speed limit would be ensured.
- f. The truck drivers will have proper driving license.
- g. Constant education, training etc. will go a long way in reducing accidents.

### **3.3 Measures to prevent incidents during Inundation/ Flooding due to Sudden Release of Water from Upstream Dam**

The following activities will be done to minimize the risk are:-

- a. During monsoon months and heavy rains the mining operations are completely ceased.
- b. Liason is kept with DVC and CWC for issuing warning during heavy rains and discharges from theup-stream dams.

### **3.4 Measures to prevent quick – sand conditions**

The following activities will be done to minimize the risk are:-

- a. The mining activities will be restricted to 1 m depth from river bed surface or water level whichever is less.
- b. Mining activities will be completely stopped during monsoon season.
- c. Mining will be done as per the approved Mining Plan.

## **4.0 DISASTER MANAGEMENT PLAN**

This deals with action plan for accidents like landslides, subsidence, flood, inundation, fire, seismic activities, dam failures etc. and emergency plan proposed for quick evacuation, ameliorative measures to be taken etc.

- a. The shallow depth of activities in river bed mining will not involve any high risk accident due to side falls/collapse.
- b. The complete mining operation will be carried out under the Management and control of experienced and qualified Mines Manager having Certificate of Competency to manage the mines granted by DGMS.
- c. All the provisions of Mines Act 1952, MMR 1961 and Mines Rules 1955 and other laws applicable to mine will strictly be complied with.
- d. Mining will be completely stopped during the monsoon months.
- e. During heavy rainfall even during non – monsoon periods, the mining activities will be closed.
- f. All persons in supervisory capacity will be provided with proper communication facilities.

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Supplementary Note to the EIA & EMP for Sand Mining (Major Mineral) in the Riverbed of Ajoy River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield  
(21 Sand Mining Stations having total area of 414.36 Ha & Peak Sand Extraction Capacity of 2.0 Million m<sup>3</sup>/ year)

- g. Proper coordination with DVC and CWC will be maintained so that at the time of releasing water from the dam / dam failure, if any, suitable warning/information is given in advance.
- h. The riverbed area once dug will not be mined again until the area is replenished in the monsoon.
- i. Mining will be done at least 20 m inside of the either banks.
- j. Mining will not be done in the concave areas of the rivers.
- k. No sand mining within a distance of 500 meters upstream/downstream of any high level bridge and 200 meters upstream/downstream of other bridges, culverts, embankments etc.
- l. No mining operation shall be carried out at a point within a distance of 200 m from any railway line, reservoir, canal or other public works, such as roads and buildings or inhabited site except the previous permission in writing of the Irrigation and waterways Department and/or Public Works (Roads) Department.
- m. No mining shall be carried out within 5 KM from the barrage axis/dam axis.

## Annexure – 4

## FLORA & FAUNA

### A. TERRESTIAL FLORA & FAUNA

#### 1.0 Flora

##### Vegetation Pattern of the Study Area

The general vegetation is essentially tropophilous but with a tendency towards xerophytes. The flora of the area is characterized by the arborescent species such as *Simul* (*Salmalia malabarica* Schott. & Endl.), *Neem* (*Azadirachta indica*), *Amlaki* (*Phyllanthus embica*), *Lannea coromandelica* Merr., *Narikel* (*cocos nucifera*), *Khejur* (*Phoenix dactylifera* L.), *Tal* (*Borassus flabellifer* L.), *Bat* (*Ficus bengalensis* L.), *Asvattha* (*Ficus religiosa* L.), *Palas* (*Butea frondosa*), *Krishnachuda* (*Caesalpinia Pulcherrima*), *Am* (*Mangifera indica* L.) and shrubby species such as *ashsheoda* (*Glycosmis pentaphylla* Corr.), *Pianj*, *Rasun*, *Rajanigandha* (*Polyanthes tuberosa* Willd.), *Ghentu* or *Bhat* (*Clerodendron infortunatum* Gaertn.), *Kurabaka* (*Barleria Cristata*), *Gulanchara* (*Tinospora cordifolia*), *Tulsi* (*Ocimum sanctum*), *Solanum torvum* SW., *S. Verbascifolium* L., *Trema orientalis* Bl., *Shiora* (*Streblus asper* Lour.) and *Dumur* (*Ficus hispida* L.).

The uplands of Asansol subdivision and the laterite area of the district are in places covered with *Sal* (*Shorea robusta* Gaertn.), *Mohua* (*Madhnea latifolia*), *Palas* (*Butea monosperma*), *Bans* (*Bambusa arundinacea*), *Shireesha* (*Albizzia lebbek*), *Arka* (*Calotropis gigantea*), *Kend* (*Diospyros melanoxylon*), *Arjun* (*Terminalia Arjuna*) and *Ashan* (*T. tomentosa*). The common plants in hedges and wastelands are *lal-bharenda* (*Jatropha gossypifolia* L.), *Ban-okra* (*Urena lobata* L.), *Heliotropium strigosum* Willd., *Hati-soond* (*H. indicum* L.), *Ulu* (*Imperata arundinacea*), *Sida veronicifolia* Lam., *S.cordifolia* L., etc. (Source : District Website).

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield

(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Trees of economic importance are to be found in abundance all around and these could be classified in three groups – fruit-bearing trees, trees for timber and fuel and flowering trees. Among fruit-bearing trees, Mango, Jacktree, date-palm, imli, plum ( ber ), Wood Apple ( Angle mameelos), custard apple; Avla, Black plum and papaya are commonly found and jack fruit and mango are relatively in greater number. The timber trees are mostly Mahua (basis latifolia) Gamhar (genelina arborea ), Asan (Terminalia tomentosa) Murga ( Ptercarpus marsupium ) , Shisham ( Dahbergia sisso ), Sal (Shorearobusta ) , Bamboos ( Dendrocalamus strictus ) and the Margosa tree etc. Besides trees like Siris, Semar (Silk Cotton) and Sahjan (Morniga aneiphera) etc. are also available.

Low lands of the area are cultivated by Paddy, Maize, Arhar and Kulthi. Vegetables like Brinjal, Tomato, Potato, Chili, Bean (Sem), Jhinga, Parol are cultivated.

#### LIST OF FLORA IN STUDY AREA

FLORA	LOCAL NAME	BOTANICAL NAME
COMMERCIAL CROPS		
VEGETABLES	Baigan	<i>Solanum melongena</i>
	Tomato	<i>Lycopersicum esculentum</i>
	Bean	<i>Lablab purpureus</i>
	Jhinga	<i>Luffa acutangula</i>
	Parval	<i>Trichosanthes dioica</i>
	Kohra	<i>Benincasa hispida</i>
	Karela	<i>Momordica charantia</i>
	Kakri	<i>Momordica dioica</i>
	Kundri	<i>Coccinia grandis</i>
	Kaddu	<i>Cucurbita pepo</i>
	Bhindi	<i>Hiabiscus esculentus</i>
	Nenua	<i>Luffa cylindrica</i>
	Onion	<i>Allium cepa</i>
	Sem	<i>Phaseolus lunatus</i>
	Kheera	<i>Cucrbaltus sativus</i>
Phool Gobi	<i>B. oleraceavar</i>	
OIL YIELDING PLANTS	Sarson	<i>Brassica compestris</i>
	Castor plant	<i>Ricinus communis</i>
SPICES	Coriander	<i>Coriandrum sativum</i>
	Lahsun	<i>Allium sativum</i>
	Adrak	<i>Zingiber officinale</i>
	Haldi	<i>Curcuma augustifolia</i>
FRUITS	Aam	<i>Mangifera indica</i>
	Amrud	<i>Psidium guajava</i>
	Jamun	<i>Syzygium cumini</i>
	Kathal	<i>Artocarpus heterophyllus</i>
	Bel	<i>Aegle marmelos</i>

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

	Papaya	<i>Carica papaya</i>
<b>AGRICULTURAL CROPS</b>		
CEREALS	Dhan	<i>Oryza sativa</i>
	Makka	<i>Zea mays</i>
	Wheat	<i>Triticum aestivum</i>
PULSES	Arhar	<i>Cajanus cajan</i>
	Lentil	<i>Lens culineris</i>
	Khesari	<i>Lathyrus sativus</i>
	Chana	<i>Cicer arientum</i>
	LOCAL NAME	BOTANICAL NAME
<b>SOCIAL FORESTRY</b>		
Trees	Palas	<i>Butea monosperma</i>
	Sisam	<i>Dalbergia sissoo</i>
	Mango	<i>Mangifera indica</i>
	Ashok	<i>Saraca indica</i>
	Kathal	<i>Artocarpus heterophyllus</i>
	Gulmohar	<i>Delonix regia</i>
	Neem	<i>Azadirachta indica</i>
	Sal	<i>Shorea robusta</i>
	Babul	<i>Acacia nilotica</i>
	Karanj	<i>Pongamia pinnata</i>
Semal	<i>Bombax cieba</i>	
<b>NATURAL VEGETATION</b>		
HERBS	Ban tulsi	<i>Ocimum basilicum</i>
	Tulsi	<i>Ocimum sanctum</i>
	Galphuli	<i>Moghania species</i>
	Akaon	<i>Calotropis gigantean</i>
	Putus	<i>Lantana camara</i>
	Ram Datwan	<i>Smilax macrophylla</i>
SHRUBS/CLIMBERS	Orchid	<i>Habenaria susannae</i>
	Kari	<i>Millusa tomentosa</i>
	Castor plant	<i>Ricinus communis</i>
	Broom jute	<i>Sida rhombifolia</i>
	Chaste tree	<i>Vitex negundo</i>
TREES	Sal	<i>Shorea robusta</i>
	Khair	<i>Acacia catechu</i>
	Banyan	<i>Ficus bengalensis</i>
	Simal	<i>Bombax ceiba</i>
	Mahua	<i>Madhuca indica</i>
	Palas	<i>Butea monosperma</i>
	Kusum	<i>Schlechera oleosa</i>
	Peepal	<i>Ficus religiosa</i>
	Asan	<i>Terminalia tomentosa</i>
	Imli	<i>Tammarindus indica</i>
	Kadam	<i>Anthoosphalus cadamba</i>
	Neem	<i>Azadirachta indica</i>
Mango	<i>Mangifera indica</i>	

## 2.0 Fauna

The carnivora of the area comprise jackal and other smaller species. Monkeys abound including the variety known as Hanuman. Poisonous snakes include several kinds of cobra, the karait and the deadly Russell's viper. Other most frequently seen varieties are the Dhamna and various species of harmless grass snakes.

The avifauna are pea-fowl, jungle-fowl, jungle crow, house crow, treepie, common babbler, common jora, gold-fronted chloropsis, red-vented babul, red-whiskered bulbul, red spotted bluethroat, brown-backed robin, Shama, Tickell's blue flycatcher, paradise flycatcher, wood shrike, black drongo, tailor bird, streaked fantail warbler, golden oriole, common mayna, pied mayna, white-backed munia, white-throated munia, spitted munia, red munia, yellow-throated sparrow, house sparrow, woodpecker, India cuckoo, pied crested cuckoo, koel, parakeet, nilkantha, bee-eater, kingfisher, hornbill, hoopoe, horned owl, spotted owl, jungle owl, griffon vulture, long-billed vulture, scavenger vulture, lagger falcon, small spotted eagle, brahminy kite, pariah kite, sparrow hawk, various types of pigeon and dove, goose, duck, teal, lapwing, white necked stork and some varieties of egret and heron.

### LIST OF FAUNA IN STUDY AREA

FAUNA	COMMON NAME	ZOOLOGICAL NAME
<b>LISTED UNDER WILDLIFE PROTECTION ACT,1972</b>		
<b>TERRESTRIAL FAUNA</b>		
Schedule-I	Nil	-
Schedule-II	Lomdi (Common Fox)	<i>Vulpes spp.</i>
	Siyar	<i>Canis aureus</i>
	Jungle Cat	<i>Felis chaus</i>
	Common langur	<i>Presbytis chtellus</i>
Schedule-III	Wild boar	<i>Sus scrofa</i>
Schedule-IV	Mongoose	<i>Herpestes edwardsi</i>
	Squirrel	<i>Funambulus pennanti</i>
	Hare	<i>Capralogus species</i>
Schedule-V	Common Rat	<i>Rattus rattus</i>
	Bat	<i>Rousettus leschenaultia</i>
	Mice	<i>Mus musculus</i>
<b>AMPHIBIANS &amp; REPTILES</b>		

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

FAUNA	COMMON NAME	ZOOLOGICAL NAME
Schedule-II	Common Lizards	<i>Varanus species</i>
	Cobra	<i>Naja naja kauthua</i>
	Rat Snake	<i>Ptyas mucosus</i>
Schedule-IV	Toad	<i>Bufo melanostictus</i>
	Karait	<i>Bungurus caeruleus</i>
	Water snake	<i>Natrix piscator</i>
<b>AVI FAUNA</b>		
Schedule-IV	Common Sparrow	<i>Pesser domesticus</i>
	Bulbul	<i>Pycnonotus cafer</i>
	Kabutar	<i>Colombia livia</i>
	Owl	<i>Strigidae</i>
	Ducks	<i>Nettopus Coromandelianus</i>
	Jungli Murgi	<i>Gallus gallus</i>
	Mynas	<i>Acruditheres tristis Linn.</i>
Schedule-V	Common Crow	<i>Corvus splendens</i>
<b>NOT LISTED UNDER WILDLIFE PROTECTION ACT,1972</b>		
Mammals (Domestic Animals)	Goat	<i>Capra species</i>
	Cow	<i>Bos indicus</i>
	Dog	<i>Canis familiaris</i>
	Sheep	<i>Capra Sp.</i>
	Pig	<i>Sus scrofa</i>
	Horse	<i>Equus Sp.</i>
Birds (Domestic Birds)	Sparrow	<i>Passer domesticus</i>
	Duck	<i>Nettopus Coromandelianus</i>
Amphibian	Frog	<i>Rana Tigerina</i>
	Tree frog	<i>Hyle Spp.</i>
	Flying frog	<i>Rhacopnonis Spp.</i>
Aquatic fauna (Fishes)	Rohu	<i>Labco rohita</i>
	Catla	<i>Cyprindiae</i>
	Garai	<i>Channa punctatus</i>
	Mangoor	<i>Clarias batrachus</i>
	Pothia	<i>Punctius ticta</i>
	Bokwa	<i>Eutropichttys baacha</i>
	Zebra fish	<i>Danio rerio</i>
Invertebrates	Birni	<i>Polistis Spp.</i>
	Grosshopper	<i>Hieroglyphus banian</i>
	Tidha	<i>Schistocerca gregaria</i>
	Moth	<i>Antheria mylita</i>
	Black Bee	<i>Apis dorsata</i>
	Bee	<i>Apis indica</i>
	Stem Borer	<i>Chilo auricilia</i>
	Cockroach	<i>Blata orientalis</i>
	Madhumakkhi	<i>Apis indica</i>
	Chinti	<i>Solpopsis Spp.</i>
	Lahi	<i>Kerria laxxa</i>
Jugnu	<i>Photinus Spp.</i>	

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

FAUNA	COMMON NAME	ZOOLOGICAL NAME
	Gojar	<i>Scolopendra Spp.</i>
Aquatic Insect	Daphnia	<i>Nepa Spp.</i>
	Prawn	<i>Chaetogaster</i>
<b>ENDANGERED SPECIES</b>	Nil	-
<b>ENDEMIC SPECIES</b>	Nil	-
<b>MIGRATORY SPECIES</b>	Tree Pipit	<i>Anthus Trivialis</i>
	Cuckoo	<i>Cuculus Micropterus</i>
	Ducks	<i>Dendrosygnia Javanica</i>

## B. RIVERBED FLORA & FAUNA

A study of the riverbed flora and fauna was conducted and a list of species found to be present are given below –

### LIST OF FLORA & FAUNA IN RIVERBED

Aquatic Flora		
Macrophytes	C. Hydrcharitaceae	a. <i>Hydrilla verticillata</i> b. <i>Vallisneria spiridis</i> c. <i>Blyxa octandra</i> d. <i>Lemna perpusia</i> e. <i>Vallisneria spiridis</i> f. <i>Eichhornia crassipes</i>
	D. Weeds	a. <i>Cyperus elatus</i> (Nut Grass)
Phytoplankton	A. Chlorophyta	a. <i>Chlamydomonas sp.</i> b. <i>Microspora sp.</i> c. <i>Spirogyra sp.</i> d. <i>Oedogonium sp.</i> e. <i>Eudorina sp.</i> f. <i>Ulothrix sp.</i> g. <i>Desmidium sp.</i> h. <i>Clausterium sp.</i> i. <i>Pediastrum sp.</i> j. <i>Akistrodesmus sp.</i> k. <i>Coelestrum sp.</i> l. <i>Crucigenia sp.</i> m. <i>Hydrodiction sp.</i> n. <i>Scenedesmus sp.</i> o. <i>Phacus sp.</i>
	B. Bacillariophyta	a. <i>Tabellaria sp.</i> b. <i>Fragilaria sp.</i> c. <i>Nitzschia sp.</i> d. <i>Melosira sp.</i> e. <i>Pinnularia sp.</i>

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

		<ul style="list-style-type: none"> <li>f. <i>Pleurosigma sp.</i></li> <li>g. <i>Navicula sp.</i></li> <li>h. <i>Synedra sp.</i></li> <li>i. <i>Cymbella sp.</i></li> </ul>
	C. Cyanophyta	<ul style="list-style-type: none"> <li>a. <i>Anacystis sp.</i></li> <li>b. <i>Microcystis sp.</i></li> <li>c. <i>Oscillatoria sp.</i></li> <li>d. <i>Phormidium sp.</i></li> </ul>
Aquatic Fauna		
Zooplankton	A. Rotifers	<ul style="list-style-type: none"> <li>a. <i>Brachionus sp.</i></li> <li>b. <i>Keratella sp.</i></li> <li>c. <i>Filina sp.</i></li> <li>d. <i>Monostyla sp.</i></li> <li>e. <i>Lecan sp.</i></li> </ul>
	B. Copepods	<ul style="list-style-type: none"> <li>a. <i>Diaptomus sp.</i></li> <li>b. <i>Cyclops sp.</i></li> <li>c. <i>Mesecyclops sp.</i></li> <li>d. <i>Nauplius sp.</i></li> <li>e. <i>Melosira sp.</i></li> </ul>
	C. Cladocerans	<ul style="list-style-type: none"> <li>a. <i>Daphnia sp.</i></li> <li>b. <i>Moina sp.</i></li> </ul>
Worms	A. Oligochaete	<ul style="list-style-type: none"> <li>a. <i>Thiara sp.</i></li> <li>b. <i>Pleurocera sp.</i></li> </ul>
	B. Chironomid worms	
	C. Fly nymphs	
	D. Mosquito Larvae	
Fish		<ul style="list-style-type: none"> <li>1. Barillus bola</li> <li>2. Puntius sarana</li> <li>3. Catla catla</li> <li>4. Cirrhine mrigala</li> <li>5. C. Reba</li> <li>6. Labeo rohita</li> <li>7. L kalbasu</li> <li>8. L boga</li> <li>9. L boggut</li> <li>10. L Diocheilus</li> <li>11. Ompak bimaculatus</li> <li>12. Wallago attu</li> <li>13. Mystus singhala</li> <li>14. M Aor</li> <li>15. R Rita</li> <li>16. B Bagarius</li> <li>17. Chupisoma garua</li> <li>18. Labeo bata</li> <li>19. Bhincasugil coraula</li> <li>20. Notopterus Notoptarus</li> <li>21. Chela gora</li> <li>22. Chela sp.</li> <li>23. Barilius barila</li> <li>24. Esomus danricus</li> </ul>

Supplementary Note to the EIA & EMP for Composite Plan of Sand Mining (Major Mineral) in the Riverbed of Damodar River for Stowing Purpose in underground mines of ECL falling in Raniganj Coalfield (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

		<p>25. Amblypharyngodon mola  26. Aspidoparia morar  27. Puntius sophore  28. P. Conchonus  29. Garre spp.  30. Botia spp.  31. Nemachilus spp.  32. Mystus cavasius  33. Glyptoth sp.  34. Hara sp.  35. Clarias batrachus  36. Heteropneutis fossilis  37. Xenortodon cancella  38. Chanaa punctatus  39. C. Satriatus  40. Glossogobius giuris  41. Ambossia bacilis  42. A. Nama  43. A. Ranga  44. Masteembelus armetus  45. M. Pancalus  46. Amblyceps sp.  47. Dorishthys cuncunus  48. Ailia coilia  49. Amphipnous cuchia  50. Coliaa faciatus  51. Apocnyptis sp.  52. Coliaa faciatus  53. Apocynptis sp.</p>
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## ANNEXURE-5

ईस्टर्न कोलफील्ड्स लिमिटेड  
(कोल इण्डिया लिमिटेड का एक अंग)  
अध्यक्ष-सह-प्रबंध निदेशक का कार्यालय  
सांकतोडिया, पोस्ट-डिसरगढ़, जिला-बर्धमान (प.ब.)  
कंपनी सचिवालय  
टेलिफैक्स: 0341-2520546  
सी.आइ.एन :U10101WB1975GOI030295  
वेबसाइट :www.easterncoal.gov.in  
Ref. No. ECL:CS:3(281-C)/05



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(A Subsidiary of Coal India Limited)  
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CIN-U10101WB1975GOI030295  
Website: www.easterncoal.gov.in

August 05, 2015

सेवा मे/To  
महाप्रबंधक (योजना एवं परियोजना)/  
General Manager (P&P),  
ई.सी.एल मुख्यालय, सांकतोडिया  
ECL, HQ, Sanctoria.

महा प्रबंधक (यो.एवं परियो.) विभाग  
G. M. (P&P)'S Deptt.  
डायरी नं .....  
Dairy No. 1079 .....  
दिनांक .....  
Date 06/08/15 .....  
ई.सी.एल. मुख्यालय, सांकतोडिया  
ECL, HQ, SANCTORIA

महोदय/Dear Sir,

Sub. : Minutes of the 281<sup>st</sup> Meeting of Board of Directors of ECL, held on 28<sup>th</sup> July, 2015.-

Reproduced below is the relevant extract from the Minutes of the 281<sup>st</sup> Meeting of the Board of Directors of Eastern Coalfields Limited, held on 28<sup>th</sup> July, 2015 with regard to following:

"281.01(C) & Action Taken Report on the previous decisions of the Board.  
(supple)

(a) 276.03(T): Construction of 12 MTY Coal Handling Plant at Sonepur Bazari OCP: Details of effect of additional capital outlay on the IRR and the pay back period.

(i) GM (P&P) apprised the Board that effect of additional capital outlay on the IRR and the pay back period of 12 MTY capacity CHP of Sonepur Bazari Area. He also apprised the Board that the Financial IRR after including the additional capital of ₹ 46.97 Crore would be 36.46% at 100% capacity utilisation and 25.82% at 85% capacity utilisation.

(ii) To a query as to the reasons for increasing the CHP capacity from 8 MTY to 12 MTY, he apprised the Board that considering the future projections of coal production from the Area, the design of the CHP is changed to handle 12 MTY.

(iii) Thereafter, Board noted the information as brought out in the agenda.

281.02(C) Exception Report on 'On-going' Projects.

(i) GM (P&P) apprised the Board that Sarpi and Rajmahal Projects would be completed during the year.

(ii) Thereafter, Board noted the information as brought out in the agenda.

281.03(E) Project Report of Nakrakonda Kumardihi-B OCP (April, 2015) (Capacity: 3.00 MTY, Capital Investment: ₹ 181.3499 Crore under Outsourcing Option).

(i) Deferred.

281.03(R) Composite Mining Plan for sand mining from river bed of Damodar river (January, 2015) for stowing purpose in ECL UG Mines.

(i) GM (P&P) apprised the Board regarding Composite Mining Plan for sand mining from river bed of Damodar river (January, 2015) for stowing purpose in ECL UG Mines. He also apprised the Board that the Sub-Committee of ECL Board for "Evaluation, Appraisal and

✓  
Sri A. K. Mishra,  
Chairman  
2/8/15

gmm

Approval of Projects" in its meeting held on 28<sup>th</sup> July, 2015 has agreed and recommended the proposal for approval of the Board.

(ii) In view of above, Board after detailed deliberation approved the Composite Mining Plan for Sand Mining of 1.5 M cum per year from River bed of Damodar River (January, 2015) with an additional capital outlay of ₹ 34.29 Lakh as brought out in the agenda.

**281.03(S) Composite Mining Plan for Sand Mining in River bed of Ajay River (December, 2014) for stowing purpose in ECL UG Mines.**

(i) GM (P&P) apprised the Board regarding Composite Mining Plan for Sand Mining in River bed of Ajay River (December, 2014) for stowing purpose in ECL UG Mines. He also apprised the Board that the Sub-Committee of ECL Board for "Evaluation, Appraisal and Approval of Projects" in its meeting held on 28<sup>th</sup> July, 2015 has agreed and recommended the proposal for approval of the Board.

(ii) In view of above, Board after detailed deliberation approved the Composite Mining Plan for Sand Mining 2.00 M cum per year in River bed of Ajay River (December, 2014) as brought out in the agenda.

**281.03(W) Inviting Shri Samir Ranjan Ghosh, as Independent Technical Consultant to attend the 21<sup>st</sup> meeting of the Sub-Committee of ECL Board for "Evaluation, Appraisal and Approval of Projects," to be held on 28<sup>th</sup> July, 2015, at ECL HQ, Sanctoria.**

(i) It was apprised to the Board that the Sub-Committee of ECL Board for "Evaluation, Appraisal and Approval of Projects," in its 16<sup>th</sup> meeting held on 01.11.2014 advised to invite an Independent Technical Consultant, who has experience and expertise in Coal Mining for giving his independent and valued opinion on the proposals of new projects.

(ii) It was proposed to invite Shri Samir Ranjan Ghosh, as Independent Technical Consultant for giving his expert opinion on the agenda of Project Report of Nakrakonda Kumardihi-B OCP (April, 2015) in the 21<sup>st</sup> meeting of the Sub-Committee of ECL Board for "Evaluation, Appraisal and Approval of Projects," on 28<sup>th</sup> July, 2015. He is entitled for a Fee of ₹ 10,000/- (Rupees Ten Thousand) only along with travelling expenses and accommodation for the same.

(iii) In view of above, Board after detailed deliberation approved the proposal for Inviting Shri Samir Ranjan Ghosh, as Independent Technical Consultant for giving his expert opinion on the agenda of Project Report of Nakrakonda Kumardihi-B OCP (April, 2015) (Capacity: 3.00 MTY, Capital Investment: ₹ 181.3499 Crore under Outsourcing Option) in the 21<sup>st</sup> meeting of the Sub-Committee of ECL Board for "Evaluation, Appraisal and Approval of Projects," to be held on 28<sup>th</sup> July, 2015 and hereafter as and when required as brought out in the agenda.

**281.03(Y) Purushottampur OC Patch Part-I of Bankola Area by Outsourcing.**

(i) GM (P&P) apprised the Board regarding Purushottampur OC Patch Part-I by Outsourcing. He also apprised the Board that the Sub-Committee of ECL Board for "Evaluation, Appraisal and Approval of Projects" in its meeting held on 28<sup>th</sup> July, 2015 has agreed and recommended the proposal for approval of the Board.

(ii) In view of above, Board after detailed deliberation approved the Scheme for Purushottampur OC Patch Part-I of Bankola Area for extraction of 8.00 LT of coal and removal of 51.00 L cum of OB with capital investment of ₹ 4.55 Crore under Outsourcing Option along with acquisition of 58.02 Acres of land and offering 28 number of employment."

Original papers/file(s) on the proposal bearing Items No. 281.01(C), 281.02(C), 281.03(E), 281.03(R), 281.03(S), 281.03(W) & 281.03 (Y) have been handed over to your Department on 27.07.2015.

This is for your information and necessary action, please.

भवदीय/Yours faithfully,

*V R Reddy*  
(वी आर रेड्डी)

(V R Reddy)

महाप्रबंधक (वित्त)/कंपनी सचिव

General Manager (Finance)/Company Secretary

Copy to:  
GM (Proj)

-- for kind information & n.a.

*V R Reddy*  
6.8.15.

## ANNEXURE-6

No. 34012/(9)/2012-CPAM  
Government of India  
Ministry of Coal

New Delhi, dated 31<sup>st</sup> May 2012

To

1	Chairman, Coal India Limited, 10-Netaji Subash Road, Kolkata -700001 (W. B).
2	CMD, Eastern Coalfields Limited, Sanctoria, P.O. Dishergarh, Dist. Burdwan-713333, (W. B).
3	CMD, Central Coalfields Limited, Darbhanga House, Ranchi - 834001 (Jharkhand).
4	CMD, Northern Coalfields Limited, P.O. Singrauli, Distt. Sidhi 486889 (M. P).
5	CMD, Bharat Coking Coal Limited, Koyla Bhavan, Koyla Nagar, Dhanbad-826005 (Jharkhand).
6	CMD, Mahanadi Coalfields Limited, Jagriti Vihar, P.O. A. Katpali, Burla, UCE-768 020. Distt. Sambalpur (Orissa)
7	CMD, Western Coalfields Limited, Coal Estate, Civil Lines, Nagpur-440001 (Maharashtra).
8	CMD, South Eastern Coalfields Limited, Seepat Road, Bilaspur - 495001 (Chhasttigarh).
9	CMD, Central Mine Planning & Design Institute Limited, Gondwana Place, Kanke Road, Ranchi (Jharkhand).

Subject **Approval of Mine Plans / Mine Closure Plans of Coal / Lignite Projects.**

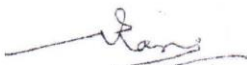
Sir

I am directed to state that Mining Plans/Mine Closure Plans of Coal India Limited (CIL) and its subsidiaries are not required to be approved by the Standing Committee at Ministry of Coal under MMDR Act for obtaining lease in case of areas of Nationalized mines acquired under Coal Bearing Areas [Acquisition and Development] Act. 1957. Mining Plans of projects of CIL and its subsidiaries are thus prepared by CMPDIL and the project report subsequently prepared and approved by the Board of CIL / Coal companies or Ministry of Coal as per delegated powers.

CIL, its subsidiaries, Neyveli Lignite Corporations Limited (NLC) and Singareni Collieries Company Limited (SCCL) are required to prepare Mining Plans for obtaining leases/renewal of mining leases for areas acquired under LA Act. for non-nationalized areas under MC Rule, 1960 and obtaining the approval of Standing Committee at Ministry of Coal.

As per Guidelines for preparation of Mine Closure Plan [dated January 2012] in the case of projects / mines of Govt. Companies the competent authority to approve the Mine Closure Plan [MCP] will be the authority competent to approve the Mining Plan.

Yours faithfully,

  
[V.S. Rana]

Under Secretary to the Govt. of India  
Phone No. 23073934

The information given in this report is not to be communicated either directly or indirectly to the press or to any person not holding an official position in the CIL/Government.

**FINAL  
ENVIRONMENTAL IMPACT ASSESSMENT  
&  
ENVIRONMENTAL MANAGEMENT PLAN  
(As per EIA Notification, 2006)  
for  
COMPOSITE PLAN OF SAND MINING IN THE  
RIVERBED OF DAMODAR RIVER**

(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

**Raniganj Coalfield  
Eastern Coalfields Limited**

**(August, 2015)**

**Prepared at**

**Regional Institute – I  
Central Mine Planning & Design Institute Ltd.  
(A Subsidiary of Coal India Ltd.)  
G. T. Road (West End)  
Asansol - 713 304**

(No change in Content from original submission to MoEF. Structure only revised as per the Generic Structure prescribed in the Annexure – III of the EIA Notification, 2006 following the observations of the EAC during meeting held on 27.10.2015, Agenda No. 2.22)

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## Chapter – 1

### Introduction

#### 1.1 Purpose of the Report

This EIA & EMP document has been prepared for obtaining Environmental Clearance for extraction of riverbed sand from 15 stations in Damodar River for the sole purpose of stowing in underground mines belonging to Eastern Coalfields Ltd., located in the Raniganj Coalfield in the state of West Bengal.

Most of the underground mines in ECL employ the Bord & Pillar method of working, where, after initial development, the standing pillars have to be extracted. These pillars can be extracted either by caving and allowing the surface to subside or stowing the de-coaled area with sand in cases where various surface features like buildings, roads, railway lines etc. are to be protected or safety of the mine or the workers has to be ensured against the danger from water and fire in the overlying seams. Due to growth of the population and various developmental works, considerable surface area is now covered with various surface features. Beside this, in most of mines, the top seams have already been worked and are filled up with water. Further, land acquisition for caving is becoming difficult with time. In the given circumstances, most of the pillar extraction in ECL has to be undertaken with sand stowing to ensure maximum recovery of coal blocked in pillars.

Thus, sand stowing is essential for safety of the mines as well as for conservation of coal. Pillar extraction needs to be undertaken with stowing to recover about 80% of coal blocked in pillars and it is imperative to maintain continued supply of sand in adequate quantity for ensuring safety and productivity of the underground mines.

About 3.5 million cubic meters per annum of sand is required for stowing purpose in the mines of ECL falling in Raniganj Coalfield. To meet this requirement, sand is obtained from Ajoy and Damodar rivers flowing on the northern and southern flanks of Raniganj Coalfield, respectively, as shown in Plate – 1. Sand from these two rivers is being extracted by ECL for the last 40 years on the basis of temporary leases / permits obtained from the Govt. of West Bengal.

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

This report covers the environmental impacts and suggests remedial measures for the proposal to mine 1.5 million cubic meters (peak extraction) of sand from 15 stations, with total leasehold area of 86.58 Ha in the riverbed of Damodar River flowing along the southern portion of the command area of ECL in Raniganj Coalfield as given in Table – I below and shown in Plate – 2A of the report.

Table - 1

**Stations in Damodar Riverbed where sand is being extracted for stowing purpose**

Station No.	P.S.	J.L. No.	Mouza	Gram Panchayat	Patch No.	Plot No.	Area (Acre)	Maximum extraction per year (M Cum)	Method of mining
1	Mejia	8	Gopalpur	Ardhagram	1	1094	6.00	0.030	Manual
2	Mejia	7	Ardhagram	Ardhagram	1	1324, 1325	46.00	0.360	Diesel Operated Dredger
3	Mejia	36	Gopalganj	Ardhagram	1	657	6.00	0.030	Manual
4	Saltora	42	Majit	Durlavpur	1	1731, 1736	10.00	0.050	Manual
5	Saltora	45	Sahebdanga	Durlavpur	1	1	25.00	0.150	Manual
6	Mejia	1	Bhara	Ardhagram	1	1819, 1824	6.00	0.120	Pontoon
					2	1629	4.00		
					3	1814	2.00		
					4	1	4.00		
7	Mejia	35	Anandpur	Durlavpur	1	1	4.50	0.020	Manual
8	Andal	51	Ramprasadpur	Ramprasadpur	1	1983, 665, 667 – 681, 683 – 685, 687 – 698, 804 - 819	13.20	0.050	Diesel Operated Dredger
9	Andal	50	Baska	Madanpur	1	1071, 1073, 1075, 1076, 1217, 1218, 1220 -1223, 1205, 1234		0.050	Electrically operated Scraper
10	Andal	48	Madanpur	Madanpur	1	3, 1215 - 1222, 2330, 2335, 2337 – 2339, 2454, 2520, 2547, 2578, 2579, 2444	33.66	0.150	Diesel Operated Dredger
11	Raniganj	31	Napur	Raniganj	1	1891, 2391, 2394 – 2396		0.060	-do-
12	Raniganj	12	Narayankuri	Raniganj	1	217, 231 - 233		0.060	-do-
13	Kulti	40	Sitalpur	Kulti Municipality	1	1620	24.50	0.180	Manual
					2	637	5.75		
14	Kulti	60	Chinakuri	Kulti Municipality	1	278	6.75	0.040	Pontoon & Manual
15	Neturia	95	Parebelia	Bhamuria	1	1, 901, 3567	16.50	0.100	Manual
Total							213.86	1.450	
							i.e 86.58 Ha	Peak : 1.5	

Source: J K Ropeways, ECL

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EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Sand mining at the above 15 stations is being carried out on the basis of Temporary Working Permits issued by the Govt. of West Bengal which is being renewed from time to time. However, the Assistant Secretary, Government of West Bengal, C&I department vide his memo no. 689 dated 09/10/2012 has advised fulfilling of all the formalities which includes obtaining Environmental Clearance from MoEF for grant of long – term lease for the stations earmarked for sand mining in the Damodar Riverbed.

Since all the 15 stations are in the same riverbed of Damodar River and are spread in stations over 42 kms of its course through the Raniganj Coalfield, it was felt that a composite application for sand mining in the Damodar Riverbed be made covering all the 15 stations rather than making piecemeal applications. The total area of these stations is 213.86 Acre (86.58 Ha) which is only a very small fraction of the total riverbed area of Damodar during its course along the Raniganj Coalfield.

## 1.2 Legal Framework Related to Sand Mining

- According to clause (e) of Section 3 of the MMDR Act, 1957 and as per Rule 70 of the MCR, 1960; sand is classified as minor mineral based on the end use.
- Mines and Minerals (Development & Regulation) Act, 1957, under section 15, empowers the State Government to make rules in respect of minor mineral.
- The Ministry of Environment, Forests and Climate Change (formerly Ministry of Environment & Forests), New Delhi in perpetuation of the directive of the Apex court in reference to the SLP (C) No. 729-731/2011, 21833/ 2009, 12498 – 499/ 2010, SLP (C) CC.... 16157/ 2011 & CC 18235/ 2011 issued guidelines on sand mining. The following recommendations are therefore made for the riverbed mining.
  - a. In the case of mining leases for riverbed sand mining, specific river stretches should be identified and mining permits/ lease should be granted stretch wise, so that the requisite safeguard measures are duly implemented and are effectively monitored by the respective Regulatory Authorities.
  - b. The depth of mining may be restricted to 3m / water level, whichever is less.

- c. For carrying out mining in proximity to any bridge and/ or embankment, appropriate safety zone should be worked out on case to case basis, taking into account the structural parameters, location aspects, flow rate etc. and no mining should be carried out in the safety zone so worked out. The safety zone is 45 m radius from any road / rail bridge or embankment.

### **1.3 Identification of Project & Project Proponent**

#### The Project

Sand for the sole purpose of stowing in underground mines is being extracted by ECL from Damodar Riverbed for the last 40 years on the basis of temporary leases / permits obtained from the Govt. of West Bengal. There are in all 15 stations of sand mining in the Damodar Riverbed spread in stations over 42 kms of its course along the southern boundary of the Raniganj Coalfield as shown in Table – 1 above. Since obtaining environment clearance is now mandatory for sand mining to continue, a composite plan for extracting sand from the Damodar Riverbed has been prepared covering all the 15 stations with combined mining leasehold area of 213.86 Acre (86.58 Ha). Total quantity of sand proposed to be extracted is 1.5 million m<sup>3</sup> per annum at peak level of extraction. Sand mining is carried out manually as well as mechanically at these stations. Out of these 15 stations, sand is extracted manually at 7 stations. Diesel operated dredgers have been deployed at 5 stations, electrically operated scrapers at 1 station and pontoons at 2 stations. Maximum depth up to which sand is extracted from riverbed is 2.0m (maximum depth of 1.5 m at manual average depth of about 1.7 m). It is then loaded on trucks and transported either directly to the linked underground mines or stored in depots at transfer points for subsequent transport to the mines. Sand extraction and transportation activities are outsourced to experienced contractors and carried out under the supervision and guidelines of ECL.

#### Raniganj Coalfield and ECL

Underground coal mining had been continuing in Raniganj Coalfields by numerous small owners in the past. Raniganj Coalfield remained the principal producer of coal in India in 19th Century and considerable period of the 20th Century.

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EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

In 1973, all Non-coking Coal Mines were nationalized and brought under Eastern Division of Coal Mines Authority Limited. In 1975 Eastern Coalfields Limited, a Subsidiary of Coal India Limited (C.I.L) was formed and inherited all the private sector coal mines of Raniganj Coalfields.

ECL has a mining leasehold area of 753.75 Sq.Kms and surface right exists over 237.18 Sq.Kms. It is situated in two States-West Bengal and Jharkhand. Raniganj Coalfield is spreading over Burdwan, Birbhum, Bankura and Purulia Districts in West Bengal. At present ECL has 108 no. of operating mines out of which 91 are underground mines, 9 are opencast mines and 8 are mixed (UG & OC). Only 3 of these mines (all 3 opencast), lie outside the Raniganj Coalfield. The existing manpower in Eastern Coalfields Limited as on 01.07.2013 was 72973.

Thus, the major area of operation of ECL is Raniganj Coalfield in Burdwan District bounded by Ajoy River in North and Damodar River in South. Parts of Raniganj Coalfield like Kasta are located on the North of Ajoy, Mugma on the west of Barakar River, while Kalidaspur/Ardhagram and Parbelia are on South of Damodar River.

ECL has produced 36 MT of coal during 2013-14. The share of production from UG mines, which has been falling steadily for several years, was around 20 %. One of the reasons for the decline in production from underground mines can be attributed to inadequate supply of stowing sand.

### Project Proponent

The J K Ropeways under ECL is the organization looking after the mining of sand for stowing purposes in the underground mines of ECL. It is headed by General Manager (J K Ropeways) who reports to Director (T), Operations. A separate chapter on J K Ropeways and its organisation is included as Chapter – 7.

The leases are maintained by the LRE Deptt. at ECL Headquarters headed by General Manager (LRE) reporting to Director (T), Planning. The environment cell operates under General Manager (Env) also reporting to Director (T), Planning.

#### **1.4 Brief Description of the Nature, Size & Location of the Project**

The proposal is for extraction of 1.5 million m<sup>3</sup> of sand per annum from 15 stations in the riverbed of Damodar River, flowing along the southern portion of Raniganj Coalfield. They fall under three districts, namely, Burdwan on the northern bank of Damodar and Bankura & Purulia on the southern. The combined lease area of the 15 stations is 213.86 Acre (86.58 Ha) spread over 42 kms of the course of Damodar along Raniganj Coalfield.

The salient features of the project are as below –

- The sand collection is restricted to 1.5 m to 2.0 m (average depth of about 1.7 m considering the total leasehold of 86.58 Ha) keeping maximum extraction depth of 1.5 m in case of manual extraction and maximum depth of 2 m in case of mechanized extraction. Details of machinery employed for mechanized extraction of sand is given in Chapter – 7.
- Sand extraction is confined to lean season (non – monsoon period) only. The removal is done without affecting the base flow of the river and in such manner as to maintain the smooth flow of the river during the monsoons. This helps in protection of the banks from erosion.
- The sand is mined from surface of river-bed manually at some stations and at others with the help of dredgers, scrapers and pontoons. Sand is extracted manually at 7 stations. Diesel operated dredgers have been deployed at 5 stations, electrically operated scrapers at 1 station and pontoons at 2 stations.
- There is no drilling and blasting involved.
- There is no rehabilitation & resettlement involved.
- There is no dust generation and liquid effluent generation during collection of sand.
- The transport of sand from the sand ghat is done through tippers covered with tarpaulin / thick plastic sheets.
- All necessary facilities like shelter, drinking water, safety equipment, etc are provided to the workers deployed for the collection of sand from the river bed.

### **1.5 Importance to the Country & Region**

Presently, sand is the only material suitable for stowing in underground mines. Fly – ash generated from power plants is being considered for use in stowing in place of sand and some pilot projects have been undertaken in this respect. However, its efficacy is yet to be proven and there are other practical difficulties involved which need to be sorted out. Thus, for the time being there is no feasible alternative to sand for the purpose of stowing.

Stowing not only provides protection against subsidence effectively if carefully done and makes underground mining safer especially in the case there are overlying workings, but is also more environment friendly as the overlying strata of aquifers do not get disturbed. Damage to aquifers can lower the water table in the mining area and cause degradation of agricultural lands. Sand stowing is, therefore, essential for safety as well as conservation and an environment friendly method of mining.

Thus, availability of sand is essential for safety of the mines as well as for conservation of coal. Pillar extraction needs to be undertaken with stowing to recover about 80% of coal blocked in pillars and it is imperative to maintain continued supply of sand in adequate quantity for ensuring safety and productivity of the underground mines. Also, with the gradual depletion of coal reserves close to the surface, deeper coal seams would have to be targeted in which mining will be possible by underground method only and the focus will have to shift from opencast to underground method of mining.

Apart from the mines providing livelihood for a major share of the population in the Raniganj Coalfield, the extraction of sand being outsourced, provides a source of livelihood for several local persons engaged in this trade.

### **1.6 Scope of the study – details of regulatory scoping carried out (As per Terms of Reference)**

TOR for the proposal has been issued by MoEF vide letter no. J – 11015 / 269 / 2012 – IA. II (M) dated 29 – 01 – 2014, copy of which is enclosed as Annexure – 1. Certain points of the TOR were found to be inapplicable for the concerned proposal of riverbed

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)  
sand – mining and hence not considered for elaboration in the EIA & EMP. These points  
are mentioned hereunder –

SI No. in TOR	Prescribed Terms of Reference not found applicable to this proposal
6	Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.
9	Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.
10	A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.
11	Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.
12	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.
18	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village located in the mine lease area will be shifted or not. The issues relating to shifting of Village including their R&R and socio-economic aspects should be discussed in the report.
21	The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.
22	Necessary clearance from the Competent Authority for withdrawal of requisite quantity of water for the Project should be provided.
23	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the

	Project, if any, should be provided.
25	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.
26	Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.

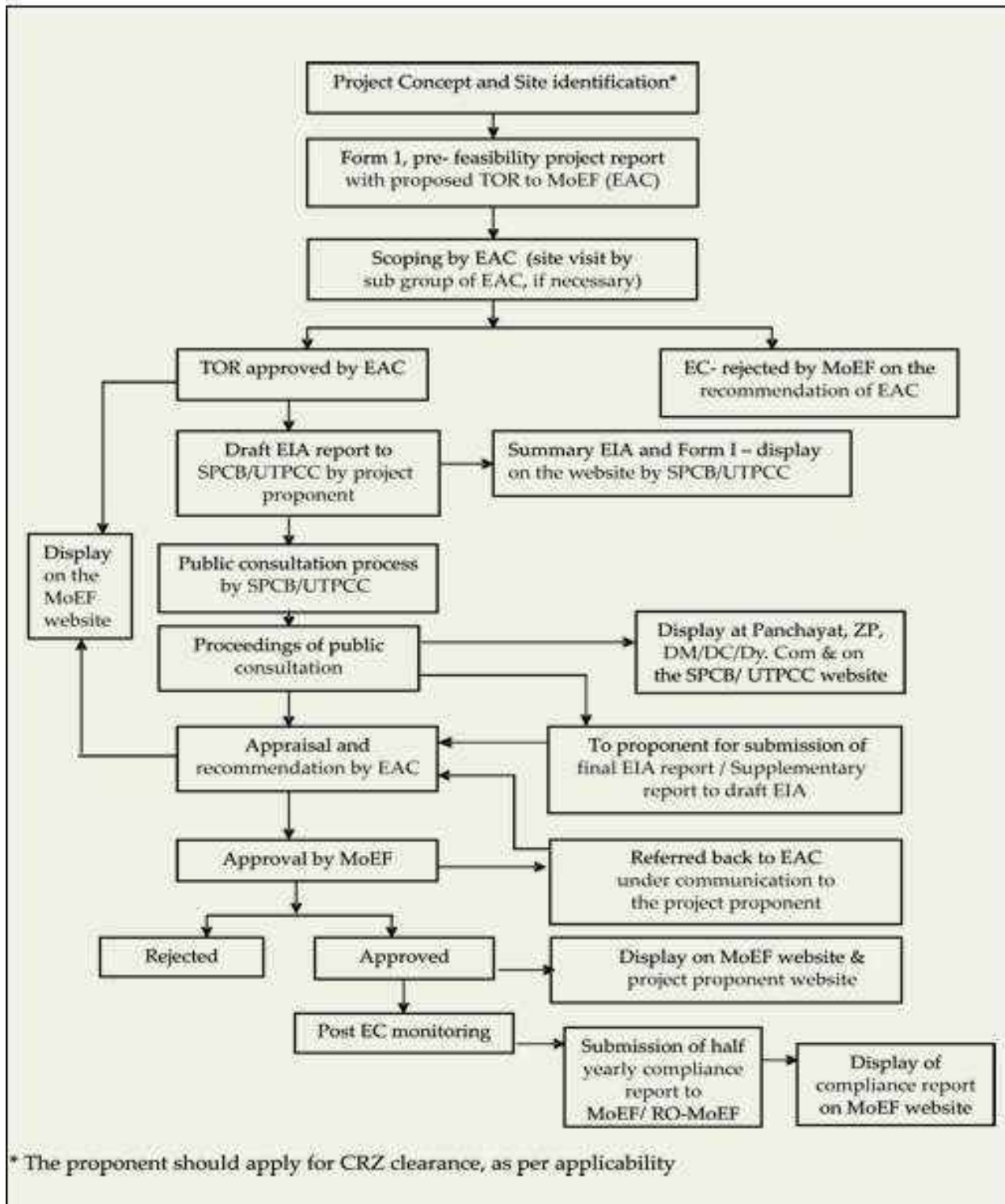
### 1.7 EIA Process

As per the Gazette Notification dated 14th September' 2006 and its subsequent amendments, the project is classified as "A" category project. The Environmental Clearance process for the proposed project will comprise of three stages. These stages in sequential order are: -

1. Scoping
2. Public consultation
3. Appraisal

The flow chart depicting these stages to obtain the prior Environmental Clearance for the project is as given below:-

EIA Flow Chart As per EIA Notification, 2006



Source: MoEF&CC

**1.8 Point Wise Compliance of TOR**

The application (Form - 1) of Terms of Reference (TOR) for sand mining project in Ajoy Riverbed of Eastern Coalfields Limited was submitted at MoEF&CC, New Delhi and the same was considered in the 11<sup>th</sup> Meeting of the Reconstituted Expert Committee (Mining) held during September, 25 – 27, 2013 and 13<sup>th</sup> meeting held on 12<sup>th</sup> November, 2013 was accorded approval vide letter no. J-11015/ 268/ 2012-IA.II (M) dated 29.01.2014 (**Annexure - I**). The point wise compliance of the TOR is as under: -

**Point Wise Compliance of TOR No. J-11015/268/2012-IA.II (M) dated 29 – 01 – 2014**

TO R No.	Terms of Reference	Compliance / Implementation / Plan																																																											
1	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification, 1994 came into force w.r.t. the highest production achieved prior to 1994.	Sand Extraction from the riverbed of Damodar River since 1990-91:- <table border="1"> <thead> <tr> <th>Year</th> <th>Quantity Extracted (Million m<sup>3</sup>)</th> <th>Year</th> <th>Quantity Extracted (Million m<sup>3</sup>)</th> </tr> </thead> <tbody> <tr><td>1990 – 91</td><td>1.26</td><td>2003 – 04</td><td>0.94</td></tr> <tr><td>1991 – 92</td><td>1.23</td><td>2004 – 05</td><td>0.89</td></tr> <tr><td>1992 – 93</td><td>1.18</td><td>2005 – 06</td><td>0.97</td></tr> <tr><td>1993 – 94</td><td>0.95</td><td>2006 – 07</td><td>0.90</td></tr> <tr><td>1994 – 95</td><td>0.95</td><td>2007 – 08</td><td>0.78</td></tr> <tr><td>1995 – 96</td><td>0.97</td><td>2008 – 09</td><td>0.82</td></tr> <tr><td>1996 – 97</td><td>0.93</td><td>2009 – 10</td><td>0.75</td></tr> <tr><td>1997 – 98</td><td>0.92</td><td>2010 – 11</td><td>0.72</td></tr> <tr><td>1998 – 99</td><td>0.93</td><td>2011 – 12</td><td>0.60</td></tr> <tr><td>1999 – 00</td><td>0.84</td><td>2012 – 13</td><td>0.74</td></tr> <tr><td>2000 – 01</td><td>0.98</td><td>2013 – 14</td><td>0.93</td></tr> <tr><td>2001 – 02</td><td>1.01</td><td>2014 - 15</td><td>0.85</td></tr> <tr><td>2002 – 03</td><td>1.19</td><td>2015 – 16 (till June)</td><td>0.14</td></tr> </tbody> </table> <ul style="list-style-type: none"> <li>➤ It can be seen from the above table that the highest extraction of 1.26 Million m<sup>3</sup> was made during the year 1990 – 91.</li> <li>➤ This level of extraction has not been exceeded post – 94</li> </ul>				Year	Quantity Extracted (Million m <sup>3</sup> )	Year	Quantity Extracted (Million m <sup>3</sup> )	1990 – 91	1.26	2003 – 04	0.94	1991 – 92	1.23	2004 – 05	0.89	1992 – 93	1.18	2005 – 06	0.97	1993 – 94	0.95	2006 – 07	0.90	1994 – 95	0.95	2007 – 08	0.78	1995 – 96	0.97	2008 – 09	0.82	1996 – 97	0.93	2009 – 10	0.75	1997 – 98	0.92	2010 – 11	0.72	1998 – 99	0.93	2011 – 12	0.60	1999 – 00	0.84	2012 – 13	0.74	2000 – 01	0.98	2013 – 14	0.93	2001 – 02	1.01	2014 - 15	0.85	2002 – 03	1.19	2015 – 16 (till June)	0.14
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2	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	Enclosed as <b>Annexure – II</b>																																																											
3	All documents including approved mine plan, EIA and public hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management and mining technology and should be in the name of lessee.	As desired all the documents including approved Mine Plan, EIA and Public Hearing are compatible with one another in terms of the mine lease area, production levels, waste generation and its management.																																																											
4	All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery/toposheet should be provided. Such an	All corner coordinates of the mining lease area and along with other ecological features of the study area (core and buffer zone) have been provided on Landsat-8 Data of year 2014 with high resolution. Enclosed as Enclosed as <b>Plate - 9</b> .																																																											

TO R No.	Terms of Reference	Compliance / Implementation / Plan																																				
	Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).																																					
5	Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/violation of the environmental or forest norms/ conditions?	<p><b>Environmental Policy:</b> CIL has a well laid down Environmental policy duly being executed under the supervision of Environmental Cell established in all subsidiaries of CIL.</p> <p><b>Non Compliance Reporting Procedure:</b> ECL has well defined procedures to bring into focus any infringement/ deviation/ violation of the environmental and forest norms.</p>																																				
	The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given.	ECL has well defined hierarchical system to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions.																																				
	The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large may also be detailed in the EIA report.	As per Organizational Chart. Refer Chapter - 8																																				
6	Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.	Not Applicable since project involves manual and mechanical sand removal from surface of Damodar riverbed without blasting																																				
7	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc should be for the life of the mine / lease period.	The study area (10 km core & buffer zone) around the mine lease from lease periphery has been considered. Enclosed as <b>Plate - 3</b> . It is a dry river bed sand mining project. Hence, there will be no waste generation during the mineral extraction.																																				
8	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and	<p>The land use of the study area showing forest area, agriculture land, water bodies, human settlement etc. has been given below:</p> <table border="1"> <thead> <tr> <th colspan="6">Buffer Zone Land Use of Damodar River</th> </tr> <tr> <th>Level – 1 : Land Use</th> <th>Area (Km2)</th> <th>% of Total</th> <th>Level – II : Land Use</th> <th>Area (Km2)</th> <th>% of Total</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Forest Land</td> <td rowspan="2">24.01</td> <td rowspan="2">2.15</td> <td>Dense Forest</td> <td>16.61</td> <td>1.49</td> </tr> <tr> <td>Open Forest</td> <td>7.40</td> <td>0.66</td> </tr> <tr> <td>Scrubs</td> <td>164.78</td> <td>14.76</td> <td>Scrubs</td> <td>164.78</td> <td>14.76</td> </tr> <tr> <td rowspan="2">Plantation Area</td> <td rowspan="2">27.90</td> <td rowspan="2">2.50</td> <td>Social Forestry</td> <td>25.83</td> <td>2.31</td> </tr> <tr> <td>Plantation on OB</td> <td>2.07</td> <td>0.19</td> </tr> </tbody> </table>	Buffer Zone Land Use of Damodar River						Level – 1 : Land Use	Area (Km2)	% of Total	Level – II : Land Use	Area (Km2)	% of Total	Forest Land	24.01	2.15	Dense Forest	16.61	1.49	Open Forest	7.40	0.66	Scrubs	164.78	14.76	Scrubs	164.78	14.76	Plantation Area	27.90	2.50	Social Forestry	25.83	2.31	Plantation on OB	2.07	0.19
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TO R No.	Terms of Reference	Compliance / Implementation / Plan					
	post operational phases and submitted. Impact, if any, of change of land use should be given.				Plantation on Backfill	0.00	0.00
					Orchard	0.00	0.00
		Agricultural Land	735.08	65.85	Crop Land	215.46	19.30
					Fallow Land	519.62	46.55
		Waste Land	34.21	3.07	Waste Land	13.93	1.25
					Sand Body	19.27	1.73
					Fly Ash Pond	1.01	0.09
		Mining Area	4.29	0.38	Coal Quarry	1.52	0.14
					Barren OB Dump	1.83	0.16
					Back Fill	0.05	0.00
					Coal Dump	0.09	0.01
					Water Filled Quarry	0.80	0.07
		Settlements	94.81	8.50	Urban Settlements	55.74	4.99
					Rural Settlements	15.79	1.42
					Industrial Settlements	23.28	2.09
Water Body	31.15	2.79	River / Ponds	31.15	2.79		
Total	1116.22	100.00	Total	1116.22	100.00		
		There is no National Park, Wildlife Sanctuary, Migratory routes of fauna and National Monument within 10 km periphery of the lease area and as per secondary data available. Map showing land use of the study area by using Satellite Imagery is enclosed as <b>Plate - 9</b> .					
9	Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.	Mining of sand is restricted to the Damodar riverbed and there is no overburden. No R&R issues are involved.					
10	A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal	There is no forest land involved in the mining lease area of Damodar Riverbed.					

TO R No.	Terms of Reference	Compliance / Implementation / Plan
	Committees.	
11	Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	There is no forest land involved in the mining lease area of Damodar Riverbed.
12	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.	There is no forest land involved in the mining lease area of Damodar Riverbed. The area is not covered under Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006. Hence, it is not applicable.
13	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	Out of total study area 1116.22 Km <sup>2</sup> , there is only 24.01 Km <sup>2</sup> of forest land which is largely open forest. Sand mining will not affect the nature of the forest land in any manner.
14	A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly detailed mitigative measures required, should be worked out with cost implications and submitted.	There is no such impact.
15	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Tiger/Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the State Wildlife Department/Chief Wildlife Warden under the Wildlife (Protection) Act, 1972 and copy furnished.	There is no National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Tiger/ Elephant Reserves (existing as well as proposed) is situated within 10km of the mining lease area as per the primary survey and the available secondary data.
16	A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall	A detailed biological study of flora and fauna (core and buffer zone) has been carried out and the outcome is given in the <b>Chapter - 3</b> .

TO R No.	Terms of Reference	Compliance / Implementation / Plan
	<p>be carried out. Details of flora and fauna, duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.</p>	
17	<p>Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Dept. Should be secured and furnished to the effect that the proposed mining activities could be considered.</p>	<p>The study area does not come into the list of critically polluted areas</p>
18	<p>R&amp;R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&amp;R Plan, the relevant State/National Rehabilitation &amp; Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village located in the mine lease area will be shifted or not. The issues relating to shifting of Village including their R&amp;R and socio-economic aspects should be discussed in the report.</p>	<p>There are no R &amp; R issues since there is no habitation in the Damodar Riverbed</p>

TO R No.	Terms of Reference	Compliance / Implementation / Plan
19	One season (non-monsoon) primary baseline data on ambient air quality (PM10, SO2 and NOx), water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the predominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the predominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.	One season (non-monsoon) primary baseline data on ambient air quality (PM10, SO2 and NOx), water quality, noise level, soil, flora and fauna and Site-specific meteorological data has been incorporated in Chapter – 3 of the EIA&EMP. Plan Showing Baseline Stations is enclosed as <b>Plate-5</b> Plan Showing Wind rose is enclosed as <b>Plate- 4</b> Refer Chapter – 3 for Baseline Data for Ambient Air.
20	Air quality modelling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modelling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.	Refer Chapter – 4 for Air Quality Modelling using. Plan showing Sand transport route is enclosed as <b>Plate – 6</b> Plan Showing Isopleths of PM10 is enclosed as <b>Plate – 7</b>
21	The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.	No water is required for sand mining. Water needed for spraying on sand transport roads is sourced from mine water from coal mines to which the sand supplies are linked
22	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	No water is required for sand mining. 'Consents' for discharge of mine water from coal mines are obtained from SPCB. This mine water after settling is used for dust suppression on sand transport roads
23	Description of water conservation measures proposed to be adopted in the Project should be given.	No water is discharged from sand mining

TO R No.	Terms of Reference	Compliance / Implementation / Plan		
	Details of rainwater harvesting proposed in the Project, if any, should be provided.			
24	Impact of the project on the water quality, both surface and groundwater should be assessed and necessary safeguard measures, if any required, should be provided.	<p><b>Impact of Sand Mining on Water (River water) Quality</b></p> <ul style="list-style-type: none"> <li>➤ There may be impact of the project activities on the water quality of the river due to mechanical extraction of sand as well as entry of trucks into the riverbed.</li> <li>➤ The main source of water pollution is diesel / hydraulic fluids which are used for operating the dredgers, scrapers etc.</li> <li>➤ The entry of trucks into the riverbed may also lead to inadvertent spillage of diesel / hydraulic fluids from these trucks.</li> <li>➤ These oils having been absorbed by the sand may find its way into the water course if allowed to remain there.</li> </ul> <p><b>Impact on Ground water</b></p> <ul style="list-style-type: none"> <li>➤ No impact of sand mining is envisaged on adjoining ground water quality.</li> </ul> <p><b>Impact on Water table / Hydrogeology</b></p> <ul style="list-style-type: none"> <li>➤ Sand will be extracted upto an average depth of 1.7 m. So, the sand extraction activities will not intersect the water table. Hence, there will be no impact on the water table.</li> </ul> <p><b>Impact on Hydrology</b></p> <ul style="list-style-type: none"> <li>➤ Two seasonal streams, Nunia Khal and Harial Jore, meets Damodar River in the downstream. These seasonal streams will remain unaffected due to sand extraction.</li> <li>➤ Rain water channels entering Damodar river will also remain unaffected due to sand extraction from the riverbed.</li> <li>➤ There is no proposal of diversion / modification of any stream or nallah on either side of the river and hence there will be no impact on the hydrology of the area.</li> </ul> <p><b>River water pollution control measures</b></p> <ul style="list-style-type: none"> <li>➤ Utmost caution will be taken to prevent spillage of diesel and other fluids.</li> <li>➤ Regular maintenance of trucks and other vehicles to minimize leakage of fluids.</li> <li>➤ Routine monitoring of river water samples to know the quality of water.</li> <li>➤ The sand within the area of the river bed on which the spillage occurs will be scraped out completely and transported outside along with the mined sand such no trace of the oils remain in the riverbed.</li> </ul>		
<b>SURFACE WATER QUALITY DATA</b>				
Sl. No.	Parameters	Resultant		IS:2296 – 1982 (Inland surface water) Class C
		Min	Max	
1.	pH	7.6	8.1	6.5 – 8.5
2.	Colour, Hazen Units	10	18	300
3.	Suspended solids, mg/l	10	60	-
4.	Total Dissolved solids, mg/l	300	528	1500
5.	Dissolved Oxygen, mg/l	5.1	6.9	4.0 min
6.	BOD - 3 days, 27oC, mg/l	1.6	4.6	3.0
7.	Chloride (as Cl) , mg/l	32	90	600
8.	Flouride (as F) , mg/l	0.56	0.68	1.5
9.	Sulphate (as SO4) , mg/l	18	52	400

TO R No.	Terms of Reference		Compliance / Implementation / Plan		
	10.	Nitrate (as NO <sub>3</sub> ) , mg/l	10	22	50
11.	Phenols (as C <sub>6</sub> H <sub>5</sub> OH) , mg/l	<0.001	<0.001	0.005	
12.	Chromium (as Cr+6) , mg/l	<0.01	0.03	0.05	
13.	Copper (as Cu) , mg/l	<0.02	0.03	1.5	
14.	Selenium (as Se) , mg/l	<0.01	<0.01	0.05	
15.	Arsenic (as As) , mg/l	<0.01	<0.01	0.2	
16.	Cadmium (As Cd) , mg/l	<0.01	<0.01	0.01	
17.	Lead (as Pb) , mg/l	<0.05	<0.05	0.1	
18.	Zinc (as Zn) , mg/l	0.02	0.03	15	
19.	Iron (as Fe) , mg/l	0.14	0.34	5	
20.	Mineral Oil, mg/l	< 0.01	< 0.01	<0.01	
21.	Total Coliform organisms, MPN/100ml	17	2900	5000	

All the values were found to be well within the IS: 2296 class C norms.

25	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.	Since sand extraction is limited to 2.0m from the surface of the Damodar riverbed (average depth 1.7 m) water table of the area is not intersected. Average GWL from 2006 to 2012 & R. L. of surrounding wells of the riverbed is given below:
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**Average GWL from 2006 to 2011 & R. L. of the riverbed surrounding wells**

Well no	Location	MP in m	Depth (m)	Dia (m)	R.L. (G.L.) in m	Owner	Average GWL from 2006 to 2011	
							Pre-Monsoon	Post – Monsoon
NKS-28	Srerampur	0.70	6.95	1.20	66	Panchayet	6.90	3.53
NKS-30A	Baska gram	0.70	11.50	1.80	71	Panchayat	11.05	10.00
NKS-31	Napur	0.60+0.25	8.65	1.85	79	Panchayet	5.54	3.59
NKS-32	Ballavpur more	0.65+0.10	22.10	1.95	79	Govt	9.32	3.91
NKS-34	Kankardanga	0.55	17.75	1.95	83	Panchayet	3.47	2.72
NKS-69	Mejia More	0.86	5.68	1.20	78	Panchayat	5.22	3.87
NKS-70	Jemua village	0.60	16.35	1.40	85	Panchayat	13.00	7.07
NKS-71	Kalidaspur	0.65	5.33	2.50	99	Panchayat	3.94	2.53
NKS-73	Ardhgram	0.70	9.58	1.27	82	Panchayat	9.48	7.18
NKS-74	Dang Mejia	0.59	9.64	1.25	79	Panchayat	5.85	2.05
NKS-75	Telenda village	0.82	8.75	1.32	73	Panchayat	7.49	3.84
NKS-76	Purunia	0.63	6.30	1.22	73	Panchayat	6.63	4.05
NKS-77	Debogram	0.82	6.65	1.30	68	Panchayat	6.18	3.85

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

TO R No.	Terms of Reference			Compliance / Implementation / Plan					
		NKS-88	Old Egara	0.84	23.60	1.80	84	Panchayat	12.63
	BK-10	Nimcha village	0.65	13.64	3.05	99	Govt , domestic	12.43	4.98
	BK-12	Chelod	0.80	26.45	1.80	101	Govt , domestic	6.68	3.16
	BK-13	Tirat	0.92	7.94	2.00	89	Govt , domestic	5.97	3.43
	K-66	Balarampur	0.45	10.60	1.15	124	Panchayat	10.10	4.00
	K-67 A	Saburband	0.80	11.70	1.35	110	Panchayat	11.40	4.10
	K-71	Rataura village	0.80	16.20	1.25	105	Panchayat	6.05	3.00
26	Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.			No other streams pass through / confluence with the Damodar riverbed except ephemeral streams during the rainy season. No diversions are required / proposed. There is no impact on hydrology of the river due to sand extraction					
27	Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and bgl. A schematic diagram may also be provided for the same.			See Compliance of TOR No. – 25 above for groundwater table. Sand Extraction is limited to 2.0m. Information on site elevation is given below:					
	Information on Site Elevation								
	Location No.	Latitude	Longitude	Pre-monsoon Elevation (m)	Post-monsoon Elevation (m)				
	1	23°40'55.39"N	86°49'49.49"E	89.94	90.12				
	2	23°40'46.12"N	86°49'50.07"E	91.87	91.75				
	3	23°40'44.18"N	86°50'51.97"E	89.73	90.16				
	4	23°40'32.85"N	86°51'1.30"E	91.08	91.23				
	5	23°37'49.33"N	86°57'2.33"E	83.42	84.18				
	6	23°37'43.53"N	86°59'27.38"E	82.15	83.44				
	7	23°37'37.55"N	86°59'21.92"E	84.91	85.17				
	8	23°36'55.22"N	87° 1'53.61"E	80.16	80.88				
	9	23°36'40.78"N	87° 3'15.95"E	78.30	79.25				
	10	23°36'30.51"N	87° 3'27.65"E	77.11	78.63				
	11	23°35'44.69"N	87° 4'37.62"E	73.98	74.72				
	12	23°35'30.13"N	87° 5'21.14"E	76.85	78.04				
	13	23°35'21.53"N	87° 5'37.88"E	73.14	73.86				
	14	23°35'21.64"N	87° 5'26.73"E	76.19	76.12				
	15	23°34'32.83"N	87° 6'51.93"E	72.23	74.61				
	16	23°34'7.21"N	87° 9'4.40"E	69.17	70.55				
	17	23°33'58.87"N	87° 9'18.40"E	72.96	74.28				
	18	23°33'42.30"N	87° 9'18.03"E	76.31	76.24				
	19	23°33'49.24"N	87°10'50.08"E	68.25	70.13				
	20	23°33'52.90"N	87°11'6.18"E	67.36	68.90				
	21	23°33'23.52"N	87°11'54.18"E	67.32	68.85				
28	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form			No plantations are proposed in the Damodar riverbed					

TO R No.	Terms of Reference	Compliance / Implementation / Plan
	(indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the project.	
29	Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered.	Chapter – 4, Section – 4.2, Plate – 6
30	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA report.	According to Mines Rule 1955, following temporary infrastructure facilities will be provided:- <ul style="list-style-type: none"> <li>➤ Mine Office (On-site and Offsite);</li> <li>➤ Rest Shelter;</li> <li>➤ Drinking Water Facilities;</li> <li>➤ Conservancy Facilities;</li> <li>➤ First-Aid Facilities.</li> </ul>
31	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.	<ul style="list-style-type: none"> <li>➤ Excavation of sand will be done only up to 2.0m from the river bed or above the ground water table.</li> <li>➤ River will be replenished by sediments during rainy season.</li> <li>➤ However, it will be ensured that river bed surface is uniformly extracted so that there is no ponding or irregular water accumulation in pits.</li> <li>➤ Hence, no reclamation and restoration activity has been carried out.</li> </ul>
32	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given.	No plantations proposed in the Damodar Riverbed
33	Occupational Health impacts of the Project should be anticipated and	Occupational health impacts of river bed sand mining is very remote. However, such evidences have not been proven so far, though the mining is

TO R No.	Terms of Reference	Compliance / Implementation / Plan
	the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP.	<p>undertaken for years. No records for any occupational health problems were reported during the primary survey. However, in case of health implications will be reported, following mitigation measures will be adopted:-</p> <ul style="list-style-type: none"> <li>➤ All employees will be trained, educated and encouraged to follow best and safe work practices in their working environment.</li> <li>➤ All workers will be subjected to Initial Medical Examination as per Mines Rule 1955 both at times of appointment and Periodical Medical Examination at least once in five years.</li> <li>➤ First aid trained personnel's, first aid stations fully equipped as per Mines Rules 1955 and first aid kits will be made available all the time.</li> <li>➤ A regular schedule will be programmed for monitoring health of the workers and staff associated with the sand mining operations and other connected activities for identifying occupational diseases etc. in time and initiating remedial measures.</li> <li>➤ Each mine has a well-equipped dispensary along with Regional Hospitals for the treatment of the mine personnel.</li> <li>➤ These facilities are being extended to the contractual personnel also as well as to the local population.</li> <li>➤ Mobile dispensaries are used to monitor the health of the population around the area and regular health camps are being held.</li> <li>➤ Budget is allocated for occupational health amounting Rs- 30.0 lakhs/annum.</li> </ul>
34	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	<p>The impact zone was identified based on incremental GLC's (Ground Level Concentrations) of PM<sub>10</sub>. It was observed to be 1 – 2 km around the mineral transportation routes. To minimize the impact due to dust generation following precautions will be taken:-</p> <ul style="list-style-type: none"> <li>➤ The transportation route will be tried to bypass the villages falling in the impact zone.</li> <li>➤ Plantation will be carried out along the road.</li> <li>➤ Due to unavoidable circumstances, if villages cannot be bypass and vehicles have to move through the villages, the speed of the vehicles will be maintained low (25kmph). It will minimize the dust generation.</li> <li>➤ However, due to low speed more vehicular exhausts will generate. To control the vehicular exhausts PUC certified vehicles will be used.</li> <li>➤ Budget is allocated for community development amounting Rs- 30.0 lakhs/annum.</li> </ul>
35	Measures of socio economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	<p><b>Flood Control</b></p> <ul style="list-style-type: none"> <li>➤ Siltation leads to the aggradation of the river bed, decreasing the carrying capacity of the river and thus increases the probability of flooding of banks during monsoons.</li> <li>➤ Removal of sand from the riverbed is beneficial from the point of view of flood control.</li> </ul> <p><b>Employment Potential</b></p> <ul style="list-style-type: none"> <li>➤ Also, since most of the work of sand extraction (except supervision and controls) is outsourced, the various activities provide employment to a very large workforce of nearly 6000 local persons round the year except during monsoons when sand mining is suspended.</li> </ul>
36	Detailed environmental management plan to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if	<p>No impact on land use of the riverbed. Occupational health impacts of river bed sand mining is very remote. However, such evidences have not been proven so far, though the mining is undertaken for years. No records for any occupational health problems were reported during the primary survey.</p>

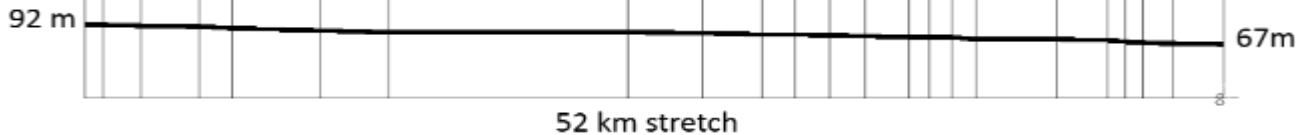
TO R No.	Terms of Reference	Compliance / Implementation / Plan																												
	any, occupational health impacts besides other impacts specific to the proposed Project.																													
37	Public hearing points raised and commitment of the project proponent on the same along with time bound action plan to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.	Public hearing points raised and commitment of the project proponent on the same along with time bound action plan to implement the same is incorporated in Chapter – 6.																												
38	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the project should be given.	Nil																												
39	The cost of the project (capital cost and recurring cost) as well as the cost towards implementation of EMP should clearly be spelt out.	<p>The annual recurring cost of environment management is tabulated below –</p> <table border="1"> <thead> <tr> <th>S I. N o</th> <th>Particulars of Revenue Expenditure</th> <th>Total Annual Cost (Rs in Lakhs)</th> <th>Unit Cost (Rs/m<sup>3</sup>)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Pollution control</td> <td>45.00</td> <td>3.00</td> </tr> <tr> <td>2</td> <td>Environmental monitoring</td> <td>30.00</td> <td>2.00</td> </tr> <tr> <td>3</td> <td>Occupational health</td> <td>30.00</td> <td>2.00</td> </tr> <tr> <td>4</td> <td>Avenue plantation along sand transport route</td> <td>6.00</td> <td>0.40</td> </tr> <tr> <td>5</td> <td>Community development</td> <td>30.00</td> <td>2.00</td> </tr> <tr> <td></td> <td>Total</td> <td>171.00</td> <td>9.40</td> </tr> </tbody> </table>	S I. N o	Particulars of Revenue Expenditure	Total Annual Cost (Rs in Lakhs)	Unit Cost (Rs/m <sup>3</sup> )	1	Pollution control	45.00	3.00	2	Environmental monitoring	30.00	2.00	3	Occupational health	30.00	2.00	4	Avenue plantation along sand transport route	6.00	0.40	5	Community development	30.00	2.00		Total	171.00	9.40
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5	Community development	30.00	2.00																											
	Total	171.00	9.40																											
40	Details of replenishment studies	Refer Chapter – 6.																												
41	Details of Transportation of mined out materials as per the Indian Road Congress for both the ways (loaded as well as unloaded trucks) load and its impact on Environment	Chapter – 4, Section – 4.2.2																												
42	Proper species specific Conservation plan for Schedule-I and II species	Not required																												
43	Impact of mining on plankton	No impact																												
44	Details of mining activity to be provided w.r.t Block Wise/ Calendar wise/ Zone wise, as the mine lease area is having a long stretch	Chapter – 2																												
45	Details of Gradient of river bed to be provided	<p><b>Damodar River Information</b></p> <ul style="list-style-type: none"> <li>➤ The entire Damodar valley can be divided into the upper, middle and lower valleys according to the gradient.</li> <li>➤ The upper valley with a length of 240 kms lies between 600 m and 190 m above MSL. Here the river has a gradient of 1.89 m per km. The Barakar River meets Damodar at this point.</li> <li>➤ The middle valley stretches here onwards for a length of 160 km and lies between 190 m and 90 m above MSL with a gradient of 0.57 m per km.</li> </ul>																												

TO R No.	Terms of Reference	Compliance / Implementation / Plan
		<ul style="list-style-type: none"> <li>➤ The river begins its course through Raniganj Coalfield from the beginning of the point of confluence with Barakar. The entire riverbed in this region is covered with fine sand due to high rate of siltation.</li> <li>➤ In the next phase of 145 km of the lower valley, till its confluence with Hooghly, the gradient of the riverbed is 0.19 m per km.</li> <li>➤ Regular flooding of the Damodar River had caused it to be labeled the "River of Sorrows", and following a devastating flood in 1943, the Government of West Bengal formed a board of inquiry to address the issue.</li> </ul>

**Gradient of the Damodar River**



**Overall Gradient 1 in 2080**



46	Details of excavation schedule & sequential mining plan to be indicated	Peak extraction limit of 1.5 Mm <sup>3</sup> will not be exceeded. Refer Section – 2.2
47	Mining Plan shall be prepared carefully, dividing lease area into manageable blocks to ensure scientific and systematic mining of minor minerals	<ul style="list-style-type: none"> <li>➤ The mining plan has been prepared carefully and scientifically.</li> <li>➤ Systematic mining will be adopted for resource conservation, safety of workers, minimization of degradation of surrounding environment, etc. which will overall help in sustainable development.</li> <li>➤ Lease area has been divided into 15 sand mining stations for the ease of operation, management and supervision of mining operation which</li> </ul>

TO R No.	Terms of Reference			Compliance / Implementation / Plan						
				will overall ensure scientific and systematic mining. ➤ Sand mining stations and patches are shown below:						
<u>Stations in Damodar Riverbed where sand is being extracted for stowing purpose</u>										
Station No.	P.S.	J.L. No.	Mouza	Gram Panchayat	Patch No.	Plot No.	Area (Acre)	Maximum extraction per year (M Cum)	Method of mining	
1	Mejia	8	Gopalpur	Ardhagram	1	1094	6.00	0.030	Manual	
2	Mejia	7	Ardhagram	Ardhagram	1	1324, 1325	46.00	0.360	Diesel Operated Dredger	
3	Mejia	36	Gopalganj	Ardhagram	1	657	6.00	0.030	Manual	
4	Saltora	42	Majit	Durlavpur	1	1731, 1736	10.00	0.050	Manual	
5	Saltora	45	Sahebdanga	Durlavpur	1	1	25.00	0.150	Manual	
6	Mejia	1	Bhara	Ardhagram	1	1819, 1824	6.00	0.120	Pontoon	
					2	1629	4.00			
					3	1814	2.00			
					4	1	4.00			
7	Mejia	35	Anandpur	Durlavpur	1	1	4.50	0.020	Manual	
8	Andal	51	Ramprasadpur	Ramprasadpur	1	1983, 665, 667 – 681, 683 – 685, 687 – 698, 804 - 819	13.20	0.050	Diesel Operated Dredger	
						1071, 1073, 1075, 1076, 1217, 1218, 1220 - 1223, 1205, 1234				
9	Andal	50	Baska	Madanpur	1	1071, 1073, 1075, 1076, 1217, 1218, 1220 - 1223, 1205, 1234	13.20	0.050	Electrically operated Scraper	
10	Andal	48	Madanpur	Madanpur	1	3, 1215 - 1222, 2330, 2335, 2337 – 2339, 2454, 2520, 2547, 2578, 2579, 2444	33.66	0.150	Diesel Operated Dredger	

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

TO R No.	Terms of Reference				Compliance / Implementation / Plan					
	11	Raniganj	31	Napur	Raniganj	1	1891, 2391, 2394 – 2396		0.060	-do-
12	Raniganj	12	Narayankuri	Raniganj	1	217, 231 - 233		0.060	-do-	
13	Kulti	40	Sitalpur	Kulti Municipality	1	1620	24.50	0.180	Manual	
					2	637	5.75			
14	Kulti	60	Chinakuri	Kulti Municipality	1	278	6.75	0.040	Pontoon & Manual	
15	Neturia	95	Parebelia	Bhamuria	1	1, 901, 3567	16.50	0.100	Manual	
	Total						213.86	1.450		
							i.e 86.58 Ha	Peak : 1.5		
Source: J K Ropeways, ECL										
48	The base line data shall be collected so as to represent the whole mine lease area				Baseline data represents whole lease area.					
A	All documents to be properly referenced with index and continuous page numbering				Complied					
B	Where data are presented in the report, especially in tables, the period in which the data were collected and the source should be indicated				Indicated					
C	Where the documents provided are in a language other than English, an English translation should be provided				Whole document is in English language					
D	The Questionnaire for environmental appraisal of industrial projects as devised earlier by the Ministry shall also be filled and submitted				Filled and submitted along with Final EIA&EMP					
E	While preparing the EIA report, the instructions for the proponents and instructions for the consultants issued by MoEF vide O.M. No. J-11013/41/2006-IA. II(I) dated 4th August, 2009, which are available on the website of this Ministry, should also be followed.				Complied					
F	Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the F.R for securing the TOR) should be brought to the attention of MoEF with reasons for such changes and permission should be sought, as				No such change has been made.					

TO R No.	Terms of Reference	Compliance / Implementation / Plan
	the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation.	
G	As per the circular no. J-11011/618/2010-IA.II(I) dated 30.5.2012, you are requested to submit certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project by the Regional Office of Ministry of Environment & Forests, if applicable.	Will be submitted after obtaining Environmental Clearance.
5	The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.	Complied

### 1.9 Post Environmental Clearance Monitoring

The project management will submit a half yearly compliance report in respect of stipulated prior Environmental Clearance terms and conditions after half – yearly closings on 30<sup>th</sup> September and 31<sup>st</sup> March every year. The latest compliance report will be displayed on the website of the concerned regulatory authority.

### 1.10 Generic Structure Of Environmental Impact Assessment

In terms of EIA Notification of the MoEF&CC, New Delhi dated 14<sup>th</sup> September, 2006 and its subsequent amendments, the generic structure of the EIA document is as under:

-

#### Generic Structure of EIA Document

S. No.	Chapters	Page Nos.
1	Introduction	

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

2	Project Description	
3	Description of the Environment	
4	Anticipated Environmental Impact & Mitigation Measures	
5	Environmental Monitoring Programme	
6	Additional Studies	
7	Project Benefits	
8	Environmental Management Plan	
9	Summary & Conclusion	
10	Disclosure of Consultant Engaged	

## Chapter – 2

### Project Description

#### 2.1 Proposal

Sand stowing is essential for safety of the mines as well as for conservation of coal. Pillar extraction needs to be undertaken with stowing to recover about 80% of coal blocked in pillars and it is imperative to maintain continued supply of sand in adequate quantity for ensuring safety and productivity of the underground mines.

About 3.5 million cubic meters per annum of sand is required for stowing purpose in the mines of ECL falling in Raniganj Coalfield. To meet this requirement, sand is obtained from Ajoy and Damodar rivers flowing on the northern and southern flanks of Raniganj Coalfield, respectively. Sand from these two rivers is being extracted by ECL for the last 40 years on the basis of temporary leases / permits obtained from the Govt. of West Bengal.

This report covers the environmental impacts and suggests remedial measures for the proposal to mine 1.5 million cubic meters (peak extraction) of sand from 15 stations, with total leasehold area of 86.58 Ha in the riverbed of Damodar River flowing along the southern portion of the command area of ECL in Raniganj Coalfield as given in Table – I below and shown in Plate – 2A of the report.

**Table - 1**  
**Stations in Damodar Riverbed where sand is being extracted for stowing purpose**

Station No.	P.S.	J.L. No.	Mouza	Gram Panchayat	Patch No.	Plot No.	Area (Acre)	Maximum extraction per year (M Cum)	Method of mining
1	Mejia	8	Gopalpur	Ardhagram	1	1094	6.00	0.030	Manual
2	Mejia	7	Ardhagram	Ardhagram	1	1324, 1325	46.00	0.360	Diesel Operated Dredger
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5	Saltora	45	Sahebdanga	Durlavpur	1	1	25.00	0.150	Manual
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					2	1629	4.00		
					3	1814	2.00		
					4	1	4.00		
7	Mejia	35	Anandpur	Durlavpur	1	1	4.50	0.020	Manual
8	Andal	51	Ramprasadpur	Ramprasadpur	1	1983, 665, 667	13.20	0.050	Diesel

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Station No.	P.S.	J.L. No.	Mouza	Gram Panchayat	Patch No.	Plot No.	Area (Acre)	Maximum extraction per year (M Cum)	Method of mining
						- 681, 683 – 685, 687 – 698, 804 - 819			Operated Dredger
9	Andal	50	Baska	Madanpur	1	1071, 1073, 1075, 1076, 1217, 1218, 1220 -1223, 1205, 1234,		0.050	Electrically operated Scraper
10	Andal	48	Madanpur	Madanpur	1	3, 1215 - 1222, 2330, 2335, 2337 – 2339, 2454, 2520, 2547, 2578, 2579, 2444	33.66	0.150	Diesel Operated Dredger
11	Raniganj	31	Napur	Raniganj	1	1891, 2391, 2394 – 2396		0.060	-do-
12	Raniganj	12	Narayankuri	Raniganj	1	217, 231 - 233		0.060	-do-
13	Kulti	40	Sitalpur	Kulti Municipality	1	1620	24.50	0.180	Manual
					2	637	5.75		
14	Kulti	60	Chinakuri	Kulti Municipality	1	278	6.75	0.040	Pontoon & Manual
15	Neturia	95	Parebelia	Bhamuria	1	1, 901, 3567	16.50	0.100	Manual
	Total						213.86	1.450	
							i.e 86.58 Ha	Peak : 1.5	

Source: J K Ropeways, ECL

Sand mining at the above 15 stations is being carried out on the basis of Temporary Working Permits issued by the Govt. of West Bengal which is being renewed from time to time. However, the Assistant Secretary, Government of West Bengal, C&I department vide his memo no. 689 dated 09/10/2012 has advised fulfilling of all the formalities which includes obtaining Environmental Clearance from MoEF for grant of long – term lease for the stations earmarked for sand mining in the Damodar Riverbed.

Since all the 15 stations are in the same riverbed of Damodar River and are spread in stations over 42 kms of its course through the Raniganj Coalfield, it was felt that a composite application for sand mining in the Damodar Riverbed be made covering all the 15 stations rather than making piecemeal applications. The total area of these stations is 213.86 Acre (86.58 Ha) which is only a very small fraction of the total riverbed area of Damodar during its course along the Raniganj Coalfield.

## 2.2. Sand Extraction from the riverbed of Damodar River since 1990-1991

The year-wise sand extraction from the Damodar Riverbed since year 1990-1991 has been tabulated below.

Year	Quantity Extracted (Million m <sup>3</sup> )	Year	Quantity Extracted (Million m <sup>3</sup> )
1990 – 91	1.26	2003 – 04	0.94
1991 – 92	1.23	2004 – 05	0.89
1992 – 93	1.18	2005 – 06	0.97
1993 – 94	0.95	2006 – 07	0.90
1994 – 95	0.95	2007 – 08	0.78
1995 – 96	0.97	2008 – 09	0.82
1996 – 97	0.93	2009 – 10	0.75
1997 – 98	0.92	2010 – 11	0.72
1998 – 99	0.93	2011 – 12	0.60
1999 – 00	0.84	2012 – 13	0.74
2000 – 01	0.98	2013 – 14	0.93
2001 – 02	1.01	2014 - 15	0.85
2002 – 03	1.19	2015 – 16 (till June)	0.14

Source: ECL

It can be seen from the above table that the highest extraction of 1.26 Million m<sup>3</sup> was made during the year 1990 – 91. This level of extraction has not been exceeded post – 94.

## 2.3 Method of Mining

The proposal is for peak extraction of 1.5 million m<sup>3</sup> of sand per annum from 15 stations in the riverbed of Damodar River, flowing along the southern portion of Raniganj Coalfield. They fall under three districts, namely, Burdwan on the northern bank of Damodar and Bankura & Purulia on the southern of West Bengal as shown in Plate - 1. The combined lease area of the 15 stations is 213.86 Acre (86.58 Ha) spread over 42 kms of the course of Damodar along Raniganj Coalfield.

The salient features of the project are as below –

- The sand collection is restricted to 1.5 m to 2.0 m (average depth of about 1.7 m considering the total leasehold of 86.58 Ha) keeping maximum extraction depth of 1.5 m in case of manual extraction and maximum depth of 2 m in case of

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EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year) mechanized extraction. Details of machinery employed for mechanized extraction of sand is given in Chapter – 7.

- Sand extraction is confined to lean season (non – monsoon period) only. The removal is done without affecting the base flow of the river and in such manner as to maintain the smooth flow of the river during the monsoons. This helps in protection of the banks from erosion.
- The sand is mined from surface of river-bed manually at some stations and at others with the help of dredgers, scrapers and pontoons. Sand is extracted manually at 7 stations. Diesel operated dredgers have been deployed at 5 stations, electrically operated scrapers at 1 station and pontoons at 2 stations.
- There is no drilling and blasting involved.
- There is no rehabilitation & resettlement involved.
- There is no dust generation and liquid effluent generation during collection of sand.
- The transport of sand from the sand ghat is done through tippers covered with tarpaulin / thick plastic sheets.
- All necessary facilities like shelter, drinking water, safety equipment, etc are provided to the workers deployed for the collection of sand from the river bed.

## 2.4 Sand Availability

Sand is available in the riverbed of Damodar River up to depths ranging from 8 m to 17 m as per studies carried out. As per the sand replenishment studies carried out for this proposal (please refer Chapter – 3), the annual replenishment is up to 1.9 m of sand which gets evenly distributed on the riverbed. However, sand extraction is required up to depths of 1.5 to 2.0 m (average depth of 1.7 m within leasehold) in order to achieve the targeted capacity of 1.5 million m<sup>3</sup>.

The annual minable reserves have been accordingly calculated as under -

### Calculation of reserves

- a. For 42 km stretch of Damodar River flowing through Raniganj Coalfield
  - ✓ Average depth of sand in the riverbed – 12.5 m

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EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

- ✓ Average width of riverbed – 1500 m
- ✓ Stretch of river available for sand extraction – 42 kms
- ✓ Total sand reserves =  $42000 \times 1500 \times 12.5 = 787.5$  million m<sup>3</sup>
- ✓ Total mineable sand (up to 3 m depth) =  $42000 \times 1500 \times 3 = 189$  million m<sup>3</sup>
- b. For the proposed riverbed area of 86.58 Ha
  - ✓ Total area of sand mining leasehold = 86.58 Ha
  - ✓ Total sand reserves =  $865800 \times 12.5 = 10.82$  million m<sup>3</sup>
  - ✓ Total mineable sand (up to 3 m depth) =  $865800 \times 3 = 2.6$  million m<sup>3</sup>
  - ✓ Total sand proposed to be mined annually at peak level with due regard to replenishment =  $865800 \times 1.7\text{m (average)} = 1.5$  million m<sup>3</sup>
  - ✓ Total sand replenishment / annum (refer Chapter – 3) = 1.65 million m<sup>3</sup>

It can be observed from the above calculation that ECL will be extracting less than the annual replenished quantity of sand.

## **2.5 Introduction of J K Ropeway**

J. K. Ropeways was installed by erstwhile Coal Board to collect/gather sand from Damodar and Ajoy rivers and transport the same to different coal mines for sand stowing purposes. Sand stowing is considered necessary for the proper conservation of coal reserves and safety of mines against fire, strata control, etc. JK Ropeways has been functioning since 1965. Installation nos. I and II were installed in Damodar River in December 1968 and Installation III was installed in Ajoy River in March 1967 for collecting/ gathering and transporting 2.90 million tonnes of sand per year. Besides the above installations, dredging is being done at Narayankuri – Amritnagar in Damodar River. After nationalisation of coal mines, ECL took over the charge of JK Ropeways in the year 1975. Presently, it is being looked after by GM (JK Ropeways), ECL.

## **2.6 Present Status of J K Ropeway**

In JK Ropeways, most of the installations/ equipments are very old (more than 40 years). Due to ageing of the equipments/ installations and non-availability of regular spares, some of the equipments/ installations are presently in-operative and their future operations may not be practicable. At present, there are three installations for gathering and transportation of sand from Damodar River in JK Ropeways. These are:

- i) Installation No. I
- ii) Installation No. II
- iii) Narayankuri-Amritnagar Installation.

Installation No. III, which was situated at Ajoy River, has been dismantled due to higher cost of sand production. Plate – 8 shows the schematic layout of various installations of JK Ropeways showing different work-stations with respective equipments. Below table gives the installation-wise list of major equipment presently operating in JK Ropeways, ECL.

The operations of the JK Ropeways are controlled through the offices of the Project Officer, JK Ropeways, ECL, whereas the offices of General Manager, JK Ropeways, ECL control the overall administration of the system. JK Ropeways is served exclusively

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
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by a central workshop for major repair and maintenance of the equipments/ machineries  
of various installations and a central store for catering to day-to-day needs.

Installation-wise equipment at different stations of JK Ropeways, ECL

Name of Installation	Station No.	Dredger		Scraper (S)/Feeder Conveyor (C)		Sand Bunker		Mono-cable Ropeway		Long Conveyor		Bi-cable Ropeway		Remarks
		Existing (E)	Working (W)	E	W	E	W	E	W	E	W	E	W	
INST. I	1/1	3 (2 Mackay, 1 DMI)	1 (Mackay)	-	-	-	-	-	-	-	-	-	-	Shore dumping
	1/3	1 (Susuk)	-	2S, 2C	1S, 1C	1	1	1	1	-	-	-	-	Mono-cable transports to Stn. 1/7
	1/5	2 (Mackay)	1 (Mackay)	1S, 1C	-	1	-	1	-	-	-	-	-	Shore dumping
	1/7	-	-	-	-	1	-	1	1	-	-	1	-	Bi-Cable in-operative, Mono-cable ground dump at Stn. 1/7
	1/8, 1/9 & 1/10	-	-	-	-	-	-	-	-	-	-	1	-	
INST. II	2/1	2 (Mackay)	1 (Mackay)	2S, 2C	1S, 1C	2	1	1	1	-	-	-	-	Mono-cable delivers to Stn. 2/7
	2/3	-	-	1S, 1C	1S, 1C	1	1	-	-	1	1	-	-	Long Conveyor delivers to 2/7
	2/5	1 (Mackay)	-	1C	-	1	-	1	-	-	-	-	-	Stn. In-operative
	2/7	-	-	-	-	1	1	2	1	1	1	1	1	Bi-Cable delivers to Stn. 2/26
	2/8	-	-	-	-	-	-	-	-	-	-	1	1	Bi-Cable transfer stn.
	2/26	-	-	1	1	-	-	-	-	-	-	1	1	Bi-Cable unloading stn.
	2/9	-	-	-	-	-	-	-	-	-	-	1	1	Bi-Cable return stn.
Narayankuri-Amritnagar Inst		2 (MAMC)	1 (MAMC)	-	-	-	-	-	-	-	-	-	-	Shore dumping

### **INSTALLATION NO. I**

Installation No. I consists of three sand collection/ gathering stations, viz. 1/1, 1/3 and 1/5 on the banks of River Damodar and four transfer stations, viz. 1/7, 1/8, 1/9 and 1/10.

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Out of the previously mentioned four transfer stations, only Station No. 1/7 is operative and the remaining are in-operative due to non-functioning of Bi-cable ropeways (BC-1).

## **INSTALLATION NO. II**

Installation No. II is one of the three operating installations of JK Ropeways. It consists of three sand collection/ gathering stations, viz. 2/1, 2/3 and 2/5 on the banks of River Damodar and four transfer stations, viz. 2/7, 2/8, 2/26 and 2/9 (refer Fig-1). Currently station 2/5 is in-operative.

## **NARAYANKURI – AMRITNAGAR INSTALLATION**

Narayankuri – Amritnagar Installation is one of the operating installations of JK Ropeways. It is a sand collection/ gathering station situated on the bank of River Damodar. This station is basically a shore dumping station, which earlier was operated by two electrically operated dredgers (MAMC- make) (viz. D-10 & D-11). However, only D-11 dredger is currently in operation (refer Plate-8). This dredger pumps sand/water slurry to the shore dump where water drains out naturally from the sand. The sand from shore dump is transported by trucks contractually to different collieries for onward usage. The shore dump capacity is around 20000m<sup>3</sup> of sand.

## **SPECIFICATIONS OF SAND GATHERING EQUIPMENT/ MACHINERY**

Sand gathering/collection machinery includes:

1. Dredgers
  - a) Diesel operated dredgers: 2 nos. operative, 1 under maintenance, & 6 in-operative
  - b) Electric operated dredgers: 1 no. operative, & 1 in-operative
2. Scrapers: 4 nos. operative, & 2 in-operative
3. Sand separating plant: 1 no. in-operative.

## **SPECIFICATIONS OF TRANSPORT MACHINERY**

Sand transport machinery includes:

- I. Ropeways

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- a) Mono-cable system: 2 nos. operative & 2 in-operative.  
b) Bi-cable system: 1 no. operative & 1 in-operative.
- II. Conveyors: 8 nos. operative & 5 in-operative.

### **EXISTING MANPOWER**

Unit-wise existing manpower detail at various installations of JK Ropeways, ECL is given in Table below:

Installation-wise existing manpower at different stations of JK Ropeways, ECL

SL. No.	UNIT	UNIT STATUS	EXISTING MANPOWER (As on 31.03.2010)		
			EXECUTIVES	NON-EXECUTIVES	TOTAL
1	GM Office & Project Office	Operative	16	77	93
2	Workshop	-Do-	0	63	63
3	Store	-Do-	0	5	5
4	Narainkuri/ Amritnagar Installation	-Do-	0	27	27
5	Installation No. III	In-operative	0	0	0
Installation No. I					
6	Station 1/1	Operative	0	21	21
7	Station 1/3	-Do-	0	20	20
8	Station 1/5	-Do-	0	28	28
9	Station 1/7	Operative	0	35	35
10	Station 1/8	In-operative	0	0	0
11	Station 1/9	-Do-	0	0	0
12	Station 1/10	-Do-	0	0	0
Installation No. II					
13	Station 2/1	Operative	0	19	19
14	Station 2/3	-Do-	0	5	5
15	Station 2/5	In-operative	0	0	0
16	Station 2/7	Operative	0	59	59
17	Station 2/8	-Do-	0	46	46
18	Station 2/26	-Do-	0	6	6
19	Station 2/9	-Do-	0	11	11
<b>Total</b>			<b>16</b>	<b>422</b>	<b>438</b>

**2.7 Area Wise Sand Requirement and Supply of Sand for Last Five Years**

The sand extraction by J K Ropeways from Damodar and Ajoy Rivers (departmental means as well as through outsourcing on contractual basis) for last five years are given in table below:

Sl. No.	Area	Amount of sand extracted for stowing (Mm <sup>3</sup> )				
		2008-09	2009-10	2010-11	2011-12	2012-13
1	Manual extraction from Damodar & Ajoy Riverbeds through outsourcing	2.84	2.38	2.06	1.67	1.56
2	Mechanised extraction (Departmental)	0.13	0.15	0.09	0.05	0.05
	Total	2.97	2.53	2.15	1.72	1.61

(source: J K Ropeways)

It is envisaged that out of the total sand requirement of 3.5 million m<sup>3</sup> for stowing purpose by ECL (1.5 million m<sup>3</sup> from Damodar riverbed and 2.0 million m<sup>3</sup> from Ajoy riverbed), J K Ropeways will achieve a mechanized extraction capacity of 0.90 million m<sup>3</sup> by 2015 – 16 from its installations in Damodar riverbed.

## CHAPTER – 3

### DESCRIPTION OF THE ENVIRONMENT

#### 3.1 Introduction & Area Information

The River Damodar originates in Chandwa in Palamau district of Jharkhand, in the Chotanagpur Plateau, and flows eastward for about 547 km through the states of Jharkhand and West Bengal to the estuary of the River Hooghly. It has a number of tributaries and subtributaries, such as Barakar, Konar, Bokaro, Haharo, Jamunia, Ghari, Guaia, Khudia and Bhera. The Barakar is the most important tributary of the Damodar. It originates near Padma in Hazaribagh district of Jharkhand and meets the Damodar near Dishergarh in West Bengal.

Damodar River basin is the repository of 46% coal reserves in India and is one of the richest mineralized zones of the country with a high growth of mining and industrial development, demographic and urban growth extending over a large area of Jharkhand and West Bengal.

In order to contain the annual floods which devastated West Bengal, two dams across the rivers Barakar and Damodar were built at Maithon in 1957 and Panchet in 1959. Both the dams are some 8 km upstream of the confluence point of the rivers. From the point of confluence, the river flows easterly between the districts of Burdwan on the north bank and Purulia district and later on Bankura district on the southern bank. The Raniganj coalfield extends upto 42 kms with most of the mines on the northern bank.

The present proposal is to obtain permanent mining lease for 15 sand mining stations along the 42 kms downstream stretch of the Damodar River from the said point of confluence with Barakar River.

#### 3.1.1 Topography & Drainage

##### Topography

The river flows from west to east and a major portion of the Raniganj Coalfield is under its catchment.

Physiographically, the Raniganj coal belt overlies the granite plateau fringe of Chotanagpur with a general elevation of about 100 meters. Permo carboniferous rock formations of Talcher, Barakar, Barren Measures, Raniganj & Panchet series are

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exposed in many planes with small isolated occurrences of upper Gondwanas near the southern boundary fault. Among the rock formations, the Raniganj & Barakar series contain some of the thickest & best coals of India (Bose, 1968).

General RL of the area varies between 80 to 100 m. The area consists of barren, rocky and rolling country with a laterite soil. The topography of the area is undulating and gently sloping towards Damodar River, which forms the southern boundary and controls the drainage of the area.

#### Drainage

The area is drained by a few seasonal streams like Nunia Nala, Singaran Nala and a number of ephemeral streams and the drainage of the whole area is controlled by Damodar river.

### **3.1.2 Landuse**

The landform is the riverbed of Damodar River along the Raniganj Coalfield and is the main course of the river. The river course is owned by the State of West Bengal and falls under the districts of Burdwan, Bankura & Purulia. The sand is mined on the basis of lease and temporary working permits renewed from time to time. There is no other land use within the river course.

The locations of the sand mining stations are shown on toposheet map and Google Earth map as Plates 2B & 2C.

### **3.1.3 Landuse of Study Area**

The study area comprises 10 km on either side of the 42 km stretch of the river Damodar. This 882.00 sqkm area (approximately) is predominantly agricultural interspersed with habitations. Underground as well as opencast mines are present on either bank. An approximate breakup of the 882.00 sqkm study area is tabulated as under (shown in Plate – 3)–

SI No.	Class of Land	Particulars	Approximate Area (sqkm)	%
1	Built up Area / Settlement	Urban	57.24	6.39
		Rural		
		Industrial		

SI No.	Class of Land	Particulars	Approximate Area (sqkm)	%
2	Vegetation Cover (Forest)	Dense Forest	25.84	2.93
		Open Forest		
2	Vegetation Cover (Non-Forest)	Scrub	178.61	20.15
		Social Forestry		
		Plantation on OB Dumps		
		Plantation on Backfilled areas		
3	Agricultural Land	Crop Land	466.23	52.86
		Fallow land		
4	Wastelands		63.33	7.18
5	Waterbodies	Rivulets, Nallahs, Ponds, Water-logged quarries	29.90	3.39
6	Mine Area	Coal Dump	19.32	2.09
		Barren Backfilled Area		
		Barren OB Dump		
		Quarry Area		
7	Damodar River Bed		42.00	4.7
<b>Total</b>			<b>882.00</b>	<b>100.00</b>

### 3.1.4 Climate & Meteorology

#### Rainfall

The area receives rainfall by South-West monsoon. Rainy season sets in the middle of June and lasts till September. The normal average rainfall is 1400 mm.

#### Climate

The climate is tropical with hot dry summer, a good rainy season and cool winter. Thunder storms accompanied with severe squalls occur in pre-monsoon months. Dust storms also occur occasionally in April and May. Morning fog occurs in the winter months.

The area is characterized by humid to sub-humid climate. During summer the hot spell prevails from March to middle of June. Rainy season starts from middle of June to end to September. Winter starts from the middle of November and continues till the end of February. The area experiences great heat from April to June, when the maximum temperature crosses 45<sup>0</sup>c. December is the coldest month when the minimum temperatures fall down to as low as 1<sup>0</sup> C.

Longterm Meteorological Data

Meteorological data based on long term trends observed at IMD Station at Asansol are shown below –

Month	Temperatures (°C)				Relative Humidity (%)	Average Precipitation (in)	No. of Rainy Days	Total Rainfall	Prominent Wind Direction	Wind Speed (mph)	
	Av Daily Max	Av Daily Min	Hist Max	Hist Min						Average	Hist Max
Jan'12	75.5	54.8	85	45	65.16	0.05	5	1.53	N/NW	1	46
Feb'12	86	58	98	49	46	0.01	2	0.31	N/NW	1	5
Mar'12	96	66	105	58	34	0.04	2	1.26	N/NW	1	5
Apr'12	100	73	107	62	51.9	0.04	4	1.28	S/SW	2	23
May'12	103	76	114	67	54	0.07	8	2.38	S/SW	2	69
June'12	101	78	115	68	62.8	0.17	12	5.31	S/SW	2	39
July'12	91	77	96	71	84	0.30	21	9.53	S/SW	2	88
Aug'12	91	78	95	75	84	0.28	19	9.05	S/SW	1	106
Sep'11	88	75	94	70	86.5	0.08	5	2.38	S/SW	1	34
Oct'11	90	72	93	63	74.6	0.02	3	0.56	N/NW	0	8
Nov'11	86	63	91	58	65.7	0.01	2	0.39	N/NW	0	4
Dec'11	81	54	88	45	59.6	0.00	0	0.00	N/NW	1	6

Micro – Meteorological Data

Micro – meteorological data was generated at station set up for the purpose around the riverbed during the summer season concurrently with baseline data generation for air for the period from 1<sup>st</sup> April'12 to 23<sup>rd</sup> June'12 and the abstract is provided below –

Date	Wind Velocity (kmph)			Predominant Wind Direction (From)	Temperature (°C)			Relative Humidity (%) Average			Atm. Pr. (mm / Hg)	Rainfall (mm)	Sky Appearance
	Min	Max	Avg		Min	Max	Avg	Min	Max	Avg			
01/02.04.12	<1.0	4.6	2.5	SSW	24.0	36.5	29.9	36	68	50.4	750	0	Clear
02/03.04.12	<1.0	4.2	2.3	SW	23.5	37.0	30.0	34	71	49.9	750	0	Clear
03/04.04.12	<1.0	4.1	2.3	SW	23.5	37.0	29.3	37	72	53.0	750	0	Clear
04/05.04.12	<1.0	3.3	2.1	SSE	24.0	36.5	29.3	35	68	54.5	750	0	Clear
05/06.04.12	<1.0	4.7	2.5	SW	23.5	36.0	29.6	40	71	54.5	750	0	Clear
06/07.04.12	<1.0	3.2	2.0	SSW	23.5	36.5	29.3	39	70	55.0	750	0	Clear
07/08.04.12	<1.0	3.9	2.2	SSW	23.5	36.0	29.2	38	71	54.1	750	0	Clear
08/09.04.12	<1.0	4.2	2.3	SSE	23.5	36.5	29.3	36	71	53.0	750	0	Clear
09/10.04.12	<1.0	4.1	2.5	SW	23.5	37.5	29.7	37	71	53.0	750	0	Clear
10/11.04.12	<1.0	4.0	2.3	SSW	23.5	36.5	29.5	35	70	52.7	750	0	Clear
11/12.04.12	<1.0	6.1	2.8	SSW	24.0	36.5	29.5	36	71	54.8	750	0	Clear
12/13.04.12	<1.0	4.6	2.5	SW	23.5	37.0	29.2	34	70	54.5	750	0	Clear
13/14.04.12	<1.0	8.0	3.5	WSW	24.5	38.0	30.0	33	64	50.0	751	0	Clear
14/15.04.12	<1.0	8.3	4.1	SSE	24.0	38.5	30.1	32	68	48.4	751	0	Clear
15/16.04.12	<1.0	6.7	2.9	WSW	24.0	37.0	30.4	36	68	50.4	751	0	Clear
16/17.04.12	<1.0	4.7	2.5	WSW	25.0	35.5	30.4	42	62	51.5	751	0	Clear
17/18.04.12	<1.0	4.0	1.9	SW	24.0	36.0	30.3	40	68	49.3	751	0	Clear
18/19.04.12	<1.0	7.8	3.0	SW	25.0	37.5	31.1	40	62	48.8	751	0	Clear
19/20.04.12	<1.0	4.2	2.7	SW	26.0	38.5	33.7	35	55	45.4	751	0	Clear
20/21.04.12	<1.0	3.4	2.3	W	25.5	40.0	32.9	39	59	49.1	751	0	Clear
21/22.04.12	<1.0	14.8	4.9	SW	26.0	39.5	31.9	41	61	49.8	751	0	Clear

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Date	Wind Velocity (kmph)			Predominant Wind Direction (From)	Temperature (°C)			Relative Humidity (%) Average			Atm. Pr. (mm / Hg)	Rainfall (mm)	Sky Appearance
	Min	Max	Avg		Min	Max	Avg	Min	Max	Avg			
22/23.04.12	<1.0	8.4	3.9	SSW	26.0	37.5	32.8	40	65	52.0	751	0	Clear
23/24.04.12	<1.0	4.4	2.3	SW	29.5	40.0	33.9	41	61	51.5	751	0	Clear
24/25.04.12	<1.0	6.4	2.9	SW	28.5	39.0	34.2	40	60	50.3	751	0	Clear
25/26.04.12	<1.0	12.8	5.5	SW	28.0	39.0	31.5	45	70	59.3	751	5	Rainy
26/27.04.12	<1.0	6.4	5.0	SW	28.0	36.0	31.7	49	70	55.9	751	0	Clear
27/28.04.12	<1.0	8.3	4.2	SW	26.0	39.0	31.5	36	70	56.4	751	15	Rainy
28/29.04.12	<1.0	1.6	2.9	SW	26.5	38.5	31.8	32	66	50.2	751	0	Clear
29/30.04.12	<1.0	5.1	2.7	SSE	28.0	40.5	33.8	32	60	45.1	751	0	Clear
30/01.05.12	<1.0	4.2	2.3	SSW	27.5	40.0	33.0	32	63	44.6	751	0	Clear
01/02.05.12	<1.0	5.1	2.0	SW	27.5	39.5	33.7	29	64	42.9	750	0	Clear
02/03.05.12	<1.0	5.6	2.5	WNW	26.0	36.0	30.2	38	82	59.1	750	0	Clear
03/04.05.12	<1.0	4.2	2.2	S	25.0	36.5	29.4	49	80	61.2	750	0	Clear
04/05.05.12	<1.0	5.8	1.9	S	25.0	33.5	28.4	39	75	59.3	750	0	Clear
05/06.05.12	<1.0	3.6	1.8	SSW	25.0	35.0	29.8	37	78	58.4	750	0	Clear
06/07.05.12	<1.0	8.3	3.9	NNW	27.0	36.0	30.7	37	70	53.7	750	0	Clear
07/08.05.12	<1.0	4.2	2.0	SW	28.0	36.0	32.0	37	73	58.0	750	0	Clear
08/09.05.12	<1.0	3.1	1.8	SW	28.0	38.5	33.0	31	65	45.9	750	0	Clear
09/10.05.12	<1.0	11.2	2.6	NW	27.0	38.0	30.6	36	75	60.1	750	12	Rainy
10/11.05.12	<1.0	3.7	2.0	SSW	27.5	36.5	31.5	38	77	57.9	750	0	Clear
11/12.05.12	<1.0	4.8	2.3	SSW	27.0	37.5	31.5	46	73	60.5	750	0	Clear
12/13.05.12	<1.0	6.2	2.8	SW	27.0	39.0	31.3	35	72	59.0	750	4	Rainy
13/14.05.12	<1.0	6.2	2.8	WSW	27.5	39.0	33.8	41	68	53.0	751	0	Clear
14/15.05.12	<1.0	6.1	2.9	SSW	30.0	42.5	36.8	29	59	38.8	751	10	Rainy
15/16.05.12	<1.0	7.2	2.2	SE	29.5	41.0	34.0	27	61	43.1	751	4	Rainy
16/17.05.12	<1.0	5.4	2.7	SW	29.0	41.5	34.9	29	59	41.4	751	0	Clear
17/18.05.12	<1.0	5.5	3.1	SW	29.0	43.0	35.0	26	64	45.8	751	0	Clear
18/19.05.12	<1.0	7.6	2.5	SW	29.0	37.0	32.9	44	65	52.8	751	0	Clear
19/20.05.12	<1.0	5.2	2.3	SW	29.0	40.5	34.1	32	65	48.5	751	0	Clear
20/21.05.12	<1.0	10.9	2.9	SW	26.5	38.5	30.6	33	75	60.8	751	0	Drizzling
21/22.05.12	<1.0	2.9	1.9	SW	27.0	41.0	33.3	32	70	51.7	751	0	Clear
22/23.05.12	<1.0	3.1	2.1	SW	29.0	42.0	35.7	29	69	45.3	751	0	Clear
23/24.05.12	<1.0	6.2	2.7	SW	30.5	44.0	36.6	26	67	44.9	751	0	Clear
24/25.05.12	<1.0	6.4	3.3	SSW	30.0	45.0	37.1	27	70	44.9	751	0	Clear
25/26.05.12	<1.0	8.5	3.8	SW	30.0	45.0	36.5	30	72	48.8	750	0	Clear
26/27.05.12	<1.0	5.0	2.6	SSW	30.0	40.0	34.9	35	65	50.9	750	0	Clear
27/28.05.12	<1.0	4.3	2.1	SW	30.0	39.0	33.7	35	67	50.3	750	0	Clear
28/29.05.12	<1.0	4.8	2.5	S	29.5	39.5	33.7	39	61	53.3	750	0	Clear
29/30.05.12	<1.0	3.6	2.2	SW	30.0	40.0	34.5	36	68	52.5	750	0	Clear
30/31.05.12	<1.0	7.3	2.9	SSW	30.0	41.0	35.1	40	71	53.3	750	0	Clear
31/01.06.12	<1.0	6.2	2.5	SSW	30.0	41.0	35.6	40	69	53.0	750	0	Clear
01/02.06.12	<1.0	3.1	1.9	SSW	30.0	40.5	34.7	36	70	52.7	750	0	Clear
02/03.06.12	<1.0	4.5	1.9	S	30.5	40.5	34.8	38	66	52.5	750	0	Clear
03/04.06.12	<1.0	3.8	2.2	SE	31.0	43.0	37.7	28	65	43.0	750	0	Clear
04/05.06.12	<1.0	5.6	3.8	WNW	33.5	44.0	38.3	27	51	38.2	750	0	Clear
05/06.06.12	<1.0	6.8	3.2	WNW	29.5	44.5	35.8	27	61	43.9	750	0	Clear
06/07.06.12	<1.0	6.1	2.6	SSW	30.0	41.0	33.3	35	65	52.1	751	6	Rainy
07/08.06.12	1.0	8.2	2.8	SE	28.5	39.0	31.6	35	73	59.3	751	19	Rainy

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Date	Wind Velocity (kmph)			Predominant Wind Direction (From)	Temperature (°C)			Relative Humidity (%) Average			Atm. Pr. (mm / Hg)	Rainfall (mm)	Sky Appearance
	Min	Max	Avg		Min	Max	Avg	Min	Max	Avg			
08/09.06.12	<1.0	4.6	2.5	NW	29.5	41.5	34.7	32	68	50.0	751	0	Clear
09/10.06.12	<1.0	5.8	3.2	NW	29.5	43.0	35.6	33	65	48.8	751	0	Clear
10/11.06.12	<1.0	6.6	2.2	SSW	30.0	43.0	36.2	27	65	47.3	751	0	Clear
11/12.06.12	<1.0	6.3	3.0	SW	30.0	43.0	36.1	32	65	47.2	751	0	Clear
12/13.06.12	<1.0	5.2	2.3	SSE	28.5	42.5	33.2	29	74	53.8	751	9	Rainy
13/14.06.12	<1.0	12.2	2.8	SSW	27.0	40.5	31.6	31	77	61.0	751	11	Rainy
14/15.06.12	<1.0	5.2	2.5	SW	28.5	39.0	34.0	40	68	52.6	751	0	Clear
15/16.06.12	<1.0	8.3	4.4	SW	31.0	41.5	36.6	32	61	44.1	751	0	Clear
16/17.06.12	<1.0	8.1	4.0	SSW	28.0	42.5	34.2	32	79	55.3	751	8	Rainy
17/18.06.12	<1.0	7.4	4.0	WSW	29.0	36.0	31.5	42	75	62.5	751	0	Clear
18/19.06.12	<1.0	5.7	2.7	SW	26.5	37.0	30.7	42	85	65.9	751	10	Rainy
19/20.06.12	<1.0	3.4	1.8	SW	28.0	34.5	31.3	47	73	61.5	751	0	Clear
20/21.06.12	<1.0	3.6	2.1	SSW	28.5	36.0	31.2	45	78	63.4	751	0	Clear
21/22.06.12	<1.0	3.2	1.8	SW	28.0	32.5	29.1	58	78	62.8	751	0	Clear
22/23.06.12	<1.0	3.5	2.0	SW	27.5	33.0	30.7	54	76	64.0	751	11	Rainy
23/24.06.12	<1.0	3.8	2.0	SW	27.5	34.0	30.9	51	79	64.2	751	14	Rainy
Season	<1.0	14.8	3.2	SW	23.5	45.0	32.5	26	85	52.4	750	116.0	Clear

### Observations

It can be observed that the pre - dominant wind direction during summer was from South – west which conforms with the long – term trend on which basis the baseline air monitoring stations had been fixed. Highest wind velocity was recorded as 14.8 kmph (4.1 m/s). Maximum and minimum temperatures recorded were 45.0°C & 23.5°C. Maximum and minimum humidity recorded were 85 % & 26 % and atmospheric pressure was around 750 mmHg. Total number of rainy days was 10 with a total precipitation of 116 mm. Wind rose for the summer season of 2012 is given as Plate– 4.

## **3.2 Ambient Air Quality & Noise**

### **3.2.1 Introduction**

The main objective of the ambient air quality monitoring is to assess the existing levels of air pollutants as well as the regional background concentration in the project area. Air pollution forms an important and critical factor to study the environmental issues in the mining areas. Air quality has to be frequently monitored to know the extent of pollution due to mining and allied activities.

Thus, baseline data with respect to ambient air quality was generated during the summer season from 1<sup>st</sup> April'12 to 21<sup>st</sup> June'12 and winter season from 1<sup>st</sup> Jan'13 to 31<sup>st</sup> March'13 (for 3 monitoring stations) for the purpose of EIA for the sand mining plan.

### 3.2.2 Methodology of Sampling & Analysis

To assess the ambient air quality status, monitoring stations were identified on the basis of meteorology in the upwind and downwind direction as well as to represent the cross sectional scenario of the project site. Based on the production activities, the parameters chosen for assessment of air quality are Total Suspended Particulate Matter (TSPM), Particulate Matter <10 (PM10), Particulate Matter <2.5 (PM2.5), Sulphur dioxide (SO<sub>2</sub>), Oxides of Nitrogen (NO<sub>x</sub>), Ammonia (NH<sub>3</sub>), Ozone (O<sub>3</sub>), Benzene (C<sub>6</sub>H<sub>6</sub>), Benzopyrene (C<sub>20</sub>H<sub>12</sub>) and heavy metals (Pb, As, Cr, Hg & Ni).

Calibrated Respirable Dust sampler (with an average flow of 1.2 - 1.4 m<sup>3</sup>/min) were used for monitoring of PM10 and a tapping provided in the hopper of the same sampler was utilised for sampling of SO<sub>2</sub>, NO<sub>2</sub>, O<sub>3</sub>, NH<sub>3</sub> with proper flow controller (1 L/min). Calibrated APM 550 Fine Particle Sampler (with an average flow of 1.2m<sup>3</sup>/min.) was used for monitoring of PM2.5. A temporary field laboratory for the purpose of calibration of equipments and standardisation of analytical procedures was also established. A digital imported CO detector was used for monitoring of CO. Collected samples were analysed on the day of sample collection with the following procedure.

#### TSPM & PM10

Calibrated Respirable Dust Sampler with Whatman's GF/A glass microfibre filter paper was used for the determination of PM. PM10 is a measure of particulate matter having size <10 microns. The dust particles having size >10 microns is being collected in the cyclone and measured. This along with PM10 value gives total PM. Ambient air laden with suspended particulates enters the Respirable Dust Sampler (RDS) through the inlet pipe of sampler by means of high flow rate blower (1.2 to 1.4m<sup>3</sup>/min). As the air passes through the cyclone, coarse, non- respirable dust (size > 10 microns) is separated from the air stream by centrifugal forces acting on the solid particles. These separated particles fall through the cyclone's conical hopper and collect in the sampling bottle placed at bottom. The fine dust forming the respirable fraction (size <10 microns) of the Total Suspended Particulates passes through the cyclone and is carried by the air

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stream to the Glass Micro-fibre Filter Paper. The Respirable Particulate Matter (RPM) is retained by the filter and the carrier air exhausted from the system through the blower. The mass concentration ( $\mu\text{g}/\text{m}^3$ ) of Respirable Particulate Matter in the ambient air is computed by measuring the mass of collected particulates and the volume of air sampled. These machines were installed 3m above ground level and free from obstructions, 500 m away from dust generating sources.

### PM2.5

Calibrated APM 550 Fine Particle Sampler with Whatman's standard 47 mm diameter filter media was used for the determination of Fine Particles (PM2.5). PM2.5 is a measure of particulate matter having size <2.5 microns. APM 550 Fine Particle Sampler is based on impactor designs standardized by USEPA for ambient air quality monitoring.

### SO<sub>2</sub> (Modified West & Gaeke Spectrophotometer method)

Ambient air is bubbled at the rate of 0.5 -1.0 l/min in an Impinger containing a scrubbing solution of Sodium-Tetra Chloro Mercurate. The resultant complex is reacted with P-Rosaniline and Formaldehyde to form coloured Para-Rosaniline methyl sulphuric acid. The absorbance of the solution is measured in a Spectrophotometer at a wavelength of 560nm. The SO<sub>2</sub> is then calculated from standard graph.

### NO<sub>2</sub> (Jacob & Hocheiser modified method)

Ambient air is bubbled at the rate of 0.5-1.0 l/min in an Impinger containing a solution of Sodium Hydroxide and Sodium Arsenate. The resultant Nitrite Ion is reacted with Phosphoric acid, Sulphanilamide and N-ethylene di-amine di-hydro chloride to form a coloured complex. The absorbance is measured in a Spectrophotometer at a wavelength of 540 nm. The concentration of NO<sub>2</sub> is then calculated by using standard graph.

### Ozone (Chemical Method)

The micro amounts of ozone and the oxidants liberate Iodine when absorbed in a 1% solution of potassium iodide buffered at pH 6.8 +/-0.2. The iodine liberated is determined spectrophotometrically by measuring the absorption of tri-iodide ion at 352nm.

### Ammonia (Indophenol blue method)

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Ammonia in the air is collected by bubbling a measured volume of air through a dilute solution of sulphuric acid to form ammonium sulphate. The ammonium sulphate thus formed in the sample is analysed colorometrically by reaction with phenol and alkaline sodium hypochlorite to produce indophenol. The reaction is accelerated by the addition of Sodium Nitroprusside catalyst.

#### Benzene (C<sub>6</sub>H<sub>6</sub>) & Benzopyrene (C<sub>20</sub>H<sub>12</sub>)

The method is designed to collect particulate phase PAH in ambient air and fugitive emissions and to determine individual PAH compounds using capillary gas chromatography equipped with flame ionization detector.

#### Heavy metals (Pb, As, Cr, Hg & Ni)

The AAS technique makes use of absorption spectrophotometry to assess the concentration of metals in the sample. The method is based on active sampling using PM10 high volume sampler and then sample analysis is done by Atomic absorption spectrophotometer.

#### Summary of Methodology of analysis

S.No.	Parameters	Methodology
1	Particulate Matter <10	Respirable dust sampling and gravimetric analysis
2	PM2.5	Gravimetric method
3	Sulphur di-oxide	Improved West-Gaeke-Spectrophotometric Method
4	Oxide of Nitrogen	Jacob and Hocheiser Modified Method
5	Carbon-monoxide	Detector method
6	Ammonia	Indophenol method
7	Benzene	Adsorption and desorption followed by EC
8	Benzo-pyrene	Solvent extraction followed by GC analysis
9	Heavy Metals	AAS method after sampling on EPM Filter paper

### **3.2.3 Selection of Ambient Air Quality Baseline Stations**

The monitoring stations were identified on the basis of meteorology in the upwind and downwind direction based on the available long term meteorological data on

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predominant wind direction and wind speed for the Asansol IMD Station with a purpose to represent the cross sectional scenario of the area. The predominant wind directions taken for this purpose was from South – west. The monitoring stations were fixed at 500 m distance from dust generating sources. The methodology of baseline data generation was as per CPCB guidelines. The following stations were fixed (shown in Plate – 5)

Sl. No.	Location Name	Location Code	Remarks
Core Zone – Since this is the riverbed, there are no stations			
Locations situated on the river bank			
1.	Parbelia	A1	UG mine near the river
2.	Sodepur	A2	Habitation near the river
3.	Chinakuri – I	A3	UG mine near the river
4.	Chinakuri – III	A4	-do-
5.	Amritnagar	A5	-do-
6.	Tirat	A6	-do-
7.	Kuardih	A7	-do-
8.	Nimcha	A8	-do-
9.	Mahabir	A9	-do-
10.	Bakulia	A10	Habitation near the river
Locations situated near the river bank			
11.	Dubeswari	A11	Habitation near the river
12.	Bejdih	A12	-do-
13.	Hirakhun	A13	-do-
14.	Patmohana	A14	-do-
15.	Ratibati	A15	UG mine near the river
16.	Chalbalpur	A16	-do-
17.	J K Nagar	A17	-do-
18.	Jemehari	A18	-do-
19.	Lachhipur	A19	-do-
20.	Central Kajora	A20	-do-
21.	Madhujore	A21	-do-
22.	Ghansyampur	A22	-do-

### 3.2.4 Baseline Data for AAQ

The station – wise observed data on concentrations of pollutants in ambient air during the season on all days of monitoring are tabulated below –

**REPORT ON AMBIENT AIR QUALITY DATA**

Season: Summer, 2012

Location: Parbelia UG (A1) Core Zone

Week	Date	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>x</sub> µg/m <sup>3</sup>	NH <sub>3</sub> µg/m <sup>3</sup>	O <sub>3</sub> µg/m <sup>3</sup>	C <sub>6</sub> H <sub>6</sub> µg/m <sup>3</sup>	CO µg/m <sup>3</sup>	BaP ng/m <sup>3</sup>	Pb µg/m <sup>3</sup>	As ng/m <sup>3</sup>	Cr ng/m <sup>3</sup>	Hg ng/m <sup>3</sup>	Ni ng/m <sup>3</sup>
I	02.04.2012	57	16	7.0	23.0	BDL	BDL	BDL	BDL	BDL	0.06	BDL	0.04	BDL	0.03
	03.04.2012	54	15	7.3	20.9	BDL	BDL	BDL	BDL	BDL	0.08	BDL	0.08	BDL	0.03
II	11.04.2012	61	18	7.9	20.3	BDL	BDL	BDL	BDL	BDL	0.10	BDL	0.05	BDL	0.04
	12.04.2012	55	16	6.8	20.5	21	BDL	BDL	BDL	BDL	0.08	BDL	0.04	BDL	0.03
III	20.04.2012	58	17	7.7	21.4	22	BDL	BDL	BDL	BDL	0.08	BDL	0.02	BDL	0.02
	21.04.2012	55	16	5.2	22.2	25	BDL	BDL	BDL	BDL	0.06	BDL	0.02	BDL	0.04
IV	28.04.2012	53	13	5.0	20.9	24	BDL	BDL	BDL	BDL	0.12	BDL	0.02	BDL	0.06
	29.04.2012	50	12	5.2	21.4	24	BDL	BDL	BDL	BDL	0.12	BDL	0.02	BDL	0.04
V	04.05.2012	54	13	6.4	20.0	BDL	BDL	BDL	BDL	BDL	0.10	BDL	0.02	BDL	0.06
	05.05.2012	59	15	5.5	20.2	BDL	BDL	BDL	BDL	BDL	0.14	BDL	0.02	BDL	0.05
VI	09.05.2012	56	14	6.3	20.9	BDL	BDL	BDL	BDL	BDL	0.12	BDL	0.02	BDL	0.03
	10.05.2012	57	14	7.0	20.9	BDL	BDL	BDL	BDL	BDL	0.10	BDL	0.02	BDL	0.06
VII	18.05.2012	66	17	7.7	21.2	BDL	BDL	BDL	BDL	BDL	0.06	BDL	0.02	BDL	0.06
	19.05.2012	56	14	7.2	21.4	BDL	BDL	BDL	BDL	BDL	0.12	BDL	0.02	BDL	0.04
VIII	21.05.2012	58	14	7.0	21.7	BDL	BDL	BDL	BDL	BDL	0.08	BDL	0.05	BDL	0.08
	22.05.2012	60	15	7.6	21.5	BDL	BDL	BDL	BDL	BDL	0.08	BDL	0.04	BDL	0.06
IX	01.06.2012	58	14	6.8	21.8	BDL	BDL	BDL	BDL	BDL	0.12	BDL	0.03	BDL	0.05
	02.06.2012	61	15	7.2	21.5	BDL	BDL	BDL	BDL	BDL	0.06	BDL	0.04	BDL	0.04
X	08.06.2012	55	18	6.5	23.3	22	BDL	BDL	BDL	BDL	0.12	BDL	0.04	BDL	0.08
	09.06.2012	65	22	7.0	22.6	24	BDL	BDL	BDL	BDL	0.08	BDL	0.03	BDL	0.06
XI	14.06.2012	65	22	6.7	21.0	22	BDL	BDL	BDL	BDL	0.06	BDL	0.04	BDL	0.04
	15.06.2012	69	23	7.2	21.1	BDL	BDL	BDL	BDL	BDL	0.10	BDL	0.03	BDL	0.04
XII	20.06.2012	56	18	6.5	21.5	BDL	BDL	BDL	BDL	BDL	0.12	BDL	0.04	BDL	0.03
	21.06.2012	59	20	5.2	22.6	BDL	BDL	BDL	BDL	BDL	0.10	BDL	0.03	BDL	0.03
<b>CPCB LIMIT</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>400</b>	<b>100</b>	<b>05</b>	<b>2000</b>	<b>01</b>	<b>1.0</b>	<b>06</b>	<b>-</b>	<b>-</b>	<b>20</b>

BDL Values for O<sub>3</sub> = <10 µg/m<sup>3</sup>  
 BDL Values for NH<sub>3</sub> = <20 µg/m<sup>3</sup>  
 BDL Values for As = < 0.30 µg /m<sup>3</sup>  
 BDL Values for Ni = <0.02 µg /m<sup>3</sup>

BDL Values for C<sub>6</sub>H<sub>6</sub> = <0.01 µg/m<sup>3</sup>  
 BDL Values for BaP = <1 µg /m<sup>3</sup>  
 BDL Values for Cr = <0.01 µg /m<sup>3</sup>

BDL Values for CO = <114.5 µg/m<sup>3</sup>  
 BDL Values for Lead = <0.01 µg /m<sup>3</sup>  
 BDL Values for Hg: <0.01 µg /m<sup>3</sup>

**CMPDI**

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**Season: Summer 2012**

**Location: Sodepur (A2) Core Zone**

Week	Date	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>	NOx µg/m <sup>3</sup>	NH <sub>3</sub> µg/m <sup>3</sup>	O <sub>3</sub> µg/m <sup>3</sup>	C <sub>6</sub> H <sub>6</sub> µg/m <sup>3</sup>	CO µg/m <sup>3</sup>	BaP ng/m <sup>3</sup>	Pb µg/m <sup>3</sup>	As ng/m <sup>3</sup>	Cr ng/m <sup>3</sup>	Hg ng/m <sup>3</sup>	Ni ng/m <sup>3</sup>
I	02.04.2012	48	18	6.5	11.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	03.04.2012	41	16	6.7	11.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
II	11.04.2012	37	15	7.9	12.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	12.04.2012	39	16	6.8	12.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
III	20.04.2012	36	12	7.8	11.7	BDL	BDL	BDL	BDL	BDL	0.01	BDL	BDL	BDL	BDL
	21.04.2012	40	16	7.2	11.6	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.01	BDL	BDL
IV	28.04.2012	45	15	6.9	11.9	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.02	BDL	BDL
	29.04.2012	39	16	7.2	11.7	BDL	BDL	BDL	BDL	BDL	0.03	BDL	0.02	BDL	BDL
V	04.05.2012	42	18	7.4	12.3	BDL	BDL	BDL	BDL	BDL	0.01	BDL	0.01	BDL	BDL
	05.05.2012	39	17	7.5	12.4	BDL	BDL	BDL	BDL	BDL	0.01	BDL	0.01	BDL	BDL
VI	09.05.2012	36	14	7.2	12.7	BDL	BDL	BDL	BDL	BDL	0.04	BDL	0.01	BDL	BDL
	10.05.2012	44	18	7.0	13.3	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.01	BDL	BDL
VII	18.05.2012	47	15	7.8	14.3	BDL	BDL	BDL	BDL	BDL	0.04	BDL	BDL	BDL	BDL
	19.05.2012	43	16	7.2	12.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
VIII	21.05.2012	42	13	7.0	12.6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	22.05.2012	44	18	6.9	12.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
IX	01.06.2012	38	13	6.7	12.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	02.06.2012	42	14	6.6	11.6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
X	08.06.2012	46	13	6.4	11.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	09.06.2012	43	14	6.2	11.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
XI	14.06.2012	38	15	6.0	11.6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	15.06.2012	36	16	6.1	11.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.04
XII	20.06.2012	40	17	5.9	11.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	21.06.2012	43	18	6.0	11.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05
<b>CPCB LIMIT</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>400</b>	<b>100</b>	<b>05</b>	<b>2000</b>	<b>01</b>	<b>1.0</b>	<b>06</b>	<b>-</b>	<b>-</b>	<b>20</b>

BDL Values for O<sub>3</sub> = <10 µg/m<sup>3</sup>  
 BDL Values for NH<sub>3</sub> = <20 µg/m<sup>3</sup>  
 BDL Values for As = < 0.30 µg /m<sup>3</sup>  
 BDL Values for Ni = <0.02 µg /m<sup>3</sup>

BDL Values for C<sub>6</sub>H<sub>6</sub> = <0.01 µg/m<sup>3</sup>  
 BDL Values for BaP = <1 µg /m<sup>3</sup>  
 BDL Values for Cr = <0.01 µg /m<sup>3</sup>

BDL Values for CO = <114.5 µg/m<sup>3</sup>  
 BDL Values for Lead = <0.01 µg /m<sup>3</sup>  
 BDL Values for Hg: <0.01 µg /m<sup>3</sup>

**CMPDI**

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

**Season : Summer 2012**

**Location: Chinakuri – I UG (A3)**

**Core Zone**

Week	Date	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>	NOx µg/m <sup>3</sup>	NH <sub>3</sub> µg/m <sup>3</sup>	O <sub>3</sub> µg/m <sup>3</sup>	C <sub>6</sub> H <sub>6</sub> µg/m <sup>3</sup>	CO µg/m <sup>3</sup>	BaP ng/m <sup>3</sup>	Pb µg/m <sup>3</sup>	As ng/m <sup>3</sup>	Cr ng/m <sup>3</sup>	Hg ng/m <sup>3</sup>	Ni ng/m <sup>3</sup>
I	04.04.2012	64	17	6.8	17.1	22	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	05.04.2012	75	21	7.0	17.2	23	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
II	13.04.2012	70	19	8.2	17.8	24	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	14.04.2012	68	18	7.1	18.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
III	16.04.2012	72	20	8.1	17.5	BDL	BDL	BDL	BDL	BDL	0.01	BDL	BDL	BDL	BDL
	17.04.2012	73	20	7.5	17.4	18	BDL	BDL	BDL	BDL	0.02	BDL	0.04	BDL	BDL
IV	26.04.2012	71	19	7.2	17.7	20	BDL	BDL	BDL	BDL	0.02	BDL	0.06	BDL	BDL
	27.04.2012	73	20	7.5	17.5	21	BDL	BDL	BDL	BDL	0.03	BDL	0.02	BDL	BDL
V	02.05.2012	75	21	7.7	18.1	BDL	BDL	BDL	BDL	BDL	0.01	BDL	0.04	BDL	BDL
	03.05.2012	74	17	7.8	18.2	BDL	BDL	BDL	BDL	BDL	0.01	BDL	0.03	BDL	BDL
VI	07.05.2012	68	18	7.5	18.5	BDL	BDL	BDL	BDL	BDL	0.04	BDL	0.06	BDL	BDL
	08.05.2012	68	18	7.3	19.1	20	BDL	BDL	BDL	BDL	0.02	BDL	0.04	BDL	BDL
VII	15.05.2012	67	18	8.1	20.1	22	BDL	BDL	BDL	BDL	0.04	BDL	0.06	BDL	BDL
	16.05.2012	68	18	7.5	18.5	20	BDL	BDL	BDL	BDL	BDL	BDL	0.04	BDL	0.02
VIII	24.05.2012	71	19	7.3	18.4	22	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.03
	25.05.2012	67	18	7.2	17.9	23	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.04
IX	03.06.2012	64	17	7.0	17.8	24	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05
	04.06.2012	68	18	6.9	17.4	24	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.06
X	09.06.2012	65	17	6.7	17.3	22	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	10.06.2012	70	19	6.5	17.5	20	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
XI	14.06.2012	64	17	6.3	17.4	21	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	15.06.2012	61	16	6.4	17.5	20	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.04
XII	19.06.2012	59	15	6.2	17.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	20.06.2012	57	14	6.3	16.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05
<b>CPCB LIMIT</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>400</b>	<b>100</b>	<b>05</b>	<b>2000</b>	<b>01</b>	<b>1.0</b>	<b>06</b>	<b>-</b>	<b>-</b>	<b>20</b>

BDL Values for O<sub>3</sub> = <10 µg/m<sup>3</sup>  
 BDL Values for NH<sub>3</sub> = <20 µg/m<sup>3</sup>  
 BDL Values for As = < 0.30 ng/m<sup>3</sup>  
 BDL Values for Ni = <0.02 ng/m<sup>3</sup>

BDL Values for C<sub>6</sub>H<sub>6</sub> = <0.01 µg/m<sup>3</sup>  
 BDL Values for BaP = <1 ng/m<sup>3</sup>  
 BDL Values for Cr = <0.01 ng/m<sup>3</sup>

BDL Values for CO = <114.5 µg/m<sup>3</sup>  
 BDL Values for Lead = <0.01 ng/m<sup>3</sup>  
 BDL Values for Hg: <0.01 ng/m<sup>3</sup>

CMPDI

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season : Summer 2012

Location : Chinakuri – III UG (A4)

Core Zone

Week	Date	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>	NOx µg/m <sup>3</sup>	NH <sub>3</sub> µg/m <sup>3</sup>	O <sub>3</sub> µg/m <sup>3</sup>	C <sub>6</sub> H <sub>6</sub> µg/m <sup>3</sup>	CO µg/m <sup>3</sup>	BaP ng/m <sup>3</sup>	Pb µg/m <sup>3</sup>	As ng/m <sup>3</sup>	Cr ng/m <sup>3</sup>	Hg ng/m <sup>3</sup>	Ni ng/m <sup>3</sup>
I	04.04.2012	62	16	6.6	17.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	05.04.2012	73	20	6.8	17.4	23	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
II	13.04.2012	68	18	8.0	18.0	23	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	14.04.2012	66	17	6.9	18.3	26	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
III	16.04.2012	70	19	7.9	17.7	27	BDL	BDL	BDL	BDL	0.01	BDL	BDL	BDL	BDL
	17.04.2012	71	19	7.3	17.6	28	BDL	BDL	BDL	BDL	0.02	BDL	0.01	BDL	0.02
IV	26.04.2012	69	18	7.0	17.9	25	BDL	BDL	BDL	BDL	0.02	BDL	0.02	BDL	0.03
	27.04.2012	71	19	7.3	17.7	27	BDL	BDL	BDL	BDL	0.03	BDL	0.02	BDL	0.04
V	02.05.2012	73	20	7.5	18.3	BDL	BDL	BDL	BDL	BDL	0.01	BDL	0.01	BDL	0.06
	03.05.2012	72	16	7.6	18.4	BDL	BDL	BDL	BDL	BDL	0.01	BDL	0.01	BDL	0.06
VI	07.05.2012	66	17	7.3	18.7	BDL	BDL	BDL	BDL	BDL	0.04	BDL	0.01	BDL	0.05
	08.05.2012	66	17	7.1	19.3	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.01	BDL	0.04
VII	15.05.2012	65	17	7.9	20.3	BDL	BDL	BDL	BDL	BDL	0.04	BDL	BDL	BDL	0.03
	16.05.2012	66	17	7.3	18.7	21	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
VIII	24.05.2012	69	18	7.1	18.6	23	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	25.05.2012	65	17	7.0	18.1	23	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
IX	03.06.2012	62	16	6.8	18.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	04.06.2012	66	17	6.7	17.6	21	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
X	09.06.2012	63	16	6.5	17.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	10.06.2012	68	18	6.3	17.7	23	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
XI	14.06.2012	62	16	6.1	17.6	25	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	15.06.2012	59	15	6.2	17.7	21	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.04
XII	19.06.2012	57	14	6.0	17.4	23	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	20.06.2012	55	13	6.1	17.1	23	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05
<b>CPCB LIMIT</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>400</b>	<b>100</b>	<b>05</b>	<b>2000</b>	<b>01</b>	<b>1.0</b>	<b>06</b>	<b>-</b>	<b>-</b>	<b>20</b>

BDL Values for O<sub>3</sub> = <10 µg/m<sup>3</sup>  
 BDL Values for NH<sub>3</sub> = <20 µg/m<sup>3</sup>  
 BDL Values for As = < 0.30 ng/m<sup>3</sup>  
 BDL Values for Ni = <0.02 ng/m<sup>3</sup>

BDL Values for C<sub>6</sub>H<sub>6</sub> = <0.01 µg/m<sup>3</sup>  
 BDL Values for BaP = <1 ng/m<sup>3</sup>  
 BDL Values for Cr = <0.01 ng/m<sup>3</sup>

BDL Values for CO = <114.5 µg/m<sup>3</sup>  
 BDL Values for Lead = <0.01 ng/m<sup>3</sup>  
 BDL Values for Hg: <0.01 ng/m<sup>3</sup>

**CMPDI**

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

**Season : Summer 2012**

**Location : Amritnagar (A5)**

**Core Zone**

Week	Date	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>x</sub> µg/m <sup>3</sup>	NH <sub>3</sub> µg/m <sup>3</sup>	O <sub>3</sub> µg/m <sup>3</sup>	C <sub>6</sub> H <sub>6</sub> µg/m <sup>3</sup>	CO µg/m <sup>3</sup>	BaP ng/m <sup>3</sup>	Pb µg/m <sup>3</sup>	As ng/m <sup>3</sup>	Cr ng/m <sup>3</sup>	Hg ng/m <sup>3</sup>	Ni ng/m <sup>3</sup>
I	04.04.2012	62	19	10.5	25.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	05.04.2012	63	19	9.3	25.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
II	13.04.2012	59	17	9.8	25.9	22	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	14.04.2012	68	20	9.0	25.3	25	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
III	16.04.2012	63	12	9.2	25.5	24	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	17.04.2012	66	21	9.1	25.3	25	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
IV	26.04.2012	56	18	8.0	25.0	24	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	27.04.2012	62	18	7.8	26.4	26	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
V	02.05.2012	71	20	8.1	25.6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.03
	03.05.2012	71	20	8.3	26.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.03
VI	07.05.2012	68	19	7.9	26.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.03
	08.05.2012	66	18	9.8	27.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.04
VII	15.05.2012	64	17	10.1	27.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	16.05.2012	71	20	10.5	27.1	20	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.04
VIII	24.05.2012	68	19	9.7	27.4	22	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	25.05.2012	64	18	9.8	27.2	22	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
IX	03.06.2012	76	21	9.6	27.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	04.06.2012	70	19	8.5	26.9	21	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
X	09.06.2012	70	23	7.7	26.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	10.06.2012	73	22	10.3	27.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
XI	14.06.2012	63	21	10.3	26.7	24	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	15.06.2012	60	20	10.1	27.2	20	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
XII	19.06.2012	59	20	10.7	26.6	22	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	20.06.2012	60	20	10.0	26.9	22	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
<b>CPCB LIMIT</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>400</b>	<b>100</b>	<b>05</b>	<b>2000</b>	<b>01</b>	<b>1.0</b>	<b>06</b>	<b>-</b>	<b>-</b>	<b>20</b>

BDL Values for O<sub>3</sub> = <10 µg/m<sup>3</sup>  
 BDL Values for NH<sub>3</sub> = <20 µg/m<sup>3</sup>  
 BDL Values for As = < 0.30 ng/m<sup>3</sup>  
 BDL Values for Ni = <0.02 ng/m<sup>3</sup>

BDL Values for C<sub>6</sub>H<sub>6</sub> = <0.01 µg/m<sup>3</sup>  
 BDL Values for BaP = <1 ng/m<sup>3</sup>  
 BDL Values for Cr = <0.01 ng/m<sup>3</sup>

BDL Values for CO = <114.5 µg/m<sup>3</sup>  
 BDL Values for Lead = <0.01 ng/m<sup>3</sup>  
 BDL Values for Hg: <0.01 ng/m<sup>3</sup>

CMPDI

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season : Summer 2012

Location : Tirat (A6)

Core Zone

Week	Date	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>x</sub> µg/m <sup>3</sup>	NH <sub>3</sub> µg/m <sup>3</sup>	O <sub>3</sub> µg/m <sup>3</sup>	C <sub>6</sub> H <sub>6</sub> µg/m <sup>3</sup>	CO µg/m <sup>3</sup>	BaP ng/m <sup>3</sup>	Pb µg/m <sup>3</sup>	As ng/m <sup>3</sup>	Cr ng/m <sup>3</sup>	Hg ng/m <sup>3</sup>	Ni ng/m <sup>3</sup>
I	04.04.2012	60	16	8.1	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	05.04.2012	71	20	8.1	20.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
II	13.04.2012	66	18	5.9	20.6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	14.04.2012	64	18	5.5	21.5	22	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
III	16.04.2012	68	19	6.4	21.5	23	BDL	BDL	BDL	BDL	0.01	BDL	BDL	BDL	BDL
	17.04.2012	69	19	7.0	20.5	24	BDL	BDL	BDL	BDL	0.02	BDL	0.01	BDL	BDL
IV	26.04.2012	67	19	6.6	19.9	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.02	BDL	BDL
	27.04.2012	69	17	7.4	19.6	BDL	BDL	BDL	BDL	BDL	0.03	BDL	0.02	BDL	0.02
V	02.05.2012	71	17	7.0	21.5	BDL	BDL	BDL	BDL	BDL	0.01	BDL	0.01	BDL	0.02
	03.05.2012	70	17	6.9	20.9	BDL	BDL	BDL	BDL	BDL	0.01	BDL	0.01	BDL	0.04
VI	07.05.2012	64	18	6.8	21.5	BDL	BDL	BDL	BDL	BDL	0.04	BDL	0.01	BDL	0.02
	08.05.2012	64	18	7.2	21.9	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.01	BDL	0.02
VII	15.05.2012	63	19	6.1	21.6	BDL	BDL	BDL	BDL	BDL	0.04	BDL	BDL	BDL	0.04
	16.05.2012	64	18	7.5	20.6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
VIII	24.05.2012	67	19	6.9	21.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.03
	25.05.2012	63	17	6.5	22.6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
IX	03.06.2012	60	14	6.7	24.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	04.06.2012	64	17	6.2	24.6	21	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
X	09.06.2012	61	19	5.9	24.4	21	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	10.06.2012	66	21	8.8	23.4	23	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
XI	14.06.2012	60	19	8.5	24.6	24	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	15.06.2012	57	18	6.9	24.5	25	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.04
XII	19.06.2012	58	19	7.8	24.6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	20.06.2012	57	18	5.6	23.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05
<b>CPCB LIMIT</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>400</b>	<b>100</b>	<b>05</b>	<b>2000</b>	<b>01</b>	<b>1.0</b>	<b>06</b>	<b>-</b>	<b>-</b>	<b>20</b>

BDL Values for O<sub>3</sub> = <10 µg/m<sup>3</sup>  
 BDL Values for NH<sub>3</sub> = <20 µg/m<sup>3</sup>  
 BDL Values for As = < 0.30 ng/m<sup>3</sup>  
 BDL Values for Ni = <0.02 ng/m<sup>3</sup>

BDL Values for C<sub>6</sub>H<sub>6</sub> = <0.01 µg/m<sup>3</sup>  
 BDL Values for BaP = <1 ng/m<sup>3</sup>  
 BDL Values for Cr = <0.01 ng/m<sup>3</sup>

BDL Values for CO = <114.5 µg/m<sup>3</sup>  
 BDL Values for Lead = <0.01 ng/m<sup>3</sup>  
 BDL Values for Hg: <0.01 ng/m<sup>3</sup>

CMPDI

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season : Summer 2012

Location : Kuardih (A7)

Core Zone

Week	Date	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>x</sub> µg/m <sup>3</sup>	NH <sub>3</sub> µg/m <sup>3</sup>	O <sub>3</sub> µg/m <sup>3</sup>	C <sub>6</sub> H <sub>6</sub> µg/m <sup>3</sup>	CO µg/m <sup>3</sup>	BaP ng/m <sup>3</sup>	Pb µg/m <sup>3</sup>	As ng/m <sup>3</sup>	Cr ng/m <sup>3</sup>	Hg ng/m <sup>3</sup>	Ni ng/m <sup>3</sup>
I	04.04.2012	64	17	7.8	17.1	22	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	05.04.2012	72	21	8.0	17.2	23	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
II	13.04.2012	70	19	8.2	17.8	24	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	14.04.2012	68	18	7.1	18.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
III	16.04.2012	72	20	8.1	17.5	BDL	BDL	BDL	BDL	BDL	0.01	BDL	BDL	BDL	BDL
	17.04.2012	73	20	7.5	17.4	18	BDL	BDL	BDL	BDL	0.02	BDL	0.04	BDL	BDL
IV	26.04.2012	71	19	7.2	17.7	20	BDL	BDL	BDL	BDL	0.02	BDL	0.06	BDL	BDL
	27.04.2012	73	20	7.5	17.5	21	BDL	BDL	BDL	BDL	0.03	BDL	0.02	BDL	BDL
V	02.05.2012	73	21	8.7	18.1	BDL	BDL	BDL	BDL	BDL	0.01	BDL	0.04	BDL	BDL
	03.05.2012	72	17	8.8	18.2	BDL	BDL	BDL	BDL	BDL	0.01	BDL	0.03	BDL	BDL
VI	07.05.2012	68	19	8.5	18.5	BDL	BDL	BDL	BDL	BDL	0.04	BDL	0.06	BDL	BDL
	08.05.2012	68	18	8.3	19.1	20	BDL	BDL	BDL	BDL	0.02	BDL	0.04	BDL	BDL
VII	15.05.2012	67	19	8.1	20.1	22	BDL	BDL	BDL	BDL	0.04	BDL	0.06	BDL	BDL
	16.05.2012	68	18	7.5	18.5	20	BDL	BDL	BDL	BDL	BDL	BDL	0.04	BDL	0.02
VIII	24.05.2012	71	19	7.3	18.4	22	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.03
	25.05.2012	67	18	7.2	17.9	23	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.04
IX	03.06.2012	64	17	7.0	17.8	24	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05
	04.06.2012	68	18	6.9	17.4	24	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.06
X	09.06.2012	65	17	6.7	17.3	22	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	10.06.2012	70	19	7.5	17.5	20	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
XI	14.06.2012	64	17	7.3	17.4	21	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	15.06.2012	61	18	6.4	17.5	20	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.04
XII	19.06.2012	59	18	7.2	17.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	20.06.2012	57	17	7.3	16.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05
<b>CPCB LIMIT</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>400</b>	<b>100</b>	<b>05</b>	<b>2000</b>	<b>01</b>	<b>1.0</b>	<b>06</b>	<b>-</b>	<b>-</b>	<b>20</b>

BDL Values for O<sub>3</sub> = <10 µg/m<sup>3</sup>  
 BDL Values for NH<sub>3</sub> = <20 µg/m<sup>3</sup>  
 BDL Values for As = < 0.30 ng/m<sup>3</sup>  
 BDL Values for Ni = <0.02 ng/m<sup>3</sup>

BDL Values for C<sub>6</sub>H<sub>6</sub> = <0.01 µg/m<sup>3</sup>  
 BDL Values for BaP = <1 ng/m<sup>3</sup>  
 BDL Values for Cr = <0.01 ng/m<sup>3</sup>

BDL Values for CO = <114.5 µg/m<sup>3</sup>  
 BDL Values for Lead = <0.01 ng/m<sup>3</sup>  
 BDL Values for Hg: <0.01 ng/m<sup>3</sup>

CMPDI

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season : Summer 2012

Location : Nimcha (A8)

Core Zone

Week	Date	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>x</sub> µg/m <sup>3</sup>	NH <sub>3</sub> µg/m <sup>3</sup>	O <sub>3</sub> µg/m <sup>3</sup>	C <sub>6</sub> H <sub>6</sub> µg/m <sup>3</sup>	CO µg/m <sup>3</sup>	BaP ng/m <sup>3</sup>	Pb µg/m <sup>3</sup>	As ng/m <sup>3</sup>	Cr ng/m <sup>3</sup>	Hg ng/m <sup>3</sup>	Ni ng/m <sup>3</sup>
I	04.04.2012	62	16	6.6	19.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	05.04.2012	70	20	6.8	19.4	23	BDL	BDL	BDL	BDL	BDL	BDL	0.02	BDL	BDL
II	13.04.2012	68	18	8.0	18.0	23	BDL	BDL	BDL	BDL	BDL	BDL	0.02	BDL	BDL
	14.04.2012	66	17	6.9	18.3	26	BDL	BDL	BDL	BDL	BDL	BDL	0.02	BDL	BDL
III	16.04.2012	70	19	7.9	17.7	27	BDL	BDL	BDL	BDL	0.01	BDL	BDL	BDL	BDL
	17.04.2012	70	19	7.3	17.6	28	BDL	BDL	BDL	BDL	0.02	BDL	0.01	BDL	0.02
IV	26.04.2012	69	18	7.0	17.9	25	BDL	BDL	BDL	BDL	0.02	BDL	0.02	BDL	0.03
	27.04.2012	70	19	7.3	17.7	27	BDL	BDL	BDL	BDL	0.03	BDL	0.02	BDL	0.04
V	02.05.2012	71	20	7.5	18.3	BDL	BDL	BDL	BDL	BDL	0.01	BDL	0.02	BDL	0.06
	03.05.2012	71	16	7.6	18.4	BDL	BDL	BDL	BDL	BDL	0.01	BDL	0.02	BDL	0.06
VI	07.05.2012	66	18	7.3	18.7	BDL	BDL	BDL	BDL	BDL	0.04	BDL	0.02	BDL	0.05
	08.05.2012	66	18	7.1	19.3	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.02	BDL	0.04
VII	15.05.2012	65	18	7.9	19.3	BDL	BDL	BDL	BDL	BDL	0.04	BDL	BDL	BDL	0.03
	16.05.2012	66	18	7.3	18.7	21	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
VIII	24.05.2012	69	19	7.1	18.6	23	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	25.05.2012	65	19	7.0	18.1	23	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
IX	03.06.2012	62	19	6.8	18.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	04.06.2012	66	19	6.7	17.6	21	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
X	09.06.2012	63	20	6.5	19.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	10.06.2012	68	20	6.3	19.7	23	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
XI	14.06.2012	62	20	6.1	19.6	25	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	15.06.2012	59	20	6.2	19.7	21	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.04
XII	19.06.2012	57	20	6.0	19.4	23	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	20.06.2012	55	20	6.1	19.1	23	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05
<b>CPCB LIMIT</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>400</b>	<b>100</b>	<b>05</b>	<b>2000</b>	<b>01</b>	<b>1.0</b>	<b>06</b>	<b>-</b>	<b>-</b>	<b>20</b>

BDL Values for O<sub>3</sub> = <10 µg/m<sup>3</sup>  
 BDL Values for NH<sub>3</sub> = <20 µg/m<sup>3</sup>  
 BDL Values for As = < 0.30 ng/m<sup>3</sup>  
 BDL Values for Ni = <0.02 ng/m<sup>3</sup>

BDL Values for C<sub>6</sub>H<sub>6</sub> = <0.01 µg/m<sup>3</sup>  
 BDL Values for BaP = <1 ng/m<sup>3</sup>  
 BDL Values for Cr = <0.01 ng/m<sup>3</sup>

BDL Values for CO = <114.5 µg/m<sup>3</sup>  
 BDL Values for Lead = <0.01 ng/m<sup>3</sup>  
 BDL Values for Hg: <0.01 ng/m<sup>3</sup>

**CMPDI**

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

**Season : Summer 2012**

**Location : Mahabir (A9)**

**Core Zone**

Week	Date	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>x</sub> µg/m <sup>3</sup>	NH <sub>3</sub> µg/m <sup>3</sup>	O <sub>3</sub> µg/m <sup>3</sup>	C <sub>6</sub> H <sub>6</sub> µg/m <sup>3</sup>	CO µg/m <sup>3</sup>	BaP ng/m <sup>3</sup>	Pb µg/m <sup>3</sup>	As ng/m <sup>3</sup>	Cr ng/m <sup>3</sup>	Hg ng/m <sup>3</sup>	Ni ng/m <sup>3</sup>
I	04.04.2012	59	18	9.0	23.8	BDL	BDL	BDL	BDL	BDL	0.08	BDL	0.04	BDL	0.03
	05.04.2012	58	17	8.0	21.7	BDL	BDL	BDL	BDL	BDL	0.10	BDL	0.08	BDL	0.03
II	13.04.2012	60	20	8.6	21.1	BDL	BDL	BDL	BDL	BDL	0.08	BDL	0.05	BDL	0.05
	14.04.2012	59	18	9.2	21.3	21	BDL	BDL	BDL	BDL	0.06	BDL	0.04	BDL	0.04
III	16.04.2012	62	19	8.4	22.2	22	BDL	BDL	BDL	BDL	0.10	BDL	0.02	BDL	0.03
	17.04.2012	59	18	5.9	23.0	24	BDL	BDL	BDL	BDL	0.08	BDL	0.02	BDL	0.04
IV	26.04.2012	51	15	5.7	22.7	20	BDL	BDL	BDL	BDL	0.11	BDL	0.02	BDL	0.02
	27.04.2012	54	14	5.9	23.2	22	BDL	BDL	BDL	BDL	0.08	BDL	0.02	BDL	0.04
V	02.05.2012	58	15	7.1	21.8	20	BDL	BDL	BDL	BDL	0.09	BDL	0.02	BDL	0.05
	03.05.2012	60	17	6.2	22.0	21	BDL	BDL	BDL	BDL	0.11	BDL	0.02	BDL	0.05
VI	07.05.2012	60	16	7.0	22.7	BDL	BDL	BDL	BDL	BDL	0.14	BDL	0.02	BDL	0.03
	08.05.2012	60	16	7.7	22.7	BDL	BDL	BDL	BDL	BDL	0.12	BDL	0.02	BDL	0.06
VII	15.05.2012	65	19	8.4	23.0	BDL	BDL	BDL	BDL	BDL	0.08	BDL	0.02	BDL	0.03
	16.05.2012	60	16	7.9	23.2	BDL	BDL	BDL	BDL	BDL	0.10	BDL	0.02	BDL	0.03
VIII	24.05.2012	62	16	7.7	23.5	BDL	BDL	BDL	BDL	BDL	0.06	BDL	0.05	BDL	0.02
	25.05.2012	64	17	8.3	23.3	BDL	BDL	BDL	BDL	BDL	0.06	BDL	0.04	BDL	0.06
IX	03.06.2012	62	16	7.5	23.6	BDL	BDL	BDL	BDL	BDL	0.10	BDL	0.03	BDL	0.05
	04.06.2012	65	17	7.9	22.3	BDL	BDL	BDL	BDL	BDL	0.08	BDL	0.04	BDL	0.04
X	09.06.2012	59	20	7.2	22.1	BDL	BDL	BDL	BDL	BDL	0.11	BDL	0.04	BDL	0.06
	10.06.2012	65	24	7.7	22.4	BDL	BDL	BDL	BDL	BDL	0.08	BDL	0.03	BDL	0.04
XI	14.06.2012	69	24	7.4	22.8	20	BDL	BDL	BDL	BDL	0.09	BDL	0.04	BDL	0.06
	15.06.2012	66	25	7.9	22.9	22	BDL	BDL	BDL	BDL	0.11	BDL	0.03	BDL	0.05
XII	19.06.2012	60	20	7.2	22.3	22	BDL	BDL	BDL	BDL	0.14	BDL	0.04	BDL	0.03
	20.06.2012	63	22	5.9	22.4	BDL	BDL	BDL	BDL	BDL	0.12	BDL	0.03	BDL	0.06
<b>CPCB LIMIT</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>400</b>	<b>100</b>	<b>05</b>	<b>2000</b>	<b>01</b>	<b>1.0</b>	<b>06</b>	<b>-</b>	<b>-</b>	<b>20</b>

BDL Values for O<sub>3</sub> = <10 µg/m<sup>3</sup>  
 BDL Values for NH<sub>3</sub> = <20 µg/m<sup>3</sup>  
 BDL Values for As = < 0.30 ng/m<sup>3</sup>  
 BDL Values for Ni = <0.02 ng/m<sup>3</sup>

BDL Values for C<sub>6</sub>H<sub>6</sub> = <0.01 µg/m<sup>3</sup>  
 BDL Values for BaP = <1 ng/m<sup>3</sup>  
 BDL Values for Cr = <0.01 ng/m<sup>3</sup>

BDL Values for CO = <114.5 µg/m<sup>3</sup>  
 BDL Values for Lead = <0.01 ng/m<sup>3</sup>  
 BDL Values for Hg: <0.01 ng/m<sup>3</sup>

**CMPDI**

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

**Season : Summer 2012**

**Location : Bakulia (A10)**

**Core Zone**

Week	Date	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>x</sub> µg/m <sup>3</sup>	NH <sub>3</sub> µg/m <sup>3</sup>	O <sub>3</sub> µg/m <sup>3</sup>	C <sub>6</sub> H <sub>6</sub> µg/m <sup>3</sup>	CO µg/m <sup>3</sup>	BaP ng/m <sup>3</sup>	Pb µg/m <sup>3</sup>	As ng/m <sup>3</sup>	Cr ng/m <sup>3</sup>	Hg ng/m <sup>3</sup>	Ni ng/m <sup>3</sup>
I	04.04.2012	39	11	5.3	11.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	05.04.2012	50	15	5.5	11.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
II	13.04.2012	45	13	6.7	11.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	14.04.2012	43	12	5.6	12.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
III	16.04.2012	47	14	6.6	11.4	BDL	BDL	BDL	BDL	BDL	0.01	BDL	BDL	BDL	BDL
	17.04.2012	48	14	6.0	11.3	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.01	BDL	BDL
IV	26.04.2012	46	13	5.7	11.6	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.02	BDL	BDL
	27.04.2012	48	14	6.0	11.4	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.02	BDL	BDL
V	02.05.2012	50	15	6.2	12.0	BDL	BDL	BDL	BDL	BDL	0.01	BDL	0.01	BDL	BDL
	03.05.2012	49	10	6.3	12.1	BDL	BDL	BDL	BDL	BDL	0.01	BDL	0.01	BDL	BDL
VI	07.05.2012	43	12	6.0	12.4	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.01	BDL	BDL
	08.05.2012	43	12	5.8	13.0	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.01	BDL	BDL
VII	15.05.2012	42	12	6.6	14.0	BDL	BDL	BDL	BDL	BDL	0.03	BDL	BDL	BDL	BDL
	16.05.2012	43	12	6.0	12.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
VIII	24.05.2012	46	13	5.8	12.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	25.05.2012	42	12	5.7	11.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
IX	03.06.2012	39	11	5.5	11.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	04.06.2012	43	12	5.4	11.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
X	09.06.2012	40	11	5.2	11.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	10.06.2012	45	13	5.0	11.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
XI	14.06.2012	39	11	4.8	11.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	15.06.2012	36	10	4.9	11.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.04
XII	19.06.2012	34	9	4.7	11.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	20.06.2012	32	10	4.8	10.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05
<b>CPCB LIMIT</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>400</b>	<b>100</b>	<b>05</b>	<b>2000</b>	<b>01</b>	<b>1.0</b>	<b>06</b>	<b>-</b>	<b>-</b>	<b>20</b>

BDL Values for O<sub>3</sub> = <10 µg/m<sup>3</sup>  
 BDL Values for NH<sub>3</sub> = <20 µg/m<sup>3</sup>  
 BDL Values for As = < 0.30 ng/m<sup>3</sup>  
 BDL Values for Ni = <0.02 ng/m<sup>3</sup>

BDL Values for C<sub>6</sub>H<sub>6</sub> = <0.01 µg/m<sup>3</sup>  
 BDL Values for BaP = <1 ng/m<sup>3</sup>  
 BDL Values for Cr = <0.01 ng/m<sup>3</sup>

BDL Values for CO = <114.5 µg/m<sup>3</sup>  
 BDL Values for Lead = <0.01 ng/m<sup>3</sup>  
 BDL Values for Hg: <0.01 ng/m<sup>3</sup>

**CMPDI**

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

**Season: Summer 2012**

**Location: Dubeswari (A11)**

**Buffer Zone**

Week	Date	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>x</sub> µg/m <sup>3</sup>	NH <sub>3</sub> µg/m <sup>3</sup>	O <sub>3</sub> µg/m <sup>3</sup>	C <sub>6</sub> H <sub>6</sub> µg/m <sup>3</sup>	CO µg/m <sup>3</sup>	BaP ng/m <sup>3</sup>	Pb µg/m <sup>3</sup>	As ng/m <sup>3</sup>	Cr ng/m <sup>3</sup>	Hg ng/m <sup>3</sup>	Ni ng/m <sup>3</sup>
I	02.04.2012	58	21	7.0	20.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.04	BDL	BDL
	03.04.2012	53	20	6.8	20.6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.08	BDL	BDL
II	11.04.2012	62	24	7.3	21.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05	BDL	BDL
	12.04.2012	67	25	7.5	21.7	21	BDL	BDL	BDL	BDL	BDL	BDL	0.04	BDL	BDL
III	20.04.2012	58	21	7.7	22.9	22	BDL	BDL	BDL	BDL	BDL	BDL	0.04	BDL	0.06
	21.04.2012	53	20	7.6	21.7	24	BDL	BDL	BDL	BDL	BDL	BDL	0.04	BDL	0.05
IV	28.04.2012	52	19	6.5	22.4	20	BDL	BDL	BDL	BDL	BDL	BDL	0.06	BDL	0.03
	29.04.2012	61	19	6.3	20.8	22	BDL	BDL	BDL	BDL	0.02	BDL	0.03	BDL	0.06
V	04.05.2012	64	22	6.6	20.0	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.03	BDL	0.06
	05.05.2012	59	20	6.8	20.8	BDL	BDL	BDL	BDL	BDL	0.03	BDL	0.03	BDL	0.04
VI	09.05.2012	65	21	6.4	21.7	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.04	BDL	0.08
	10.05.2012	56	19	6.3	20.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.04	BDL	0.06
VII	18.05.2012	60	20	6.6	21.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02	BDL	BDL
	19.05.2012	64	21	7.0	20.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.04
VIII	21.05.2012	63	21	8.2	19.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05	BDL	0.02
	22.05.2012	61	20	7.3	19.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.04	BDL	0.03
IX	01.06.2012	58	20	7.1	19.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02	BDL	BDL
	02.06.2012	64	23	7.0	18.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.04	BDL	BDL
X	08.06.2012	58	21	6.2	20.0	20	BDL	BDL	BDL	BDL	BDL	BDL	0.06	BDL	BDL
	09.06.2012	61	23	5.8	20.3	22	BDL	BDL	BDL	BDL	BDL	BDL	0.03	BDL	BDL
XI	14.06.2012	56	21	6.8	20.7	21	BDL	BDL	BDL	BDL	BDL	BDL	0.04	BDL	BDL
	15.06.2012	58	19	6.6	22.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.03	BDL	BDL
XII	20.06.2012	60	21	7.2	21.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02	BDL	BDL
	21.06.2012	63	19	7.5	20.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02	BDL	BDL
<b>CPCB LIMIT</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>400</b>	<b>100</b>	<b>05</b>	<b>2000</b>	<b>01</b>	<b>1.0</b>	<b>06</b>	<b>-</b>	<b>-</b>	<b>20</b>

BDL Values for O<sub>3</sub> = <10 µg/m<sup>3</sup>  
 BDL Values for NH<sub>3</sub> = <20 µg/m<sup>3</sup>  
 BDL Values for As = <0.30 µg /m<sup>3</sup>  
 BDL Values for Ni = <0.02 µg /m<sup>3</sup>

BDL Values for C<sub>6</sub>H<sub>6</sub> = <0.01 µg/m<sup>3</sup>  
 BDL Values for BaP = <1 µg /m<sup>3</sup>  
 BDL Values for Cr = <0.01 µg /m<sup>3</sup>

BDL Values for CO = <114.5 µg/m<sup>3</sup>  
 BDL Values for Lead = <0.01 µg /m<sup>3</sup>  
 BDL Values for Hg: <0.01 µg /m<sup>3</sup>

CMPDI

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Summer 2012

Location: Bejdih (A12)

Buffer Zone

Week	Date	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>	NOx µg/m <sup>3</sup>	NH <sub>3</sub> µg/m <sup>3</sup>	O <sub>3</sub> µg/m <sup>3</sup>	C <sub>6</sub> H <sub>6</sub> µg/m <sup>3</sup>	CO µg/m <sup>3</sup>	BaP ng/m <sup>3</sup>	Pb µg/m <sup>3</sup>	As ng/m <sup>3</sup>	Cr ng/m <sup>3</sup>	Hg ng/m <sup>3</sup>	Ni ng/m <sup>3</sup>
I	02.04.2012	48	18	5.9	14.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	03.04.2012	57	16	6.7	13.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
II	11.04.2012	54	14	5.8	13.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	12.04.2012	52	15	5.8	13.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
III	20.04.2012	56	13	5.5	13.2	BDL	BDL	BDL	BDL	BDL	0.01	BDL	BDL	BDL	BDL
	21.04.2012	57	14	6.1	12.9	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.01	BDL	BDL
IV	28.04.2012	55	14	5.5	13.0	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.02	BDL	BDL
	29.04.2012	57	15	6.6	13.2	BDL	BDL	BDL	BDL	BDL	0.03	BDL	0.02	BDL	BDL
V	04.05.2012	59	16	5.2	13.9	BDL	BDL	BDL	BDL	BDL	0.01	BDL	0.01	BDL	BDL
	05.05.2012	58	11	5.0	13.5	BDL	BDL	BDL	BDL	BDL	0.01	BDL	0.01	BDL	BDL
VI	09.05.2012	52	14	6.6	13.0	BDL	BDL	BDL	BDL	BDL	0.04	BDL	0.01	BDL	BDL
	10.05.2012	52	17	5.1	12.2	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.01	BDL	BDL
VII	18.05.2012	51	18	7.5	13.9	BDL	BDL	BDL	BDL	BDL	0.04	BDL	BDL	BDL	BDL
	19.05.2012	52	16	6.8	14.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
VIII	21.05.2012	55	16	6.7	14.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	22.05.2012	51	17	6.0	14.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
IX	01.06.2012	48	15	6.0	13.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	02.06.2012	52	15	7.2	13.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
X	08.06.2012	49	15	6.7	11.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	09.06.2012	54	16	7.2	14.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
XI	14.06.2012	48	15	6.5	14.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	15.06.2012	45	14	6.0	13.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.04
XII	20.06.2012	43	15	6.3	12.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	21.06.2012	41	16	6.7	13.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05
<b>CPCB LIMIT</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>400</b>	<b>100</b>	<b>05</b>	<b>2000</b>	<b>01</b>	<b>1.0</b>	<b>06</b>	<b>-</b>	<b>-</b>	<b>20</b>

BDL Values for O<sub>3</sub> = <10 µg/m<sup>3</sup>  
 BDL Values for NH<sub>3</sub> = <20 µg/m<sup>3</sup>  
 BDL Values for As = < 0.30 µg /m<sup>3</sup>  
 BDL Values for Ni = <0.02 µg /m<sup>3</sup>

BDL Values for C<sub>6</sub>H<sub>6</sub> = <0.01 µg/m<sup>3</sup>  
 BDL Values for BaP = <1 µg /m<sup>3</sup>  
 BDL Values for Cr = <0.01 µg /m<sup>3</sup>

BDL Values for CO = <114.5 µg/m<sup>3</sup>  
 BDL Values for Lead = <0.01 µg /m<sup>3</sup>  
 BDL Values for Hg: <0.01 µg /m<sup>3</sup>

**CMPDI**

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

**Season: Summer 2012**

**Location: Hirakhun (A13)**

**Buffer Zone**

Week	Date	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>x</sub> µg/m <sup>3</sup>	NH <sub>3</sub> µg/m <sup>3</sup>	O <sub>3</sub> µg/m <sup>3</sup>	C <sub>6</sub> H <sub>6</sub> µg/m <sup>3</sup>	CO µg/m <sup>3</sup>	BaP ng/m <sup>3</sup>	Pb µg/m <sup>3</sup>	As ng/m <sup>3</sup>	Cr ng/m <sup>3</sup>	Hg ng/m <sup>3</sup>	Ni ng/m <sup>3</sup>
I	04.04.2012	39	11	5.3	11.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	05.04.2012	50	15	5.5	11.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
II	13.04.2012	45	13	6.7	11.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	14.04.2012	43	12	5.6	12.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
III	16.04.2012	47	14	6.6	11.4	BDL	BDL	BDL	BDL	BDL	0.01	BDL	BDL	BDL	BDL
	17.04.2012	48	14	6.0	11.3	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.01	BDL	BDL
IV	26.04.2012	46	13	5.7	11.6	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.02	BDL	BDL
	27.04.2012	48	14	6.0	11.4	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.02	BDL	BDL
V	02.05.2012	50	15	6.2	12.0	BDL	BDL	BDL	BDL	BDL	0.01	BDL	0.01	BDL	BDL
	03.05.2012	49	10	6.3	12.1	BDL	BDL	BDL	BDL	BDL	0.01	BDL	0.01	BDL	BDL
VI	07.05.2012	43	12	6.0	12.4	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.01	BDL	BDL
	08.05.2012	43	12	5.8	13.0	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.01	BDL	BDL
VII	15.05.2012	42	12	6.6	14.0	BDL	BDL	BDL	BDL	BDL	0.03	BDL	BDL	BDL	BDL
	16.05.2012	43	12	6.0	12.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
VIII	24.05.2012	46	13	5.8	12.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	25.05.2012	42	12	5.7	11.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
IX	03.06.2012	39	11	5.5	11.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	04.06.2012	43	12	5.4	11.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
X	09.06.2012	40	11	5.2	11.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	10.06.2012	45	13	5.0	11.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
XI	14.06.2012	39	11	4.8	11.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	15.06.2012	36	10	4.9	11.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.04
XII	19.06.2012	34	9	4.7	11.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	20.06.2012	32	10	4.8	10.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05
<b>CPCB LIMIT</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>400</b>	<b>100</b>	<b>05</b>	<b>2000</b>	<b>01</b>	<b>1.0</b>	<b>06</b>	<b>-</b>	<b>-</b>	<b>20</b>

BDL Values for O<sub>3</sub> = <10 µg/m<sup>3</sup>  
BDL Values for BaP = <1 ng/m<sup>3</sup>  
BDL Values for NH<sub>3</sub> = <20 µg/m<sup>3</sup>

BDL Values for C<sub>6</sub>H<sub>6</sub> = <0.01 µg/m<sup>3</sup>  
BDL Values for As: < 0.30 ng/m<sup>3</sup>

BDL Values for CO = <114.5 µg/m<sup>3</sup>  
BDL Values for Hg: <0.01 ng/m<sup>3</sup>

**CMPDI**

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

**Season: Summer 2012**

**Location: Patmohana (A14)**

**Buffer Zone**

Week	Date	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>	NOx µg/m <sup>3</sup>	NH <sub>3</sub> µg/m <sup>3</sup>	O <sub>3</sub> µg/m <sup>3</sup>	C <sub>6</sub> H <sub>6</sub> µg/m <sup>3</sup>	CO µg/m <sup>3</sup>	BaP ng/m <sup>3</sup>	Pb µg/m <sup>3</sup>	As ng/m <sup>3</sup>	Cr ng/m <sup>3</sup>	Hg ng/m <sup>3</sup>	Ni ng/m <sup>3</sup>
I	04.04.2012	60	16	7.1	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	05.04.2012	71	20	6.1	20.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
II	13.04.2012	66	18	5.9	20.6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	14.04.2012	64	18	5.5	21.5	22	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
III	16.04.2012	68	19	6.4	21.5	23	BDL	BDL	BDL	BDL	0.01	BDL	BDL	BDL	BDL
	17.04.2012	69	19	7.0	20.5	24	BDL	BDL	BDL	BDL	0.02	BDL	0.01	BDL	BDL
IV	26.04.2012	67	19	6.6	19.9	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.02	BDL	BDL
	27.04.2012	69	17	7.4	19.6	BDL	BDL	BDL	BDL	BDL	0.03	BDL	0.02	BDL	0.02
V	02.05.2012	71	17	7.0	21.5	BDL	BDL	BDL	BDL	BDL	0.01	BDL	0.01	BDL	0.02
	03.05.2012	70	17	6.9	20.9	BDL	BDL	BDL	BDL	BDL	0.01	BDL	0.01	BDL	0.04
VI	07.05.2012	64	15	6.8	21.5	BDL	BDL	BDL	BDL	BDL	0.04	BDL	0.01	BDL	0.02
	08.05.2012	64	15	7.2	21.9	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.01	BDL	0.02
VII	15.05.2012	63	15	6.1	21.6	BDL	BDL	BDL	BDL	BDL	0.04	BDL	BDL	BDL	0.04
	16.05.2012	64	15	7.5	20.6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
VIII	24.05.2012	67	16	6.9	21.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.03
	25.05.2012	63	15	6.5	22.6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
IX	03.06.2012	60	14	6.7	24.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	04.06.2012	64	15	6.2	24.6	21	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
X	09.06.2012	61	19	5.9	24.4	21	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	10.06.2012	66	21	8.8	26.4	23	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
XI	14.06.2012	60	19	8.5	24.6	24	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	15.06.2012	57	18	6.9	24.5	25	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.04
XII	19.06.2012	55	17	5.8	24.6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	20.06.2012	53	16	5.6	23.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05
<b>CPCB LIMIT</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>400</b>	<b>100</b>	<b>05</b>	<b>2000</b>	<b>01</b>	<b>1.0</b>	<b>06</b>	<b>-</b>	<b>-</b>	<b>20</b>

BDL Values for O<sub>3</sub> = <10 µg/m<sup>3</sup>  
 BDL Values for NH<sub>3</sub> = <20 µg/m<sup>3</sup>  
 BDL Values for As = < 0.30 ng/m<sup>3</sup>  
 BDL Values for Ni = <0.02 ng/m<sup>3</sup>

BDL Values for C<sub>6</sub>H<sub>6</sub> = <0.01 µg/m<sup>3</sup>  
 BDL Values for BaP = <1 ng/m<sup>3</sup>  
 BDL Values for Cr = <0.01 ng/m<sup>3</sup>

BDL Values for CO = <114.5 µg/m<sup>3</sup>  
 BDL Values for Lead = <0.01 ng/m<sup>3</sup>  
 BDL Values for Hg: <0.01 ng/m<sup>3</sup>

**CMPDI**

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

**Season: Summer 2012**

**Location: Ratibati UG (A15)**

**Buffer Zone**

Week	Date	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>x</sub> µg/m <sup>3</sup>	NH <sub>3</sub> µg/m <sup>3</sup>	O <sub>3</sub> µg/m <sup>3</sup>	C <sub>6</sub> H <sub>6</sub> µg/m <sup>3</sup>	CO µg/m <sup>3</sup>	BaP ng/m <sup>3</sup>	Pb µg/m <sup>3</sup>	As ng/m <sup>3</sup>	Cr ng/m <sup>3</sup>	Hg ng/m <sup>3</sup>	Ni ng/m <sup>3</sup>
I	04.04.2012	59	20	9.3	19.3	BDL	BDL	BDL	BDL	BDL	0.06	BDL	0.04	BDL	0.03
	05.04.2012	56	19	8.3	18.2	BDL	BDL	BDL	BDL	BDL	0.12	BDL	0.08	BDL	0.04
II	13.04.2012	63	20	8.9	19.6	BDL	BDL	BDL	BDL	BDL	0.06	BDL	0.05	BDL	0.04
	14.04.2012	57	18	9.5	19.8	21	BDL	BDL	BDL	BDL	0.07	BDL	0.04	BDL	0.05
III	16.04.2012	60	22	8.7	18.7	22	BDL	BDL	BDL	BDL	0.08	BDL	0.02	BDL	0.06
	17.04.2012	57	18	6.2	19.5	21	BDL	BDL	BDL	BDL	0.10	BDL	0.02	BDL	0.06
IV	26.04.2012	49	19	6.0	18.2	25	BDL	BDL	BDL	BDL	0.12	BDL	0.02	BDL	0.04
	27.04.2012	52	16	6.2	18.7	23	BDL	BDL	BDL	BDL	0.07	BDL	0.02	BDL	0.06
V	02.05.2012	56	18	7.4	17.3	BDL	BDL	BDL	BDL	BDL	0.08	BDL	0.02	BDL	0.06
	03.05.2012	60	20	6.5	17.5	BDL	BDL	BDL	BDL	BDL	0.10	BDL	0.02	BDL	0.04
VI	07.05.2012	58	16	7.3	18.2	BDL	BDL	BDL	BDL	BDL	0.11	BDL	0.02	BDL	0.04
	08.05.2012	59	16	8.0	18.2	BDL	BDL	BDL	BDL	BDL	0.13	BDL	0.02	BDL	0.04
VII	15.05.2012	60	21	8.7	18.5	BDL	BDL	BDL	BDL	BDL	0.09	BDL	0.02	BDL	0.02
	16.05.2012	58	16	8.2	18.7	BDL	BDL	BDL	BDL	BDL	0.11	BDL	0.02	BDL	0.02
VIII	24.05.2012	60	16	8.0	19.0	BDL	BDL	BDL	BDL	BDL	0.06	BDL	0.05	BDL	0.04
	25.05.2012	62	19	8.6	18.8	20	BDL	BDL	BDL	BDL	0.06	BDL	0.04	BDL	0.06
IX	03.06.2012	60	16	7.8	19.1	22	BDL	BDL	BDL	BDL	0.10	BDL	0.03	BDL	0.06
	04.06.2012	63	20	8.2	18.8	23	BDL	BDL	BDL	BDL	0.08	BDL	0.04	BDL	0.05
X	09.06.2012	57	20	7.5	19.6	BDL	BDL	BDL	BDL	BDL	0.11	BDL	0.04	BDL	0.02
	10.06.2012	60	22	8.0	19.9	BDL	BDL	BDL	BDL	BDL	0.08	BDL	0.03	BDL	0.04
XI	14.06.2012	67	22	7.7	18.3	20	BDL	BDL	BDL	BDL	0.09	BDL	0.04	BDL	0.06
	15.06.2012	59	21	8.2	18.4	BDL	BDL	BDL	BDL	BDL	0.11	BDL	0.03	BDL	0.05
XII	19.06.2012	58	20	7.5	18.8	BDL	BDL	BDL	BDL	BDL	0.14	BDL	0.04	BDL	0.05
	20.06.2012	60	20	6.2	19.9	BDL	BDL	BDL	BDL	BDL	0.12	BDL	0.03	BDL	0.03
<b>CPCB LIMIT</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>400</b>	<b>100</b>	<b>05</b>	<b>2000</b>	<b>01</b>	<b>1.0</b>	<b>06</b>	<b>-</b>	<b>-</b>	<b>20</b>

BDL Values for O<sub>3</sub> = <10 µg/m<sup>3</sup>  
 BDL Values for NH<sub>3</sub> = <20 µg/m<sup>3</sup>  
 BDL Values for As = < 0.30 ng/m<sup>3</sup>  
 BDL Values for Ni = <0.02 ng/m<sup>3</sup>

BDL Values for C<sub>6</sub>H<sub>6</sub> = <0.01 µg/m<sup>3</sup>  
 BDL Values for BaP = <1 ng/m<sup>3</sup>  
 BDL Values for Cr = <0.01 ng/m<sup>3</sup>

BDL Values for CO = <114.5 µg/m<sup>3</sup>  
 BDL Values for Lead = <0.01 ng/m<sup>3</sup>  
 BDL Values for Hg: <0.01 ng/m<sup>3</sup>

CMPDI

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Summer 2012

Location: Chalbalpur Village (A16)

Buffer Zone

Week	Date	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>x</sub> µg/m <sup>3</sup>	NH <sub>3</sub> µg/m <sup>3</sup>	O <sub>3</sub> µg/m <sup>3</sup>	C <sub>6</sub> H <sub>6</sub> µg/m <sup>3</sup>	CO µg/m <sup>3</sup>	BaP ng/m <sup>3</sup>	Pb µg/m <sup>3</sup>	As ng/m <sup>3</sup>	Cr ng/m <sup>3</sup>	Hg ng/m <sup>3</sup>	Ni ng/m <sup>3</sup>
I	04.04.2012	66	22	8.0	24.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	05.04.2012	56	20	8.8	24.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
II	13.04.2012	66	24	8.3	24.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	14.04.2012	66	24	8.5	24.5	21	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
III	16.04.2012	61	22	7.7	24.7	22	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	17.04.2012	56	20	7.6	24.5	23	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
IV	26.04.2012	55	19	6.5	25.2	20	BDL	BDL	BDL	BDL	BDL	BDL	0.01	BDL	0.02
	27.04.2012	59	19	6.3	23.6	22	BDL	BDL	BDL	BDL	0.02	BDL	0.03	BDL	0.02
V	02.05.2012	66	22	6.6	22.8	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.02	BDL	0.03
	03.05.2012	64	23	6.8	23.6	BDL	BDL	BDL	BDL	BDL	0.03	BDL	0.02	BDL	0.03
VI	07.05.2012	67	21	6.4	24.5	BDL	BDL	BDL	BDL	BDL	0.02	BDL	BDL	BDL	0.04
	08.05.2012	59	20	7.3	23.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
VII	15.05.2012	63	20	7.6	23.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	16.05.2012	67	21	7.0	23.6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.04
VIII	24.05.2012	66	21	7.2	23.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	25.05.2012	64	20	7.3	21.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.03
IX	03.06.2012	61	20	7.1	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	04.06.2012	62	23	7.0	21.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
X	09.06.2012	56	18	6.2	21.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	10.06.2012	61	23	6.8	23.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
XI	14.06.2012	56	21	6.8	23.2	20	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	15.06.2012	51	19	6.6	24.7	22	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
XII	19.06.2012	56	21	7.2	24.1	22	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	20.06.2012	51	19	7.5	24.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
<b>CPCB LIMIT</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>400</b>	<b>100</b>	<b>05</b>	<b>2000</b>	<b>01</b>	<b>1.0</b>	<b>06</b>	<b>-</b>	<b>-</b>	<b>20</b>

BDL Values for O<sub>3</sub> = <10 µg/m<sup>3</sup>  
 BDL Values for NH<sub>3</sub> = <20 µg/m<sup>3</sup>  
 BDL Values for As = < 0.30 ng/m<sup>3</sup>  
 BDL Values for Ni = <0.02 ng/m<sup>3</sup>

BDL Values for C<sub>6</sub>H<sub>6</sub> = <0.01 µg/m<sup>3</sup>  
 BDL Values for BaP = <1 ng/m<sup>3</sup>  
 BDL Values for Cr = <0.01 ng/m<sup>3</sup>

BDL Values for CO = <114.5 µg/m<sup>3</sup>  
 BDL Values for Lead = <0.01 ng/m<sup>3</sup>  
 BDL Values for Hg: <0.01 ng/m<sup>3</sup>

**CMPDI**

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

**Season: Summer 2012**

**Location: J K Nagar UG (A17)**

**Buffer Zone**

Week	Date	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>x</sub> µg/m <sup>3</sup>	NH <sub>3</sub> µg/m <sup>3</sup>	O <sub>3</sub> µg/m <sup>3</sup>	C <sub>6</sub> H <sub>6</sub> µg/m <sup>3</sup>	CO µg/m <sup>3</sup>	BaP ng/m <sup>3</sup>	Pb µg/m <sup>3</sup>	As ng/m <sup>3</sup>	Cr ng/m <sup>3</sup>	Hg ng/m <sup>3</sup>	Ni ng/m <sup>3</sup>
I	04.04.2012	49	14	5.6	10.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	05.04.2012	53	16	5.8	10.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
II	13.04.2012	48	14	7.0	11.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	14.04.2012	46	13	5.9	11.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
III	16.04.2012	50	15	6.9	11.2	BDL	BDL	BDL	BDL	BDL	0.01	BDL	BDL	BDL	BDL
	17.04.2012	51	15	6.3	11.1	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.01	BDL	BDL
IV	26.04.2012	49	14	6.0	11.4	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.02	BDL	BDL
	27.04.2012	51	15	6.3	11.2	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.02	BDL	BDL
V	02.05.2012	53	16	6.5	11.8	BDL	BDL	BDL	BDL	BDL	0.01	BDL	0.01	BDL	BDL
	03.05.2012	52	15	6.6	11.9	BDL	BDL	BDL	BDL	BDL	0.01	BDL	0.01	BDL	BDL
VI	07.05.2012	48	13	6.3	12.2	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.01	BDL	0.02
	08.05.2012	49	13	6.1	12.8	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.01	BDL	0.02
VII	15.05.2012	49	13	6.9	13.8	BDL	BDL	BDL	BDL	BDL	0.03	BDL	BDL	BDL	0.02
	16.05.2012	49	13	6.3	12.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.04
VIII	24.05.2012	49	14	6.1	12.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	25.05.2012	51	13	6.0	11.6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05
IX	03.06.2012	52	16	5.8	11.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	04.06.2012	48	13	5.7	11.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
X	09.06.2012	47	12	5.5	11.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	10.06.2012	48	14	5.3	11.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
XI	14.06.2012	49	12	5.1	11.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	15.06.2012	44	14	5.2	11.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
XII	19.06.2012	45	13	5.0	10.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	20.06.2012	56	13	5.1	10.6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
<b>CPCB LIMIT</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>400</b>	<b>100</b>	<b>05</b>	<b>2000</b>	<b>01</b>	<b>1.0</b>	<b>06</b>	<b>-</b>	<b>-</b>	<b>20</b>

BDL Values for O<sub>3</sub> = <10 µg/m<sup>3</sup>  
 BDL Values for NH<sub>3</sub> = <20 µg/m<sup>3</sup>  
 BDL Values for As = < 0.30 ng/m<sup>3</sup>  
 BDL Values for Ni = <0.02 ng/m<sup>3</sup>

BDL Values for C<sub>6</sub>H<sub>6</sub> = <0.01 µg/m<sup>3</sup>  
 BDL Values for BaP = <1 ng/m<sup>3</sup>  
 BDL Values for Cr = <0.01 ng/m<sup>3</sup>

BDL Values for CO = <114.5 µg/m<sup>3</sup>  
 BDL Values for Lead = <0.01 ng/m<sup>3</sup>  
 BDL Values for Hg: <0.01 ng/m<sup>3</sup>

**CMPDI**

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

**Season: Summer 2012**

**Location: Jemehari UG (A18)**

**Buffer Zone**

Week	Date	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>x</sub> µg/m <sup>3</sup>	NH <sub>3</sub> µg/m <sup>3</sup>	O <sub>3</sub> µg/m <sup>3</sup>	C <sub>6</sub> H <sub>6</sub> µg/m <sup>3</sup>	CO µg/m <sup>3</sup>	BaP ng/m <sup>3</sup>	Pb µg/m <sup>3</sup>	As ng/m <sup>3</sup>	Cr ng/m <sup>3</sup>	Hg ng/m <sup>3</sup>	Ni ng/m <sup>3</sup>
I	04.04.2012	59	18	10.0	17.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	05.04.2012	58	17	10.0	17.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
II	13.04.2012	60	20	11.6	17.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	14.04.2012	59	18	11.2	16.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
III	16.04.2012	62	19	12.4	16.2	BDL	BDL	BDL	BDL	BDL	0.01	BDL	BDL	BDL	BDL
	17.04.2012	59	18	13.9	16.0	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.01	BDL	BDL
IV	26.04.2012	51	15	10.7	16.7	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.02	BDL	BDL
	27.04.2012	54	14	10.9	16.2	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.02	BDL	BDL
V	02.05.2012	58	15	9.1	16.8	BDL	BDL	BDL	BDL	BDL	0.01	BDL	0.01	BDL	BDL
	03.05.2012	60	17	9.2	15.0	BDL	BDL	BDL	BDL	BDL	0.01	BDL	0.01	BDL	BDL
VI	07.05.2012	60	16	9.0	15.7	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.01	BDL	BDL
	08.05.2012	60	16	10.7	15.7	BDL	BDL	BDL	BDL	BDL	0.02	BDL	0.01	BDL	BDL
VII	15.05.2012	65	19	10.4	15.0	BDL	BDL	BDL	BDL	BDL	0.03	BDL	BDL	BDL	BDL
	16.05.2012	60	16	11.9	15.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
VIII	24.05.2012	62	16	11.7	15.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	25.05.2012	64	17	11.3	15.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
IX	03.06.2012	62	16	11.5	15.6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	04.06.2012	65	17	10.9	16.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
X	09.06.2012	59	20	10.2	16.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	10.06.2012	65	20	10.7	16.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
XI	14.06.2012	69	24	8.4	17.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	15.06.2012	68	20	8.9	17.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.04
XII	19.06.2012	67	20	8.2	17.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
	20.06.2012	68	20	9.9	17.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05
<b>CPCB LIMIT</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>400</b>	<b>100</b>	<b>05</b>	<b>2000</b>	<b>01</b>	<b>1.0</b>	<b>06</b>	<b>-</b>	<b>-</b>	<b>20</b>

BDL Values for O<sub>3</sub> = <10 µg/m<sup>3</sup>  
 BDL Values for NH<sub>3</sub> = <20 µg/m<sup>3</sup>  
 BDL Values for As = < 0.30 ng/m<sup>3</sup>  
 BDL Values for Ni = <0.02 ng/m<sup>3</sup>

BDL Values for C<sub>6</sub>H<sub>6</sub> = <0.01 µg/m<sup>3</sup>  
 BDL Values for BaP = <1 ng/m<sup>3</sup>  
 BDL Values for Cr = <0.01 ng/m<sup>3</sup>

BDL Values for CO = <114.5 µg/m<sup>3</sup>  
 BDL Values for Lead = <0.01 ng/m<sup>3</sup>  
 BDL Values for Hg: <0.01 ng/m<sup>3</sup>

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Winter 2013

Location: Lachhipur (A19)

Buffer Zone

Unit: µg/m<sup>3</sup>

WEEK	DATE OF SAMPLING	PARTICULATE MATTER			GASES	
		SPM	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>
I	06/07. 01. 2013	264.5	115.0	67.8	10.8	24.8
	07/08. 01. 2013	270.6	117.5	69.2	11.0	25.2
II	14/15. 01. 2013	266.2	115.8	68.3	11.2	24.8
	15/16. 01. 2013	271.7	118.0	69.8	11.3	25.3
III	20/21. 01. 2013	260.0	113.0	66.6	11.0	25.6
	21/22. 01. 2013	269.6	117.2	69.0	11.2	26.0
IV	29/30. 01. 2013	270.3	117.5	69.2	11.6	26.2
	30/31. 01. 2013	272.3	118.3	69.6	11.8	26.8
V	03/04. 02. 2013	269.8	117.2	69.3	11.7	25.3
	04/05. 02. 2013	260.1	113.0	66.5	11.8	25.0
VI	13/14. 02. 2013	266.0	115.6	68.1	11.8	24.8
	14/15. 02. 2013	268.2	116.5	68.3	12.0	25.0
VII	17/18. 02. 2013	247.0	107.3	63.2	9.8	22.0
	18/19. 02. 2013	238.2	103.2	60.8	9.6	21.6
VIII	24/25. 02. 2013	267.5	116.2	68.9	10.6	25.3
	25/26. 02. 2013	271.0	117.8	69.4	10.8	25.6
IX	06/07. 03. 2013	247.2	107.5	63.6	11.0	23.8
	07/08. 03. 2013	254.0	110.2	64.8	11.3	24.2
X	10/11. 03. 2013	255.8	111.0	65.5	10.9	23.0
	11/12. 03. 2013	268.3	116.5	68.6	11.0	23.1
XI	20/21. 03. 2013	265.2	115.2	68.1	10.8	22.4
	21/22. 03. 2012	263.0	114.3	67.6	10.5	22.0
XII	25/26 .03. 2013	242.5	105.5	62.2	10.0	19.0
	26/27. 03. 2013	249.2	108.3	63.8	10.3	19.3

#### Observation-

Parameters	SPM	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>
Nos. of Observations	24	24	24	24	24
Minimum Concentration	238.2	103.2	60.8	9.6	19.0
Maximum Concentration	272.3	118.3	69.8	12.0	26.8
98 <sup>th</sup> Percentile	271.7	118.0	69.6	11.8	26.2
Arithmetic Mean	261.6	113.7	67.0	11.0	24.0
Geometric Mean	261.4	113.6	67.0	11.0	23.9
STD. Dev.	10.1	4.4	2.6	0.6	2.1

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Winter 2013

Location: Central Kajora (A20)

Buffer Zone

Unit: µg/m<sup>3</sup>

WEEK	DATE OF SAMPLING	PARTICULATE MATTER			GASES	
		SPM	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>
I	06/07. 01. 2013	271.5	119.0	67.8	10.9	24.6
	07/08. 01. 2013	278.0	121.8	69.2	11.0	25.0
II	14/15. 01. 2013	273.5	119.8	68.3	11.2	24.8
	15/16. 01. 2013	280.5	123.0	69.8	11.5	25.3
III	20/21. 01. 2013	267.0	117.0	66.6	11.0	25.2
	21/22. 01. 2013	277.3	121.5	69.0	11.4	25.6
IV	29/30. 01. 2013	276.8	121.4	69.2	11.5	26.0
	30/31. 01. 2013	279.5	122.5	69.6	11.7	26.5
V	03/04. 02. 2013	277.5	121.8	69.3	11.6	25.0
	04/05. 02. 2013	267.0	117.0	66.5	11.8	24.8
VI	13/14. 02. 2013	274.0	120.1	68.1	11.8	24.8
	14/15. 02. 2013	273.2	119.8	68.3	12	25
VII	17/18. 02. 2013	252.8	110.8	63.2	9.8	22.1
	18/19. 02. 2013	244.2	107	60.8	9.6	21.8
VIII	24/25. 02. 2013	276.5	121.2	68.9	11.6	25.3
	25/26. 02. 2013	278.6	122.1	69.4	11.8	25.7
IX	06/07. 03. 2013	267	117	63.6	11.1	23.8
	07/08. 03. 2013	260	113.8	64.8	11.3	24
X	10/11. 03. 2013	262.5	115	65.5	11	23
	11/12. 03. 2013	275.3	120.8	68.6	11.2	23.3
XI	20/21. 03. 2013	272.7	119.6	68.1	10.8	22.4
	21/22. 03. 2012	269.3	118.2	67.6	10.5	22.1
XII	25/26 .03. 2013	255	112	63.2	9.5	18.8
	26/27. 03. 2013	260	114	63.8	9.9	19.1

#### Observation-

Parameters	SPM	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>
Nos. of Observations	24	24	24	24	24
Minimum Concentration	244.2	107.0	60.8	9.5	18.8
Maximum Concentration	280.5	123.0	69.8	12.0	26.5
98 <sup>th</sup> Percentile	279.5	122.5	69.6	11.8	26.0
Arithmetic Mean	269.6	118.2	67.1	11.1	23.9
Geometric Mean	269.4	118.1	67.0	11.0	23.8
STD. Dev.	9.5	4.2	2.5	0.7	2.0

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Season: Winter 2013

Location: Madhujore (A21)

Buffer Zone

Unit: µg/m<sup>3</sup>

WEEK	DATE OF SAMPLING	PARTICULATE MATTER			GASES	
		SPM	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>
I	06/07. 01. 2013	263.5	116.5	68.8	10.8	24.8
	07/08. 01. 2013	271.0	119.8	70.5	11.0	25.0
II	14/15. 01. 2013	263.7	116.5	68.6	10.9	24.4
	15/16. 01. 2013	266.8	118.0	69.7	11.2	24.8
III	20/21. 01. 2013	255.5	113.0	66.6	10.8	25.1
	21/22. 01. 2013	260.7	115.3	67.9	10.0	25.3
IV	29/30. 01. 2013	265.0	117.2	69.1	11.5	25.5
	30/31. 01. 2013	267.9	118.5	69.8	11.8	25.8
V	03/04. 02. 2013	255.4	113.0	66.6	11.7	24.8
	04/05. 02. 2013	257.1	113.8	67.0	12.0	25.0
VI	13/14. 02. 2013	260.0	114.8	67.6	11.6	24.6
	14/15. 02. 2013	262.5	116.0	68.4	11.8	24.8
VII	17/18. 02. 2013	248.2	110.0	64.8	9.0	21.2
	18/19. 02. 2013	244.2	108.1	64.2	8.7	21.0
VIII	24/25. 02. 2013	258.2	114.2	67.3	10.9	24.8
	25/26. 02. 2013	266.0	117.6	69.2	11.1	25.0
IX	06/07. 03. 2013	243.2	107.5	63.5	11.2	23.5
	07/08. 03. 2013	251.8	111.2	65.5	11.4	23.8
X	10/11. 03. 2013	256.9	113.5	67.0	10.9	23.0
	11/12. 03. 2013	259.1	114.6	67.5	11.3	23.3
XI	20/21. 03. 2013	260.1	114.9	67.6	10.2	22.3
	21/22. 03. 2012	260.5	115.3	68.2	10.7	22.5
XII	25/26 .03. 2013	233.0	103.0	61.2	9.5	18.0
	26/27. 03. 2013	244.5	108.1	63.6	9.8	18.6

#### Observation-

Parameters	SPM	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>
Nos. of Observations	24	24	24	24	24
Minimum Concentration	233.0	103.0	61.2	8.7	18.0
Maximum Concentration	271.0	119.8	70.5	12.0	25.8
98 <sup>th</sup> Percentile	267.9	118.5	69.8	11.8	25.8
Arithmetic Mean	257.3	113.8	67.1	10.8	23.6
Geometric Mean	257.1	113.7	67.1	10.8	23.5
STD. Dev.	9.1	4.0	2.3	0.9	2.1

Season: Winter 2013

Location: Ghanshyampur (A22)

Buffer Zone

Unit: µg/m<sup>3</sup>

WEEK	DATE OF SAMPLING	PARTICULATE MATTER			GASES	
		SPM	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>
I	06/07. 01. 2013	208.8	90.8	51.8	10.8	24.6
	07/08. 01. 2013	215.5	93.7	53.5	11.1	24.8
II	14/15. 01. 2013	210.6	91.5	52.1	11.2	24.8
	15/16. 01. 2013	216.5	94.0	53.5	11.6	25.0
III	20/21. 01. 2013	204.3	88.8	50.6	11.0	25.0
	21/22. 01. 2013	208.5	90.6	51.5	11.5	25.4
IV	29/30. 01. 2013	212.3	92.3	52.8	11.5	25.8
	30/31. 01. 2013	217.5	94.5	53.9	11.8	26.0
V	03/04. 02. 2013	214.2	93.1	53.0	11.6	24.8
	04/05. 02. 2013	203	88.2	50.2	11.8	24.9
VI	13/14. 02. 2013	210.1	91.3	52	11.8	24.8
	14/15. 02. 2013	211.5	91.8	52.3	12	25
VII	17/18. 02. 2013	215	93.4	53.2	9.7	22
	18/19. 02. 2013	199.3	86.6	50.5	9.4	21.8
VIII	24/25. 02. 2013	209.5	91	51.8	11.5	25.3
	25/26. 02. 2013	215.6	93.6	53.6	11.8	25.5
IX	06/07. 03. 2013	192.2	83.5	47.3	11.0	23.8
	07/08. 03. 2013	197.5	85.8	48.5	11.3	24.0
X	10/11. 03. 2013	200.0	87.1	49.6	11.0	23.1
	11/12. 03. 2013	216.8	92	52.6	11.2	23.3
XI	20/21. 03. 2013	206.5	89.7	51.2	10.6	22.4
	21/22. 03. 2012	203	88.2	50.3	10.5	22.1
XII	25/26 .03. 2013	187	81.40	46.4	9.5	18.8
	26/27. 03. 2013	191.1	82.98	47.3	9.7	19.1

Observation-

Parameters	SPM	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>
Nos. of Observations	24	24	24	24	24
Minimum Concentration	183.0	80.4	46.2	8.8	18.0
Maximum Concentration	209.8	91.9	53.5	11.6	26.0
98 <sup>th</sup> Percentile	209.5	91.8	53.5	11.0	24.8
Arithmetic Mean	201.1	88.2	51.1	10.6	23.6
Geometric Mean	201.0	88.1	51.1	10.6	23.5
STD. Dev.	8.1	3.6	2.1	0.8	2.1

The above data can be summarized as under –

Sl. No.	Location Name	Location Code	Remarks
<b>Core Zone</b>			
1.	Parbelia	A1	Sample collected from nearby mine
2.	Sodepur	A2	Habitation near riverbed
3.	Chinakuri – I	A3	Sample collected from nearby mine
4.	Chinakuri – III	A4	-do-
5.	Amritnagar	A5	Sample collected from nearby mine
6.	Tirat	A6	-do-
7.	Kuardih	A7	-do-
8.	Nimcha	A8	-do-
9.	Mahabir	A9	-do-
10.	Bakulia	A10	Habitation near riverbed
<b>Buffer Zone</b>			
11.	Dubeswari	A11	Habitation near riverbed
12.	Bejdih	A12	-do-
13.	Hirakhun	A13	-do-
14.	Patmohana	A14	-do-
15.	Ratibati	A15	Sample collected from nearby mine
16.	Chalbalpur	A16	Sample collected from nearby habitation
17.	J K Nagar	A17	Sample collected from nearby mine
18.	Jemehari	A18	-do-
19.	Lachhipur	A19	-do-
20.	Central Kajora	A20	-do-
21.	Madhujore	A21	-do-
22.	Ghansyampur	A22	-do-

Sampling Station	Min	98 <sup>th</sup> %ile	Max	AM	GM	Std. dev	CPCB Limit
<b>PM<sub>10</sub> (Unit: µg/m<sup>3</sup>)</b>							
<b>Core Zone</b>							
Parbelia (A1)	50	66	69	58.2	58.0	4.51	<b>100</b>
Sodepur (A2)	51	73	73	61.4	61.1	6.25	
Chinakuri – I (A3)	57	75	75	68.0	67.8	4.83	
Chinakuri – III (A4)	55	73	73	66.0	65.8	4.83	
Amritnagar (A5)	56	73	76	65.5	65.4	5.1	
Tirat(A6)	57	71	71	64.3	64.2	4.3	
Kuardih (A7)	57	73	73	67.7	67.6	4.5	
Nimcha (A8)	55	71	71	65.7	65.5	4.4	
Mahabir (A9)	51	66	69	60.8	60.7	3.7	
Bakulia (A10)	51	69	69	60.7	60.6	3.91	
<b>Buffer Zone</b>							
Dubeswari (A11)	52	65	67	59.8	59.6	3.96	

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Sampling Station	Min	98 <sup>th</sup> %ile	Max	AM	GM	Std. dev	CPCB Limit	
Bejdih (A12)	41	55	56	51.9	51.7	4.72		
Hirakhun (A13)	36	43	44	36.0	35.8	3.87		
Patmohana (A14)	53	71	71	64.0	63.8	4.83		
Ratibati (A15)	49	63	67	58.8	58.6	3.6		
Chalbalpur (A16)	51	67	67	60.6	60.4	5.6		
J K Nagar (A17)	31.60	44.6	42.5	37.90	37.78	3.11		
Jemehari (A18)	33.30	44.2	42.4	38.58	38.50	2.62		
Lachhipur (A19)	103.2	118.0	118.3	113.7	113.6	4.4		
Central Kajora (A20)	107.0	122.5	123.0	118.2	118.1	4.2		
Madhujore (A21)	103.0	118.5	119.8	113.8	113.7	4.0		
Ghansyampur (A22)	81.4	94.0	94.5	89.8	89.8	3.7		
<b>PM<sub>2.5</sub> (Unit: µg/m<sup>3</sup>)</b>								
Core Zone								
Parbelia (A1)	15	22	23	16.3	16.0	3.00	<b>60</b>	
Sodepur (A2)	19	24	25	20.8	20.8	1.61		
Chinakuri – I (A3)	14	21	21	18.1	18.0	1.72		
Chinakuri – III (A4)	13	20	20	17.1	17.0	1.72		
Amritnagar (A5)	12	22	23	19.2	19.1	2.1		
Tirat(A6)	14	20	21	18.1	18.0	1.4		
Kuardih (A7)	17	21	21	18.5	18.5	1.3		
Nimcha (A8)	16	20	20	18.8	18.7	1.2		
Mahabir (A9)	14	24	25	18.3	18.1	3.0		
Bakulia (A10)	14	25	25	18.1	17.9	2.96		
Buffer Zone								
Dubeswari (A11)	19	24	25	20.8	20.8	1.61		
Bejdih (A12)	12	18	18	15.2	15.1	1.56		
Hirakhun (A13)	9	15	15	12.1	12.0	1.60		
Patmohana (A14)	14	20	21	17.1	17.0	1.91		
Ratibati (A15)	16	22	22	19.0	18.8	2.1		
Chalbalpur (A16)	18	24	24	20.9	20.9	1.7		
J K Nagar (A17)	18.20	25.8	24.6	21.86	21.79	1.86		
Jemehari (A18)	19.20	25.6	24.4	22.21	22.16	1.49		
Lachhipur (A19)	60.8	69.6	69.8	67.0	67.0	2.6		
Central Kajora (A20)	60.8	69.6	69.8	67.1	67.0	2.5		
Madhujore (A21)	61.2	69.8	70.5	67.1	67.1	2.3		
Ghansyampur (A22)	46.4	53.6	53.9	51.2	51.2	2.1		

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Sampling Station	Min	98 <sup>th</sup> %ile	Max	AM	GM	Std. dev	CPCB Limit	
<b>SO<sub>2</sub> (Unit: µg/m<sup>3</sup>)</b>								
Core Zone								
Parbelia (A1)	5.6	7.7	7.9	6.7	6.6	0.86	<b>80</b>	
Sodepur (A2)	5.8	7.7	8.2	6.9	6.9	0.56		
Chinakuri – I (A3)	6.2	8.1	8.2	7.2	7.1	0.59		
Chinakuri – III (A4)	6.0	7.9	8.0	7.0	6.9	0.59		
Amritnagar (A5)	7.7	10.5	10.7	9.3	9.3	1.0		
Tirat(A6)	5.5	8.5	8.8	6.9	6.9	0.9		
Kuardih (A7)	6.4	8.7	8.8	7.6	7.6	0.6		
Nimcha (A8)	6.0	7.9	8.0	7.0	6.9	0.6		
Mahabir (A9)	5.7	9.0	9.2	7.5	7.4	1.0		
Bakulia (A10)	5.7	9.2	9.2	7.6	7.5	0.95		
Buffer Zone								
Dubswari (A11)	5.8	7.7	8.2	6.9	6.9	0.56		
Bejdih (A12)	5.9	7.6	7.9	6.9	6.2	0.68		
Hirakhun (A13)	4.7	6.6	6.7	5.7	5.6	0.59		
Patmohana (A14)	5.5	8.5	8.8	6.7	6.7	0.82		
Ratibati (A15)	6.0	9.3	9.58	7.8	7.7	1.0		
Chalbalpur (A16)	6.2	8.5	8.8	7.2	7.2	0.7		
J K Nagar (A17)	5.30	8.0	7.7	6.86	6.83	0.62		
Jemehari (A18)	5.30	7.8	7.6	6.82	6.79	0.60		
Lachhipur (A19)	9.6	11.8	12.0	11.0	11.0	0.6		
Central Kajora (A20)	9.5	11.8	12.0	11.1	11.0	0.7		
Madhujore (A21)	8.7	11.8	12.0	10.8	10.8	0.9		
Ghansyampur (A22)	9.4	11.8	12.0	11.0	11.0	0.8		
<b>NO<sub>x</sub> (Unit: µg/m<sup>3</sup>)</b>								
Core Zone								
Parbelia (A1)	20.0	23	23.3	21.4	21.4	0.85	<b>80</b>	
Sodepur (A2)	22.8	25.2	25.7	23.8	23.8	0.67		
Chinakuri – I (A3)	16.9	19.1	20.1	17.8	17.8	0.71		
Chinakuri – III (A4)	17.1	19.3	20.3	18.0	18.0	0.71		
Amritnagar (A5)	25.0	27.4	27.4	26.4	26.4	0.8		
Tirat(A6)	19.6	24.6	24.9	22.2	22.2	1.7		
Kuardih (A7)	16.9	19.1	20.1	17.8	17.8	0.7		
Nimcha (A8)	17.6	19.7	19.7	18.7	18.6	0.7		
Mahabir (A9)	21.1	23.3	23.8	22.8	22.6	0.7		
Bakulia (A10)	21.1	23.8	23.8	22.6	22.6	0.72		
Buffer Zone								
Dubswari (A11)	18.8	22.4	22.9	20.8	20.8	1.03		
Bejdih (A12)	11.9	14.7	14.7	13.6	13.5	0.71		

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Sampling Station	Min	98 <sup>th</sup> %ile	Max	AM	GM	Std. dev	CPCB Limit
Hirakhun (A13)	7.4	9.2	9.8	8.0	8.0	0.77	
Patmohana (A14)	19.6	24.9	26.4	22.4	22.3	1.88	
Ratibati (A15)	17.3	19.9	19.9	18.8	18.8	0.7	
Chalbalpur (A16)	21.2	24.7	25.2	23.6	23.6	1.1	
J K Nagar (A17)	5.30	8.0	7.7	6.86	6.83	0.62	
Jemehari (A18)	5.30	7.8	7.6	6.82	6.79	0.60	
Lachhipur (A19)	19.0	26.2	26.8	24.0	23.9	2.1	
Central Kajora (A20)	18.8	26.0	26.5	23.9	23.8	2.0	
Madhujore (A21)	18.0	25.8	25.8	23.6	23.5	2.1	
Ghansyampur (A22)	18.8	25.8	26.0	23.8	23.8	1.9	

#### Observations from the Baseline data generation

It can be observed that the pollution has not exceeded the statutory limits as per NAAQS (2009).

### 3.3 Water Quality Status

Samples from the following points were collected and analysed for assessing the quality of surface water of the river as well as within the vicinity of the riverbed. Location of these stations are shown in Plate – 5.

Surface Water Quality Monitoring Stations			
Sample No.	Sation Name	Date of Monitoring	Location
SW <sub>1</sub>	Damodar River U/s	04/05/2012	Entry point of Cluster 5 sharing northern boundary with the river
SW <sub>2</sub>	Damodar River D/s	04/05/2012	Exit point of Cluster 5 sharing northern boundary with the river
SW <sub>3</sub>	Bhagabatidih, Pond water	04/05/2012	Near Bhagabatidih village
SW <sub>4</sub>	Saltore, Pond water	04/05/2012	Near Saltore village
SW <sub>5</sub>	Radhanagar, Pond water	05/05/2012	Near Radhanagar village
SW <sub>6</sub>	Chaprad, Pond water	05/05/2012	Near Chaprad village
SW <sub>7</sub>	Harial Jore U/s	05/05/2012	Near Asanboni village
SW <sub>8</sub>	Harial Jore D/s	05/05/2012	Point of confluence with Damodar river
SW <sub>9</sub>	Chelad, Pond water	09/05/2012	Near Chelad village
SW <sub>10</sub>	Amritnagar, Pond water	09/05/2012	Near Amritnagar village
SW <sub>11</sub>	Egara, Pond water	09/05/2012	Near Egara village
SW <sub>12</sub>	Damodar River U/s	09/05/2012	Entry point of Cluster 9 sharing southern boundary with the river
SW <sub>13</sub>	Damodar River D/s	09/05/2012	Exit point of Cluster 9 sharing southern boundary with the river
SW <sub>14</sub>	Nunia Khal U/s	09/05/2012	Near Amkula village
SW <sub>15</sub>	Nunia Khal D/s	09/05/2012	Point of confluence with Damodar river
SW <sub>16</sub>	Nimcha, Quarry water	09/05/2012	Abandoned Nimcha quarry

#### 3.3.1 Surface water quality

The analysis reports are tabulated as under –

**SURFACE WATER QUALITY DATA**

Date of sampling: 04/05/2012

Sl. No.	Parameters	Result				IS:2296 – 1982 (Inland surface water) Class C
		SW <sub>1</sub>	SW <sub>2</sub>	SW <sub>3</sub>	SW <sub>4</sub>	
1.	pH	7.6	7.7	7.9	8.0	6.5 – 8.5
2.	Colour, Hazen Units	10	12	15	15	300
3.	Suspended solids, mg/l	42	46	10	14	-
4.	Total Dissolved solids, mg/l	490	498	346	398	1500
5.	Dissolved Oxygen, mg/l	6.9	6.8	5.6	5.5	4.0 min
6.	BOD - 3 days, 27°C, mg/l	2.6	2.7	2.1	2.0	3.0
7.	Chloride (as Cl), mg/l	32	40	46	48	600
8.	Flouride (as F), mg/l	0.56	0.58	0.56	0.58	1.5
9.	Sulphate (as SO <sub>4</sub> ), mg/l	44	46	20	26	400
10.	Nitrate (as NO <sub>3</sub> ), mg/l	12	14	14	16	50
11.	Phenols (as C <sub>6</sub> H <sub>5</sub> OH), mg/l	<0.001	<0.001	<0.001	<0.001	0.005
12.	Chromium (as Cr+6), mg/l	<0.01	<0.01	<0.01	<0.01	0.05
13.	Copper (as Cu), mg/l	<0.02	<0.02	<0.02	<0.02	1.5
14.	Selenium (as Se), mg/l	<0.01	<0.01	<0.01	<0.01	0.05
15.	Arsenic (as As), mg/l	<0.01	<0.01	<0.01	<0.01	0.2
16.	Cadmium (As Cd), mg/l	<0.01	<0.01	<0.01	<0.01	0.01
17.	Lead (as Pb), mg/l	<0.05	<0.05	<0.05	<0.05	0.1
18.	Zinc (as Zn), mg/l	0.02	0.02	0.02	0.02	15
19.	Iron (as Fe), mg/l	0.18	0.20	0.18	0.20	5
20.	Mineral Oil, mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
21.	Total Coliform organisms, MPN/100ml	110	140	17	26	5000

**Date of sampling: 05/05/2012**

Sl. No.	Parameters	Result				IS:2296 – 1982 (Inland surface water) Class C
		SW <sub>5</sub>	SW <sub>6</sub>	SW <sub>7</sub>	SW <sub>8</sub>	
1.	pH	7.9	7.8	7.8	7.9	6.5 – 8.5
2.	Colour, Hazen Units	12	10	16	18	300
3.	Suspended solids, mg/l	12	12	46	50	-
4.	Total Dissolved solids, mg/l	300	338	460	472	1500
5.	Dissolved Oxygen, mg/l	5.4	5.6	5.3	5.1	4.0 min
6.	BOD - 3 days, 27°C, mg/l	2.0	1.6	2.5	2.6	3.0
7.	Chloride (as Cl) , mg/l	56	60	32	40	600
8.	Flouride (as F) , mg/l	0.58	0.58	0.58	0.60	1.5
9.	Sulphate (as SO <sub>4</sub> ) , mg/l	36	30	18	20	400
10.	Nitrate (as NO <sub>3</sub> ) , mg/l	10	12	20	22	50
11.	Phenols (as C <sub>6</sub> H <sub>5</sub> OH) , mg/l	<0.001	<0.001	<0.001	<0.001	0.005
12.	Chromium (as Cr+6) , mg/l	<0.01	<0.01	<0.01	<0.01	0.05
13.	Copper (as Cu) , mg/l	<0.02	<0.02	<0.02	<0.02	1.5
14.	Selenium (as Se) , mg/l	<0.01	<0.01	<0.01	<0.01	0.05
15.	Arsenic (as As) , mg/l	<0.01	<0.01	<0.01	<0.01	0.2
16.	Cadmium (As Cd) , mg/l	<0.01	<0.01	<0.01	<0.01	0.01
17.	Lead (as Pb) , mg/l	<0.05	<0.05	<0.05	<0.05	0.1
18.	Zinc (as Zn) , mg/l	0.02	0.03	0.02	0.03	15
19.	Iron (as Fe) , mg/l	0.18	0.18	0.20	0.22	5
20.	Mineral Oil, mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
21.	Total Coliform organisms, MPN/100ml, max.	26	21	110	140	5000

Date of sampling: 09/05/2012

Sl. No.	Parameters	Result				IS:2296 – 1982 (Inland surface water) Class C
		SW <sub>9</sub>	SW <sub>10</sub>	SW <sub>11</sub>	SW <sub>12</sub>	
1.	pH	7.9	7.8	8.0	7.8	6.5 – 8.5
2.	Colour, Hazen Units	12	10	10	16	300
3.	Suspended solids, mg/l	12	12	14	50	-
4.	Total Dissolved solids, mg/l	408	418	402	520	1500
5.	Dissolved Oxygen, mg/l	5.8	5.6	5.8	6.7	4.0 min
6.	BOD - 3 days, 27°C, mg/l	2.1	2.1	2.2	4.4	3.0
7.	Chloride (as Cl), mg/l	78	90	76	52	600
8.	Flouride (as F), mg/l	0.68	0.66	0.64	0.60	1.5
9.	Sulphate (as SO <sub>4</sub> ), mg/l	23	30	26	48	400
10.	Nitrate (as NO <sub>3</sub> ), mg/l	14	16	14	16	50
11.	Phenols (as C <sub>6</sub> H <sub>5</sub> OH), mg/l	<0.001	<0.001	<0.001	1.56	0.005
12.	Chromium (as Cr+6), mg/l	<0.01	<0.01	<0.01	0.02	0.05
13.	Copper (as Cu), mg/l	<0.02	<0.02	<0.02	0.02	1.5
14.	Selenium (as Se), mg/l	<0.01	<0.01	<0.01	<0.01	0.05
15.	Arsenic (as As), mg/l	<0.01	<0.01	<0.01	<0.01	0.2
16.	Cadmium (As Cd), mg/l	<0.01	<0.01	<0.01	<0.01	0.01
17.	Lead (as Pb), mg/l	<0.05	<0.05	<0.05	<0.05	0.1
18.	Zinc (as Zn), mg/l	0.03	0.02	0.02	0.03	15
19.	Iron (as Fe), mg/l	0.16	0.20	0.14	0.28	5
20.	Mineral Oil, mg/l	<0.01	<0.01	<0.01	< 0.01	0.01
21.	Total Coliform organisms, MPN/100ml	80	110	90	2000	5000

Date of sampling: 09/05/2012

Sl. No.	Parameters	Result				IS:2296 – 1982 (Inland surface water) Class C
		SW <sub>13</sub>	SW <sub>14</sub>	SW <sub>15</sub>	SW <sub>16</sub>	
1.	pH	8.1	7.9	8.1	7.8	6.5 – 8.5
2.	Colour, Hazen Units	18	16	18	16	300
3.	Suspended solids, mg/l	56	52	60	10	-
4.	Total Dissolved solids, mg/l	526	522	528	372	1500
5.	Dissolved Oxygen, mg/l	6.6	6.6	6.5	5.8	4.0 min
6.	BOD - 3 days, 27°C, mg/l	4.6	4.4	4.6	2.0	3.0
7.	Chloride (as Cl), mg/l	56	50	58	66	600
8.	Flouride (as F), mg/l	0.62	0.60	0.62	0.60	1.5
9.	Sulphate (as SO <sub>4</sub> ), mg/l	50	44	52	26	400
10.	Nitrate (as NO <sub>3</sub> ), mg/l	20	18	20	16	50
11.	Phenols (as C <sub>6</sub> H <sub>5</sub> OH), mg/l	1.60	1.58	1.60	<0.001	0.005
12.	Chromium (as Cr+6), mg/l	0.03	0.02	0.03	<0.01	0.05
13.	Copper (as Cu), mg/l	0.03	0.02	0.03	<0.02	1.5
14.	Selenium (as Se), mg/l	<0.01	<0.01	<0.01	<0.01	0.05
15.	Arsenic (as As), mg/l	<0.01	<0.01	<0.01	<0.01	0.2
16.	Cadmium (As Cd), mg/l	<0.01	<0.01	<0.01	<0.01	0.01
17.	Lead (as Pb), mg/l	<0.05	<0.05	<0.05	<0.05	0.1
18.	Zinc (as Zn), mg/l	0.03	0.02	0.03	0.03	15
19.	Iron (as Fe), mg/l	0.30	0.30	0.34	0.16	5
20.	Mineral Oil, mg/l	<0.01	< 0.01	<0.01	< 0.01	0.01
21.	Total Coliform organisms, MPN/100ml	2900	1300	2900	140	5000

All the values were found to be well within the IS: 2296 class C norms.

### 3.4 Flora and Fauna Survey

Baseline data on Flora & Fauna for the cluster was conducted with the following objectives –

- To study the existing status of flora & fauna
- Evaluation of baseline status of flora & fauna through field sampling, reconnaissance surveys and from secondary sources.
- Enumeration of important flora & fauna species of the eco-systems of the study area.
- To suggest mitigation measures to ensure that the ecology of the area would be preserved.

#### 3.4.1 Flora

##### Vegetation Pattern

The general vegetation is essentially tropophilous but with a tendency towards xerophytes. The flora of the area is characterized by the arborescent species such as *Simul* (*Salmalia malabarica* Schott. & Endl.), *Neem* (*Azadirachta indica*), *Amlaki* (*Phyllanthus embica*), *Lannea coromandelica* Merr., *Narikel* (*cocos nucifera*), *Khejur* (*Phoenix dactylifera* L.), *Tal* (*Borassus flabellifer* L.), *Bat* (*Ficus bengalensis* L.), *Asvattha* (*Ficus religiosa* L.), *Palas* (*Butea frondosa*), *Krishnachuda* (*Caesalpinia Pulcherrima*), *Am* (*Mangifera indica* L.) and shrubby species such as *ashsheoda* (*Glycosmis pentaphylla* Corr.), *Pianj*, *Rasun*, *Rajanigandha* (*Polyanthes tuberosa* Willd.), *Ghentu* or *Bhat* (*Clerodendron infortunatum* Gaertn.), *Kurabaka* (*Barleria Cristata*), *Gulanha* (*Tinospora cordifolia*), *Tulsi* (*Ocimum sanctum*), *Solanum torvum* SW., *S. Verbascifolium* L., *Trema orientalis* Bl., *Shiora* (*Streblus asper* Lour.) and *Dumur* (*Ficus hispida* L.).

The uplands of Asansol subdivision and the laterite area of the district are in places covered with *Sal* (*Shorea robusta* Gaertn.), *Mohua* (*Madhnea latifolia*), *Palas* (*Butea monosperma*), *Bans* (*Bambusa arundinacea*), *Shireesha* (*Albizzia lebbek*), *Arka* (*Calotropis gigantea*), *Kend* (*Diospyros melanoxylon*), *Arjun* (*Terminalia Arjuna*) and *Ashan* (*T. tomentosa*). The common plants in hedges and wastelands are *lal-bharenda* (*Jatropha gossypifolia* L.), *Ban-okra*

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EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)  
(*Urena lobata* L.), *Heliotropium strigosum* Willd., *Hati-soond* (*H. indicum* L.),  
*Ulu*(*Imperata arundinecea*), *Sida veronicifolia* Lam., *S.cordifolia* L., etc. (Source :  
District Website).

Trees of economic importance are to be found in abundance all around and these could be classified in three groups – fruit-bearing trees, trees for timber and fuel and flowering trees. Among fruit-bearing trees, Mango, Jacktree, date-palm, imli, plum ( ber ), Wood Apple ( Angle mamelos), custard apple; Avla, Black plum and papaya are commonly found and jack fruit and mango are relatively in greater number. The timber trees are mostly Mahua (*basis latifolia*) Gamhar (*genelina arborea* ), Asan (*Terminalia tomentosa*) Murga ( *Ptercarpus marsupium* ) , Shisham ( *Dahbergia sisso* ), Sal (*Shorearobusta* ) , Bamboos ( *Dendrocalamus strictus* ) and the Margosa tree etc. Besides trees like Siris, Semar (Silk Cotton) and Sahjan (*Morniga aneiphera*) etc. are also available.

Low lands of the area are cultivated by Paddy, Maize, Arhar and Kulthi. Vegetables like Brinjal, Tomato, Potato, Chili, Bean (Sem), Jhinga, Parol are cultivated.

## LIST OF FLORA IN THE STUDY AREA

FLORA	LOCAL NAME	BOTANICAL NAME
<b>COMMERCIAL CROPS</b>		
VEGETABLES	Baigan	<i>Solanum melongena</i>
	Tomato	<i>Lycopersicum esculentum</i>
	Bean	<i>Lablab purpureus</i>
	Jhinga	<i>Luffa acutangula</i>
	Parval	<i>Trichosanthes dioica</i>
	Kohra	<i>Benincasa hispida</i>
	Karela	<i>Momordica charantia</i>
	Kakri	<i>Momordica dioica</i>
	Kundri	<i>Coccinia grandis</i>
	Kaddu	<i>Cucurbita pepo</i>
	Bhindi	<i>Hiabiscus esculentus</i>
	Nenua	<i>Luffa cylindrica</i>
	Onion	<i>Allium cepa</i>
	Sem	<i>Phaseolus lunatus</i>
	Kheera	<i>Cucrbaltus sativus</i>
Phool Gobi	<i>B. oleraceavar</i>	
OIL YIELDING PLANTS	Sarson	<i>Brassica compestris</i>
	Castor plant	<i>Ricinus communis</i>
SPICES	Coriander	<i>Coriandrum sativum</i>
	Lahsun	<i>Allium sativum</i>
	Adrak	<i>Zingiber officinale</i>
	Haldi	<i>Curcuma augustifolia</i>
FRUITS	Aam	<i>Mangifera indica</i>
	Amrud	<i>Psidium guajava</i>
	Jamun	<i>Syzygium cumini</i>
	Kathal	<i>Artocarpus heterophyllus</i>
	Bel	<i>Aegle marmelos</i>
	Papaya	<i>Carica papaya</i>
<b>AGRICULTURAL CROPS</b>		
CEREALS	Dhan	<i>Oryza sativa</i>
	Makka	<i>Zea mays</i>
	Wheat	<i>Triticum aestivum</i>
PULSES	Arhar	<i>Cajanus cajan</i>
	Lentil	<i>Lens culineris</i>
	Khesari	<i>Lathyrus sativus</i>
	Chana	<i>Cicer arientum</i>
	LOCAL NAME	BOTANICAL NAME
<b>SOCIAL FORESTRY</b>		
Trees	Palas	<i>Butea monosperma</i>
	Sisam	<i>Dalbergia sissoo</i>
	Mango	<i>Mangifera indica</i>
	Ashok	<i>Saraca indica</i>
	Kathal	<i>Artocarpus heterophyllus</i>
	Gulmohar	<i>Delonix regia</i>

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

	Neem	<i>Azadirachta indica</i>
	Sal	<i>Shorea robusta</i>
	Babul	<i>Acacia nilotica</i>
	Karanj	<i>Pongamia pinnata</i>
	Semal	<i>Bombax cieba</i>
<b>NATURAL VEGETATION</b>		
HERBS	Ban tulsi	<i>Ocimum basilicum</i>
	Tulsi	<i>Ocimum sanctum</i>
	Galphuli	<i>Moghania species</i>
	Akaon	<i>Calotropis gigantean</i>
	Putus	<i>Lantana camara</i>
	Ram Datwan	<i>Smilax macrophylla</i>
SHRUBS/CLIMBERS	Orchid	<i>Habenaria susannae</i>
	Kari	<i>Millusa tomentosa</i>
	Castor plant	<i>Ricinus communis</i>
	Broom jute	<i>Sida rhombifolia</i>
	Chaste tree	<i>Vitex negundo</i>
TREES	Sal	<i>Shorea robusta</i>
	Khair	<i>Acacia catechu</i>
	Banyan	<i>Ficus bengalensis</i>
	Simal	<i>Bombax ceiba</i>
	Mahua	<i>Madhuca indica</i>
	Palas	<i>Butea monosperma</i>
	Kusum	<i>Schlechera oleosa</i>
	Peepal	<i>Ficus religiosa</i>
	Asan	<i>Terminalia tomentosa</i>
	Imli	<i>Tammarindus indica</i>
	Kadam	<i>Anthoosphalus cadamba</i>
	Neem	<i>Azadirachta indica</i>
	Mango	<i>Mangifera indica</i>

### Observation

The floristic component of the study area does not include any rare or endangered species.

### 3.4.2 Fauna

The carnivora of the area comprise jackal and other smaller species. Monkeys abound including the variety known as Hanuman. Poisonous snakes include several kinds of cobra, the karait and the deadly Russell's viper. Other most frequently seen varieties are the Dhamna and various species of harmless grass snakes.

The avifauna are pea-fowl, jungle-fowl, jungle crow, house crow, treepie, common babbler, common jora, gold-fronted chloropsis, red-vented babul, red-whiskered bulbul, red spotted bluethroat, brown-backed robin, Shama, Tickell's blue flycatcher, paradise flycatcher, wood shrike, black drongo, tailor bird, streaked fantail warbler, golden oriole, common mayna, pied mayna, white-backed munia, white-throated munia, spitted munia, red munia, yellow-throated sparrow, house sparrow, woodpecker, India cuckoo, pied crested cuckoo, koel, parakeet, nilkantha, bee-eater, kingfisher, hornbill, hoopoe, horned owl, spotted owlet, jungle owlet, griffon vulture, long-billed vulture, scavenger vulture, lagger falcon, small spotted eagle, brahminy kite, pariah kite, sparrow hawk, various types of pigeon and dove, goose, duck, teal, lapwing, white necked stork and some varieties of egret and heron.

#### LIST OF FAUNA IN THE STUDY AREA

FAUNA	COMMON NAME	ZOOLOGICAL NAME
<b>LISTED UNDER WILDLIFE PROTECTION ACT,1972</b>		
<b>TERRESTRIAL FAUNA</b>		
Schedule-I	Nil	-
Schedule-II	Lomdi (Common Fox)	<i>Vulpes spp.</i>
	Siyar	<i>Canis aureus</i>
	Jungle Cat	<i>Felis chaus</i>
	Common langur	<i>Presbytis chtellus</i>
Schedule-III	Wild boar	<i>Sus scrofa</i>
Schedule-IV	Mongoose	<i>Herpestes edwardsi</i>
	Squirrel	<i>Funambulus pennanti</i>
	Hare	<i>Capralogus species</i>
Schedule-V	Common Rat	<i>Rattus rattus</i>
	Bat	<i>Rousettus leschenaultia</i>

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

FAUNA	COMMON NAME	ZOOLOGICAL NAME
	Mice	<i>Mus musculus</i>
<b>AMPHIBIANS &amp; REPTILES</b>		
Schedule-II	Common Lizards	<i>Varanus species</i>
	Cobra	<i>Naja naja kauthua</i>
	Rat Snake	<i>Ptyas mucosus</i>
Schedule-IV	Tode	<i>Bufo melanostictus</i>
	Karait	<i>Bungurus caeruleus</i>
	Water snake	<i>Natrix piscator</i>
<b>AVI FAUNA</b>		
Schedule-IV	Common Sparrow	<i>Pesser domesticus</i>
	Bulbul	<i>Pycnonotus cafer</i>
	Kabutar	<i>Colombia livia</i>
	Owl	<i>Strigidae</i>
	Ducks	<i>Nettopus Coromandelianus</i>
	Jungli Murgi	<i>Gallus gallus</i>
	Mynas	<i>Acruditheres tristis Linn.</i>
Schedule-V	Common Crow	<i>Corvus splendens</i>
<b>NOT LISTED UNDER WILDLIFE PROTECTION ACT,1972</b>		
Mammals (Domestic Animals)	Goat	<i>Capra species</i>
	Cow	<i>Bos indicus</i>
	Dog	<i>Canis familiaris</i>
	Sheep	<i>Capra Sp.</i>
	Pig	<i>Sus scrofa</i>
	Horse	<i>Equus Sp.</i>
Birds (Domestic Birds)	Sparrow	<i>Passer domesticus</i>
	Duck	<i>Nettopus Coromandelianus</i>
Amphibian	Frog	<i>Rana Tigerina</i>
	Tree frog	<i>Hyle Spp.</i>
	Flying frog	<i>Rhacopnonis Spp.</i>
Aquatic fauna (Fishes)	Rohu	<i>Labco rohita</i>
	Catla	<i>Cyprindiae</i>
	Garai	<i>Channa punctatus</i>
	Mangoor	<i>Clarias batrachus</i>
	Pothia	<i>Punctius ticta</i>
	Bokwa	<i>Eutropichttys baacha</i>
	Zebra fish	<i>Danio rerio</i>
Invertebrates	Birni	<i>Polistis Spp.</i>
	Grosshopper	<i>Hieroglyphus banian</i>
	Tidha	<i>Schistocerca gregaria</i>
	Moth	<i>Antheria mylita</i>
	Black Bee	<i>Apis dorsata</i>
	Bee	<i>Apis indica</i>
	Stem Borer	<i>Chilo auricilia</i>

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
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FAUNA	COMMON NAME	ZOOLOGICAL NAME
	Cockroach	<i>Blata orientalis</i>
	Madhumakkhi	<i>Apis indica</i>
	Chinti	<i>Solpopsis Spp.</i>
	Lahi	<i>Kerria laxxa</i>
	Jugnu	<i>Photinus Spp.</i>
	Gojar	<i>Scolopendra Spp.</i>
Aquatic Insect	Daphnia	<i>Nepa Spp.</i>
	Prawn	<i>Chaetogaster</i>
<b>ENDANGERED SPECIES</b>	Nil	-
<b>ENDEMIC SPECIES</b>	Nil	-
<b>MIGRATORY SPECIES</b>	Tree Pipit	<i>Anthus Trivialis</i>
	Cuckoo	<i>Cuculus Micropterus</i>
	Ducks	<i>Dendrosyigna Javanica</i>

### Observation

The following fauna under the different schedules of Wildlife Protection Act, 1980 are reported in core & buffer zone and need attention for their conservation:

Sl. No.	Local Name	English Name	Zoological Name	Status in wild life protection act	
				Schedule	Part
1.	Siyar	Jackal	<i>Canis aureus</i>	II	II
2.	Lomdi	Common fox	<i>Wolpus bengalensis</i>	II	II
3.	Nag	Cobra	<i>Naja tripudians</i>	II	II
4.	Neola	Common mongoose	<i>Herpestes edwardis</i>	II	II
5.	Jangli billi	Jungle cat	<i>Fellis chaqus</i>	II	II
6.	Langur	Black faced monkey	<i>Prsbites entellus</i>	II	I
7.	Ajgar	Indian python	<i>Python molurus</i>	I	II
8.	Bansuar	Wild Boar	<i>Sus scrofa</i>	II	II

All the fauna mentioned above need sincere attention for conservation and protection.

**Chapter – 4****ANTICIPATED ENVIRONMENTAL IMPACTS  
& MITIGATION MEASURES****4.1 Introduction**

Sand stowing is essential for safety of the mines as well as for conservation of coal. Pillar extraction needs to be undertaken with stowing to recover about 80% of coal blocked in pillars and it is imperative to maintain continued supply of sand in adequate quantity for ensuring safety and productivity of the underground mines.

The impacts (both beneficial and adverse) of mining and its allied activities of the project have been assessed and presented in respect of air, water, noise, hydrogeology, blasting vibration, flora & fauna, land resource, traffic movement and visual/aesthetic aspect in this chapter.

The control measures to mitigate various environmental impacts are also highlighted in this chapter for carrying out mining operation in an environmentally compatible manner.

**4.2 Impact Assessment & Pollution Control Measures for Air**

No dust pollution is caused by the activity of actual removal of the sand from the riverbed by manual means. Negligible amount of pollutants are generated from sand extraction by mechanical means. The main source of air pollution from this sand mining plan is due to vehicular emissions and road dust from sand transporting trucks from sand stations in the riverbed to different depots (see plate – 6) and from there to the UG mines for the purpose of hydraulic sand stowing during depillaring.



Images showing sand extraction by manual means

#### 4.2.1 Sources & Pollutants

Sand is coarse and dust generated at extraction point at sand stations in the riverbed settles down within a short distance. Out of 15 sand stations, 8 are mechanically operated. Air pollution from this project mainly occurs due to transportation of sand to sand depots. Vehicular exhaust from dumpers ferrying sand is another reason for air pollution. These exhausts contain CO, SO<sub>x</sub>, NO<sub>x</sub> and small quantities of un-burnt fuel apart from some heavy metals like lead, nickel and arsenic. Air pollution due to sand transportation can be controlled to a great extent by regular sprinkling on roads by mobile water sprinklers. Dumpers employed for sand transportation require good maintenance. Several such provisions have been made in the report to contain the air pollution within the stipulated standards.



Images showing sources of pollution (vehicular emission as well as tyre dust)

The impact of mining on ambient air quality has been predicted by modeling as described below.

#### 4.2.2 Air Quality Modeling

The impact assessment (both short-term and long-term) has been carried out dealing with the help of modeling software with emphasis on the following points:

- I. Inventory of air pollution emission sources
- II. Impact assessment (short-term and long-term besides direct/indirect and residual)

#### **4.2.2.1 Air Quality Model**

##### Air Quality Model

The quantum of SPM at the receptors is influenced by concentration of pollutants and their dispersion in the atmosphere. Air quality modeling is an important tool for prediction, planning and evaluation of air pollution control activities besides identifying the requirements for emission control to meet the regulatory standards. The efficient management of air quality requires the use of modeling techniques to analyze the patterns of pollutant concentrations from many individual sources of air pollutants operating simultaneously.

Models for regional concentration patterns are based on "emission inventory" data for the region, and on standard meteorological observations assumed to be representative of the entire region.

Various attempts have been made to establish empirical relations to predict the dust emission characteristics for mining operations. These relations may give only a rough estimate of the total dust emission and provide no information about the contour of the dust distribution. The generation rate of the contaminant for most mining operations cannot be precisely determined by empirical relations because there is a high degree of variance in the way such operations are conducted in different mines. Nevertheless, the empirical relations provide the first hand information to the health workers, administrators, planners, and engineers for the development of dust control strategies.

The dust emission levels from mining operations for the purpose of this modelling have been based on USEPA publications and paper on emission factors written by Prof SP Banerjee and published in Minetech Magazine.

##### Air Quality Prediction

The Air Quality Impact Prediction has been done by using the FDM version 90121 Air Quality Model of USEPA. Estimation for increase in TSP, NO<sub>x</sub> and SO<sub>2</sub> at the Baseline Ambient Air Quality Stations has been done with the help of the above model. The model was run to predict the incremental TSP concentrations from future mining activities. The contribution of TSP from the present mining activities is already included in the baseline data generated at the stations. The model was run for the peak extraction capacity of sand from sand stations to show the incremental pollution level

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)  
above the present baseline data. The increment over and above the baseline concentrations found at the AAQ stations is the likely level of future TSP concentrations taking into account all the activities.

Station No.	Mouza	Mouza No.	Maximum extraction per year (M Cum)	Sand Depot to which sand is collected	Distance of Sand Depot from riverbed (km)
1	Sitalpur	40	0.050	Shitalpur	1.5
	Chinakuri	60	0.070		
	Parbelia	95	0.080		
2	Anandpur	35	0.050	Petuasalani	6.0
	Majit	42	0.250		
3	Sahebdanga	45	0.100	Amritnagar	2.0
	Bhara	1	0.250		
4	Narainkuri	12	0.060	Ballavpur	2.0
	Ardhagram	7	0.062		
	Gopalpur	8	0.050		
	Gopalganj	36	0.050		
	Napur	31	0.050		
5	Ramprasadpur	51	0.062	Kenda	13.0
	Baska	50	0.050		
	Madanpur	48	0.100		
			<b>Peak: 1.5</b>		

Sand from these depots is then transported to concerned UG mines for hydraulic sand stowing.



Sand transport route with the location of sand depots are enclosed as Plate – 6.

The following stations were chosen for baseline data generation for ambient air quality –

Sl. No.	Location Name	Location Code	Remarks
Core Zone – Since this is the riverbed, there are no stations			
Locations situated on the river bank			
1.	Parbelia	A1	UG mine near the river
2.	Sodepur	A2	Habitation near the river
3.	Chinakuri – I	A3	UG mine near the river
4.	Chinakuri – III	A4	-do-
5.	Amritnagar	A5	-do-
6.	Tirat	A6	-do-
7.	Kuardih	A7	-do-
8.	Nimcha	A8	-do-
9.	Mahabir	A9	-do-
10.	Bakulia	A10	Habitation near the river
Locations situated near the river bank			
11.	Dubeswari	A11	Habitation near the river
12.	Bejdih	A12	-do-
13.	Hirakhun	A13	-do-
14.	Patmohana	A14	-do-
15.	Ratibati	A15	UG mine near the river

Sl. No.	Location Name	Location Code	Remarks
16.	Chalbalpur	A16	-do-
17.	J K Nagar	A17	-do-
18.	Jemehari	A18	-do-
19.	Lachhipur	A19	-do-
20.	Central Kajora	A20	-do-
21.	Madhujore	A21	-do-
22.	Ghansyampur	A22	-do-

### Emission Standards

The USEPA Emission Factor Equation, 1988 and paper on emission factors written by Prof SP Banerjee and published in Minetech Magazine have been used to calculate the emission factors for the various sources.

### Emission from Vehicles

SO<sub>2</sub> emission factor = 17 kg per 1000 litres of diesel burnt in litres ( Source USEPA 1998).

NO<sub>x</sub> emission factor = 35.7 kg per 1000 litres of diesel burnt in litres ( Source USEPA 1998).

### Control Factors

The various control factors for dust suppression have been summarized below and have been used to calculate the estimated emission from the sources:

Operation / Activity	Control method and emission reduction	% of dust settling down within a short distance of few meters
Transporting	50 % for metalled road (Water spraying @ 2 litres/m <sup>2</sup> /h)	90 %
Dust generation at the conveyor point	> 95 % for enclosures and dust extraction system with water spraying	-
Dust generation at unloading point	> 95 % for enclosures and dust extraction system with water spraying	-
Dust generation due to truck loading/ unloading	50 % with water spraying	90%

#### 4.2.2.2 Run of the Model

RUN TITLE:  
AIR QUALITY IMPACT PREDICTION FOR DAMODAR RIVERBED PRESENT SCENARIO

INPUT FILE NAME: prsndam.IN  
OUTPUT FILE NAME: prsndam.OUT  
PLOT OUTPUT WRITTEN TO FILE NAME: prsndam.DAT

```

CONVERGENCE OPTION 1=OFF, 2=ON           1
MET OPTION SWITCH, 1=CARDS, 2=PREPROCESSED  1
PLOT FILE OUTPUT, 1=NO, 2=YES             2
MET DATA PRINT SWITCH, 1=NO, 2=YES        1
POST-PROCESSOR OUTPUT, 1=NO, 2=YES        1
DEP. VEL./GRAV. SETL. VEL., 1=DEFAULT, 2=USER  1
PRINT 1-HOUR AVERAGE CONCEN, 1=NO, 2=YES   2
PRINT 3-HOUR AVERAGE CONCEN, 1=NO, 2=YES   1
PRINT 8-HOUR AVERAGE CONCEN, 1=NO, 2=YES   1
PRINT 24-HOUR AVERAGE CONCEN, 1=NO, 2=YES  2
PRINT LONG-TERM AVERAGE CONCEN, 1=NO, 2=YES  1
NUMBER OF SOURCES PROCESSED                21
NUMBER OF RECEPTORS PROCESSED            22
NUMBER OF PARTICLE SIZE CLASSES            5
NUMBER OF HOURS OF MET DATA PROCESSED     24
LENGTH IN MINUTES OF 1-HOUR OF MET DATA   60.
ROUGHNESS LENGTH IN CM                     1.00
SCALING FACTOR FOR SOURCE AND RECPATORS    1.0000
PARTICLE DENSITY IN G/CM**3                2.20
    
```

GENERAL PARTICLE SIZE CLASS INFORMATION

PARTICLE SIZE CLASS	GRAV. CHAR. DIA. (UM)	SETTLING VELOCITY (M/SEC)	FRACTION DEPOSITION VELOCITY (M/SEC)	IN EACH SIZE CLASS
1	1.0000000	**	**	0.0300
2	6.2000000	**	**	0.1800
3	12.5000000	**	**	0.1200
4	21.1000000	**	**	0.2200
5	65.0000000	**	**	0.4500

\*\*\*\*\*  
\*\* COMPUTED BY FDM

1

RECEPTOR COORDINATES (X,Y,Z)

```

( 36997., 19263., 0.) ( 38089., 21376., 0.) ( 38604., 19941., 0.)
( 39260., 19302., 0.) ( 61328., 11624., 0.) ( 57860., 12969., 0.)
( 55767., 15513., 0.) ( 60167., 12982., 0.) ( 64462., 11424., 0.)
( 55220., 12876., 0.) ( 33873., 18019., 0.) ( 40843., 21102., 0.)
( 37325., 17494., 0.) ( 42448., 19729., 0.) ( 57318., 17719., 0.)
( 58360., 16070., 0.) ( 59646., 16719., 0.) ( 61094., 16340., 0.)
( 71806., 10698., 0.) ( 71725., 12927., 0.) ( 74080., 14941., 0.)
( 69019., 12833., 0.) (
    
```

1

SOURCE INFORMATION

ENTERED EMIS. TOTAL

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
 (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

TYPE	RATE (G/SEC, G/SEC/M OR G/SEC/M**2)	EMISSION RATE (G/SEC)	WIND SPEED FAC.	X1 (M)	Y1 (M)	X2 (M)	Y2 (M)	HEIGHT (M)	WIDTH (M)
2	0.000155000	0.11291	0.000	36873.	20170.	37508.	20527.	0.50	10.00
2	0.000155000	0.09661	0.000	37508.	20527.	37202.	21070.	0.50	10.00
2	0.000232000	0.14456	0.000	48504.	14452.	48146.	14962.	0.50	10.00
2	0.000232000	0.48922	0.000	48146.	14962.	50222.	14592.	0.50	10.00
2	0.000232000	0.19185	0.000	50599.	13856.	50222.	14592.	0.50	10.00
2	0.000232000	0.51602	0.000	50222.	14592.	52439.	14771.	0.50	10.00
2	0.000232000	0.38823	0.000	52439.	14771.	53156.	16283.	0.50	10.00
2	0.000232000	0.24807	0.000	53156.	16283.	52287.	16906.	0.50	10.00
2	0.000271000	0.43592	0.000	59871.	12015.	61443.	12356.	0.50	10.00
2	0.000210000	0.31208	0.000	65298.	8681.	66692.	9196.	0.50	10.00
2	0.000210000	0.66939	0.000	69992.	7211.	69410.	10345.	0.50	10.00
2	0.000164000	0.87403	0.000	69410.	10345.	74657.	9411.	0.50	10.00
2	0.000164000	0.50977	0.000	74657.	9411.	71824.	10690.	0.50	10.00
2	0.000164000	0.78318	0.000	71824.	10690.	72405.	15430.	0.50	10.00
2	0.000164000	0.68353	0.000	72405.	15430.	73655.	19406.	0.50	10.00
2	0.000164000	0.42496	0.000	73655.	19406.	71064.	19373.	0.50	10.00
3	0.000000674	0.03370	0.000	37202.	21070.	250.	200.	5.00	0.00
3	0.000000674	0.03370	0.000	52287.	16906.	250.	200.	5.00	0.00
3	0.000000674	0.03370	0.000	61443.	12356.	250.	200.	5.00	0.00
3	0.000000674	0.03370	0.000	66692.	9196.	250.	200.	5.00	0.00
3	0.000000674	0.03370	0.000	71253.	18454.	250.	200.	5.00	0.00

=====  
 TOTAL EMISSIONS 7.04882

1

1 HOUR AVERAGE FOR HOUR ENDING 1  
 CONCENTRATIONS IN MICROGRAMS/M\*\*3

( 36997., 19263., 0.000)	( 38089., 21376., 0.000)	( 38604., 19941., 0.000)
( 39260., 19302., 0.000)	( 61328., 11624., 0.000)	( 57860., 12969., 0.000)
( 55767., 15513., 0.000)	( 60167., 12982., 0.012)	( 64462., 11424., 0.000)
( 55220., 12876., 0.000)	( 33873., 18019., 0.000)	( 40843., 21102., 0.000)
( 37325., 17494., 0.000)	( 42448., 19729., 0.000)	( 57318., 17719., 0.000)
( 58360., 16070., 0.000)	( 59646., 16719., 0.000)	( 61094., 16340., 0.000)
( 71806., 10698., 1.587)	( 71725., 12927., 0.998)	( 74080., 14941., 0.519)
( 69019., 12833., 0.000)	(	

1

1 HOUR AVERAGE FOR HOUR ENDING 1  
 DEPOSITION RATE IN MICROGRAMS/M\*\*2/SEC

( 36997., 19263., 0.000)	( 38089., 21376., 0.000)	( 38604., 19941., 0.000)
( 39260., 19302., 0.000)	( 61328., 11624., 0.000)	( 57860., 12969., 0.000)
( 55767., 15513., 0.000)	( 60167., 12982., 0.000)	( 64462., 11424., 0.000)
( 55220., 12876., 0.000)	( 33873., 18019., 0.000)	( 40843., 21102., 0.000)
( 37325., 17494., 0.000)	( 42448., 19729., 0.000)	( 57318., 17719., 0.000)
( 58360., 16070., 0.000)	( 59646., 16719., 0.000)	( 61094., 16340., 0.000)
( 71806., 10698., 0.007)	( 71725., 12927., 0.003)	( 74080., 14941., 0.002)
( 69019., 12833., 0.000)	(	

1

24 HOUR AVERAGE FOR HOUR ENDING 24

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
 (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

CONCENTRATIONS IN MICROGRAMS/M\*\*3

( 36997., 19263., 0.000)	( 38089., 21376., 0.389)	( 38604., 19941., 0.000)
( 39260., 19302., 0.000)	( 61328., 11624., 0.000)	( 57860., 12969., 0.000)
( 55767., 15513., 0.000)	( 60167., 12982., 0.113)	( 64462., 11424., 0.020)
( 55220., 12876., 0.000)	( 33873., 18019., 0.000)	( 40843., 21102., 0.000)
( 37325., 17494., 0.000)	( 42448., 19729., 0.000)	( 57318., 17719., 0.005)
( 58360., 16070., 0.014)	( 59646., 16719., 0.013)	( 61094., 16340., 0.003)
( 71806., 10698., 0.984)	( 71725., 12927., 0.590)	( 74080., 14941., 0.395)
( 69019., 12833., 0.037)	(	

1

24 HOUR AVERAGE FOR HOUR ENDING 24  
 DEPOSITION RATE IN MICROGRAMS/M\*\*2/SEC

( 36997., 19263., 0.000)	( 38089., 21376., 0.003)	( 38604., 19941., 0.000)
( 39260., 19302., 0.000)	( 61328., 11624., 0.000)	( 57860., 12969., 0.000)
( 55767., 15513., 0.000)	( 60167., 12982., 0.001)	( 64462., 11424., 0.000)
( 55220., 12876., 0.000)	( 33873., 18019., 0.000)	( 40843., 21102., 0.000)
( 37325., 17494., 0.000)	( 42448., 19729., 0.000)	( 57318., 17719., 0.000)
( 58360., 16070., 0.000)	( 59646., 16719., 0.000)	( 61094., 16340., 0.000)
( 71806., 10698., 0.008)	( 71725., 12927., 0.004)	( 74080., 14941., 0.003)
( 69019., 12833., 0.000)	(	

1

**4.2.2.3 Resultant PM<sub>10</sub> concentration at different receptors**

The contribution of PM<sub>10</sub> at the receptors from different activities as brought out by the modeling exercise as above are tabulated and compared as under (PM<sub>10</sub> is assumed as 35% of TSPM) –

CMPDI

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Sl. No.	Location Name	Location Code	Remarks	Existing PM10 Concentrations (98th Percentile) (µg/m <sup>3</sup> )	Scenario		
					Increase in PM <sub>10</sub> conc. due to various activities (µg/m <sup>3</sup> )	Resultant PM <sub>10</sub> conc. (µg/m <sup>3</sup> )	NAAQS, 2009 Limit (µg/m <sup>3</sup> )
Locations situated on the river bank							
1	Parbelia	A1	UG mine near the river	66	0.000	66.00	100
2	Sodepur	A2	Habitation near the river	73	0.136	73.14	
3	Chinakuri – I	A3	UG mine near the river	75	0.000	75.00	
4	Chinakuri – III	A4	-do-	73	0.000	73.00	
5	Amritnagar	A5	-do-	73	0.000	73.00	
6	Tirat	A6	-do-	71	0.000	71.00	
7	Kuardih	A7	-do-	73	0.000	73.00	
8	Nimcha	A8	-do-	71	0.040	71.04	
9	Mahabir	A9	-do-	66	0.007	66.01	
10	Bakulia	A10	Habitation near the river	69	0.000	69.00	
Locations situated near the river bank							
11	Dubswari	A11	Habitation near the river	65	0.000	65.00	100
12	Bejdih	A12	-do-	55	0.000	55.00	
13	Hirakhun	A13	-do-	43	0.000	43.00	
14	Patmohana	A14	-do-	71	0.000	71.00	
15	Ratibati	A15	UG mine near the river	63	0.002	63.01	
16	Chalbalpur	A16	-do-	67	0.005	67.01	
17	J K Nagar	A17	-do-	44.6	0.005	44.65	
18	Jemehari	A18	-do-	44.2	0.001	44.21	
19	Lachhipur	A19	-do-	118.0	0.344	118.34	
20	Central Kajora	A20	-do-	122.5	0.207	122.71	
21	Madhujore	A21	-do-	118.5	0.138	118.64	
22	Ghansyampur	A22	-do-	94.0	0.013	94.01	

The above receptors (baseline stations) have been shown in Plate – 5.

#### 4.2.2.4 Observations from the Impact Prediction Exercise

It can be observed from the prediction exercise that the sand mining and its allied activities will have a very little impact on the quality of air in the surrounding and the PM<sub>10</sub> concentration will be well below the NAAQS, 2009 level. Baseline concentration levels of PM<sub>10</sub> at three stations viz., Sl. No. 19, 20 & 21 is more than the NAAQS limit due to proximity to other sources of pollution and the sand mining activities have not contributed to the pollution level.

Isopleths of PM<sub>10</sub> have been drawn and shown in Plate – 7.

#### 4.2.2.5 Air Pollution Control Measures

##### ✿ For Road Transport of Sand

The following measures will be taken:

- The metaled roads shall be kept free of potholes, etc.
- Regular maintenance of trucks and mechanical equipment such as dredgers, scrapers, pontoons etc. to limit emission of harmful exhaust fumes.
- Physical removal of dust from the roads.
- Avenue plantation along roads (where feasible) will be 15 m wide and raised in three tier fashion.
- Transportation of sand from sand stations to sand depot and to the mines by covered trucks with tarpaulin/thick plastic sheets.
- Regular sprinkling of water on sand transport roads.



Images showing transport of sand from riverbed by covered trucks

### **4.3 Impact on Aquatic Flora & Fauna**

The river Damodar is rain-fed and therefore seasonal. Though there is appreciable flow of water in the river during the monsoons, the rest of the year the flow of water in the river is very less and limited to only a few thin streams in the riverbed. The extraction of sand is carried out only during the lean season when the riverbed is easily accessible. Not much aquatic life is present during the lean periods and mining is carried out leaving sufficient distances from the flowing water. Also, since no drilling and blasting is involved, there is no impact of sand mining on the aquatic life present in the stream.

### **4.4 Impacts on Water quality**

#### Impact on River water

There will be impact of the activities on the water quality of the river due to mechanical extraction of sand as well as entry of trucks into the riverbed. The main source of pollution is diesel / hydraulic fluids which are used for operating the dredgers, scrapers etc. Utmost caution will be taken to prevent any spillage of these fluids. The entry of trucks into the riverbed may also lead to inadvertent spillage of diesel / hydraulic fluids from these trucks. These oils having been absorbed by the sand may find its way into the water course if allowed to remain there. In such cases, the sand within the area of the river bed on which the spillage occurs will be scarped out completely and transported outside along with the mined sand such no trace of the oils remain in the riverbed.

Routine monitoring of river water will be carried out to study impact of these activities and proper mitigative measures will be taken to prevent any harmful impact (refer Chapter – 6, section – 6.2.1).

#### **River water pollution control measures**

- Utmost caution will be taken to prevent spillage of diesel and other fluids.
- Regular maintenance of trucks and other vehicles to minimize leakage of fluids.
- Routine monitoring of river water samples to know the quality of water.

#### Impact on Ground water

No impact of sand mining is envisaged on adjoining ground water quality.

#### **4.5 Impact on Water table / Hydrogeology**

Sand will be extracted upto an average depth of 1.7 m as mentioned in Chapter – 2. So, the sand extraction activities will not intersect the water table. Hence, there will be no impact on the water table.

#### **4.6 Impact on land**

There is no other land use within the riverbed as mentioned in Chapter – 3, Section – 3.1.3 and sand extraction will not change the land use of the area. The shallow voids left in the riverbed after extraction of sand get completely filled up with sand during the monsoons.

#### **4.7 Impact on soil**

The riverbed is fully sand and no soil removal is involved during the sand extraction.

#### **4.8 Impact on Hydrology**

Two seasonal streams, Nunia Khal and Harial Jore, meets Damodar River in the downstream (pl refer Plate – 3). These seasonal streams will remain unaffected due to sand extraction. Rain water channels entering Damodar river will also remain unaffected due to sand extraction from the riverbed. There is no proposal of diversion / modification of any stream or nallah on either side of the river and hence there will be no impact on the hydrology of the area.

#### **4.9 Benefits arising out of Sand Extraction**

##### Flood Control

Removal of sand from the riverbed is beneficial from the point of view of flood control.

##### Employment Potential

Also, since most of the work of sand extraction (except supervision and controls) is outsourced, the various activities provide employment to a very large workforce of nearly 6000 local persons round the year except during monsoons when sand mining is suspended.

**Chapter - 5****Environmental Monitoring Programme****5.1 Routine Monitoring of Environmental Attributes**

Monitoring of environmental attributes is imperative for an effective environmental management of the project. It is proposed to carry out routine environmental monitoring by setting up sampling stations for air, noise and water. The routine monitoring will be carried out as per the following guidelines –

SI No	Environmental attribute to be monitored	No. of sampling stations	Type of monitoring	Frequency of monitoring	Follow-up Action
1	Ambient Air & Noise	30 stations for sand stations + 5 stations for sand depot = 35 stations	24 hrly sampling for PM10, PM2.5, SO <sub>2</sub> , NO <sub>X</sub> , CO & heavy metals dBA (Leq)	2 consecutive days in each quarter year. Heavy metals once every year. Once during daytime at each station in each quarter	In case the concentrations are observed to be higher than the standards for RCF on both days, fortnightly monitoring will be carried out until corrective measures take effect.
2	Damodar River water	15 samples	All parameters as per IS 2296 Inland Surface Water Body(1982) Class 'C' Standards	Once in each quarter year	Efforts will be made to identify the source of pollutant will be made and corrective action with the help of experts in the field will be taken if any of the parameters is found exceeding the standards & report submitted to WBPCB
3	Replenishment Study	15 Stations	R. L. of Riverbed	Once in every five years	Reduction in sand extraction if negative trend is noted

## Chapter – 6

### Replenishment Study

#### 6.1 Replenishment Study

##### 6.1.1 A Short Note on Damodar River

The Damodar River is one of the most important rivers in Jharkhand and West Bengal. The river has its source in Chotanagpur hills about 609 feet above sea-level close to the Chandwa village in Palamau district of Jharkhand in India. Flowing south easterly for about 240 kms through Jharkhand, it meets the Barakar River which forms the boundary between Jharkhand and West Bengal. Thereafter, Damodar flows through the southern edge of Raniganj Coalfield. The Raniganj coalfield extends up to 42 kms with most of the mines on the northern bank. Below Raniganj, the Damodar flows through deltaic plains, takes an abrupt turn in the vicinity of Burdwan and flows south. The total length of the river is nearly 547 km and a total drainage basin area is 23683.43 sq. km. After a run of about 240 km in Jharkhand and remaining 207 kms in West Bengal, the river falls into the Hooghly.

The entire Damodar valley can be divided into the upper, middle and lower valleys according to the gradient. The upper valley with a length of 240 kms lies between 600 m and 190 m above MSL. Here the river has a gradient of 1.89 m per km. The Barakar River meets Damodar at this point. The middle valley stretches here onwards for a length of 160 km and lies between 190 m and 90 m above MSL with a gradient of 0.57 m per km. The river begins its course through Raniganj Coalfield from the beginning of the point of confluence with Barakar. The entire riverbed in this region is covered with fine sand due to high rate of siltation (refer Sec 3.2). In the next phase of 145 km of the lower valley, till its confluence with Hooghly, the gradient of the riverbed is 0.19 m per km.

Regular flooding of the Damodar River had caused it to be labeled the "River of Sorrows", and following a devastating flood in 1943, the Government of West Bengal formed a board of inquiry to address the issue. The board recommended forming an organization, similar to the Tennessee Valley Authority (TVA) of the flood-

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)  
prone Tennessee Valley in the United States. In 1944, W.L. Voorduin, a senior engineer of the TVA, was appointed to develop a comprehensive plan for the area.

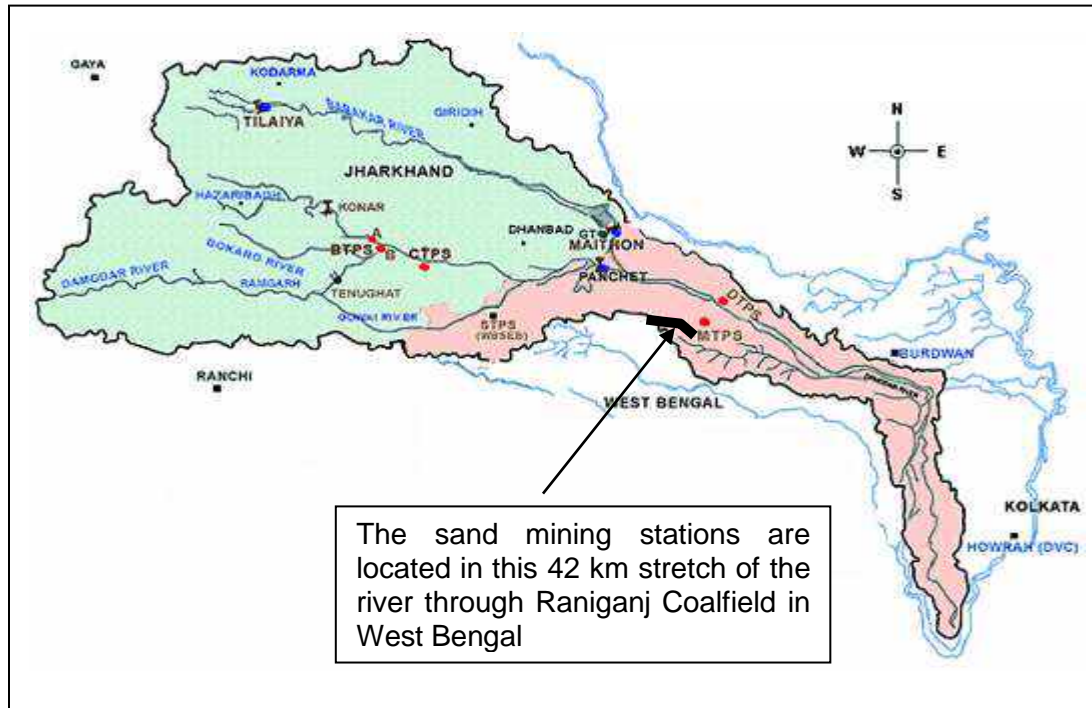


Fig – 1: Plan showing the Damodar Basin and the network of Hydroelectric & Thermal Power Plants of the Damodar Valley Corporation

In March 1948, the Damodar Valley Corporation Act (Act No. XIV of 1948) was passed by the Constituent Assembly, and the Damodar Valley Corporation (DVC) was officially formed on July 7, 1948. The corporation was jointly formed by the government bodies: the Central Government, the Government of West Bengal and the Government of Jharkhand to participate jointly for the purpose of building the Damodar Valley Corporation.

As part of the strategy for flood control, two dams across the rivers Barakar and Damodar were built at Maithon in 1957 and Panchet in 1959. Both the dams are some 8 km upstream of the confluence point of the rivers. From the point of confluence, the river flows easterly between the districts of Burdwan on the north bank and Purulia district and later on Bankura district on the southern bank.



Fig – 2: Lean season flow of Damodar River



Fig – 3: Monsoon season flow of Damodar River



Fig – 4: Sand deposits in Damodar Riverbed after monsoons

### 6.1.2 Replenishment Study

River bed RL at selected points in the dry portions of Damodar Riverbed was measured during pre – monsoon period and again during post – monsoon period in order to assess the annual quantum of sand deposition as shown in table below –

Location	Pre – monsoon RL (m)	Post – monsoon RL (m)	Difference (m)
1	76.15	77.78	1.63
2	75.91	77.85	1.94
3	75.87	77.70	1.83
4	75.38	77.89	2.51
5	76.36	77.87	1.51
6	76.18	77.88	1.7
7	75.59	77.76	2.17
8	76.61	77.79	1.18
9	76.26	77.81	1.55
10	75.27	77.75	2.48
11	76.20	77.79	1.59
12	75.43	77.87	2.44

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Location	Pre – monsoon RL (m)	Post – monsoon RL (m)	Difference (m)
13	75.80	77.79	1.99
14	75.69	77.77	2.08
Average variation			(+) 1.90 m

It can be observed that there is an average increase in riverbed RL by 1.9 m due to deposition of sand during the monsoon flow of the river.

Thus total replenished quantity of sand available each year within the leasehold of ECL for mining purpose =  $865800 \text{ m}^2 \times 1.9 \text{ m} = 1.65 \text{ million m}^3$

Out of the above annual replenishment, it is proposed to mine only 1.5 million m<sup>3</sup> up to a maximum depth of 2 m (average depth 1.7 m). Thus, there will be no long – term impact on the riverbed which will have surplus sand left after extraction of the proposed amount each year since ECL will be extracting less than the annual replenished quantity of sand (please also refer section 2.4, Chapter – 2).

## 6.2 Public Consultation

### 6.2.1 Notification & Venue

The Sand Mining Stations in Damodar Riverbed fall in 3 districts of West Bengal, namely, Bankura on the southern bank, Burdwan on the northern bank and Purulia on the southern bank. Separate public hearings on separate dates were held in all the three districts as per the EIA Notification, 2006 covering the sand mining stations falling in them respectively. Notices for holding the public hearings for Sand Mining in Damodar Riverbed for the above 3 districts were issued by the West Bengal State Pollution Control Board as given below:

Sl No.	Riverbed	District	Name of Mouza	Number of Sand Mining Stations	Sand extraction per year (in Mm <sup>3</sup> )	Area (in Acre)	Date of Public Hearing
1	Damodar	Bankura	Gopalpur, Ardhamgram, Gopalganj, Majit, Sahebdinga, Bhara, Anandpur	7	0.76	113.50	10 <sup>th</sup> July, 2015
2		Burdwan	Ramprasadpur, Baska, Napur, Madanpur, Narayankuri, Sitalpur, Chinakuri	7	0.59	83.86	14 <sup>th</sup> July, 2015
3		Purulia	Parebelia	1	0.10	16.50	24 <sup>th</sup> July, 2015
		Total			15	1.45 (Approx 1.50 Mm <sup>3</sup> )	213.86 (86.58 Ha)

The details of the notifications, advertisements, dates and venues of holding and Chairpersons of the PH Panels are tabulated as under –

Sl No.	Notification No. & dated	Name of the daily in which advertisement was published	Date and time of Public hearing	Venue	Name of the Chairman of Public Hearing Panel
1	Memo No. - 476(1-18)-2N-32/2015(E) dated	“The Telegraph” & “Anand Bazar Patrika” on 9.06.2015	12:00 PM on 10.07.2015	Meeting Hall of Mejia Panchayat Samity District – Bankura, West Bengal	Shri N. T. Taso Lepcha, W.B.C.S. (Exe), Additional District Magistrate

	9.06.2015				(Gen), District – Bankura
2			12:00 PM on 14.07.2015	Panchayat Samity Meeting Hall of Raniganj Panchayat Samity District – Burdwan, West Bengal	Sri Hrishikes Mudi, W.B.C.S. (Exe), Additional District Magistrate (ZP), District – Burdwan
3			12:00 PM on 24.07.2015	The "Sampriti Sadan", Panchayat Samity Hall, Neturia, District – Purulia, West Bengal	Sri P. K. Maiti, Additional District Magistrate (Dev), District – Purulia

The complete proceedings as received from WBPCB are given as Annexure – IV.

### 6.2.2 Attendance

More than 350 persons attended the hearings. The public hearing panels consisted of officers from the WBPCB and elected representatives of the area. Several residents from nearby villages, viz., Gopalpur, Ardhagram, Gopalganj, Majit, Sahebdanga, Bhara, Anandpur, Ramprasadpur, Baska, Napur, Madanpur, Narayankuri, Sitalpur, Chinakuri, Parebelia etc. were present in the hearing.

### 6.2.3 Public Hearing Proceedings, Queries & Replies

Several types of questions were asked and demands relating to drinking water, plantation, repairing of roads, health facilities, etc and several suggestions were made by the citizens present in the hearing. The villagers suggested allocation of more funds under CSR and to carry out more developmental works. It was advised to carry out extraction of sand with due regard to quantity of sand replenished each year, biodiversity of the surrounding area and erosion of the river banks. On behalf of the Project Proponent, General Managers of Satgram, Kunustoria & Sodepur Areas of M/s. Eastern Coal Field Ltd answered to the queries of the public and panel.

### **6.2.3.1 PH Proceedings at Bankura District:-**

#### **Welcome Note by Environmental Engineer, WBPCB**

The hearing started with the welcome note from Sri. Anajn Fouzdar, Environmental engineer, West Bengal Pollution Control Board. He explained about the provisions of the above stated MoEF notification and also informed the audience about the draft proposal of M/s. Eastern Coalfields limited for the proposed sand mining in the riverbed of Damodar river of Bankura.

#### **Sri N.T.Taso Lepcha, W.B.C.S (Exe), Additional District Magistrate (Gen), Bankura**

explained the necessity of public hearing and significance of the opinions/ suggestion of the people present in the hearing.

**Sri.A.Mukhopadhaya, W.B.C.S(Exe), Sub Divisional Officer, Bankura** requested the project proponent to explain in details about the proposed project for discussion among the panel members and others present in the hearing.

#### **Representation of CMPDI, Environmental Consultant on behalf of M/s. Eastern**

**Coalfields limited**, narrated about the project details and the proposed pollution control devices through PPT emphasizing on the lightly environmental impacts arising out of the same as well as the proposed pollution abatement measures to be taken by them. He has pointed out that a brief description has already been circulated among the people present at the hearing. Presently, there are 15 sand mining stations in the riverbed of Damodar and total area of these stations is 213.86 acre located in the district of Bankura, Burdwan, Purulia. In the districts of Bankura there are only 7 nos. of stations having total sand extraction capacity -0.76mcum/year. He mentioned that sand collection is restricted to 1.5 -2 m and confined to lean season (non monsoon period only) and excavated sand will be used only for stowing of coal mines. He also mentioned that the removal is done without affecting the base flow of the river in such a manner as to maintain the smooth flow of the river during the monsoons. The sand will be mined manually at some stations and at others with the help of dredgers, scrappers and pontoons. No drilling and blasting will be involved and there will be no chance of dust generation and effluent generation. He also assured that local people shall be consulted in each stage of the project. He also mentioned that this would generate

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)  
employment for local people and take neighboring villagers into confidence in each stage of the project.

**Sri.A.Mukhopadhaya, W.B.C.S(Exe), Sub Divisional Officer, Bankura** also again requested the project proponent to explain in details regarding the chances of contamination of ground water/ surface water and employment opportunity of the local people.

**Record of queries of the attending citizens and responses of the Project Proponent during the Public Hearing:-**

Sl. No.	Issues Raised	Commitment of Project Proponent regarding Action taken / to be undertaken
1	<b><u>Sri. Biswajit Mukherjee of Village-Bhara</u></b> welcomed the project and requested the project proponent to look after the additional employment opportunity and road development of the locality.	<b><u>General Manager, Satgram Area, ECL</u></b> appreciated the concern expressed by the
2	<b><u>Sri. Ashish Kumar Daw of village- Majit</u></b> welcomed the project and mentioned that ECL is doing sand mining for more than 20 years and no such pollution related problems are faced by the local public. He also mentioned that sand stowing is required to protect the surface from subsiding and to maintain mine safety. He also requested the project proponent to develop a community hall in the locality.	different participants and welcomed their suggestions. He informed that water required for sand mining will be re-circulated and there is no chance for contamination with the ground or surface water.
3	<b><u>Sri. Ramniranjan Acharya of village-Bhara</u></b> mentioned that coal is essential for development of industries in the locality and the area as a whole for potential development of industries. He requested the project proponent for overall development of the locality including road development community centre and development of local schools.	He also assured that more plantation programme will be taken up shortly and preferences will be given to the local people for employment. He also mentioned that the
4	<b><u>Sri. Rampada Pal of village-Kalidaspur , Sri. Biswajit Roy of village-Bhara and Sri. Mukul Biswas of village- Majit</u></b> requested the project proponent for development of community hall in the locality.	issues raised by the various participants will be addressed adequately before finalizing the environmental management

Sl. No.	Issues Raised	Commitment of Project Proponent regarding Action taken / to be undertaken
5	<b><u>Sri. Malay Mukherjee of village-Meja</u></b> informed that ECL has already taken steps for road development and he requested that more plantation to be developed in the locality and development of local infrastructure should be done in consultation with the local Panchayat.	plan.

A copy of the proceedings received from WBPCB is enclosed as Annexure – IV.

**Suggestion of Panel Members and Local Representatives at Birbhum District:-**

**Shri N.T. Taso Lepcha, W.B.C.S. (Exe.), Additional District Magistrate (Gen),**

**Bankura** emphasized that all possible measures should be ensured by the project proponent towards the mitigation of all environmental hazards and various points raised by the people present in the hearing. The project is welcomed only after incorporation of all the pollution control measures and Corporate Social Responsibility programme proposed by the project proponent. He assured the audience that the proceedings of the public hearing shall be dully forwarded to the MoEF&CC, Govt. of India and further expressed his gratitude to the audience for their active participation in the public hearing.

**6.2.3.2 PH Proceedings at Burdwan District:-**

**Welcome Note by Environmental Engineer, WBPCB**

The hearing started with a welcome note from Shri S.Ganguly, Environmental Engineer, West Bengal Pollution Control Board. He explained about the provisions of the above stated MoEF notification and also informed the audience about the draft proposal of M/s Eastern Coal Fields Limited for sand mining in the river bed of Damodar River falling under PS — Andal, Raniganj and Kulti (in mining area of 83.86 acres having extraction capacity of 0.590 MCum/year) in Dist — Burdwan, West Bengal.

**Addl. District Magistrate (Zilla Parishad), Dist. Burdwan** also welcomed the audience and gave a brief introduction about the proposed project. He then requested the project proponent (PP) to explain in details about the proposed project, giving

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emphasis on the environmental aspects in particular, for discussion among the panel members and others present in the hearing.

**Sri Sumanta Ganguly of CMPDI, Asansol (Environmental Consultant of the project) on behalf of the PP** narrated the details of the proposed project and the pollution control measures to be taken for the same through power point presentation. He explained the location details of the project, details of sand mining procedure from the river bed, probable environmental impacts of such process activities including transportation of sand through roads and measures proposed by M/s Eastern Coal Fields Limited to combat the effects. Sri Ganguly assured the audience that no mining activity will be conducted within one hundred meter of the river embankment and mining will be restricted to a depth of one meter only. He mentioned about the baseline status of Air, Water & Noise Quality of the area which are well within the standards. He further elaborated on the steps to be taken for developing the society through activities under Corporate Social Responsibility of the company.

**Record of queries of the attending citizens and responses of the Project Proponent during the Public Hearing:-**

Sl. No.	Issues Raised	Commitment of Project Proponent regarding Action taken / to be undertaken
1	<p><b>Sri C.Ghosh of Ramprasadpur</b> stated that the experience of the local residents regarding effects of on- going sand mining activity in the area is very bad. Air pollution generated during transport of sand in uncovered condition by very old vehicles causes serious problem for the local people. Road conditions are horrible due to heavy transport load and efforts for maintenance of such roads have never been initiated by the ECL authorities. Sri Ghosh further stated that accidents due to bad road conditions submergence of agricultural land as well as playground in the river course due to unlawful sand mining near the embankment are regular phenomena</p>	<p><b>Shri S.Banerjee, General Manager of Kunustoria Area of ECL</b> assured the gathering that they will ensure that sand is transported in totally covered trucks and water sprinkling will be done regularly in order to prevent fugitive emission during sand transportation. Sri Banerjee further assured that the whole</p>

Sl. No.	Issues Raised	Commitment of Project Proponent regarding Action taken / to be undertaken
	<p>in the adjoining area. He requested the PP to ensure that the conditions of local roads are maintained in good condition and proper steps are taken so that the biodiversity along the bank of the river is not affected by their proposal sand mining activity. He further requested the PP to ensure that proper replenishment of deposited sand is allowed between two successive mining seasons in order to avoid permanent damage to the riverbed leading to diversion of course of river and other related environmental nuisances. Sri Ghosh finally requested the ECL authorities to initiate extensive CSR activities in and around the proposed project site for the overall socio economic development of the area.</p>	<p>process of sand excavation from the river bed will be executed following most modern guidelines in order to ensure that there is no adverse effect on the river course, its embankment, the bridges on the river and the local biosphere as well; he assured that they will excavate only the amount of sand annually which will be replenished naturally during the next monsoon season and under all circumstances excavation up to the permissible depth will be strictly followed. Sri Banerjee also assured the gathering that ECL authorities will continue their road repairing and construction activities to ensure that the road conditions do not deteriorate to cause trouble to the local residents. He further assured the gathering that they will continue their CSR activities involving the local administration and representatives of local people.</p>
2	<p><b>Sri P. Bhattacharya of Madanpur</b> stated that he has lost major portion of his agricultural land near the embankment due to submergence in the river course due to unlawful sand mining. He requested the ECL authorities as well as the local administration to arrange for compensation for land losers like him. Sri Bhattacharya further stated that large number of plots of agricultural land situated on the two sides of the road through which sand transportation is done have lost their fertility due to deposition of layer of sand on them caused by such indiscriminate sand transportation in uncovered condition. He further requested the ECL authorities as well as the local administration to address this issues immediately.</p>	<p>process of sand excavation from the river bed will be executed following most modern guidelines in order to ensure that there is no adverse effect on the river course, its embankment, the bridges on the river and the local biosphere as well; he assured that they will excavate only the amount of sand annually which will be replenished naturally during the next monsoon season and under all circumstances excavation up to the permissible depth will be strictly followed. Sri Banerjee also assured the gathering that ECL authorities will continue their road repairing and construction activities to ensure that the road conditions do not deteriorate to cause trouble to the local residents. He further assured the gathering that they will continue their CSR activities involving the local administration and representatives of local people.</p>
3	<p><b>Sri. U. Dhibar of Vill-Nupur and Member, Ballavpur Gram Panchayat</b> stated that he was not informed well in advance about the schedule of the Public Hearing and requested the ADM to call for an administrative meeting involving the respective Panchayat Pradhans to discuss the issues related to the proposed project. The ADM requested Sri Dhibar to submit a written application to him</p>	<p>process of sand excavation from the river bed will be executed following most modern guidelines in order to ensure that there is no adverse effect on the river course, its embankment, the bridges on the river and the local biosphere as well; he assured that they will excavate only the amount of sand annually which will be replenished naturally during the next monsoon season and under all circumstances excavation up to the permissible depth will be strictly followed. Sri Banerjee also assured the gathering that ECL authorities will continue their road repairing and construction activities to ensure that the road conditions do not deteriorate to cause trouble to the local residents. He further assured the gathering that they will continue their CSR activities involving the local administration and representatives of local people.</p>

Sl. No.	Issues Raised	Commitment of Project Proponent regarding Action taken / to be undertaken
	regarding this issue.	
4	<p><b>Shri P. Khan of Vill- Narayankuri of Egara Gram Panchayat</b> stated that sand mining is being conducted in their area for atleast a decade and two. Sri Khan expressed his grievance regarding very bad road condition of the area , laqck of initiatives regarding plantation program and implementation of CSR ptogram by ECL authorities. Sri Khan further informed the audience that localized indiscriminate mechanical mining of sand has led to dangerous depth in some spots in the river bed in their locality which may lead to serious accident at any time. He requested the ECL authorities and the local administration to look in to the matter immediately. He further stated that due to indiscriminate pumping of water from the river for water supply project of Raniganj municipal area the natural river course may get affected seriously; they requested the ADM to intervene in this matter and initiate remedial measure in this regard at the earliest.</p>	
5	<p><b>Sri D.Paul of Vill — Nupur and Sri K. Banerjee of Ramprasadpur</b> expressed their grievances regarding terrible road condition and lack of maintenance of the same, erosion of land due to illegal sand mining inside the river course as well as near the embankment, air pollution caused during sand transportation in uncovered vehicles and lack of CSR activities. Sri Banerjee also stated that the roads in concern has become very narrow due to illegal encroachment leading to regular accidents and inconvenience to the local residents. He also complained that the local people are confused regarding who is the appropriate authority to approach for addressing such problems since it is not clear to them whether the onus lies with the local administration or</p>	

Sl. No.	Issues Raised	Commitment of Project Proponent regarding Action taken / to be undertaken
	the ECL authorities. Addl. District Magistrate (Zilla Parishad), Dist. Burdwan requested them to submit written representation in this regard addressing the District Magistrate, Burdwan.	
6	<b>Sri N.Mondal and Sri P.Mondal of Vill</b> — Nupur requested the ECL. authorities as well as local administration to formulate a realistic compensation package for those who has lost their agricultural land due to unscientific and illegal sand mining inside the river course as well as near the embankment and implement the same at the earliest.	
7	<b>Sri Dinanath Mondal of Vill — Nupur</b> requested the ECL authorities to plan their sand transportation route in such a way so that transportation through local villages can be avoided.	

A copy of the proceedings received from WBPCB is enclosed as Annexure – IV.

**Suggestion of Panel Members and Local Representatives at Burdwan District:-**

**Sri S.Mondal, Savapati, Raniganj Panchayat Samity** expressed his concern about the fact that about 150- 200 acres of agricultural land in Narayankuri area has already been submerged by the river due to change of river course; he requested the ECL authorities as well as the local administration to initiate proper measures to prevent further loss of agricultural land in this manner. The Savapati further stated that indiscriminate dumping of over burden originating from different mining projects of the locality in and around the river bed has also contributed to such nuisance. He further requested all concerned to ensure easy availability of sand for the local construction works. Finally Sri Mondal requested the ECL, authorities to initiate extensive CSR activities including development of local infrastructure, maintenance of local roads, plantation program, up-gradation of local schools and health centres etc.; he further requested them to involve the local administration as well as local public representatives in such endeavors.

**Addl. District Magistrate (Zilla Parishad), Dist. Burdwan** requested the PP to explore the possibility of utilizing fly ash instead of sand for stowing of mines. The ECL representatives informed that there are some inherent technical difficulties for such change over. At this the ADM requested them to furnish relevant documents in support of their claim.

He requested the local residents to submit specific written proposals to him regarding their views about different aspects of the proposed projects as well as on-going sand mining activity in the locality which were being discussed during the public hearing.

He requested the ECL authorities and Sri S. Ganguly , Environmental Engineer, West Bengal Pollution Control Board to confirm whether all concerned were informed about the Public Hearing according to the guidelines given in the EIA Notification S.O. 1533 dated 14<sup>th</sup> September , 2006 of the Ministry of Environment & Forest, Govt of India and requested Sri Ganguly to submit the relevant documents in this regard to the ADM as soon as possible. Sri Ganguly assured that the same has been done strictly as per the Notification and committed to submit the relevant documents to the ADM at the earliest.

He also requested the ECL authorities to ensure that each of their sand carrying vehicles can be properly identified through clearly visible dedicated holograms etc. and the local administration should be informed in detail about the vehicles which are dedicated for their sand excavation and transport of the same. The ADM expressed his hope that this will be effective for identifying and controlling illegal sand mining.

At the end, he emphasized that all possible measures should be ensured by the project proponent towards the mitigation of environmental problems and implementation of CSR commitments. Finally, Addl. District Magistrate expressed his gratitude to the audience for their active participation in this public hearing and concluded the session.

**Shri S.Ganguly, Environmental Engineer, West Bengal Pollution Control Board** suggested that the project proponent should include all the issues discussed in the public hearing, in the final EIA/EMP report and address the issues properly during implementation of the project. He further assured the audience that the deliberations presented by the audience in the hearing are being recorded and unedited videography of the whole proceedings will be forwarded to the appropriate authorities for their

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EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)  
consideration. Sri Ganguly also mentioned that West Bengal Pollution Board will upload the proceedings of the public hearing to their website.

### **6.2.3.3 PH Proceedings at Purulia District:-**

#### **Welcome Note by Environmental Engineer, WBPCB**

The hearing started with a welcome note from Sri S. Bhattacharya, Environmental Engineer, West Bengal Pollution Control Board. He explained about the provisions of the above stated MoEF notification and also informed the audience about the draft proposal of M/s. Eastern Coalfields Limited for the proposed Sand Mining in the Riverbed of Damodar River falling under PS — Neturia (in Mining Area of 16.50 Acres having extraction capacity of 0.100 Mcum/year) in the District of Purulia, West Bengal.

**Sri P. K. Maiti, Additional District Magistrate (Dev.), Purulia** explained the necessity of public hearing and significance of the opinions / suggestion of the people present in the public hearing.

#### **Representative of CMPDI, Environmental Consultant on behalf of M/s. Eastern**

**Coalfields Limited**, narrated about the project details and the proposed pollution control devices through Power Point presentation emphasizing on the likely environmental impacts arising out of the same as well as the proposed pollution abatement measures to be taken by them. He has pointed out that a brief description has already been circulated among the people present at the hearing. He mentioned that excavated sand will be used only for stowing of coal mines. He also mentioned that the removal will be done without affecting the base flow of the river in such manner so as to maintain the smooth flow of the river during the monsoon. The sand will be mined manually at some stations and at others with the help of dredgers, scrapers and pontoons. No drilling & blasting will be involved and there will be no chance of dust generation and effluent generation. He has also mentioned that this would generate employment for local people and take neighboring villagers into confidence in each stage of the project.

**Record of queries of the attending citizens and responses of the Project****Proponent during the Public Hearing:-**

Sl. No.	Issues Raised	Commitment of Project Proponent regarding Action taken / to be undertaken
1	<b><u>Shri Karunamoy Singh of Neturia village</u></b> mentioned that roads in the locality are damaged due to transportation of overloaded trucks with sand, coal etc. He requested the administration to look into the matter and for maintenance of roads.	<b><u>Shri S. R. Bharti, General Manager, M/s. Eastern Coalfields Limited</u></b> appreciated the concern expressed by the different participants and welcomed their suggestions. He informed that M/s. Eastern Coalfields Limited being a Govt. of India company undertakes lot of social activities through CSR programme. He welcome all the suggestions and mentioned that all the commitment will be fulfilled during the execution of the project.
2	<b><u>Shri Shibram Chakraborty of Simulia village</u></b> informed that overloaded truck carrying sand without any cover are plying in the locality for transportation of sand from the mined area, damaged Rabindra Setu, a local bridge. He requested for necessary action to repair the bridge and also demanded that no trucks should be allowed to ply without proper cover.	
3	<b><u>Shri Arup Mishra of Parbelia village</u></b> wanted to know why M/s. Eastern Coalfields Limited is going for sand mining.	
4	<b><u>Shri Ujjal Das of Vamuria village</u></b> requested M/s. Eastern Coalfields Limited authority to provide electricity, water supply and maintenance of road in the nearby area through their CSR activity.	

A copy of the proceedings received from WBPCB is enclosed as Annexure – IV.

**Suggestion of Panel Members and Local Representatives at Purulia District:-**

**Shri K. P. Yadav, Shabhapati, Neturia Panchayat Samity** requested the district administration for taking steps to prevent illegal sand mining in the locality.

**Sri P. K. Maiti, Additional District Magistrate (Dev.), Purulia** emphasized that all possible measures should be ensured by the project proponent towards the mitigation of all environmental hazards and various points raised by the people present in the hearing. The project is welcomed only after incorporation of all the pollution control measures and Corporate Social Responsibility programme proposed by the Project

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EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Proponent. He requested the project proponent to extend their CSR activity for development of the adjoining area.

The public hearing was concluded by Sri P. K. Maiti, Additional District Magistrate (Dev.), Purulia with thanks to the audience.

#### **6.2.4 Commitment of Project Proponent**

##### **Bankura District:-**

**General Manager, Satgram Area, ECL** appreciated the concern expressed by the different participants and welcomed their suggestions. He informed that water required for sand mining will be re-circulated and there is no chance for contamination with the ground or surface water. He also assured that more plantation programme will be taken up shortly and preferences will be given to the local people for employment. He also mentioned that the issues raised by the various participants will be addressed adequately before finalizing the environmental management plan.

##### **Burdwan District:-**

**Shri S.Banerjee, General Manager of Kunustoria Area of ECL** assured the gathering that they will ensure that sand is transported in totally covered trucks and water sprinkling will be done regularly in order to prevent fugitive emission during sand transportation. Sri Banerjee further assured that the whole process of sand excavation from the river bed will be executed following most modern guidelines in order to ensure that there is no adverse effect on the river course, its embankment, the bridges on the river and the local biosphere as well; he assured that they will excavate only the amount of sand annually which will be replenished naturally during the next monsoon season and under all circumstances excavation up to the permissible depth will be strictly followed. Sri Banerjee also assured the gathering that ECL authorities will continue their road repairing and construction activities to ensure that the road conditions do not deteriorate to cause trouble to the local residents. He further assured the gathering that they will continue their CSR activities involving the local administration and representatives of local people.

**Purulia District:-**

**Shri S. R. Bharti, General Manager, M/s. Eastern Coalfields Limited** appreciated the concern expressed by the different participants and welcomed their suggestions. He informed that M/s. Eastern Coalfields Limited being a Govt. of India company undertakes lot of social activities through CSR programme. He welcome all the suggestions and mentioned that all the commitment will be fulfilled during the execution of the project.

**6.2.5 Key Issues Raised during PH & Proposals made in the EMP**

- ✓ Riverbank erosion during rainy season as a result of which land and habitation are getting damaged
- ✓ Plantation along the river bank as well as along the sand transportation route
- ✓ Improvement of local road conditions
- ✓ Improvement of local school conditions
- ✓ Up-gradation of local Primary Health Centre under CSR
- ✓ Sand excavation to be carried out at least 100 m away from the riverbank
- ✓ Sand should be transported by covered trucks only
- ✓ Provision of community hall in the locality under CSR
- ✓ Improvement of irrigation canal present in the area
- ✓ Provision of employment to the local people in sand mining
- ✓ Improvement of ferry – ghat in the river through CSR activities
- ✓ Air pollution caused by sand transportation by road
- ✓ To maintain biodiversity along the river bed
- ✓ Carrying out replenishment study for riverbed sand reserve between successive mining seasons
- ✓ To ensure that no damage is done to the river embankment
- ✓ No sand extraction near bridges
- ✓ Removal of sand deposited on both sides of the sand transportation road

**6.2.6 Action Plan for Issues raised during the Public Hearing**

Based on the environmental management actions suggested in the EIA & EMP and further suggestions made during the public hearing, an action plan for implementation of environmental measures has been prepared and being given below –

Action Plan for Issues Raised during Public Hearing held at Meeting Hall of MeijaPanchayat Samity, District-Bankura for Sand Mining in the Riverbed of Damodar River:-

<b>SI No.</b>	<b>Issues raised by the Public</b>	<b>Action Plan</b>	<b>Time Line</b>
1	Additional employment opportunity and road development of the locality.	Additional employment opportunities are created through contractual transport of sand which shall be made through local people. Road development for sand transportation route lying within ECL command area will be repaired. After due consultation of State Govt.	2 years
2	Develop a community hall in the locality.	It will be done Under CSR Scheme after due consultation with district management.	1 Year
3	Overall development of the locality including road development community center and development of local schools.	It will be done Under CSR Scheme after due consultation with district management.	1 Year
4	More plantations to be developed in the locality and development of local infrastructure should be done in consultation with the local Panchayat.	Plantation shall be made after due consultation with villagers.	1 Year

Action Plan for Issues Raised in Public Hearing held at Panchayat Samity Meeting Hall of Raniganj Panchayat Samity District-Burdwan for Sand Mining in the Riverbed of Damodar River:-

<b>SI No.</b>	<b>Issues raised by the Public</b>	<b>Action Plan</b>	<b>Time Line</b>
1	Air pollution generated during transport of sand in uncovered condition by very old vehicles causes serious problem for the local people.	Covering of transportation trucks will be ensured.	-

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

SI No.	Issues raised by the Public	Action Plan	Time Line
2	Road conditions are horrible due to heavy transport load	Road development for sand transportation route lying within ECL command area will be repaired, after due consultation of State govt.	2 years
3	Proper steps are taken so that the biodiversity along the bank of the river is not affected by their proposal sand mining activity	CMPDI shall be asked to prepare a report on the impact of Sand Mining on bio diversity and necessary recommendations through this report shall be implemented at project cost.	6 month
4	Replenishment of deposited sand is allowed between two successive mining seasons in order to avoid permanent damage to the riverbed leading to diversion of course of river.	Replenishment study has been carried out and it was found the sand mining is under limit	-
5	Loss of agricultural land near the embankment due to submergence in the river course due to unlawful sand mining. Arrange for compensation for land losers.	As per the EIA study there is no such danger of submergence of land area due to sand mining.	-
6	Loss of soil fertility plots of agricultural land situated on the two sides of the road through which sand transportation is done, due indiscriminate sand transportation in uncovered condition.	Covering of transportation trucks will be ensured	-
7	Localized indiscriminate mechanical mining of sand has led to dangerous depth in some spots in the river bed in their locality which may lead to serious accident at any time	Sand mining is restricted to 1m depth below ground level.	-

Action Plan for Issues Raised in Public Hearing held at The "Sampriti Sadan", Panchayat Samity Hall at Neturia District-Purulia for Sand Mining in the Riverbed of Damodar River:-

SI No.	Issues raised by the Public	Action Plan	Time Line
1	Air pollution generated during transport of sand in uncovered condition by very old vehicles causes serious problem for the local people.	Covering of transportation trucks will be incorporated through contractual transport.	6 month
2	Roads in the locality are damaged due to transportation of overloaded	Road development for sand transportation route lying within ECL command area will	2 years

<b>SI No.</b>	<b>Issues raised by the Public</b>	<b>Action Plan</b>	<b>Time Line</b>
	trucks with sand, coal etc.	be repaired, after due consultation of State govt.	
3	Provide electricity, water supply and maintenance of road in the nearby area through their CSR activity.	It will be done Under CSR Scheme after due consultation with district management.	2 years
4.	Repairing of damaged Rabindra Setu, a local bridge in Simulia Village, Nituria Panchyets Samity.	It will be done Under CSR Scheme after due consultation with district management.	2 years

### 6.2.7 Conclusion of Public Hearing

All the environmental issues raised by the public have been addressed in the EIA & EMP (Please also refer Chapter 4 & 8 for details of mitigation measures and environmental action plan). Also, expert studies with respect to Ecology and Biodiversity, Soil Conservation and Socio-economics are underway, and suggestions, if any, made in these studies shall be implemented at cost to the Project. It was emphasized by the ECL management that all mitigation measures as suggested in the EIA & EMP with regard to abatement of pollution of air, water & noise will be taken. It was also stated that all CSR works will be undertaken in consultation with village representatives on priority basis (Please also refer Chapter – 8 for details of CSR). The people present expressed their support for Sand Mining with adequate pollution control measures in place so as to ensure sustainable development of the area.

## Chapter - 7

### Project Benefit

#### 7.1 Benefits arising out of Sand Extraction

Sand stowing is essential for safety of the mines as well as for conservation of coal. Depillaring needs to be undertaken with stowing to recover about 80% of coal blocked in pillars and it is imperative to maintain continued supply of sand in adequate quantity for ensuring safety and productivity of the underground mines. Some other benefits of Sand extraction is illustrated below:

##### Flood Control

Removal of sand from the riverbed is beneficial from the point of view of flood control.

##### Employment Potential

Also, since the entire work of sand extraction (except supervision and controls) is outsourced, the various activities provide employment to a very large workforce of nearly 6000 local persons round the year except during monsoons when sand mining is suspended.

#### 7.2 Environment Management

The environmental management includes the following -

- Generation of environmental data bank.
- Evolving micro environmental management plan for the project in collaboration with other agencies and consultants.
- Monitoring project implementation along with environmental control measures.
- Co-ordinate with other project activities to ensure timely implementation of the schemes.
- Co-ordination with Ministry of Environment & Forest, Central /State Pollution Control Board for prevention and control of pollution.
- Obtaining work permit from the state government.
- Submission of 6-monthly compliance reports to Ministry of Environment & Forest
- Carrying out Environmental Audit and submission of Environmental Statements

### **7.3 Corporate Social Responsibility**

As part of its Corporate Social Responsibility (CSR) efforts, Coal India Limited and its subsidiary companies regularly undertake various community development activities in and around the coalfield areas for the benefit of the local people.

Works done under Community Development Programme are normally as under:-

- ✓ Installation/Repairing of Hand Pumps.
- ✓ Digging/renovation of Wells/Ponds/Dam etc.
- ✓ Water Supply through pipelines.
- ✓ Construction/Renovation and repair of Community Centre/building.
- ✓ Construction/repair of Roads/Culverts.
- ✓ Construction/repair of school building.
- ✓ Organising Medical Camps.
- ✓ Organising Sports and cultural activities.
- ✓ Misc works.

## Chapter - 8

# Environmental Management Plan

### 8.1 Environmental Management Plan and Environment Management System

Environmental management involves functions that determine and implement environmental policy. It involves identification of objectives, adoption of appropriate mitigation measures, protection of ecosystems, enhancement of the quality of life for those affected, and minimization of environmental costs. Environmental Management Plan (EMP) will be formulated with an objective to mitigate the adverse impacts of any proposed project. This includes an environmental policy on protection of environment and public safety. One of the goals of EIA is to develop the implementation of a set of environmental protection measures. These measures are normally set in an EMP.

Management of rivers includes legal, social and economic considerations, as well as scientific insights.

Environmental Management System (EMS) refers to the management of an organization's environmental programmes in a systematic, planned and documented manner. It includes the organizational structure, planning and resources for developing, implementing and maintaining policy for environmental protection. The Environmental Action Plan for mining in this project has been prepared accordingly and the measures suggested will go a long way in improving the overall environmental scenario of the project.

### 8.2 Organizational Setup

The success of environmental management in an organization not only depends on deep involvement of its personnel at all levels but also on the creation of an effective implementing organizational structure. The objectives are:

- To implement environmental control and protection measures.
- Subsequent environmental monitoring of the efficacy of various control measures.
- Plantation/green belt development.
- Land restoration.

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EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Keeping this in view, a project – specific organizational structure responsible for the implementation of environmental control and mitigation measures as well as monitoring of such implementation has been prepared.

### **8.2.1 Organisation for Environmental Management**

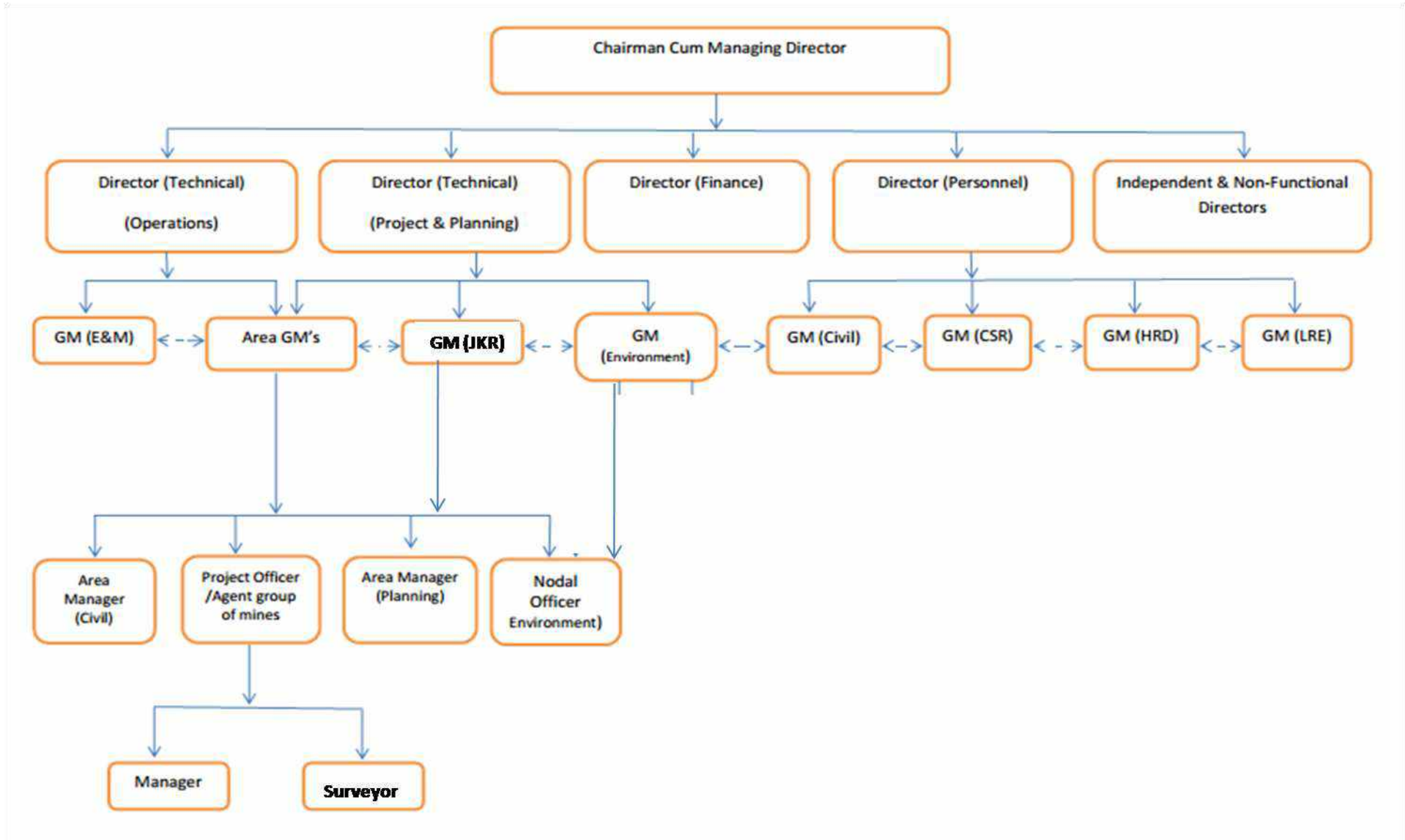
Eastern Coalfields Limited, the lessee of these sand mining stations in the riverbed has set-up an Environmental Cell headed by a General Manager at Borachak House. The cell provides necessary support that is required for Environmental Management of the project under the jurisdiction of the company.

The environmental management includes the following -

- Generation of environmental data bank.
- Evolving micro environmental management plan for the project in collaboration with other agencies and consultants.
- Monitoring project implementation along with environmental control measures.
- Co-ordinate with other project activities to ensure timely implementation of the schemes.
- Co-ordination with Ministry of Environment & Forest, Central /State Pollution Control Board for prevention and control of pollution.
- Obtaining work permit from the state government.
- Submission of 6-monthly compliance reports to Ministry of Environment & Forest
- Carrying out Environmental Audit and submission of Environmental Statements

The scope of environmental management includes plantation, health inspection, surface drainage, air, water and noise pollution check etc.

An organisation chart for environmental management has been prepared and is given in the following figure:



### 8.3 Environmental Monitoring & Control

#### 8.3.1 Routine Monitoring of Environmental Attributes

Monitoring of environmental attributes is imperative for an effective environmental management of the project. It is proposed to carry out routine environmental monitoring by setting up sampling stations for air, noise and water. The routine monitoring will be carried out as per the following guidelines –

SI No	Environmental attribute to be monitored	No. of sampling stations	Type of monitoring	Frequency of monitoring	Follow-up Action
1	Ambient Air & Noise	30 stations for sand stations + 5 stations for sand depot = 35 stations	24 hrly sampling for PM10, PM2.5, SO <sub>2</sub> , NO <sub>x</sub> , CO & heavy metals dBA (Leq)	2 consecutive days in each quarter year. Heavy metals once every year. Once during daytime at each station in each quarter	In case the concentrations are observed to be higher than the standards for RCF on both days, fortnightly monitoring will be carried out until corrective measures take effect.
2	Damodar River water	15 samples	All parameters as per IS 2296 Inland Surface Water Body(1982) Class 'C' Standards	Once in each quarter year	Efforts will be made to identify the source of pollutant will be made and corrective action with the help of experts in the field will be taken if any of the parameters is found exceeding the standards & report submitted to WBPCB
3	Replenishment Study	15 Stations	R. L. of Riverbed	Once in every five years	Reduction in sand extraction if negative trend is noted

- Apart from above, sand replenishment studies will be conducted periodically to assess the annual replenishment rate of sand in the riverbed to prevent over – exploitation (please refer Chapters – 2 & 3).

### **8.3.2 Plantation Programme**

No plantations will be raised on the Damodar riverbed. However, mines are carrying out plantations on reclaimed land and other earmarked locations within their leaseholds as per programme suggested in their approved EIA & EMPs. These plantations are continuously monitored till trees attain desired growth.

### **6.3.3 Health Monitoring**

A regular schedule will be programmed for monitoring health of the workers and staff associated with the sand mining operations and other connected activities for identifying occupational diseases etc. in time and initiating remedial measures. Each mine has a well-equipped dispensary along with Regional Hospitals for the treatment of the mine personnel. These facilities are being extended to the contractual personnel also as well as to the local population. Mobile dispensaries are used to monitor the health of the population around the area and regular health camps are being held.

### **8.3.4 Additional Studies**

Additional studies, if required, from time to time shall be carried out and suggestions, if any, made in these studies shall be implemented at cost to the Project.

## **8.4 Corporate Social Responsibility**

As part of its Corporate Social Responsibility (CSR) efforts, Coal India Limited and its subsidiary companies regularly undertake various community development activities in and around the coalfield areas for the benefit of the local people.

Works done under Community Development Programme are normally as under:-

- ✓ Installation/Repairing of Hand Pumps.
- ✓ Digging/renovation of Wells/Ponds/Dam etc.
- ✓ Water Supply through pipelines.
- ✓ Construction/Renovation and repair of Community Centre/building.
- ✓ Construction/repair of Roads/Culverts.
- ✓ Construction/repair of school building.
- ✓ Organising Medical Camps.
- ✓ Organising Sports and cultural activities.
- ✓ Misc works.

**Major CSR activities undertaken by ECL during 2012-13:**

## a) Baseline Survey / Need Assessment:

In terms DPE Guidelines and CIL CSR Policy Baseline Survey / Need Assessment Study (NAS) for Rajmahal, Sonepur Bazari and Pandaveswar has been conducted by engaging National Corporate Social Responsibility Hub (NCSR HUB) – Tata Institute of Social Science (TISS).

In the First Phase, Baseline Survey/Need Assessment Survey has been conducted in 14 villages of Rajmahal Area of Jharkhand and the final report has been submitted, which is under examination. In the second phase Baseline Survey/Need Assessment Survey has been conducted by NCSR Hub in the Sonepur Bazari and Pandaveswar of West Bengal, which has been completed and report has been submitted.

## b) Women Empowerment at Bankola Area:

Another step to strengthen the women belonging to the weaker section of the society in the area of sustainable development and women empowerment is being undertaken by providing training in Tailoring, and other Village Industries product like Candle Making, Food Processing, Silk Screen Painting, Phenyle and Liquid Soap Making to the 100 women of nearby villages of Bankola Area. An amount of ` 9.89 lakhs has been approved for this project run by an NGO Durgapur Creative Welfare Society in the name of “SWABHIMAAN” under the supervision of WIPS and AIWC of ECL.

## c) Summer Camp at Bidhan Chandra Pratibandhi Karma Kendra, Khandra:

A Camp was organized for the distribution of aids and appliances for the physically challenged persons of Bidhan Chandra Pratibandhi Karma Kendra, Khandra is an sheer example of sharing value in the society by AIWC. It also distribute items of regular use among the Old Aged persons of Prantik Old Age Home Burnpur for the upliftment of downtrodden and weaker section of the society.

## d) Imparting free Computer Education Training at DAV School, Pandaveswar:

A school for imparting training on Computer skill has been opened for children belonging to the poor and weaker section of the society at Pandaveswar Area which is facilitating habitants of the nearby villages and surrounding areas where there is no facilities for conducting Computer training.

## e) MOU Activities for 2012-13:

Sl No.	Performance Indicator	Measurement Unit	Target for the year	Achievements	Date of Reporting of Details to TISS Database	Date of Acceptance Conveyed to TISS
1	Providing Drinking Water by 60 nos. of Hand Pumps in nearby villages (Rajmahal Area)	Rs. Lakh	45	Completed in March – 2013	18.01.2013	21.01.2013
2	Lighting by Solar Lights in	Rs. Lakh	20	Completed in March – 2013	18.01.2013	21.01.2013

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
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	the villages nearby (Rajmahal Area).					
3	Construction of PCC Road from Nemapanchayat Bhawan to Telegama Village via Joharsthan with culverts.	Month of Completion	Jan'13	Completed in March – 2013	18.01.2013	21.01.2013
4	Providing well equipped Mobile Medical Van (1 No.)	Month of Completion	Dec'12	Completed in March – 2013	18.01.2013	21.01.2013
5	Construction of 2 nos. room at Pandaveswar Community Centre.	Month of Completion	Jan'13	Completed in August – 2012	18.01.2013	21.01.2013

#### HIGHLIGHTS OF WELFARE ACTIVITIES:

- > Since the year 2010-11, a programme of Block Repairing started. In the year 2010-11, against the target of 3869 quarters 3716 quarters completed. In the year 2011-12, against the target of 4647 quarters, 4427 Quarters completed. In the year 2012-13, against the target of 4500 quarters, 4136 quarters completed.
- > For improvement of Water- supply and portability of water 23 different schemes have been undertaken in different Areas of ECL covering total population of 5, 33,587.
- > A new 10 bedded hospital at Jhanjra has been constructed and commissioned with the facilities of indoor treatment. The hospital was inaugurated by Sri Rakesh Sinha, CMD ECL on 22nd March 2013.
- > A proposal for opening of DAV School at JHANJHRA Area with CBSE Syllabus has been approved. Action to start the college is being taken up.
- > In addition to 2 number of school bus, one more bus has been sanctioned for SP Mines in 2012-13.
- > 03 class room and toilets with a cost of Rs.20.44 lakhs has been sanctioned for DAV School, SP Mines.
- > 1048 cases have been referred to reputed hospital for advanced treatment of patients as per the policy.
- > PME has been done for 14988 employees against target of 14876 during the year 2012.
- > A proposal for renovation & repair of Sanctoria Hospital for Rs. 49, 64,276.56 was approved, which is under process.
- > Services of Specialists have been rationalized. Specialists from Sanctoria & CH Kalla are visiting Mugma Regional Hospital and Bansra Regional Hospital.

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

- > Total of 674 no of health camps on immunization, school health, blood donation, HIV/AIDS awareness, thyroid awareness, eye camp, family welfare were undertaken during the year 2012-13 covering 36032 beneficiaries.
- > Intercompany CARROM TOURNAMENT 2012-13 was organized by ECL from 21st of April to 23rd of April at Mines Rescue Station.
- > Inter- Area Games and Sports have been organized as per Sports Calendar and Rs.19.19 lakh have been spent.
- > ECL cricket team won the championship trophy of CIL Inter Company Tournament 2012-13.
- > ECL Football Team declared joint winner of CIL Inter Company Football Tournament 2012-13.
- > ECL Cultural Team declared champion in CIL Inter Company Cultural Tournament 2012-13.

### Major welfare activities

#### Block Repairing of Quarters

- > Considering the condition of the houses/quarters which are very old in nature, from last year the concept of block repairing was introduced whose status given below:

Year	No.of Units	Amount Spent (Rs.in Lakhs)
2010-2011	3640	732.63
2011-2012	4344	861.42

#### Water Supply Schemes

- > No. of Water Supply Schemes have been approved during 2011-12 status of which is appended below:

Year	No of projects approved	No.of Projects completed	Amount Spent (Rs.in Lakhs)
2011-2012	76	41	178.18

#### HEALTH CARE:

- > **The health care system includes preventive and curative aspects. It has:-**
  - \* Two Central Hospitals
  - \* 10 Peripheral Hospital
  - \* Dispensaries in all administrative Areas of ECL to cater treatment at each unit.

**Up gradation of central hospital with addition of following equipment –**

- \* Fully automated Bio chemistry analyzer.
- \* Electrolyte Analyzer.
- \* C.Arm with OT table.
- \* Dialysis machine.
- \* Telemedicine.
- \* 2 body AC mortuary.
- \* Laparoscopic surgery equipment.
- \* Multi Para monitors.
- \* Ventilators.
- \* Nails & plates for orthopedic surgery.
- \* Ultrasound.

**Major CSR Activities**

> **A total amount of Rs. 13.14 crore has been utilized to carry out different CSR activities during 2011-12 in ECL.**

> **Major activities undertaken under CSR during 11-12 in ECL:**

- \* An amount of Rs. 111.72 lakhs has been sanctioned for upgradation of Netaji Eye Hospital. In first phase, an amount of Rs. 25.35 lakhs has been provided for procuring medical equipment and Rs. 20.50 lakhs for civil works.
- \* In second phase an amount of Rs. 37.75 lakhs will be given for medical equipment and Rs. 28.11 lakh for completing the civil construction works.

> **Assistance of Bidhan Chandra Pratibandhi Karma Kendra, Khandra:**

- \* An amount of Rs. 3.78 lakhs sanctioned for Bidhan Chandra Pratibandhi Karma Kendra to provide Artificial limbs/Prosthesis Arm Crutches, tri-cycles, wheel chairs, Prosthesis spectacles and hearing aids etc. to the physically challenged children of the said school.

**Supply of Drinking Water**

- > Villages around Rajmahal Area have been provided with 50 nos. of deep tube wells and 45 nos. of water tankers were deployed to meet the acute water scarcity in the area.
- > 38 nos. of hand pumps have also been installed/ repaired in the said area. Action has already been taken for sinking another 9 nos. of deep tube wells for supply of water to the villagers.
- > Laying of pipelines, digging of ponds, sinking of wells and bore-holes, installation of hand pumps have also been undertaken in other Areas of ECL under CSR programme. A sum of Rs. 447.12 lakhs have been spent under this head.

### **Infrastructure Development 2011-12**

- > Construction and repair of PCC & Concrete roads, drains, culverts and construction of urinals
- > Construction and repair of community centers, boundary walls etc.
- > Construction of burning ghats
- > Construction of children parks
- > Facilitating electrification of villages
- > 68 nos. of solar lights have already been installed in villages around Rajmahal command area of ECL.

**A sum of Rs. 175.30 lakhs has been incurred on infrastructural development.**

- > In ECL, Corporate Medical Department is contributing substantially in promoting and maintaining harmonious relationship amongst the employees and their family through rendering specialised services besides their day to day job to the people.

#### **Mobile Medical Vans:**

- |   |           |
|---|-----------|
| > Total no. of Mobile Medical Vans  | - 4 nos.  |
| > Total no. of Camps organised through Mobile Medical Vans during 2011-12 | - 51 nos. |
| > Total no. of beneficiaries Health Camps during 2011-12                  | - 2599    |
| > Total no. of health camps   | - 674     |
| > Total no. of beneficiaries  | - 36032   |

### **8.5 Corporate Policy for Environmental Management**

Coal India Ltd. has come out with its corporate policy for environmental management in the current year which will be strictly adhered to.

#### **Policy Statement:**

Coal India Ltd affirms its commitment for environment friendly mining with right mitigation of pollution, reclamation of the degraded land, preservation of biodiversity and proper disposal of waste following the best environmental practices including judicious use of the non-renewable energy on the path of continual improvement.

**Objectives:**

Coal India Ltd shall endeavor to:

1. Conduct mining and associated operation in an environmentally responsible manner to comply with applicable laws and other requirements related to environmental aspects. Design projects with due consideration of sustainable development.
2. Prevent pollution of surrounding habitation by continuous monitoring and adopting suitable measures for environment protection.
3. Ensure compliance of all applicable EC conditions, FC conditions and other statutory conditions issued by regulatory agencies.
4. Implement EMP in all our mines effectively to mitigate pollutions on air, water and noise, reclamation of degraded land and proper disposal of wastes.
5. Strive to conserve Bio-Diversity.
6. Conserve natural resources through recycling of waste on the principle of REDUCE, RECYCLE and REUSE. Put special thrust on efficient energy utilization as a measure to reduce carbon foot-print.
7. Strive for continual improvement in environmental performance by setting targets, measuring progress and taking corrective action.
8. Create environmental awareness among employees and local communities through pro-active communication and training.

**8.6 Cost of Environmental Management**

The annual recurring cost of environment management is tabulated below –

Sl. No.	Particulars of Revenue Expenditure	Total Annual Cost (Rs in Lakhs)	Unit Cost (Rs/m <sup>3</sup> )
1	Pollution control	45.00	3.00
2	Environmental monitoring	30.00	2.00
3	Occupational health	30.00	2.00
4	Avenue plantation along sand transport route	6.00	0.40
5	Community development	30.00	2.00
	Total	171.00	9.40

## Chapter – 9

### Summary & Conclusion

#### 9.1 Purpose of the Report

Sand stowing is essential for safety of the mines as well as for conservation of coal. Depillaring needs to be undertaken with stowing to recover about 80% of coal blocked in pillars and it is imperative to maintain continued supply of sand in adequate quantity for ensuring safety and productivity of the underground mines.

About 3.5 million cubic meters per annum of sand is required for stowing purpose in the mines of ECL falling in Raniganj Coalfield. To meet this requirement, sand is obtained from Ajoy and Damodar rivers flowing on the northern and southern flanks of Raniganj Coalfield, respectively. Sand from these two rivers is being extracted by ECL for the last 40 years on the basis of temporary leases / permits obtained from the Govt. of West Bengal.

Presently, there are 15 sand mining stations / sites in the riverbed of Damodar spread over 42 kms of its course through the Raniganj Coalfield. The total area of these stations is 213.86 Acre (86.58 Ha) which is only a very small fraction of the total riverbed area of Damodar falling along the Raniganj Coalfield. Since all the 15 stations are in the same riverbed of Damodar River, it was felt that a composite application for sand mining in the Damodar Riverbed be made covering all the 15 stations rather than making piecemeal applications.

An EIA & EMP document has been prepared for obtaining Environmental Clearance for extraction of riverbed sand from Damodar River. TOR was obtained from MoEF vide letter no. J – 11015 / 268 / 2012 – IA. II (M) dated 29 – 01 – 2014 on the basis of composite plan covering all the 15 stations.

This report covers the environmental impacts and suggests remedial measures for extracting 1.5 million cubic meters per year (peak extraction) of sand from the 15 stations, with total leasehold area of 86.58 Ha in the riverbed of Damodar River.

**9.2 Lease Details**

ECL is in possession of lease from the West Bengal Govt. for sand extraction from the following stations in Damodar Riverbed –

**Stations in Damodar Riverbed where sand is being extracted for stowing purpose**

Station No.	P.S.	J.L. No.	Mouza	Gram Panchayat	Patch No.	Plot No.	Area (Acre)	Maximum extraction per year (M Cum)	Method of mining
1	Mejia	8	Gopalpur	Ardhagram	1	1094	6.00	0.030	Manual
2	Mejia	7	Ardhagram	Ardhagram	1	1324, 1325	46.00	0.360	Diesel Operated Dredger
3	Mejia	36	Gopalganj	Ardhagram	1	657	6.00	0.030	Manual
4	Saltora	42	Majit	Durlavpur	1	1731, 1736	10.00	0.050	Manual
5	Saltora	45	Sahebdanga	Durlavpur	1	1	25.00	0.150	Manual
6	Mejia	1	Bhara	Ardhagram	1	1819, 1824	6.00	0.120	Pontoon
					2	1629	4.00		
					3	1814	2.00		
					4	1	4.00		
7	Mejia	35	Anandpur	Durlavpur	1	1	4.50	0.020	Manual
8	Andal	51	Ramprasadpur	Ramprasadpur	1	1983, 665, 667 – 681, 683 – 685, 687 – 698, 804 - 819	13.20	0.050	Diesel Operated Dredger
9	Andal	50	Baska	Madanpur	1	1071, 1073, 1075, 1076, 1217, 1218, 1220 -1223, 1205, 1234,		0.050	Electrically operated Scraper
10	Andal	48	Madanpur	Madanpur	1	3, 1215 - 1222, 2330, 2335, 2337 – 2339, 2454, 2520, 2547, 2578, 2579, 2444	33.66	0.150	Diesel Operated Dredger
11	Raniganj	31	Napur	Raniganj	1	1891, 2391, 2394 – 2396		0.060	-do-
12	Raniganj	12	Narayankuri	Raniganj	1	217, 231 - 233		0.060	-do-
13	Kulti	40	Sitalpur	Kulti Municipality	1	1620	24.50	0.180	Manual
					2	637	5.75		
14	Kulti	60	Chinakuri	Kulti Municipality	1	278	6.75	0.040	Pontoon & Manual
15	Neturia	95	Parebelia	Bhamuria	1	1, 901, 3567	16.50	0.100	Manual
Total							213.86	1.450	
							i.e 86.58 Ha	Peak : 1.5	

Source: J K Ropeways, ECL

### 9.3 Method of Sand Mining

The methodology of extraction of riverbed sand is as follows –

- The sand collection is restricted to 1.5 m to 2.0 m (average depth of about 1.7 m considering the total leasehold of 86.58 Ha) keeping maximum extraction depth of 1.5 m in case of manual extraction and maximum depth of 2 m in case of mechanized extraction. Details of machinery employed for mechanized extraction of sand is given in Chapter – 7.
- Sand extraction is confined to lean season (non – monsoon period) only. The removal is done without affecting the base flow of the river and in such manner as to maintain the smooth flow of the river during the monsoons. This helps in protection of the banks from erosion.
- The sand is mined from surface of river-bed manually at some stations and at others with the help of dredgers, scrapers and pontoons. Sand is extracted manually at 7 stations. Diesel operated dredgers have been deployed at 5 stations, electrically operated scrapers at 1 station and pontoons at 2 stations.
- There is no drilling and blasting involved.
- There is no rehabilitation & resettlement involved.
- There is no dust generation and liquid effluent generation during collection of sand.
- The transport of sand from the sand ghat is done through tippers covered with tarpaulin / thick plastic sheets.
- All necessary facilities like shelter, drinking water, safety equipment, etc are provided to the workers deployed for the collection of sand from the river bed.



Images showing sand extraction by manual means

#### 9.4 Sand Extraction from the riverbed of Damodar River since 1990-1991

The year-wise sand extraction from the Damodar Riverbed since year 1990-1991 has been tabulated below.

Year	Quantity Extracted (Million m <sup>3</sup> )	Year	Quantity Extracted (Million m <sup>3</sup> )
1990 – 91	1.26	2003 – 04	0.94
1991 – 92	1.23	2004 – 05	0.89
1992 – 93	1.18	2005 – 06	0.97
1993 – 94	0.95	2006 – 07	0.90
1994 – 95	0.95	2007 – 08	0.78
1995 – 96	0.97	2008 – 09	0.82
1996 – 97	0.93	2009 – 10	0.75
1997 – 98	0.92	2010 – 11	0.72
1998 – 99	0.93	2011 – 12	0.60
1999 – 00	0.84	2012 – 13	0.74
2000 – 01	0.98	2013 – 14	0.93
2001 – 02	1.01	2014 - 15	0.85
2002 – 03	1.19	2015 – 16 (till June)	0.14

Source: ECL

It can be seen from the above table that the highest extraction of 1.26 Million m<sup>3</sup> was made during the year 1990 – 91. This level of extraction has not been exceeded post – 94.

#### 9.5 A Short Note on Damodar River

The Damodar River is one of the most important rivers in Jharkhand and West Bengal. The river has its source in Chotanagpur hills about 609 feet above sea-level close to the Chandwa village in Palamau district of Jharkhand in India. Flowing south easterly for

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

about 240 kms through Jharkhand, it meets the Barakar River which forms the boundary between Jharkhand and West Bengal. Thereafter, Damodar flows through the southern edge of Raniganj Coalfield. The Raniganj coalfield extends up to 42 kms with most of the mines on the northern bank. Below Raniganj, the Damodar flows through deltaic plains, takes an abrupt turn in the vicinity of Burdwan and flows south. The total length of the river is nearly 547 km and a total drainage basin area is 23683.43 sq. km. After a run of about 240 km in Jharkhand and remaining 207 kms in West Bengal, the river falls into the Hooghly.

The entire Damodar valley can be divided into the upper, middle and lower valleys according to the gradient. The upper valley with a length of 240 kms lies between 600 m and 190 m above MSL. Here the river has a gradient of 1.89 m per km. The Barakar River meets Damodar at this point. The middle valley stretches here onwards for a length of 160 km and lies between 190 m and 90 m above MSL with a gradient of 0.57 m per km. The river begins its course through Raniganj Coalfield from the beginning of the point of confluence with Barakar. The entire riverbed in this region is covered with fine sand due to high rate of siltation (refer Sec 3.2). In the next phase of 145 km of the lower valley, till its confluence with Hooghly, the gradient of the riverbed is 0.19 m per km.

As part of the strategy for flood control, DVC has carried out construction of dams on the Damodar River and its main tributary, Barakar River, along with hydroelectric power plants.

## 9.6 Replenishment Study

River bed RL at selected points in the dry portions of Damodar Riverbed was measured during pre – monsoon period and again during post – monsoon period in order to assess the annual quantum of sand deposition as shown in table below –

Location	Pre – monsoon RL (m)	Post – monsoon RL (m)	Difference (m)
1	76.15	77.78	1.63
2	75.91	77.85	1.94
3	75.87	77.70	1.83
4	75.38	77.89	2.51

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5	76.36	77.87	1.51
6	76.18	77.88	1.7
7	75.59	77.76	2.17
8	76.61	77.79	1.18
9	76.26	77.81	1.55
10	75.27	77.75	2.48
11	76.20	77.79	1.59
12	75.43	77.87	2.44
13	75.80	77.79	1.99
14	75.69	77.77	2.08
Average variation			(+) 1.90 m

It can be observed that there is an average increase in riverbed RL by 1.9 m due to deposition of sand during the monsoon flow of the river.

Thus total replenished quantity of sand available each year within the leasehold of ECL for mining purpose = 865800 m<sup>2</sup> x 1.9 m = 1.65 million m<sup>3</sup>

Out of the above annual replenishment, it is proposed to mine only 1.5 million m<sup>3</sup> up to a maximum depth of 2 m (average depth 1.7 m). Thus, there will be no long – term impact on the riverbed which will have surplus sand left after extraction of the proposed amount each year since ECL will be extracting less than the annual replenished quantity of sand (please also refer section 2.4, Chapter – 2).

### 9.7 Impact of Sand Mining on Ambient Air Quality

Sand is generally composed of coarse and heavy particles and dust generated at extraction point at sand stations in the riverbed settles down within a short distance. Out of 8 stations where sand is extracted by mechanical means, only 1 station has electrical operated scrapper which is the main source of air pollution from sand mining activities. Since, level of operation is very minimal (0.05 Mm<sup>3</sup> per year), the contribution of pollutants is negligible. Dust pollution mainly occurs due to transportation of sand to sand depots / stowing bunkers at mines by trucks owing to poor road conditions and vehicular exhausts. These exhausts contain CO, SO<sub>x</sub>, NO<sub>x</sub> and small quantities of un-burnt fuel apart from some heavy metals like lead, nickel and arsenic.

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EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Concentration levels of PM<sub>10</sub> at different receptors have been calculated using FDM90121 air quality impact prediction model and the findings have been given in the table below:

**CMPDI**

EIA & EMP for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/ year)

Sl. No.	Location Name	Location Code	Remarks	Existing PM10 Concentrations (98th Percentile) (µg/m <sup>3</sup> )	Scenario		
					Increase in PM <sub>10</sub> conc. due to various activities (µg/m <sup>3</sup> )	Resultant PM <sub>10</sub> conc. (µg/m <sup>3</sup> )	NAAQS, 2009 Limit (µg/m <sup>3</sup> )
Locations situated on the river bank							
1	Parbelia	A1	UG mine near the river	66	0.000	66.00	100
2	Sodepur	A2	Habitation near the river	73	0.136	73.14	
3	Chinakuri – I	A3	UG mine near the river	75	0.000	75.00	
4	Chinakuri – III	A4	-do-	73	0.000	73.00	
5	Amritnagar	A5	-do-	73	0.000	73.00	
6	Tirat	A6	-do-	71	0.000	71.00	
7	Kuardih	A7	-do-	73	0.000	73.00	
8	Nimcha	A8	-do-	71	0.040	71.04	
9	Mahabir	A9	-do-	66	0.007	66.01	
10	Bakulia	A10	Habitation near the river	69	0.000	69.00	
Locations situated near the river bank							
11	Dubeswari	A11	Habitation near the river	65	0.000	65.00	100
12	Bejdih	A12	-do-	55	0.000	55.00	
13	Hirakhun	A13	-do-	43	0.000	43.00	
14	Patmohana	A14	-do-	71	0.000	71.00	
15	Ratibati	A15	UG mine near the river	63	0.002	63.01	
16	Chalbalpur	A16	-do-	67	0.005	67.01	
17	J K Nagar	A17	-do-	44.6	0.005	44.65	
18	Jemehari	A18	-do-	44.2	0.001	44.21	
19	Lachhipur	A19	-do-	118.0	0.344	118.34	
20	Central Kajora	A20	-do-	122.5	0.207	122.71	
21	Madhujore	A21	-do-	118.5	0.138	118.64	
22	Ghansyampur	A22	-do-	94.0	0.013	94.01	

It can be observed from the above table that concentration level of PM<sub>10</sub> is well within the standards stipulated in NAAQS, 2009. Baseline concentration levels of PM<sub>10</sub> at three stations viz., Sl. No. 19, 20 & 21 is more than the NAAQS limit due to proximity to other sources of pollution and the sand mining activities have not contributed to the pollution level.

### 9.7.1 Air Pollution Control Measures

Air pollution due to sand transportation can be controlled to a great extent by regular sprinkling on roads by mobile water sprinklers. Dumpers employed for sand transportation require good maintenance. Several such provisions have been made in the report to contain the air pollution within the stipulated standards.

#### ✿ For Road Transport of Sand

The following measures will be taken:

- The metalled roads shall be kept free of potholes, etc.
- Regular maintenance of trucks to limit emission of harmful exhaust fumes.
- Physical removal of dust from the roads.
- Avenue plantation along roads (where feasible) will be 15 m wide and raised in three tier fashion.
- Transportation of sand from sand stations to sand depot and to the mines by covered trucks.
- Regular sprinkling of water on sand transport roads.



Images showing transport of sand from riverbed by covered trucks

## 9.8 Impact on Aquatic Flora & Fauna

The river Damodar is rain-fed and therefore seasonal. Though there is appreciable flow of water in the river during the monsoons, the rest of the year the flow of water in the river is very less and limited to only a few thin streams in the riverbed. The extraction of sand is carried out only during the lean season when the riverbed is easily accessible. Not much aquatic life is present during the lean periods and mining is carried out leaving sufficient distances from the flowing water. Also, since the method of extraction does not involve drilling and blasting, there is no impact of sand mining on the aquatic life present in the stream.

## 9.9 Impacts on Water quality

### Impact on River water

There will be impact of the project activities on the water quality of the river due to mechanical extraction of sand as well as entry of trucks into the riverbed. The main source of water pollution is diesel / hydraulic fluids which are used for operating the dredgers, scrapers etc. Utmost caution will be taken to prevent any spillage of these fluids. The entry of trucks into the riverbed may also lead to inadvertent spillage of diesel / hydraulic fluids from these trucks. These oils having been absorbed by the sand may find its way into the water course if allowed to remain there. In such cases, the sand within the area of the river bed on which the spillage occurs will be scraped out completely and transported outside along with the mined sand such no trace of the oils remain in the riverbed.

Routine monitoring of river water will be carried out to study impact of these activities and proper mitigative measures will be taken to prevent any harmful impact.

### **River water pollution control measures**

- Utmost caution will be taken to prevent spillage of diesel and other fluids.
- Regular maintenance of trucks and other vehicles to minimize leakage of fluids.
- Routine monitoring of river water samples to know the quality of water.

### Impact on Ground water

No impact of sand mining is envisaged on adjoining ground water quality.

### **9.10 Impact on Water table / Hydrogeology**

Sand will be extracted upto an average depth of 1.7 m as mentioned in Chapter – 2. So, the sand extraction activities will not intersect the water table. Hence, there will be no impact on the water table.

### **9.11 Impact on land**

There is no other land use within the riverbed and sand extraction will not change the land use of the area. The shallow voids left in the riverbed after extraction of sand get completely filled up with sand during the monsoons.

### **9.12 Impact on soil**

The riverbed is fully sand and no soil removal is involved during the sand extraction.

### **9.13 Impact on Hydrology**

Two seasonal streams, Nunia Khal and Harial Jore, meets Damodar River in the downstream. These seasonal streams will remain unaffected due to sand extraction. Rain water channels entering Damodar river will also remain unaffected due to sand extraction from the riverbed. There is no proposal of diversion / modification of any stream or nallah on either side of the river and hence there will be no impact on the hydrology of the area.

### **9.14 Benefits arising out of Sand Extraction**

#### Flood Control

Removal of sand from the riverbed is beneficial from the point of view of flood control.

#### Employment Potential

Also, since most of the work of sand extraction (except supervision and controls) is outsourced, the various activities provide employment to a very large workforce of nearly 6000 local persons round the year except during monsoons when sand mining is suspended.

### 9.15 Environment Management

The environmental management includes the following -

- Generation of environmental data bank.
- Evolving micro environmental management plan for the project in collaboration with other agencies and consultants.
- Monitoring project implementation along with environmental control measures.
- Co-ordinate with other project activities to ensure timely implementation of the schemes.
- Co-ordination with Ministry of Environment & Forest, Central /State Pollution Control Board for prevention and control of pollution.
- Obtaining work permit from the state government.
- Submission of 6-monthly compliance reports to Ministry of Environment & Forest
- Carrying out Environmental Audit and submission of Environmental Statements

The scope of environmental management also includes plantation works, health inspections, surface drainage, air, water and noise pollution checks etc.

Monitoring programme for environmental parameters is given as under -

SI No	Environmental attribute to be monitored	No. of sampling stations	Type of monitoring	Frequency of monitoring	Follow-up Action
1	Ambient Air & Noise	30 stations for sand stations + 5 stations for sand depot = 35 stations	24 hrly sampling for PM10, PM2.5, SO2, NOX, CO & heavy metals dBA (Leq)	2 consecutive days in each quarter year. Heavy metals once every year. Once during daytime at each station in each quarter	In case the concentrations are observed to be higher than the standards for RCF on both days, fortnightly monitoring will be carried out until corrective measures take effect.
2	Damodar River water	15 samples	All parameters as per IS 2296 Inland Surface Water Body(1982) Class 'C' Standards	Once in each quarter year	Efforts will be made to identify the source of pollutant will be made and corrective action with the help of experts in the field will be taken if any of the parameters is found exceeding the standards & report submitted to WBPCB
3	Replenishment Study	15 Stations	R. L. of Riverbed	Once in every five years	Reduction in sand extraction if negative trend is noted

### 9.16 Additional Studies

Additional studies, if required, from time to time shall be carried out and suggestions, if any, made in these studies shall be implemented at cost to the Project.

### 9.17 Corporate Social Responsibility

As part of its Corporate Social Responsibility (CSR) efforts, Coal India Limited and its subsidiary companies regularly undertake various community development activities in and around the coalfield areas for the benefit of the local people.

Works done under Community Development Programme are normally as under:-

- ✓ Installation/Repairing of Hand Pumps.
- ✓ Digging/renovation of Wells/Ponds/Dam etc.
- ✓ Water Supply through pipelines.
- ✓ Construction/Renovation and repair of Community Centre/building.
- ✓ Construction/repair of Roads/Culverts.
- ✓ Construction/repair of school building.
- ✓ Organising Medical Camps.
- ✓ Organising Sports and cultural activities.
- ✓ Misc works.

### 9.18 Cost of Environmental Management

The annual recurring cost of environment management is tabulated below –

Sl. No.	Particulars of Revenue Expenditure	Total Annual Cost (Rs in Lakhs)	Unit Cost (Rs/m <sup>3</sup> )
1	Pollution control	45.00	3.00
2	Environmental monitoring	30.00	2.00
3	Occupational health	30.00	2.00
4	Avenue plantation along sand transport route	6.00	0.40
5	Community development	30.00	2.00
	Total	171.00	9.40

### **9.19 Public Consultation:-**

The Sand Mining Stations in Damodar Riverbed fall in 3 districts of West Bengal, namely, Burdwan on the northern bank and Purulia & Bankura on the southern bank. Separate public hearings on separate dates were held in all the three districts as per the EIA Notification, 2006 covering the sand mining stations falling in them respectively. Several residents from nearby villages participated in the hearing.

Several types of questions were asked and demands relating to drinking water, plantation, repairing of roads, health facilities, etc and several suggestions were made by the citizens. The villagers suggested allocation of more funds under CSR and to carry out more developmental works. It was advised to carry out extraction of sand with due regard to quantity of sand replenished each year, biodiversity of the surrounding area and erosion of the river banks. On behalf of the Project Proponent, General Managers of Satgram, Kunustoria & Sodepur Areas of M/s. Eastern Coal Field Ltd answered to the queries of the public and panel.

All the environmental issues raised by the public have been addressed in the EIA & EMP Also, expert studies with respect to Ecology and Biodiversity, Soil Conservation and Socio-economics are underway, and suggestions, if any, made in these studies shall be implemented at cost to the Project. It was emphasized that all mitigation measures as suggested in the EIA & EMP with regard to abatement of pollution of air, water & noise would be taken. It was also stated that all CSR works will be undertaken in consultation with village representatives on priority. The people present expressed their support for Sand Mining with adequate pollution control measures in place so as to ensure sustainable development of the area.

## Chapter – 10

### Disclosure of Engaged Consultant

This Final EIA & EMP document for Composite Plan of Sand mining in the riverbed of Damodar River has been prepared at CMPDI, Regional Institute – I, Asansol as per the prescribed Terms of Reference issued by MoEF&CC vide letter no. 11015/268/2012-IA.II (M) dated 29.01.2014.

The information related to sand mining plots, annual extractions and mode of extraction along with documents pertaining to lease have been obtained from Mine Plan approved by the Board of Directors ECL.

The different EIA studies have been carried out by agencies as given in the following table –

Sl. No.	Nature of Study	Name of the Agency
1	Mine Plan	CMPDI, a subsidiary of Coal India Ltd., is a premier consultancy organization engaged in mineral exploration, land resource management through remote sensing survey, coal petrography, mine planning, coal preparation & utilization, design of coal handling plants, environmental management of coal projects etc. The environmental laboratory of CMPDI is recognised by NABL and accredited with ISO-9001 certification. CMPDI is accredited by QCI for preparation of EAI & EMPs for mining sector with inhouse Functional Area Experts in the areas of Air Pollution (AP), Air Quality (AQ), Water Pollution (WP), Noise & Vibration (NV), Solid & Hazardous Waste (SHW), Risk & Hazards (RH), Landuse (LU), Geology (Geo) and Hydrogeology (HG) and Empanelled Experts in the fields of Ecology & Biodiversity (EB), Soil Conservation (SC) and Socio-economics (SE). (Names of the Experts are given overleaf)
2	Land-use study	
3	One – season Baseline Data on Ambient Air Quality	Richardson & Cruddas (1972) Ltd : Established in 1858, R&C Ltd. has grown into an engineering establishment. Nationalized by Act of Parliament in the year 1972. Richardson & Cruddas (1972) Ltd. has grown into an Engineering Enterprises in fabrication of various process equipments meeting the needs of Power Sector, Steel Manufacturing Plants, Railways, Oil & Gas, Fertilizers, Sugar Industries, Atomic Energy, Space, Water & Sewage Treatment Plants etc. R&C has four manufacturing units, two located in Mumbai at Byculla and Mulund, one at Nagpur and one at Chennai. R&C's corporate office is located at Byculla, Mumbai and has liasoning offices in New Delhi and Kolkata.
4	One – season Baseline Data on Water Quality study	VRDS Consultants, Chennai with MOU with Chennai Testing Laboratory, Chennai accredited to NABL.
5	Flora & Fauna study	PDIL, Dhanbad, a premier design engineering and consultancy PSU organization having ISO 9001:2000 certification, committed towards technological excellence and self-reliance in the growth of the core sector.

**ECs & FAEs involved in preparation of the EIA & EMP**Names of EIA Coordinators:

1. Shri V K Pandey, Sr Manager (Env), CMPDI HQ, Ranchi
2. Shri Anand Shekhar, Sr Manager (E & M) / HOD (Env), CMPDI, RI – I, Asansol

Names of Functional Area Experts

SI No.	Functional Area	Name of FAE	Name of Associate FAE
1	Air Pollution (AP)	D P Singh, CM (Env), CMPDI HQ, Ranchi	Sandeep Sharma, Asst. Manager (Env), CMPDI, RI – I, Asansol
2	Noise & Vibration (NV)	Anand Shekhar, Sr Manager (E & M) / HOD (Env), CMPDI, RI – I, Asansol	-do-
3	Air Quality (AQ)	P C Jha, Sr Manager (Env), CMPDI HQ, Ranchi	A K Singh, Asst. Manager (Env), CMPDI, RI – I, Asansol
4	Water Pollution (WP)	Vinita Arora, Sr Manager (Env), CMPDI HQ, Ranchi	-do-
5	Solid & Hazardous Waste (SHW)	V K Pandey, Sr Manager (Env), CMPDI HQ, Ranchi	
6	Risk & Hazards (RH)	Amit Roy, Chief Manager (Min), CMPDI, RI – II, Dhanbad	
7	Landuse (LU)	B Hariharalal,	
8	Geology (Geo)	Dr. R P Singh, Deputy Manager (Geo), CMPDI HQ, Ranchi	
9	Hydrogeology (HG)	Shyamananda Panja, CM (Hydrogeology), CMPDI HQ, Ranchi	
10	Ecology & Biodiversity (EB)	Dr. Anshumali, Associate Professor, ISM, Dhanbad	
11	Soil Conservation (SC)	-do-	
12	Socio-economics (SE)	R M Bhute, Social Action for Rural Development (NGO), Ramgarh, Ranchi	

**Proforma (Questionnaire)  
for Composite Plan  
of  
Sand Mining in the Riverbed  
of  
Damodar River**

**(PROFORMA FOR ENVIRONMENTAL APPRAISAL OF  
MINING PROJECTS  
(MINING SECTOR PROJECTS))**

## PROFORMA FOR ENVIRONMENTAL APPRAISAL OF SAND MINING PROJECTS (COAL MINING SECTOR PROJECTS)

- Note 1 : All information to be given in the form of Annex/s should be properly numbered and form part of reply to this proforma.
- Note 2 : Please enter  in appropriate box where answer is Yes / No
- Note 3 : No abbreviation to be used - **Not available** or **Not applicable** should be clearly mentioned.
- Note 4 : **Core zone** is the mining lease area.  
**Buffer zone** in case of ML area up to 25 ha. is to be considered as **5 km** all around the periphery of the core zone and for ML area above 25 ha. an area **10 km** all around the periphery of the core zone.
- Note 5 : Adopt **Scoping process** in carrying out EIA study.
- Note 6 : Please indicate source of data.

### 1. General Information

- (a) Name of the project : Composite Plan for Sand Mining on Damodar River Bed for the purpose of stowing in underground mines of Eastern Coalfields Ltd. in Raniganj Coalfield. Mining of sand to be carried out in 213.86 Acre (86.58 Ha) spread over 15 locations (pl refer table below) along the river bed over a stretch of about 42 kms (Please refer Plate – I)
- (b) Name of the proponent : Shri R. R. Sharma
- Mailing Address : General Manager, J.K.Ropeway  
Eastern Coalfields Limited  
PO-Kajoragram, District-Burdwan, West Bengal  
PIN: 713380
- E-mail :  
Telephone : 0341-2379529
- Fax No. :0341-2379250
- (c) Objective of the project : Most of the Underground mines in ECL employ Bord & Pillar method of working, where, after initial development, the standing pillars have to be extracted. These pillars can be extracted either by caving and allowing the surface to subside or stowing the decoaled areas with sand in cases where various surface features like buildings, roads, railway line etc are to be protected from subsidence or ensuring safety of the mines and the workers against the water and fire risk in the overlying seams. Due to growth of population and various developmental works, considerable surface area is now covered with various surface features and land acquisition for caving is becoming difficult with time. In the given circumstances, most of the pillar extraction in ECL has to be undertaken with sand

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

stowing to ensure maximum recovery of coal blocked in pillars.

To meet this requirement, sand is obtained from Damodar River flowing in the southern edge of Raniganj Coalfield. Sand from this river is being extracted by ECL for the last 40 years on the basis of temporary leases/permits obtained from the Govt. of West Bengal.

There are in all 15 stations of sand mining in the Damodar River bed spread in stations over 42 kms of its course along the southern boundary of the Raniganj Coalfield. Since obtaining Environmental Clearance is now mandatory for Sand Mining to continue, a composite plan for extracting Sand from Damodar Riverbed has been prepared covering all the 15 Stations with combine mining leasehold area of 213.86 Acre (86.58 Ha).

(d) Location of Stations:

Mouza	Tehsil	District	State
Gopalpur, Ardhagram, Gopalganj, Majit, Sahebdanga, Bhara, Anandpur, Ramprasadpur, Baska, Madanpur, Nupur, Narayankuri, Sitalpur, Chinakuri, Parbelia	Kulti, Asansol, Raniganj, Andal, Durgapur, Kanksa	Burdwan, Purulia, Bankura	West Bengal

(e) Does the proposal relate to

(i) New mine	Yes	<input type="checkbox"/>	No	<input checked="" type="checkbox"/>
(ii) Expansion	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
• Increase in ML area	Yes	<input type="checkbox"/>	No	<input checked="" type="checkbox"/>
• Increase in annual production	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
(iii) Renewal of ML	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
(iv) Modernisation	Yes	<input type="checkbox"/>	No	<input checked="" type="checkbox"/>

(f) Site Information

(i) Geographical Location

- Latitude 041'30" N"/>
- Longitude 049'10" E"/>
- Survey of India Topo sheet number

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

- Elevation above Mean Sea Level

80 to 100 m

- Total mining lease area (in ha.)

86.58 Ha

(ii) Dominant nature of terrain

- |             |     |                                     |    |                          |
|-------------|-----|-------------------------------------|----|--------------------------|
| • Flat      | Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> |
| • Undulated | Yes | <input type="checkbox"/>            | No | <input type="checkbox"/> |
| • Hilly     | Yes | <input type="checkbox"/>            | No | <input type="checkbox"/> |

(Source: Composite plan for Sand mining in Riverbed of Ajay River and Final EIA & EMP Report)

## 2. Landuse

The landform is the riverbed of Damodar River along the Raniganj Coalfield and is the main course of the river. The river course is owned by the State of West Bengal and falls under the districts of Burdwan, Bankura & Purulia. The sand is mined on the basis of lease and temporary working permits renewed from time to time. There is no other land use within the river course.

The locations of the sand mining stations are shown on toposheet map and Google Earth map as Plates 2B & 2C.

## 3. Indicate the seismic zone in which ML area falls. In case of zone IV & V, details of earth quakes in last 10 years. Not Applicable

(a) Severity (Richter Scale)

(b) Impact i.e. Damage to

- |                 |     |                          |    |                                     |
|-----------------|-----|--------------------------|----|-------------------------------------|
| • Life          | Yes | <input type="checkbox"/> | No | <input checked="" type="checkbox"/> |
| • Property      | Yes | <input type="checkbox"/> | No | <input checked="" type="checkbox"/> |
| • Existing mine | Yes | <input type="checkbox"/> | No | <input checked="" type="checkbox"/> |

**4. Break-up of mining lease area (in ha.) as per approved conceptual plan:**

Purpose	Mining Lease Area				Total	Area acquired				Area to be acquired			
	Government		Private			Government		Private		Government		Private	
	Forest	Others	Agri.	Others		Forest	Others	Agri.	Others	Forest	Others	Agri.	Others
1. Area to be excavated		86.58			86.58								
2. Storage for top soil*													
3. Overburden / Dumps													
4. Mineral storage													
5. Infrastructure (Workshop, Administrative Building)													
6. Roads													
7. Railways													
8. Green Belt													
9. Garland drain													
10. Effluent treatment plant													
11. Coal handling plant / mineral separation plant													
12. Township area													
13. Other (Undisturbed)													
14. Rehabilitation Site													
TOTAL		86.58			86.58								

**Note: Total area in the riverbed from which sand will be extracted and for which Temporary working permits have been obtained from the State Government is 86.58 Ha, details of which are provided in the following table.**

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

**Stations in Damodar Riverbed where sand is being extracted for stowing purpose**

Station No.	P.S.	J.L. No.	Mouza	Gram Panchayat	Patch No.	Plot No.	Area (Acre)	Maximum extraction per year (M Cum)	Method of mining
1	Mejia	8	Gopalpur	Ardhagram	1	1094	6.00	0.030	Manual
2	Mejia	7	Ardhagram	Ardhagram	1	1324, 1325	46.00	0.360	Diesel Operated Dredger
3	Mejia	36	Gopalganj	Ardhagram	1	657	6.00	0.030	Manual
4	Saltora	42	Majit	Durlavpur	1	1731, 1736	10.00	0.050	Manual
5	Saltora	45	Sahebdanga	Durlavpur	1	1	25.00	0.150	Manual
6	Mejia	1	Bhara	Ardhagram	1	1819, 1824	6.00	0.120	Pontoon
					2	1629	4.00		
					3	1814	2.00		
					4	1	4.00		
7	Mejia	35	Anandpur	Durlavpur	1	1	4.50	0.020	Manual
8	Andal	51	Ramprasadpur	Ramprasadpur	1	1983, 665, 667 – 681, 683 – 685, 687 – 698, 804 - 819	13.20	0.050	Diesel Operated Dredger
9	Andal	50	Baska	Madanpur	1	1071, 1073, 1075, 1076, 1217, 1218, 1220 -1223, 1205, 1234,		0.050	Electrically operated Scraper
10	Andal	48	Madanpur	Madanpur	1	3, 1215 - 1222, 2330, 2335, 2337 – 2339, 2454, 2520, 2547, 2578, 2579, 2444	33.66	0.150	Diesel Operated Dredger
11	Raniganj	31	Napur	Raniganj	1	1891, 2391, 2394 – 2396		0.060	-do-
12	Raniganj	12	Narayankuri	Raniganj	1	217, 231 - 233		0.060	-do-
13	Kulti	40	Sitalpur	Kulti Municipality	1	1620	24.50	0.180	Manual
					2	637	5.75		
14	Kulti	60	Chinakuri	Kulti Municipality	1	278	6.75	0.040	Pontoon & Manual
15	Neturia	95	Parebelia	Bhamuria	1	1, 901, 3567	16.50	0.100	Manual
Total							213.86	1.450	
							i.e 86.58 Ha	Peak :	1.5

**5. Township (outside mining lease)**

(a) Total area (in ha)

X

(b) No. of dwelling units

X

(c) Distance from mine site

X

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

## 6. Distance of water bodies (in km)

Distance from	River Bank *	Other Water bodies * Sea / creek / lake / nalla etc. (Damra Nallah)
Mining lease boundary	Sand mining in the riverbed of Damodar River	
Ancillary facilities	-	-

## 7. For projects falling within the Coastal Regulation Zone (CRZ) NOT APPLICABLE

Whether the mineral to be mined is of rare nature and not available outside CRZ?

Yes  No

if yes, annex a scaled location map showing low tide line (LTL), high tide line (HTL) duly demarcated by one of the authorized agencies\* [ \*Director, Space Application Centre, Ahmedabad: Centre for Earth Sciences Studies, Thiruvananthapuram: Institute of Remote Sensing, Anna University, Chennai: Institute of Wetland Management & Ecological Designs, Kolkata: Naval Hydrographers's Office, Dehradun: National Institute of Oceanography, Panjim, Goa: and National Institute of Ocean Technology, Chennai], boundary of mining lease area, distance of ML area from LTL and HTL CRZ boundary and CRZ classification of the project area as per the approved Coastal Zone Management Plan, and settlements, sand dunes, mangroves, forest land/patches, turtles breeding and nesting sites etc., if any, in the project area.

## 8. Indicate aerial distance from the periphery of core zone / area from the periphery of the buffer zone to the boundary of following (up to 10 km):

S. No.	Areas	Name	Aerial distance from (in km.)	
			Core * Zone	Buffer* Zone
1.	National Park / Sanctuary	None	-	-
2.	Biosphere Reserve / Tiger Reserve / Elephant Reserve / any other Reserve	None	-	-
3.	Forest (RF / PF / unclassified)	None	-	-
4.	Habitat for migratory birds	None	-	-
5.	Corridor for animals of schedule I & II of the Wildlife (Protection) Act, 1972	None	-	-
6.	Archaeological sites * Notified	None	-	-

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

* Others				
7.	Defence Installation	None	-	-
8.	Industries / Thermal Power Plants			
9.	Other Mines	Working mines of ECL are present on both side of Damodar River	0 – 10 kms	
10.	Airport		-	-
11.	Railway Lines			
12.	National / State Highways			
13.	Others	-	-	

[\* Buffer zone in case of ML area up to 25 ha. is to be considered as **5 km** all around the periphery of the core zone and for ML area above 25 ha. an area **10 km** all around the periphery of the core zone].

### 9. Description of flora & fauna separately in the core and buffer zones.\*

[\* Consult the Wildlife (Protection) Act, 1972 as amended subsequently and list species with (1) Common name (2) Scientific name and (3) under which schedule of the Wildlife (Protection) Act the identified species fall. Get the list authenticated by an Expert in the field / credible scientific institute / University / Chief Wildlife Warden office. **Information to be based on field survey conducted by M/S PDIL, Sindri**]

#### LIST OF FLORA SURROUNDING THE CORE & BUFFER ZONE

FLORA	LOCAL NAME	BOTANICAL NAME
COMMERCIAL CROPS		
VEGETABLES	Baigan	<i>Solanum melongena</i>
	Tomato	<i>Lycopersicon esculentum</i>
	Bean	<i>Lablab purpureus</i>
	Jhinga	<i>Luffa acutangula</i>
	Parval	<i>Trichosanthes dioica</i>
	Kohra	<i>Benincasa hispida</i>
	Karela	<i>Momordica charantia</i>
	Kakri	<i>Momordica dioica</i>
	Kundri	<i>Coccinia grandis</i>
	Kaddu	<i>Cucurbita pepo</i>
	Bhindi	<i>Hiabiscus esculentus</i>
	Nenua	<i>Luffa cylindrica</i>
	Onion	<i>Allium cepa</i>
	Sem	<i>Phaseolus lunatus</i>
	Kheera	<i>Cucurbitus sativus</i>
Phool Gobi	<i>B. oleraceavar</i>	
OIL YIELDING PLANTS	Sarson	<i>Brassica campestris</i>
	Castor plant	<i>Ricinus communis</i>
SPICES	Coriander	<i>Coriandrum sativum</i>
	Lahsun	<i>Allium sativum</i>
	Adrak	<i>Zingiber officinale</i>
	Haldi	<i>Curcuma augustifolia</i>
FRUITS	Aam	<i>Mangifera indica</i>

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
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	<b>Amrud</b>	<b><i>Psidium guajava</i></b>
	<b>Jamun</b>	<b><i>Syzygium cumini</i></b>
	<b>Kathal</b>	<b><i>Artocarpus heterophyllus</i></b>
	<b>Bel</b>	<b><i>Aegle marmelos</i></b>
	<b>Papaya</b>	<b><i>Carica papaya</i></b>
<b>AGRICULTURAL CROPS</b>		
CEREALS	<b>Dhan</b>	<b><i>Oryza sativa</i></b>
	<b>Makka</b>	<b><i>Zea mays</i></b>
	<b>Wheat</b>	<b><i>Triticum aestivum</i></b>
PULSES	<b>Arhar</b>	<b><i>Cajanus cajan</i></b>
	<b>Lentil</b>	<b><i>Lens culineris</i></b>
	<b>Khesari</b>	<b><i>Lathyrus sativus</i></b>
	<b>Chana</b>	<b><i>Cicer arientum</i></b>
<b>FLORA</b>	<b>LOCAL NAME</b>	<b>BOTANICAL NAME</b>
<b>SOCIAL FORESTRY</b>		
Trees	Palas	<i>Butea monosperma</i>
	Sisam	<i>Dalbergia sissoo</i>
	Mango	<i>Mangifera indica</i>
	Ashok	<i>Saraca indica</i>
	Kathal	<i>Artocarpus heterophyllus</i>
	Gulmohar	<i>Delonix regia</i>
	Neem	<i>Azadirachta indica</i>
	Sal	<i>Shorea robusta</i>
	Babul	<i>Acacia nilotica</i>
	Karanj	<i>Pongamia pinnata</i>
Semal	<i>Bombax cieba</i>	
<b>NATURAL VEGETATION</b>		
HERBS	Ban tulsi	<i>Ocimum basilicum</i>
	Tulsi	<i>Ocimum sanctum</i>
	Galphuli	<i>Moghania species</i>
	Akaon	<i>Calotropis gigantean</i>
	Putus	<i>Lantana camara</i>
	Ram Datwan	<i>Smilax macrophylla</i>
SHRUBS/CLIMBERS	Orchid	<i>Habenaria susannae</i>
	Kari	<i>Millusa tomentosa</i>
	Castor plant	<i>Ricinus communis</i>
	Broom jute	<i>Sida rhombifolia</i>
	Chaste tree	<i>Vitex negundo</i>
TREES	Sal	<i>Shorea robusta</i>
	Khair	<i>Acacia catechu</i>
	Banyan	<i>Ficus bengalensis</i>
	Simal	<i>Bombax ceiba</i>
	Mahua	<i>Madhuca indica</i>
	Palas	<i>Butea monosperma</i>
	Kusum	<i>Schlechera oleosa</i>
	Peepal	<i>Ficus religiosa</i>
	Asan	<i>Terminalia tomentosa</i>
	Imli	<i>Tammarindus indica</i>
	Kadam	<i>Anthoosphalus cadamba</i>
	Neem	<i>Azadirachta indica</i>
Mango	<i>Mangifera indica</i>	

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

### FAUNA OF CORE ZONE

FAUNA	COMMON NAME	ZOOLOGICAL NAME
<b>LISTED UNDER WILDLIFE PROTECTION ACT,1972</b>		
<b>TERRESTRIAL FAUNA</b>		
Schedule-I	Nil	-
Schedule-II	Nil	-
Schedule-III	Nil	
Schedule-IV	Neola	<i>Herpestes edwardsi</i>
Schedule-V	Rat	<i>Rattus rattus</i>
<b>AMPHIBIANS &amp; REPTILES</b>		
Schedule-II	Indian cobra	<i>Naja naja kauthua</i>
Schedule-IV	Toad	<i>Bufo melanostictus</i>
Schedule-IV	Common frog	<i>Euphlyctis hexadactyla</i>
<b>AVI FAUNA</b>		
Schedule-IV	Common Sparrow	<i>Passer domesticus</i>
	Kabutar	<i>Colombia livia</i>
	Wood sandpiper	<i>Tringa glareola</i>
	Koel	<i>Eudynamys scolopaceae</i>
	Owl	<i>Bubo bubo</i>
	Common myna	<i>Acridotheres tristis</i>
Schedule-V	Common Crow	<i>Corvus splendens,</i>
<b>NOT LISTED UNDER WILDLIFE PROTECTION ACT,1972</b>		
<b>MAMMALS / (DOMESTIC ANIMALS)</b>	Goat	<i>Capra species</i>
	Cow	<i>Bos indicus</i>
	Buffalo	<i>Bubalus bubalis</i>
<b>BIRDS</b>	Tota (Parrot)	<i>Pisttacus krameri</i>
<b>AQUATIC FAUNA</b>	Potia	<i>Puntius spp.</i>
	Mangur	<i>Clarias betrachus</i>
	Garai	<i>Channa punctatus</i>
	Catla	<i>Catla catla</i>
<b>INVERTEBRATES</b>	Cockroach	<i>Blata orientalis</i>
	Madhumakkhi	<i>Apis spp.</i>
	Chinti	<i>Solenopsis spp.</i>
	Honey bee	<i>Apis dorsata</i>
	Birni	<i>Polistis spp.</i>
	Jugnu	<i>Photinus spp.</i>
<b>ENDANGERED SPECIES</b>	Nil	-
<b>ENDEMIC SPECIES</b>	Nil	-
<b>MIGRATORY SPECIES</b>	Nil	-

**10. Details of mineral reserves (as per approved Mining Plan)**

	Quantity (in million m <sup>3</sup> )
(a) Proved	10.82
(b) Indicated	
(c) Inferred	
(d) Mineable reserves	2.6

**11. Major geological formation / disturbances in the mining lease area**

(a) Geological maps submitted	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
(b) Geological sections submitted	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
(c) Contour map submitted	Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
(d) Whether the presence, if any, noted of				
(i) Faults	Yes	<input type="checkbox"/>	No	<input checked="" type="checkbox"/>
(ii) Dykes	Yes	<input type="checkbox"/>	No	<input checked="" type="checkbox"/>
(iii) Shear Zone	Yes	<input type="checkbox"/>	No	<input checked="" type="checkbox"/>
(iv) Folds	Yes	<input type="checkbox"/>	No	<input checked="" type="checkbox"/>
(v) Other weak zones	Yes	<input type="checkbox"/>	No	<input checked="" type="checkbox"/>
(e) Source of data (Indicate)	Geological Report, CMPDI			

**12. Production of mineral(s) and life of mine**

(a) Rated capacity of mine mineral wise (Tonnes / annum)	1.5 Million m <sup>3</sup> /year
(b) Life of mine at proposed capacity (Years)	
(c) Lease period (Years)	Temporary work permit granted
(d) Date of expiry of lease (D /M /Y)	30 <sup>th</sup> Sep, 2015*

\*Temporary work permit granted by West Bengal government is attached as Annexure-III.

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

(e) Indicate in case of existing mines

(i) Date of opening of mine

Pre- Nationalisation

(ii) Production in the last 5 years  
from year 2010 to year 2014  
in million tonnes.

1<sup>st</sup> year to 5<sup>th</sup> year

Refer Table below

Production in the last 5 years from year 2010 to year 2014 in million m<sup>3</sup>

Sl. No.	Year	Quantity Extracted (Mm <sup>3</sup> )
1.	2010	0.72
2.	2011	0.60
3.	2012	0.74
4.	2013	0.93
5.	2014 (till Sep'14)	0.66
Average extraction / annum		0.86

(iii) Projected production for the next  
5 years from year 2010-11 to year  
2014-15 in million tonnes.

6<sup>th</sup> to 10<sup>th</sup> year

Refer Table below

Projected production for the next 6th to 10th year 5 years from year 2015 to  
year 2019 in million m<sup>3</sup>.

Sl. No.	Year	Quantity Extracted (Mm <sup>3</sup> )
1.	2015	1.0
2.	2016	1.5
3.	2017	1.5
4.	2018	1.5
5.	2019	1.5

(iv) Whether mining was suspended after  
opening of the mine?

Yes  No

If yes, details thereof including last production  
figure and reason for the same.

(f) Whether plans & sections provided?

Yes  No

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

### 13. Type and method of mining operations

TYPE		METHOD	
Opencast	<input type="checkbox"/>	Manual	<input checked="" type="checkbox"/>
Underground	<input type="checkbox"/>	Semi-mechanised	<input type="checkbox"/>
Both	<input checked="" type="checkbox"/>	Mechanised	<input checked="" type="checkbox"/>

### 14. Details of ancillary operations for mineral processing

- (a) Existing
- (b) Additional

### 15. Mine details

- (a) Opencast mine
- (i) Stripping ratio (mineral in tonnes to over burden in m<sup>3</sup>)
- (ii) Ultimate working depth (in m bgl)
- (iii) Indicate present working depth in case of existing mine (in m bgl)
- (iv) Thickness of top soil (in m.)
- Minimum
  - Maximum
  - Average
- (v) Thickness of overburden (in m.)
- Minimum
  - Maximum
  - Average
- (vi) Mining Plan
- Height and width of the bench in

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
 (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)  
 overburden / waste.

• Height & width of the bench in ore body / coal seam. Not Applicable

• Proposed inclination / slope of the sides of the opencast mine (separately for overburden, coal / ore and overall slope of the pit sides) both while operating the mine as well as at the time of closure of the mine. Not Applicable

• Whether transverse sections across the opencast mine at the end of fifth year and at the end of the life of the mine have been submitted? Yes  No

(vii) Type of blasting, if any, to be adopted. No Blasting

(b) Underground min **NOT APPLICABLE**

(i) Seam / Ore body Min.Depth (m) Max. Depth (m) Avg. thickness (m)

Rate of dip in degree Direction of dip

(ii) Mode of entry into the mine

- Shaft
- Adit
- Incline

(iii) Details of machinery

1	On surface	
2	At Face	
3	For transportation	
4	Others	

(iv) Method of stoping (metalliferrous mines) **Not Applicable**

- Open
- Filled
- Shrinkage
- Caving
- Combination of above
- Others (Specify)

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
 (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

(v) Extraction method

- Caving
- Stowing
- Partial extraction

(vi) Subsidence - No applicable for sand mining

- Predicted max. subsidence (in m)
- Max. value of tensile strain (in mm/m)
- Max. slope change (in mm/m)
- Whether identified possible subsidence area(s) superimposed on Surface Plan has been submitted?

- Major impacts on surface features like natural drainage pattern, houses, buildings, water bodies, roads, forest, etc.

- Salient features of subsidence management (monitoring and control).

**16. Surface drainage pattern at mine site**

(a) Whether the pre-mining surface drainage plan submitted? Yes  No

(b) Do you propose any modification / diversion in the existing natural drainage pattern at any stage? If yes, when. Provide location map indicating contours, dimensions of water body to be diverted, direction of flow of water and proposed route / changes, if any i.e. realignment of river / nallah / any other water body falling within core zone and its impact. Yes  No

**17. Embankment and / or weir construction**

**NOT APPLICABLE FOR SAND MINING**

(a) Do you propose, at any stage, construction of

- (i) Embankment for protection against flood? Yes  No
-

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

(ii) Weir for water storage for the mine? Yes No

- (b) If so, provide details thereof.
- (c) Impact of embankment on HFL and settlement around.
- (d) Impact of weir on down stream users of water.

Note- Sand extraction is confined to lean season (non – monsoon period) only. The removal is done without affecting the base flow of the river and in such manner as to maintain the smooth flow of the river during the monsoons. This helps in protection of the banks from erosion.

**18. Vehicular traffic density (outside the ML area)**

	Type of vehicles	No. of trips per day
(a) Existing	Tipping Truck	300
(b) After the proposed activity	Tipping Truck*	397

\* The figures for vehicular density pertain to the present and proposed mining activities only. Detail of other vehicles plying outside ML area is not known.

- (c) Whether the existing road network is adequate? If no, provide details of alternative proposal?
- Yes  No

**19. Loading, transportation and unloading of mineral and waste rocks on surface:**

(a) Manual	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
(b) Tubs, mine cars, etc.	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
(c) Scraper, shovels, dumpers / trucks.	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
(d) Conveyors (belt, chain, etc.)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
(e) Others (specify).	<input type="text"/>	

**20. Mineral(s) transportation outside the ML area**

	Qty. (in M <sup>3</sup> )	Percentage (%)	Average Length (in km)
(a) Road	4764	100	4.5

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
 (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

(b)	Rail			
i.	Existing	<input type="text"/>	<input type="text"/>	<input type="text"/>
ii.	When OC Patches are in operation	<input type="text"/>	<input type="text"/>	<input type="text"/>
iii.	When OC Patches are exhausted and only UG mines are in operation	<input type="text"/>	<input type="text"/>	<input type="text"/>
(c)	Conveyors	<input type="text"/>	<input type="text"/>	<input type="text"/>
(d)	Rope way	<input type="text"/>	<input type="text"/>	<input type="text"/>
(e)	Water ways	<input type="text"/>	<input type="text"/>	<input type="text"/>
(f)	Pipeline	<input type="text"/>	<input type="text"/>	<input type="text"/>
(g)	Others (Specify)	<input type="text"/>	<input type="text"/>	<input type="text"/>
	Total	<input type="text" value="4764"/>		

**21. Baseline Meteorological and Air Quality data****(a) Micro-meteorological data**

[Continuous monitoring through autographic instrument for one full season other than monsoon]

(i) Wind rose pattern for one full season (16 points of compass i.e. N, NNE, NE, ---) based on 24-hourly data. For coastal area also furnish day-time and night time data.

- Day time
- Night time
- 24 – hours period

(ii) Site specific monitored data

Month	Wind Speed (kmph)			Temperature (°C)			Relative Humidity (%)			Rain Fall * (mm)			Cloud Cover** (Octas of sky)
	Mean	Max.	% of calm	Mean (Dry Bulb)	Highest	Lowest	Mean	Highest	Lowest	Total	24-hours Highest	No. of rainy days	Mean
APR'12	2.93	14.8	29.43	30.96	40.5	23.5	52	72	32	20	15	2	Clear
MAY'12	2.51	11.2	22.17	33.25	45.0	25.0	52	82	26	30	12	4	Clear
JUNE'12	2.68	12.2	18.55	33.64	44.5	26.5	54	85	27	88	19	8	Clear

\* 24-hours rainfall should be reported from 08:30 hrs. IST of previous day to 08:30 hrs. IST of the day.

\* Rainy day is considered when 24 hrs. rainfall is  $\geq 2.5$  mm.

\*\* Visual observations of cloud cover should be recorded four times a day at regular intervals.

(iii) Indicate name and distance of the nearest IMD Meteorological station from which climatological data have been obtained for reporting in the EIA report, if any.

: Meteorological data based on long term trends observed at IMD Station at Asansol (20 Kms west of the cluster boundary)

**(b) Ambient air quality data\* (RPM, SPM, SO<sub>2</sub>, and NO<sub>x</sub>)**

[\*Monitoring should be carried out covering one full season except monsoon – same season as in 21 (a) (i)]

[\*Frequency of sampling: Sampling to be done twice a week for the entire season 24 hourly for SPM &amp; RPM. For gaseous pollutants 24- hourly data be given irrespective of the sampling period. ]

(i) Season and period for which monitoring has been carried out: - Summer, 2012 from April, 2012 to June 2012

(ii) No. of samples collected at each monitoring station: - Total 24 samples were collected from each station

**Core and Buffer Zone of Damodar River**

Sampling Station	Min	98 <sup>th</sup> %ile	Max	AM	GM	Std. dev	CPCB Limit	
<b>PM<sub>10</sub> (in ug/m<sup>3</sup>)</b>								
Core Zone								
Parbelia (A1)	50	66	69	58.2	58.0	4.51	<b>100</b>	
Sodepur (A2)	51	73	73	61.4	61.1	6.25		
Chinakuri – I (A3)	57	75	75	68.0	67.8	4.83		
Chinakuri – III (A4)	55	73	73	66.0	65.8	4.83		
Amritnagar (A5)	56	73	76	65.5	65.4	5.1		
Tirat(A6)	57	71	71	64.3	64.2	4.3		
Kuardih (A7)	57	73	73	67.7	67.6	4.5		
Nimcha (A8)	55	71	71	65.7	65.5	4.4		
Mahabir (A9)	51	66	69	60.8	60.7	3.7		
Bakulia (A10)	51	69	69	60.7	60.6	3.91		
Buffer Zone								
Dubeswari (A11)	52	65	67	59.8	59.6	3.96		
Bejdih (A12)	41	55	56	51.9	51.7	4.72		
Hirakhun (A13)	36	43	44	36.0	35.8	3.87		

**CMPDI**

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

Sampling Station	Min	98 <sup>th</sup> %ile	Max	AM	GM	Std. dev	CPCB Limit
Patmohana (A14)	53	71	71	64.0	63.8	4.83	
Ratibati (A15)	49	63	67	58.8	58.6	3.6	
Chalbalpur (A16)	51	67	67	60.6	60.4	5.6	
J K Nagar (A17)	31.60	44.6	42.5	37.90	37.78	3.11	
Jemehari (A18)	33.30	44.2	42.4	38.58	38.50	2.62	
Lachhipur (A19)	103.2	118.0	118.3	113.7	113.6	4.4	
Central Kajora (A20)	107.0	122.5	123.0	118.2	118.1	4.2	
Madhujore (A21)	103.0	118.5	119.8	113.8	113.7	4.0	
Ghansyampur (A22)	81.4	94.0	94.5	89.8	89.8	3.7	
<b>PM<sub>2.5</sub> (in ug/m<sup>3</sup>)</b>							
<b>Core Zone</b>							
Parbelia (A1)	15	22	23	16.3	16.0	3.00	<b>60</b>
Sodepur (A2)	19	24	25	20.8	20.8	1.61	
Chinakuri – I (A3)	14	21	21	18.1	18.0	1.72	
Chinakuri – III (A4)	13	20	20	17.1	17.0	1.72	
Amritnagar (A5)	12	22	23	19.2	19.1	2.1	
Tirat(A6)	14	20	21	18.1	18.0	1.4	
Kuardih (A7)	17	21	21	18.5	18.5	1.3	
Nimcha (A8)	16	20	20	18.8	18.7	1.2	
Mahabir (A9)	14	24	25	18.3	18.1	3.0	
Bakulia (A10)	14	25	25	18.1	17.9	2.96	
<b>Buffer Zone</b>							
Dubeswari (A11)	19	24	25	20.8	20.8	1.61	
Bejdih (A12)	12	18	18	15.2	15.1	1.56	
Hirakhun (A13)	9	15	15	12.1	12.0	1.60	
Patmohana (A14)	14	20	21	17.1	17.0	1.91	

**CMPDI**

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

Sampling Station	Min	98 <sup>th</sup> %ile	Max	AM	GM	Std. dev	CPCB Limit
Ratibati (A15)	16	22	22	19.0	18.8	2.1	
Chalbalpur (A16)	18	24	24	20.9	20.9	1.7	
J K Nagar (A17)	18.20	25.8	24.6	21.86	21.79	1.86	
Jemehari (A18)	19.20	25.6	24.4	22.21	22.16	1.49	
Lachhipur (A19)	60.8	69.6	69.8	67.0	67.0	2.6	
Central Kajora (A20)	60.8	69.6	69.8	67.1	67.0	2.5	
Madhujore (A21)	61.2	69.8	70.5	67.1	67.1	2.3	
Ghansyampur (A22)	46.4	53.6	53.9	51.2	51.2	2.1	
<b>SO<sub>2</sub> (in ug/m<sup>3</sup>)</b>							
<b>Core Zone</b>							
Parbelia (A1)	5.6	7.7	7.9	6.7	6.6	0.86	<b>80</b>
Sodepur (A2)	5.8	7.7	8.2	6.9	6.9	0.56	
Chinakuri – I (A3)	6.2	8.1	8.2	7.2	7.1	0.59	
Chinakuri – III (A4)	6.0	7.9	8.0	7.0	6.9	0.59	
Amritnagar (A5)	7.7	10.5	10.7	9.3	9.3	1.0	
Tirat(A6)	5.5	8.5	8.8	6.9	6.9	0.9	
Kuardih (A7)	6.4	8.7	8.8	7.6	7.6	0.6	
Nimcha (A8)	6.0	7.9	8.0	7.0	6.9	0.6	
Mahabir (A9)	5.7	9.0	9.2	7.5	7.4	1.0	
Bakulia (A10)	5.7	9.2	9.2	7.6	7.5	0.95	
<b>Buffer Zone</b>							
Dubeswari (A11)	5.8	7.7	8.2	6.9	6.9	0.56	
Bejdih (A12)	5.9	7.6	7.9	6.9	6.2	0.68	
Hirakhun (A13)	4.7	6.6	6.7	5.7	5.6	0.59	
Patmohana (A14)	5.5	8.5	8.8	6.7	6.7	0.82	
Ratibati (A15)	6.0	9.3	9.58	7.8	7.7	1.0	
Chalbalpur (A16)	6.2	8.5	8.8	7.2	7.2	0.7	

**CMPDI**

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

Sampling Station	Min	98 <sup>th</sup> %ile	Max	AM	GM	Std. dev	CPCB Limit	
J K Nagar (A17)	5.30	8.0	7.7	6.86	6.83	0.62		
Jemehari (A18)	5.30	7.8	7.6	6.82	6.79	0.60		
Lachhipur (A19)	9.6	11.8	12.0	11.0	11.0	0.6		
Central Kajora (A20)	9.5	11.8	12.0	11.1	11.0	0.7		
Madhujore (A21)	8.7	11.8	12.0	10.8	10.8	0.9		
Ghansyampur (A22)	9.4	11.8	12.0	11.0	11.0	0.8		
<b>NO<sub>x</sub> (in ug/m<sup>3</sup>)</b>								
<b>Core Zone</b>								
Parbelia (A1)	20.0	23	23.3	21.4	21.4	0.85	<b>80</b>	
Sodepur (A2)	22.8	25.2	25.7	23.8	23.8	0.67		
Chinakuri – I (A3)	16.9	19.1	20.1	17.8	17.8	0.71		
Chinakuri – III (A4)	17.1	19.3	20.3	18.0	18.0	0.71		
Amritnagar (A5)	25.0	27.4	27.4	26.4	26.4	0.8		
Tirat(A6)	19.6	24.6	24.9	22.2	22.2	1.7		
Kuardih (A7)	16.9	19.1	20.1	17.8	17.8	0.7		
Nimcha (A8)	17.6	19.7	19.7	18.7	18.6	0.7		
Mahabir (A9)	21.1	23.3	23.8	22.8	22.6	0.7		
Bakulia (A10)	21.1	23.8	23.8	22.6	22.6	0.72		
<b>Buffer Zone</b>								
Dubeswari (A11)	18.8	22.4	22.9	20.8	20.8	1.03		
Bejdih (A12)	11.9	14.7	14.7	13.6	13.5	0.71		
Hirakhun (A13)	7.4	9.2	9.8	8.0	8.0	0.77		
Patmohana (A14)	19.6	24.9	26.4	22.4	22.3	1.88		
Ratibati (A15)	17.3	19.9	19.9	18.8	18.8	0.7		
Chalbalpur (A16)	21.2	24.7	25.2	23.6	23.6	1.1		
J K Nagar (A17)	5.30	8.0	7.7	6.86	6.83	0.62		
Jemehari (A18)	5.30	7.8	7.6	6.82	6.79	0.60		

**CMPDI**

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

Sampling Station	Min	98 <sup>th</sup> %ile	Max	AM	GM	Std. dev	CPCB Limit
Lachhipur (A19)	19.0	26.2	26.8	24.0	23.9	2.1	
Central Kajora (A20)	18.8	26.0	26.5	23.9	23.8	2.0	
Madhujore (A21)	18.0	25.8	25.8	23.6	23.5	2.1	
Ghansyampur (A22)	18.8	25.8	26.0	23.8	23.8	1.9	

BDL = Below detectable limit

# Annex a location map indicating location of AAQ stations, their direction and distance with respect to project site.

**22. Stack and emission details, if any\* Not Applicable**

Sl. No.	Process / unit of operation (e.g. DG Set, Boiler)	Height of stack (m)	Internal top dia. (m)	Flue gas exit velocity (m/sec)	Emission rate (kg/hr)				Heat emission rate from top of stack (K.cal/hr)	Exhaust / Flue gas			
					SPM	SO <sub>2</sub>	NO <sub>x</sub>	CO		Temp °C	Density	Specific Heat	Volumetric flow rate (m <sup>3</sup> /hr.)

**23. Details of fugitive emissions during mining operations\***

There is no dust generation and liquid effluent generation during collection of sand. Although the main sources of air pollution for the purpose of estimation of increase in TSPM was identified as dry sand handling during loading and unloading activities.

**24. Air Quality Impact Prediction (AQIP)\***

- (a) Details of model(s) used for AQIP including grid size, terrain features, and input meteorological data

The Air Quality Impact Prediction has been done by using the FDM version 90121 Air Quality Model of USEPA. Estimation for increase in TSP at the Baseline Ambient Air Quality Stations has been done with the help of the above model. The model was run to predict the incremental TSP concentrations from future mining activities. The contribution of TSP from the present mining activities is already included in the baseline data generated at the stations. The quantum of such contribution from the present mining activities was determined by running the model for the present scenario only (Scenario A). The model was run again for predicting contribution from proposed mining activities (Scenarios B & C separately). The difference between the contributions from the present and proposed mining activities is the incremental impact.

- (b) Maximum incremental GLC values of pollutants based on prediction exercise

(in µg/m<sup>3</sup>)

Sl. No.	Location Name	Location Code	Remarks	Existing PM10 Concentrations (98th Percentile)	Scenario		
					Increase in PM <sub>10</sub> conc. due to various activities	Resultant PM <sub>10</sub> conc.	NAAQS, 2009 Limit
Core Zone							
1	Parbelia	A1	Sample collected from nearby mine	66	0.00	66.00	100
2	Sodepur	A2	Habitation near riverbed	73	0.00	73.00	
3	Chinakuri – I	A3	Sample collected from nearby mine	75	0.00	75.00	
4	Chinakuri – III	A4	-do-	73	0.00	73.00	
5	Amritnagar	A5	Sample collected from nearby	73	0.00	73.00	

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

			mine				
6	Tirat	A6	-do-	71	0.00	71.00	
7	Kuardih	A7	-do-	73	0.00	73.00	
8	Nimcha	A8	-do-	71	0.06	71.06	
9	Mahabir	A9	-do-	66	0.00	66.00	
10	Bakulia	A10	Habitation near riverbed	69	0.00	69.00	
Buffer Zone							
11	Dubeswari	A11	Habitation near riverbed	65	0.00	65.00	100
12	Bejdih	A12	-do-	55	0.00	55.00	
13	Hirakhun	A13	-do-	43	0.00	43.00	
14	Patmohana	A14	-do-	71	0.00	71.00	
15	Ratibati	A15	Sample collected from nearby mine	63	0.00	63.00	
16	Chalbalpur	A16	Sample collected from nearby habitation	67	0.00	67.00	
17	J K Nagar	A17	Sample collected from nearby mine	44.6	0.00	44.60	
18	Jemehari	A18	-do-	44.2	0.01	44.21	
19	Lachhipur	A19	-do-	118.0	0.00	118.00	
20	Central Kajora	A20	-do-	122.5	0.00	122.50	
21	Madhujore	A21	-do-	118.5	0.02	118.52	
22	Ghansyampur	A22	-do-	94.0	0.00	94.00	

[\* Question Number 22, 23 & 24 need not be filled-in for mines having ML area of **25 ha. or less.**]

**25. Water requirement (m<sup>3</sup>/day)**

Water will be required only for the drinking purpose of the working personnel.

**26. Source of water supply**

RCFA water will be used for the drinking purpose.

[\*Annex a copy of sanction letter / permission from the concerned authority (Central Ground Water Authority in case of ground water abstraction is from notified area / State Ground Water Board in case of non-notified area / State Irrigation Department for surface water pumping) for drawing water.]

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

## 27. Lean season flow in case of pumping from river / nalla (cumecs)

Pumping will be done only for extraction of sand from river.

## 28. Ground water potential of the study area

NOT APPLICABLE FOR SAND MINING PROJECTS

### 28.1. Ground water availability

(a) Range of water table (m bgl)

(i) Pre-monsoon

- Core Zone
- Buffer zone



(ii) Post-monsoon

- Core Zone
- Buffer zone



(b) Total annual replenishable recharge (million m<sup>3</sup>/ year)

- By ground water table fluctuation method
- By rainfall infiltration factor method



(c) Annual draft excluding estimated draft through mine discharge (million m<sup>3</sup>/ year)

(d) Estimated draft through mine discharge (million m<sup>3</sup>/ year)

(e) Net annual ground water availability (million m<sup>3</sup>/ year)

(f) Stage of ground water development in %

### 28.2. Water demand - Competing users of the water source

S. No.	Usage	Present Consumption (m <sup>3</sup> /day)		Additional proposed as per local plan (m <sup>3</sup> /day)		Total (m <sup>3</sup> /day)	
		Mine Water	Ground	Mine Water	Ground	Mine Water	Ground
1	Domestic						
2	Irrigation						
3	Industry						
4	Mining						
5	Others (specify)						
Total							

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

## 29. Water quality\*

- (a) Annex physico -chemical analysis of water at intake point \*\*
- (b) In case of existing mine, annex report on quality of water discharge  
i.e. complete physico - chemical analysis\*\*

[\*For non-discharging mines at least four ground water samples to be taken preferably from downstream direction of the mine in pre-monsoon and post-monsoon periods and analysed. For discharging mines six samples are to be analysed]

\*\*All parameters as per BIS 10500. Indicate name of Methodology, Equipment used for analysis, and Detection Level (DL) for each parameter.

\*\*\* Wherever any analytical parameter is below detection level, "BDL" (Below Detection Level) should be written instead of 'NIL'.

Samples from the following points were collected and analysed for assessing the quality of surface water of the river as well as within the vicinity of the riverbed.

Location of these stations are shown in Plate – 5.

Surface Water Quality Monitoring Stations			
Sample No.	Sation Name	Date of Monitoring	Location
SW <sub>1</sub>	Damodar River U/s	04/05/2012	Entry point of Cluster 5 sharing northern boundary with the river
SW <sub>2</sub>	Damodar River D/s	04/05/2012	Exit point of Cluster 5 sharing northern boundary with the river
SW <sub>3</sub>	Bhagabatidih, Pond water	04/05/2012	Near Bhagabatidih village
SW <sub>4</sub>	Saltore, Pond water	04/05/2012	Near Saltore village
SW <sub>5</sub>	Radhanagar, Pond water	05/05/2012	Near Radhanagar village
SW <sub>6</sub>	Chaprad, Pond water	05/05/2012	Near Chaprad village
SW <sub>7</sub>	Harial Jore U/s	05/05/2012	Near Asanboni village
SW <sub>8</sub>	Harial Jore D/s	05/05/2012	Point of confluence with Damodar river
SW <sub>9</sub>	Chelad, Pond water	09/05/2012	Near Chelad village
SW <sub>10</sub>	Amritnagar, Pond water	09/05/2012	Near Amritnagar village
SW <sub>11</sub>	Egara, Pond water	09/05/2012	Near Egara village
SW <sub>12</sub>	Damodar River U/s	09/05/2012	Entry point of Cluster 9 sharing southern boundary with the river
SW <sub>13</sub>	Damodar River D/s	09/05/2012	Exit point of Cluster 9 sharing southern boundary with the river
SW <sub>14</sub>	Nunia Khal U/s	09/05/2012	Near Amkula village
SW <sub>15</sub>	Nunia Khal D/s	09/05/2012	Point of confluence with Damodar river
SW <sub>16</sub>	Nimcha, Quarry water	09/05/2012	Abandoned Nimcha quarry

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

### SURFACE WATER QUALITY DATA

Date of sampling: 04/05/2012

Sl. No.	Parameters	Result				IS:2296 – 1982 (Inland surface water) Class C
		SW <sub>1</sub>	SW <sub>2</sub>	SW <sub>3</sub>	SW <sub>4</sub>	
1.	pH	7.6	7.7	7.9	8.0	6.5 – 8.5
2.	Colour, Hazen Units	10	12	15	15	300
3.	Suspended solids, mg/l	42	46	10	14	-
4.	Total Dissolved solids, mg/l	490	498	346	398	1500
5.	Dissolved Oxygen, mg/l	6.9	6.8	5.6	5.5	4.0 min
6.	BOD - 3 days, 27oC, mg/l	2.6	2.7	2.1	2.0	3.0
7.	Chloride (as Cl) , mg/l	32	40	46	48	600
8.	Flouride (as F) , mg/l	0.56	0.58	0.56	0.58	1.5
9.	Sulphate (as SO <sub>4</sub> ) , mg/l	44	46	20	26	400
10.	Nitrate (as NO <sub>3</sub> ) , mg/l	12	14	14	16	50
11.	Phenols (as C <sub>6</sub> H <sub>5</sub> OH) , mg/l	<0.001	<0.001	<0.001	<0.001	0.005
12.	Chromium (as Cr+6) , mg/l	<0.01	<0.01	<0.01	<0.01	0.05
13.	Copper (as Cu) , mg/l	<0.02	<0.02	<0.02	<0.02	1.5
14.	Selenium (as Se) , mg/l	<0.01	<0.01	<0.01	<0.01	0.05
15.	Arsenic (as As) , mg/l	<0.01	<0.01	<0.01	<0.01	0.2
16.	Cadmium (As Cd) , mg/l	<0.01	<0.01	<0.01	<0.01	0.01
17.	Lead (as Pb) , mg/l	<0.05	<0.05	<0.05	<0.05	0.1
18.	Zinc (as Zn) , mg/l	0.02	0.02	0.02	0.02	15
19.	Iron (as Fe) , mg/l	0.18	0.20	0.18	0.20	5
20.	Mineral Oil, mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
21.	Total Coliform organisms, MPN/100ml	110	140	17	26	5000

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

**Date of sampling:** 05/05/2012

Sl. No.	Parameters	Result				IS:2296 – 1982 (Inland surface water) Class C
		SW <sub>5</sub>	SW <sub>6</sub>	SW <sub>7</sub>	SW <sub>8</sub>	
1.	pH	7.9	7.8	7.8	7.9	6.5 – 8.5
2.	Colour, Hazen Units	12	10	16	18	300
3.	Suspended solids, mg/l	12	12	46	50	-
4.	Total Dissolved solids, mg/l	300	338	460	472	1500
5.	Dissolved Oxygen, mg/l	5.4	5.6	5.3	5.1	4.0 min
6.	BOD - 3 days, 27°C, mg/l	2.0	1.6	2.5	2.6	3.0
7.	Chloride (as Cl) , mg/l	56	60	32	40	600
8.	Flouride (as F) , mg/l	0.58	0.58	0.58	0.60	1.5
9.	Sulphate (as SO <sub>4</sub> ) , mg/l	36	30	18	20	400
10.	Nitrate (as NO <sub>3</sub> ) , mg/l	10	12	20	22	50
11.	Phenols (as C <sub>6</sub> H <sub>5</sub> OH) , mg/l	<0.001	<0.001	<0.001	<0.001	0.005
12.	Chromium (as Cr+6) , mg/l	<0.01	<0.01	<0.01	<0.01	0.05
13.	Copper (as Cu) , mg/l	<0.02	<0.02	<0.02	<0.02	1.5
14.	Selenium (as Se) , mg/l	<0.01	<0.01	<0.01	<0.01	0.05
15.	Arsenic (as As) , mg/l	<0.01	<0.01	<0.01	<0.01	0.2
16.	Cadmium (As Cd) , mg/l	<0.01	<0.01	<0.01	<0.01	0.01
17.	Lead (as Pb) , mg/l	<0.05	<0.05	<0.05	<0.05	0.1
18.	Zinc (as Zn) , mg/l	0.02	0.03	0.02	0.03	15
19.	Iron (as Fe) , mg/l	0.18	0.18	0.20	0.22	5
20.	Mineral Oil, mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
21.	Total Coliform organisms, MPN/100ml, max.	26	21	110	140	5000

Date of sampling: 09/05/2012

Sl. No.	Parameters	Result				IS:2296 – 1982 (Inland surface water) Class C
		SW <sub>9</sub>	SW <sub>10</sub>	SW <sub>11</sub>	SW <sub>12</sub>	
1.	pH	7.9	7.8	8.0	7.8	6.5 – 8.5
2.	Colour, Hazen Units	12	10	10	16	300
3.	Suspended solids, mg/l	12	12	14	50	-
4.	Total Dissolved solids, mg/l	408	418	402	520	1500
5.	Dissolved Oxygen, mg/l	5.8	5.6	5.8	6.7	4.0 min
6.	BOD - 3 days, 27°C, mg/l	2.1	2.1	2.2	4.4	3.0
7.	Chloride (as Cl), mg/l	78	90	76	52	600
8.	Flouride (as F), mg/l	0.68	0.66	0.64	0.60	1.5
9.	Sulphate (as SO <sub>4</sub> ), mg/l	23	30	26	48	400
10.	Nitrate (as NO <sub>3</sub> ), mg/l	14	16	14	16	50
11.	Phenols (as C <sub>6</sub> H <sub>5</sub> OH), mg/l	<0.001	<0.001	<0.001	1.56	0.005
12.	Chromium (as Cr+6), mg/l	<0.01	<0.01	<0.01	0.02	0.05
13.	Copper (as Cu), mg/l	<0.02	<0.02	<0.02	0.02	1.5
14.	Selenium (as Se), mg/l	<0.01	<0.01	<0.01	<0.01	0.05
15.	Arsenic (as As), mg/l	<0.01	<0.01	<0.01	<0.01	0.2
16.	Cadmium (As Cd), mg/l	<0.01	<0.01	<0.01	<0.01	0.01
17.	Lead (as Pb), mg/l	<0.05	<0.05	<0.05	<0.05	0.1
18.	Zinc (as Zn), mg/l	0.03	0.02	0.02	0.03	15
19.	Iron (as Fe), mg/l	0.16	0.20	0.14	0.28	5
20.	Mineral Oil, mg/l	<0.01	<0.01	<0.01	< 0.01	0.01
21.	Total Coliform organisms, MPN/100ml	80	110	90	2000	5000

Date of sampling: 09/05/2012

Sl. No.	Parameters	Result				IS:2296 – 1982 (Inland surface water) Class C
		SW <sub>13</sub>	SW <sub>14</sub>	SW <sub>15</sub>	SW <sub>16</sub>	
1.	pH	8.1	7.9	8.1	7.8	6.5 – 8.5
2.	Colour, Hazen Units	18	16	18	16	300
3.	Suspended solids, mg/l	56	52	60	10	-
4.	Total Dissolved solids, mg/l	526	522	528	372	1500
5.	Dissolved Oxygen, mg/l	6.6	6.6	6.5	5.8	4.0 min
6.	BOD - 3 days, 27°C, mg/l	4.6	4.4	4.6	2.0	3.0
7.	Chloride (as Cl), mg/l	56	50	58	66	600
8.	Flouride (as F), mg/l	0.62	0.60	0.62	0.60	1.5
9.	Sulphate (as SO <sub>4</sub> ), mg/l	50	44	52	26	400
10.	Nitrate (as NO <sub>3</sub> ), mg/l	20	18	20	16	50
11.	Phenols (as C <sub>6</sub> H <sub>5</sub> OH), mg/l	1.60	1.58	1.60	<0.001	0.005
12.	Chromium (as Cr+6), mg/l	0.03	0.02	0.03	<0.01	0.05
13.	Copper (as Cu), mg/l	0.03	0.02	0.03	<0.02	1.5
14.	Selenium (as Se), mg/l	<0.01	<0.01	<0.01	<0.01	0.05
15.	Arsenic (as As), mg/l	<0.01	<0.01	<0.01	<0.01	0.2
16.	Cadmium (As Cd), mg/l	<0.01	<0.01	<0.01	<0.01	0.01
17.	Lead (as Pb), mg/l	<0.05	<0.05	<0.05	<0.05	0.1
18.	Zinc (as Zn), mg/l	0.03	0.02	0.03	0.03	15
19.	Iron (as Fe), mg/l	0.30	0.30	0.34	0.16	5
20.	Mineral Oil, mg/l	<0.01	< 0.01	<0.01	< 0.01	0.01
21.	Total Coliform organisms, MPN/100ml	2900	1300	2900	140	5000

All the values were found to be well within the IS: 2296 class C norms.

- (b) Whether saline water ingress will take place?  
(applicable to coastal areas)

Yes

No

- (c) Impact on stream / lake / springs-

Sand extraction is confined to lean season (non – monsoon period) only. The removal is done without affecting the base flow of the river and in such manner as to maintain the smooth flow of the river during the monsoons. This helps in protection of the banks from erosion.

**[\* Provide a comprehensive hydro-geological assessment report** if the average mine dewatering is more than 100 m<sup>3</sup>/day and or going below water table in non-monsoon period. The report should be based on preferably latest one year pre-monsoon and post-monsoon baseline data covering information on ground water situation, aquifer characteristics, water level conditions (April – May and November), estimate of ground water resources, predicted impact of the project on ground water regime and detailed remedial / conservation measures such as artificial recharge of ground water etc. The report should be based on actual field inventory out of existing wells, at least 30 observation wells in the buffer zone with supplementary information from secondary sources (mention name). For estimation\*\* of ground water resource (refer question no. 28 above) be designated study area of the buffer

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year) zone may be sub-divided into command and non-command areas, watershed-wise (in case of hard rock / consolidated formations) / block-wise / mandal-wise in case of alluvial / unconsolidated formations)]

[\*\*For estimating ground water resources in the area follow the Ground Water Estimation Committee recommendations of 1997]

### 31. Waste Water Management

NOT APPLICABLE FOR SAND MINING PROJECTS

#### Mine

(a) Daily average discharge (m<sup>3</sup>/day) from different sources

(i) Mine water discharge during

• Lean period

• Monsoon period

(ii) Workshop/Plantation

(iii) Domestic (mine site & nearby villages)

(iv) Beneficiation / Washeries

(v) Coal Handling Plant

(vi) Tailings pond

(vii) Others (Service buildings & canteens)

Total

(b) Waste water treatment plant; flow sheet for treatment process attached.

Yes

No

(c) Quantity of water recycled / reused / to be recycled in

(d) Point of final discharge

Final Point	Quantity discharged (in m <sup>3</sup> /day)
1. Surface	
(i) Agricultural land	
(ii) Waste land	
(iii) Forest land	
(iv) Green belt	
2. River / nallah	
3. Lake	
4. Sea	
5. Others (specify)	
Total	

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

## (e) Users of discharge water

- |       |                  |                      |                      |    |                      |
|-------|------------------|----------------------|----------------------|----|----------------------|
| (i)   | Human            | Yes                  | <input type="text"/> | No | <input type="text"/> |
| (ii)  | Livestock        | Yes                  | <input type="text"/> | No | <input type="text"/> |
| (iii) | Irrigation       | Yes                  | <input type="text"/> | No | <input type="text"/> |
| (iv)  | Industry         | Yes                  | <input type="text"/> | No | <input type="text"/> |
| (v)   | Others (specify) | <input type="text"/> |                      |    |                      |

## (f) Details of the river / nalla, if final effluent is / will be discharged (cumecs)

- |       |   |                      |                      |    |                      |
|-------|---|----------------------|----------------------|----|----------------------|
| (i)   | Average flow rate   | <input type="text"/> |                      |    |                      |
| (ii)  | Lean season flow rate   | <input type="text"/> |                      |    |                      |
| (iii) | Aquatic life  |                      |                      |    |                      |
| (iv)  | Analysis of river water 100 meters upstream and 100 meters downstream of discharge point submitted. | Yes                  | <input type="text"/> | No | <input type="text"/> |

**Township**

- |     |  |                      |                      |    |                      |
|-----|--|----------------------|----------------------|----|----------------------|
| (a) | Waste water generation from township (m <sup>3</sup> /day)   | <input type="text"/> |                      |    |                      |
| (b) | Are you planning to provide sewage treatment plant?  | Yes                  | <input type="text"/> | No | <input type="text"/> |
| (c) | Usage of treated water: Treated water will be used in irrigation and discharged in river or nallah |                      |                      |    |                      |

**32. Attach water balance statement in the form of a flow diagram indicating source (s), consumption (Section-wise) and output.**

NOT APPLICABLE FOR SAND MINING PROJECTS

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
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### 33. Ambient noise level leq dB(A)

S. No.	Location of Station	Method of sand extraction	Date of Monitoring (Day time)	Noise Level in dBA (Leq) Measured at River bank
1	Bhara	Mechanically by means of diesel/electrical scrapers, dredgers and pontoons	10/10/2014	52.7
2	Ramprasadpur		10/10/2014	55.8
3	Baska		10/10/2014	51.9
4	Madanpur		10/10/2014	53.4
5	Narayankuri		10/10/2014	51.2

### 34. Solid Waste

NOT APPLICABLE FOR SAND MINING PROJECTS

(a) Top soil and Solid waste quantity and quality

Name (Lump/fines/slurry/Sludge/others)	Composition	Quantity (m3/month)	Method of disposal
Mining activity*			
a. Top Soil			
b. Over burden			
c. Others (specify)			
Effluent Treatment Plant (sludge)			
<b>Total</b>			

[\* Annex layout plan indicating the dump sites.]

- (b) (i) Does waste (s) contain any hazardous/toxic substance/ radioactive materials or heavy metals? Yes  No
- (ii) If yes, whether details and precautionary measures provided? Yes  No
- (c) Recovery and recycling possibilities: Not Applicable
- (d) Possible user(s) of the solid waste: Miner Itself
- (e) (i) Is the solid waste suitable for backfilling? Yes  No

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River (15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

(ii) If yes, when do you propose to start backfilling.

(in million m<sup>3</sup>)

Solid waste (s)	Already accumulated (A)	To be generated (B)	% of A & B to be backfilled	
			A	B
Over burden				
Others (specify)				

**Land reclamation Plan**

(f) In case waste is to be dumped on the ground, indicate

(i) Associated environmental problems: Land degradation, dust and noise pollution

(ii) Number & type of waste dumps\*

- No. of external dumps
- Max. projected height of dumps (in m)
- No. of terraces and height of each stage
- Overall slope of the dump (degree)
- Proposed reclamation measures

\* The environmental impact will be for a short period only as most of these patches/mines are very small and will be exhausted, generally, within 2 – 3 years after which the quarries will be completely backfilled and biologically reclaimed with the help of experts and **there will be no external OB dump and no surface voids.**

(iii) Section of the waste dump in relation to the adjacent ground profile attached. Yes  No

**35. Fuel / Energy requirements\***

[\*To be furnished for mines having ML area more than 25 ha. or captive power generation of 500KVA and above]

(a) Total power requirement (in MW)

S. No.		Mine Site	Township	Others (Workshops, utilities, etc)	Total
1	Present	1.0 MW	0.5 MW	0.5 MW	2.0 MW
2	Proposed / additional	0.5 MW	-	-	0.5 MW
Total		1.5 MW	0.5 MW	0.5 MW	2.5 MW

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(b) Source of power (in MW)

S. No.		SEB/Grid*	Captive power plant	DG Sets
1	Present	2.0 MW		
2	Proposed	0.5 MW		
Total		2.5 MW		

[\* Annex a copy of the sanction letter from the concerned authority]

(c) Details of fuels

S.No.	Fuel	Daily Consumption (Kilo Litre Per Day)		Calorific value (Kcals/kg)	% Ash	% Sulphur
		Existing	Proposed			
1	HSD	0.50	1.1			
2	LSHS					
3	Other (specify)					

Note: Diesel consumption will be limited to the days of extraction during non-monsoon period only.

### 36. Storage of inflammable / explosive materials

NOT APPLICABLE FOR SAND MINING PROJECTS

S. No.	Name	Number of Storages	Consumption (in TPD)	Maximum Quantity at any point of time
1	Fuels			
2	Explosives			

### 37. Human Settlement: Not Applicable

### 38. Rehabilitation & Resettlement (R&R) Plan\* Not Applicable\*\*

[\*Provide a comprehensive rehabilitation plan, if more than 1000 people are likely to be displaced, other-wise a summary plan]

Note:- \*\*Only land will be acquired for starting the proposed open cast patches. Areas identified for the patches are un-habituated. Hence only compensation against land acquisitions will be made to the land loser as per R & R Policy of CIL

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

## (a) Villages falling within the study area

	Villages	
	Number	Name
Core zone		
500 m from the blasting site (s)		
Buffer zone		
Township site		

## (b) Details of village(s) in the core zone

S. No.	Village name	Population*		Average Annual Income
		Tribal	Others	

[\*As per 2001 census / actual survey]

## (c) Population to be displaced and / or Land oustees

Name of village(s) falling within	Number of oustees		
	Land (only)	Homestead (only)	Land and Homestead (both)
<u>Mining Lease</u> 1. 2. ▪ ▪			
<u>Township Site</u> 1. 2. ▪			

(d) Whether R&R package has been finalised?  
If yes, salient features of R&R plan for oustees.

- (i) Site details where the people are proposed to be resettled & facilities existing / to be created.
- (ii) Funds earmarked for compensation package.

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
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- (iii) Agency /Authority responsible for their resettlement.
- (iv) Time of commencement of resettlement of Project Affected People (PAP).
- (v) Period by which resettlement of PAP will be over.

**39. Lease -wise plantation details      Not Applicable**

(a) Lease area (in ha.)	<u>Existing mine</u>	<u>New mine</u>
(i) Area broken up	<input type="text"/>	<input type="text"/>
(ii) To be broken up	<input type="text"/>	<input type="text"/>
(iii) Area not to be broken-up	<input type="text"/>	<input type="text"/>
(b) Township area (in ha.)	<input type="text"/>	<input type="text"/>

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(c) Area afforested and proposed (in ha.):      Not applicable

(

(d) No. and type of trees planted and proposed

(i) Existing :      Nil

(ii) Proposed:      Plantation along the sand transport route and along the river banks will be taken up with due consultation with the district administration.

**40. Environmental health and safety**

A	What major health and safety hazards are anticipated?	Air and water borne diseases
B	What provisions have been made/proposed to be made to conform to health and safety requirements?	a. Health awareness camps in local villages. b. Child health camps in local schools. c. PME of mining personnel being conducted regularly. d. Audiometry examination of mining personnel exposed to high noise level.

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
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		e. Health awareness programs & yoga camps for employees. f. Personal protective equipment provided to personnel.
C	In case of an existing mine	
i	Comprehensive report on health status of the workers as under the Mines Act annexed.	-
ii	Mineralogical composition of RPM (dust)	
	Alpha Quartz (SiO <sub>2</sub> )	10.1 %
	Quartz (SiO <sub>2</sub> )	31.6 %
	Chromium* (Total as well as Hexavalent)	Not Applicable
	Lead**	Not Applicable
D	Information on radiation protection measures, if applicable.	Not Applicable

[\* Only for Chromite mines]

[\*\*Only for Base Metal mines]

#### 41. Environmental Management Plan

Salient features of environmental protection measures

S. No.	Environmental issues*	Already practiced, if applicable	Proposed
1	Air pollution	Water spraying on sand transportation route, Plantation	Provision of dust control
2	Water pollution	-	Regular monitoring water quality
3.	Water conservation	Consumption of water is required only for drinking purpose of workers	-
4.	Noise pollution	Plantation, Regular Maintenance of dumpers	Plantation, Regular Maintenance of Dumpers
5.	Solid waste / Tailings	Not applicable	Not applicable
6.	Land degradation	Not applicable	Not applicable
7.	Erosion & Sediment	Plantation	Plantation
8.	Top soil	Not applicable	Not applicable
9.	Ground vibration	No Blasting	To be continued
10.	Wildlife conservation	Plantation	Plantation
11.	Forest protection	No forest exists within leasehold boundary	No forest exists within leasehold boundary
12.	Others (specify)		

[\* As applicable]

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

**42. Compliance with environmental safeguards (For existing units)**

A	Status of the compliance of conditions of environmental clearance issued by MoEF, if any, enclosed.	--
B	Status of the compliance of 'Consent to Operate' issued by SPCB, if any, enclosed.	--
C	Latest 'environmental statement' enclosed.	--

**43. Scoping of EIA**

A	Whether environmental impact assessment of the project has been carried out by following scoping process?	Yes
B	If yes, a copy of scoping of EIA annexed.	TOR Given as Annexure - I

**44. Mine closure**

A	Have you planned mine closure?	Yes
B	Submitted a conceptual mine closure plan.	Yes
C	If yes, indicate estimated amount for implementing the same (in Rs. Lakhs/annum)	4.57

**45. Capital cost of the project (in Rs. Lakh)  
(Based on latest estimate)**

34.29 Lakh (additional)

**46. Cost of environmental protection measures**

(in Rs. Lakh)

Sl. No.	Particulars of Revenue Expenditure	Total Annual Cost (Rs in Lakhs)	Unit Cost (Rs/m <sup>3</sup> )
1	Pollution control	45.00	3.00
2	Environmental monitoring	30.00	2.00
3	Occupational health	30.00	2.00
4	Avenue plantation along sand transport route	6.00	0.40
5	Community development	30.00	2.00
	Total	171.00	9.40

**47. Amount earmarked for socio-economic welfare measures for the nearby villages other than R&R plans.**

2 % of the average profits of CIL for the last 3 preceding years or Rs 5/- per tonne of coal produced whichever is higher will be earmarked for community development and socio-economic measures under CSR.

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#### 48. Public Hearing

		PH1	PH2	PH3
<b>A</b>	Date of Advertisement	09/06/2015		
<b>B</b>	Newspapers in which the advertisement appeared	"The Telegraph" & "Anand Bazar Patrika"	"The Telegraph" & "Anand Bazar Patrika"	"The Telegraph" & "Anand Bazar Patrika"
<b>C</b>	Date of public hearing (DD/MM/YYYY)	10/07/2015	14/07/2015	24/07/2015
<b>D</b>	Public Hearing Panel chaired by & members present	Shri N. T. Taso Lepcha, W.B.C.S. (Exe), Additional District Magistrate (Gen), District – Bankura	Sri Hrishikes Mudi, W.B.C.S. (Exe), Additional District Magistrate (ZP), District – Burdwan	Sri P. K. Maiti, Additional District Magistrate (Dev), District – Purulia
<b>E</b>	No. of people attended the public hearing meeting and number of people from the lease area	200	300	250

(f) Summary/details of public hearing in tabular form.

#### **PH1: PH Proceedings at Meeting Hall of Mejia Panchayat Samity District – Bankura, West Bengal**

Sl. No.	Issues Raised	Commitment of Project Proponent regarding Action taken / to be undertaken	Suggestion of Panel Members
1	<b><u>Sri. Biswajit Mukherjee of Village-Bhara</u></b> welcomed the project and requested the project proponent to look after the additional employment opportunity and road development of the locality.	<b><u>General Manager, Satgram Area, ECL</u></b> appreciated the concern expressed by the different participants and welcomed their suggestions. He informed that water required for sand mining will be re-circulated and there is no chance for contamination with the ground or surface water. He also assured that more plantation	<b><u>Shri N.T. Taso Lepcha, W.B.C.S. (Exe.), Additional District Magistrate (Gen), Bankura</u></b> emphasized that all possible measures should be ensured by the project proponent towards the mitigation of all environmental hazards and various points raised by the people present in the hearing. The project is welcomed only after incorporation of all the
2	<b><u>Sri. Ashish Kumar Daw of village-Majit</u></b> welcomed the project and mentioned that ECL is doing sand mining for more than 20 years and no such pollution related problems are faced by the local public. He also mentioned that sand stowing is required to protect the surface from subsiding and to maintain mine safety. He also requested the project proponent to develop a community hall in the locality.		

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

Sl. No.	Issues Raised	Commitment of Project Proponent regarding Action taken / to be undertaken	Suggestion of Panel Members
3	<b><u>Sri. Ramniranjan Acharya of village-Bhara</u></b> mentioned that coal is essential for development of industries in the locality and the area as a whole for potential development of industries. He requested the project proponent for overall development of the locality including road development community centre and development of local schools.	programme will be taken up shortly and preferences will be given to the local people for employment. He also mentioned that the issues raised by the various participants will be addressed adequately before finalizing the environmental management plan.	pollution control measures and Corporate Social Responsibility programme proposed by the project proponent. He assured the audience that the proceedings of the public hearing shall be dully forwarded to the MoEF&CC, Govt. of India and further expressed his gratitude to the audience for their active participation in the public hearing.
4	<b><u>Sri. Rampada Pal of village-Kalidaspur , Sri. Biswajit Roy of village-Bhara and Sri. Mukul Biswas of village- Majit</u></b> requested the project proponent for development of community hall in the locality.		
5	<b><u>Sri. Malay Mukherjee of village-Meija</u></b> informed that ECL has already taken steps for road development and he requested that more plantation to be developed in the locality and development of local infrastructure should be done in consultation with the local Panchayat.		

**PH2: PH Proceedings at Panchayat Samity Meeting Hall of Raniganj Panchayat Samity District – Burdwan, West Bengal**

Sl. No.	Issues Raised	Commitment of Project Proponent regarding Action taken / to be undertaken	Suggestion of Panel Members and Local Representatives
1	<b>Sri C.Ghosh of Ramprasadpur</b> stated that the experience of the local residents regarding effects of on- going sand mining activity in the area is very bad. Air pollution generated during transport of sand in uncovered condition by very old vehicles causes serious problem for the local people. Road conditions are horrible due to heavy transport load	<b>Shri S.Banerjee, General Manager of Kunustoria Area of ECL</b> assured the gathering that they will ensure that sand is transported in totally covered trucks and water sprinkling will be done regularly in order	<b><u>Sri S.Mondal, Savapati, Raniganj Panchayat Samity</u></b> expressed his concern about the fact that about 150- 200 acres of agricultural land in Narayankuri area has already been submerged by the river due to change of river course; he requested

Sl. No.	Issues Raised	Commitment of Project Proponent regarding Action taken / to be undertaken	Suggestion of Panel Members and Local Representatives
	<p>and efforts for maintenance of such roads have never been initiated by the ECL authorities. Sri Ghosh further stated that accidents due to bad road conditions submergence of agricultural land as well as playground in the river course due to unlawful sand mining near the embankment are regular phenomena in the adjoining area. He requested the PP to ensure that the conditions of local roads are maintained in good condition and proper steps are taken so that the biodiversity along the bank of the river is not affected by their proposal sand mining activity. He further requested the PP to ensure that proper replenishment of deposited sand is allowed between two successive mining seasons in order to avoid permanent damage to the riverbed leading to diversion of course of river and other related environmental nuisances. Sri Ghosh finally requested the ECL authorities to initiate extensive CSR activities in and around the proposed project site for the overall socio economic development of the area.</p>	<p>to prevent fugitive emission during sand transportation. Sri Banerjee further assured that the whole process of sand excavation from the river bed will be executed following most modern guidelines in order to ensure that there is no adverse effect on the river course, its embankment, the bridges on the river and the local biosphere as well; he assured that they will excavate only the amount of sand annually which will be replenished naturally during the next monsoon season and under all circumstances excavation up to the permissible depth will be strictly followed. Sri Banerjee also assured</p>	<p>the ECL authorities as well as the local administration to initiate proper measures to prevent further loss of agricultural land in this manner. The Savapati further stated that indiscriminate dumping of over burden originating from different mining projects of the locality in and around the river bed has also contributed to such nuisance. He further requested all concerned to ensure easy availability of sand for the local construction works. Finally Sri Mondal requested the ECL, authorities to initiate extensive CSR activities including development of local infrastructure, maintenance of local roads, plantation program, up-gradation of local schools and health centres etc.; he further requested them to involve the local administration as well as local public representatives in such endeavors.</p>
2	<p><b>Sri P. Bhattacharya of Madanpur</b> stated that he has lost major portion of his agricultural land near the embankment due to submergence in the river course due to unlawful sand mining. He requested the ECL authorities as well as the local administration to arrange for compensation for land losers like him. Sri Bhattacharya further stated that large number of plots of agricultural land situated on the two sides of the road through which</p>	<p>the gathering that ECL authorities will continue their road repairing and construction activities to ensure that the road conditions do not deteriorate to cause trouble to the local residents. He further assured the gathering that they will continue their CSR activities involving the local</p>	<p><b><u>Addl. District Magistrate (Zilla Parishad), Dist. Burdwan</u></b> requested the PP to explore the possibility of utilizing fly ash instead of sand for stowing of mines. The ECL representatives informed that there are some inherent technical difficulties for such change over. At this the ADM requested them to</p>

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

Sl. No.	Issues Raised	Commitment of Project Proponent regarding Action taken / to be undertaken	Suggestion of Panel Members and Local Representatives
	<p>sand transportation is done have lost their fertility due to deposition of layer of sand on them caused by such indiscrimination sand transportation in uncovered condition. He further requested the ECL authorities as well as the local administration to address this issues immediately.</p>	<p>administration and representatives of local people.</p>	<p>furnish relevant documents in support of their claim. He requested the local residents to submit specific written proposals to him regarding their views about different aspects of the proposed projects as well as on-going sand mining activity in the locality which were being discussed during the public hearing.</p>
3	<p><b>Sri. U. Dhibar of Vill-Nupur and Member, Ballavpur Gram Panchayat</b> stated that he was not informed well in advance about the schedule of the Public Hearing and requested the ADM to call for an administrative meeting involving the respective Panchayat Pradhans to discuss the issues related to the proposed project. The ADM requested Sri Dhibar to submit a written application to him regarding this issue.</p>		<p>He requested the ECL authorities and Sri S. Ganguly , Environmental Engineer, West Bengal Pollution Control Board to confirm whether all concerned were informed about the Public Hearing according to the guidelines given in the EIA Notification S.O. 1533 dated 14<sup>th</sup> September , 2006 of the Ministry of Environment &amp; Forest, Govt of India and requested Sri Ganguly to submit the relevant documents in this regard to the ADM as soon as possible. Sri Ganguly assured that the same has been done strictly as per the Notification and committed to submit the relevant documents to the ADM at the earliest.</p>
4	<p><b>Shri P. Khan of Vill- Narayankuri of Egara Gram Panchayat</b> stated that sand mining is being conducted in their area for atleast a decade and two. Sri Khan expressed his grievance regarding very bad road condition of the area , laqck of initiatives regarding plantation program and implementation of CSR ptogram by ECL authorities. Sri Khan further informed the audience that localized indiscriminate mechanical mining of sand has led to dangerous depth in some spots in the river bed in their locality which may lead to serious accident at any time. He requested the ECL authorities and the local administration to look in to the matter immediately. He further stated that due to indiscriminate</p>		<p>He also requested the ECL authorities to ensure that each of their sand carrying vehicles can be properly identified through clearly visible dedicated holograms</p>

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

Sl. No.	Issues Raised	Commitment of Project Proponent regarding Action taken / to be undertaken	Suggestion of Panel Members and Local Representatives
	pumping of water from the river for water supply project of Raniganj municipal area the natural river course may get affected seriously; they requested the ADM to intervene in this matter and initiate remedial measure in this regard at the earliest.		etc. and the local administration should be informed in detail about the vehicles which are dedicated for their sand excavation and transport of the same. The ADM expressed his hope that this will be effective for identifying and controlling illegal sand mining.
5	<b>Sri D.Paul of Vill — Nupur and Sri K. Banerjee of Ramprasadpur</b> expressed their grievances regarding terrible road condition and lack of maintenance of the same, erosion of land due to illegal sand mining inside the river course as well as near the embankment, air pollution caused during sand transportation in uncovered vehicles and lack of CSR activities. Sri Banerjee also stated that the roads in concern has become very narrow due to illegal encroachment leading to regular accidents and inconvenience to the local residents. He also complained that the local people are confused regarding who is the appropriate authority to approach for addressing such problems since it is not clear to them whether the onus lies with the local administration or the ECL authorities. Addl. District Magistrate (Zilla Parishad), Dist. Burdwan requested them to submit written representation in this regard addressing the District Magistrate, Burdwan.		At the end, he emphasized that all possible measures should be ensured by the project proponent towards the mitigation of environmental problems and implementation of CSR commitments. Finally, Addl. District Magistrate expressed his gratitude to the audience for their active participation in this public hearing and concluded the session. <b><u>Shri S.Ganguly, Environmental Engineer, West Bengal Pollution Control Board</u></b> suggested that the project proponent should include all the issues discussed in the public hearing, in the final EIA/EMP report and address the issues properly during implementation of the project. He further assured the audience that the deliberations presented by the audience in the hearing are being recorded and unedited videography of the whole proceedings will be forwarded to the appropriate authorities for their
6	<b>Sri N.Mondal and Sri P.Mondal of Vill — Nupur</b> requested the ECL authorities as well as local administration to formulate a realistic compensation package for those who has lost their agricultural land		

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

Sl. No.	Issues Raised	Commitment of Project Proponent regarding Action taken / to be undertaken	Suggestion of Panel Members and Local Representatives
	due to unscientific and illegal sand mining inside the river course as well as near the embankment and implement the same at the earliest.		consideration. Sri Ganguly also mentioned that West Bengal Pollution Board will upload the proceedings of the public hearing to their website.
7	<b>Sri Dinanath Mondal of Vill — Nupur</b> requested the ECL authorities to plan their sand transportation route in such a way so that transportation through local villages can be avoided.		

**PH3: PH Proceedings at The "Sampriti Sadan", Panchayat Samity Hall, Neturia, District — Purulia, West Bengal**

Sl. No.	Issues Raised	Commitment of Project Proponent regarding Action taken / to be undertaken	<u>Suggestion of Panel Members and Local Representatives</u>
1	<b><u>Shri Karunamoy Singh of Neturia village</u></b> mentioned that roads in the locality are damaged due to transportation of overloaded trucks with sand, coal etc. He requested the administration to look into the matter and for maintenance of roads.	<b><u>Shri S. R. Bharti, General Manager, M/s. Eastern Coalfields Limited</u></b> appreciated the concern expressed by the different participants and welcomed their suggestions. He informed that M/s. Eastern Coalfields Limited being a Govt. of India company undertakes lot of social activities through CSR programme. He welcome all the suggestions and mentioned that all the commitment will be fulfilled during the execution of the	<b><u>Shri K. P. Yadav, Shabhapati, Neturia Panchayat Samity</u></b> requested the district administration for taking steps to prevent illegal sand mining in the locality. <b><u>Sri P. K. Maiti, Additional District Magistrate (Dev.), Purulia</u></b> emphasized that all possible measures should be ensured by the project proponent towards the mitigation of all environmental hazards and various points raised by the people present in the hearing. The project is welcomed only after incorporation of all the pollution control
2	<b><u>Shri Shibram Chakraborty of Simulia village</u></b> informed that overloaded truck carrying sand without any cover are plying in the locality for transportation of sand from the mined area, damaged Rabindra Setu, a local bridge. He requested for necessary action to repair the bridge and also demanded that		

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

<b>Sl. No.</b>	<b>Issues Raised</b>	<b>Commitment of Project Proponent regarding Action taken / to be undertaken</b>	<b><u>Suggestion of Panel Members and Local Representatives</u></b>
	no trucks should be allowed to ply without proper cover.	project.	measures and Corporate Social Responsibility programme proposed by the Project Proponent.
3	<b><u>Shri Arup Mishra of Parbelia village</u></b> wanted to know why M/s. Eastern Coalfields Limited is going for sand mining.		He requested the project proponent to extend their CSR activity for development of the adjoining area.
4	<b><u>Shri Ujjal Das of Vamuria village</u></b> requested M/s. Eastern Coalfields Limited authority to provide electricity, water supply and maintenance of road in the nearby area through their CSR activity.		The public hearing was concluded by Sri P. K. Maiti, Additional District Magistrate (Dev.), Purulia with thanks to the audience.

**49. Whether the following approvals\* (wherever applicable) have been obtained?**

I	Site clearance from MoEF	Not Required
II	'Consent for Establishment' from the State Pollution Control Board	PH held on ..... Consent to establishment will be obtained from WBPCB after grant of EC..
III	'Consent to Operate' from the State Pollution Control Board	TWP obtained from Consent to operate will be obtained from WBPCB after grant of EC.
IV	NOC from Atomic Mineral Division	Not Applicable
V	NOC from Atomic Mineral Division	Not Applicable
VI	In case of existing mines, mining scheme approval from IBM	Not Applicable
VII	Forestry clearance under FCA, 1980	Not Applicable
VIII	NOC from Chief Controller of Explosives	Not Applicable
IX	Commitment regarding availability / pumping of water from the concerned Authorities	Not Applicable
X	In case of ML area falling in notified areas of the Central Ground Water Authority, NOC from them.	Not Applicable

[\* Annex copies of approvals and number them]

Proforma (Questionnaire) for Composite Plan of Sand Mining in the Riverbed of Damodar River  
(15 Sand Mining Stations having total area of 86.58 Ha & Peak Sand Extraction Capacity of 1.5 Million m<sup>3</sup>/year)

**50. Was / is there any court case relating to the project or related activities?  
If so, provide details present status.**

No, There is no court case related to any of the mines within the cluster.

**Verification:** The data and information given in this proforma are true to the best of my knowledge and belief.

Date:

**General Manager (JK Ropeways)**

Place:

**Eastern Coalfields Limited**

**PO-Kajoragram, District-Burdwan,**

**West Bengal PIN: 713380**

(Given under the seal of organisation on  
behalf of whom the applicant is signing)

# Annexures

<b>Annexure No.</b>	<b>Description</b>
I	Terms of Reference
II	Documents in support of Lease and Temporary Working Permits
III	Minutes of Meeting of the Sub-Committee ECL Board for “Evaluation, Appraisal and Approval of Projects” – Approval of Composite Sand Mining Plan in Ajoy & Damodar Riverbed
IV	Public Hearing Proceedings held in Bankura, Purulia & Burdwan Districts

# Annexure – I

## “Terms of Reference”



**No. J-11015/268/2012-IA.II (M)**  
Government of India  
Ministry of Environment and Forests  
IA Division

**By Speed Post**

Paryavaran Bhavan  
C.G.O. Complex, Lodi Road  
New Delhi-110 003  
Telefax: 011-2436 0795

Dated: 29<sup>th</sup> January, 2014

To,  
✓ **M/s Eastern Coalfields Limited,**  
Barachak House, P.O. Sitarampur,  
District Burdwan -713359.  
West Bengal.

Ph. 0341-2254510; email [envecl@yahoo.com](mailto:envecl@yahoo.com)

**Sub.: Composite Sand Mining by M/s. Eastern Coalfields Ltd., located at Eastern Coal fields Ltd. PO - Sanctoria, Dist- Burdwan, West Bengal. (86.58 ha)- Prescribing TORs regarding.**

This has reference to your letter No ECL/ENV/Corres/13/431 dated 06<sup>th</sup> November, 2013 regarding prescribing TORs for undertaking detailed EIA study for the purpose of obtaining environmental clearance in accordance with the provisions of the EIA Notification, 2006. For this purpose, the Proponent had submitted information in the prescribed format (Form-1) along with a Pre-feasibility Report. The proposal was considered by the Reconstituted Expert Appraisal Committee in its 11<sup>th</sup> meeting held during September, 25-27, 2013 and 13<sup>th</sup> meeting held on 12<sup>th</sup> November, 2013.

2. The proposal is for River sand mining by M/s. Eastern Coalfields Ltd. with production capacity of 1.5 million m<sup>3</sup> per annum in the mine lease area of 86.58ha. The mine is located over a stretch of 42 kms in Damodar River bed in the District-Burdwan, West Bengal. The sand is required for the purpose of stowing in underground mines of Eastern Coalfields Ltd. In Raniganj Coalfield.

3. Based on the information content in the documents submitted and the presentation made before the Committee for mining projects, the following TORs are prescribed for undertaking detailed EIA study:-

- 1) Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification, 1994 came into force w.r.t. the highest production achieved prior to 1994.
- 2) A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.
- 3) All documents including approved mine plan, EIA and public hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management and mining technology and

- should be in the name of the lessee.
- 4) All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery/toposheet should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).
  - 5) Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/violation of the environmental or forest norms/conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large may also be detailed in the EIA report.
  - 6) Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.
  - 7) The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc should be for the life of the mine / lease period.
  - 8) Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.
  - 9) Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.
  - 10) A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.
  - 11) Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.
  - 12) Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.
  - 13) The vegetation in the RF / PF areas in the study area, with necessary details, should be given.
  - 14) A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly detailed mitigative measures required, should be worked out with cost

- implications and submitted.
- 15) Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Tiger/Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the State Wildlife Department/Chief Wildlife Warden under the Wildlife (Protection) Act, 1972 and copy furnished.
  - 16) A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.
  - 17) Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Dept. Should be secured and furnished to the effect that the proposed mining activities could be considered.
  - 18) R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village located in the mine lease area will be shifted or not. The issues relating to shifting of Village including their R&R and socio-economic aspects should be discussed in the report.
  - 19) One season (non-monsoon) primary baseline data on ambient air quality ( $PM_{10}$ ,  $SO_2$  and  $NO_x$ ), water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of  $PM_{10}$ , particularly for free silica, should be given.
  - 20) Air quality modelling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modelling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.

- 21) The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.
- 22) Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.
- 23) Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.
- 24) Impact of the project on the water quality, both surface and groundwater should be assessed and necessary safeguard measures, if any required, should be provided.
- 25) Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.
- 26) Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.
- 27) Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and bgl. A schematic diagram may also be provided for the same.
- 28) A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the project.
- 29) Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered.
- 30) Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA report.
- 31) Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.
- 32) A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given.
- 33) Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP.


- 34) Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.
- 35) Measures of socio economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.
- 36) Detailed environmental management plan to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.
- 37) Public hearing points raised and commitment of the project proponent on the same along with time bound action plan to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.
- 38) Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the project should be given.
- 39) The cost of the project (capital cost and recurring cost) as well as the cost towards implementation of EMP should clearly be spelt out.
- 40) Details of replenishment studies
- 41) Details of Transportation of mined out materials as per the Indian Road Congress for both the ways (loaded as well as unloaded trucks) load and its impact on Environment
- 42) Proper species specific Conservation plan for Schedule-I and II species
- 43) Impact of mining on plankton
- 44) Details of mining activity to be provided w.r.t Block Wise/ Calendar wise/ Zone wise, as the mine lease area is having a long stretch
- 45) Details of Gradient of river bed to be provided
- 46) Details of excavation schedule & sequential mining plan to be indicated
- 47) Mining Plan shall be prepared carefully, dividing lease area into manageable blocks to ensure scientific and systematic mining of minor minerals
- 48) The base line data shall be collected so as to represent the whole mine lease area.

4. Besides the above, the below mentioned general points are also to be followed:-

- a) All documents to be properly referenced with index and continuous page numbering.
- b) Where data are presented in the report especially in tables, the period in which the data were collected and the sources should be indicated.
- c) Where the documents provided are in a language other than English, an English translation should be provided.
- d) The Questionnaire for environmental appraisal of Industrial projects as devised earlier by the Ministry shall also be filled and submitted.
- e) While preparing the EIA report, the instructions for the proponents and instructions for the consultants issued by MoEF vide O.M. No. J-11013/41/2006-IA. II(I) dated 4<sup>th</sup> August, 2009, which are available on the website of this Ministry, should also be followed.
- f) Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the F.R for securing the TOR) should be brought to the attention of MoEF with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure

and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation.

- g) As per the circular no. J-11011/618/2010-IA.II(I) dated 30.5.2012, you are requested to submit certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project by the Regional Office of Ministry of Environment & Forests, if applicable.
5. The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.
6. The prescribed TORs would be valid for a period of two years for submission of the EIA/EMP reports, as per the O.M. No. J-11013/41/2006-IA.II(I) dated 22.3.2010.
7. After preparing the draft EIA (as per the generic structure prescribed in Appendix- III of the EIA Notification, 2006) covering the above mentioned issues, the proponent will get the public hearing conducted and take further necessary action for obtaining environmental clearance in accordance with the procedure prescribed under the EIA Notification, 2006.

  
(Dr. V.P. Upadhyay)  
Director

**Copy to:**

- 1). **The Secretary**, Ministry of Mines, Government of India Shastri Bhawan, New Delhi.
- 2). **The Secretary**, Department of Environment, Government of West Bengal, Kolkata.
- 3). **The Secretary**, Department of Mines, Government of West Bengal, Secretariat, Kolkata.
- 4). **The Secretary**, Department of Forests, Government of West Bengal, Kolkata.
- 5). **The Additional Principal Chief Conservator of Forests**, Ministry of Environment & Forests, Regional Office (EZ), A/3, Chandra Shekar, Bhubneshwar-751 023.
- 6). **The Chairman**, Central Pollution Control Board, CBD-Cum-Office Complex, East Arjun Nagar, New Delhi-110 032.
- 7). **The Chairman**, West Bengal State Pollution Control Board, Paribesh Bhawan, 10A- Block LA, Sector -III, Salt Lake City, KOLKATTA - 700 098.
- 8). **The Member Secretary**, Central Ground Water Authority, A2, W3 Curzon Road Barracks, K.G. Marg, New Delhi-110001.
- 9). **The Controller General**, Indian Bureau of Mines, Indra Bhavan, Civil Lines, Nagpur-440 001.
- 10). **The District Collector**, Burdwan District, West Bengal.
- 11). **Guard File.**
- 12). **MoEF website**

(Dr. V.P. Upadhyay)  
Director

**Annexure – II**  
**“Documents in support of  
Lease and Temporary  
Working Permits”**

111

GOVERNMENT OF WEST BENGAL  
COMMERCE & INDUSTRIES DEPARTMENT  
GROUP 'E'.

Memo No. 415-CI/E/31-96/99

Calcutta, the 6th August, 1999.

From :- The Deputy Secretary to the Govt. of West Bengal.

To :- The General Manager (L&E),  
Eastern Coalfields Ltd.  
(a Subsidiary of Coal India Limited),  
Sanctoria, P.O. Disergarb,  
Dist. Burdwan. PIN - 713333.

Sib: Grant of Temporary Working Permit for  
extraction of sand for stowing purpose  
to Eastern Coalfields Ltd. for a  
period of 6 (six) months.

Ref: His letter No. ECL/CMD/DEL/ Mining Lease  
(Sand)/34/779 dated 24.7.99.

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The undersigned is directed to inform you that the State Government in the Commerce & Industries Department has been pleased to grant Temporary Working Permit, as a special case, to M/s. Eastern Coalfields Limited (ECL) of Sanctoria, P.O. Disergarb, Dist. Burdwan, West Bengal for extraction of sand for stowing purpose in respect of an area of 1694.06 acres as mentioned in the Annexure enclosed with this grant order and as requested by ECL.

The grant of Temporary Working Permit is subject to the following terms and conditions :-

- (i) Sand extracted for stowing purpose, being a major mineral, shall not be used for any other purpose by the ECL.
- (ii) ECL shall submit formal application in the prescribed manner/as envisaged in the Mines and Minerals (Regulation and Development) Act, 1957 and the Mineral Concession Rules, 1960 for grant of long-term Mining Lease for extraction of sand for stowing purpose to the State Government at the earliest. Such application for grant of Mining Lease shall be accompanied by duly approved Mining Plan. The State Government will be at liberty to refuse further grant of Temporary Working Permit for extraction of sand for stowing purpose to ECL if the latter fails to submit application for long-term Mining Lease before the expiry of the validity of this Permit.
- (iii) ECL shall submit monthly return to the State Government in this Department on the quantum of sand for stowing purpose lifted and despatched. Copies of such reports shall be forwarded to (a) the Director, Mines & Minerals, West Bengal, (b) Chief Mining Officer, West Bengal at Asansol and (c) District Land & Land Reforms Officer, Burdwan/Birbhum/Bankura. Monthly returns shall be submitted within the 10th day of the succeeding month.

- (iv) The work of extraction of sand for stowing purpose under this Permit shall be subject to periodical inspections by the authorized officers of the Office of the Chief Mining Officer, West Bengal at Asansol and the concerned District Land and Land Reforms Officers.
- (v) Each truck or any other vehicle carrying sand for stowing purpose for FGL shall carry Challans, duly authenticated. The said Challans shall be dated and marked forenoon/afternoon as the case may be. The challan shall also contain the details of routes on which the truck/vehicle may or will move.
- (vi) The extraction of sand for stowing purpose shall be undertaken in such a way that it does not endanger the adjoining villages or agricultural lands, if any, by soil erosion. FGL shall also take precautionary measures for protecting river embankments.
- (vii) No extraction of sand for stowing purpose shall be done :-
- (a) within 20 (twenty) metres from the banks of the rivers;
  - (b) within 200 (two hundred) metres, on both sides, of any river bridge, culvert, river embankments and structural installations of the Irrigation and Waterways Department;
  - (c) within 200 (two hundred) metres from any hydraulic structure, bridge, reservoir, canal, road, other public works or buildings except with the previous permission in writing of the Irrigation and Waterways Department and/or Public Works (Roads) Department;
  - (d) within 5 (five) kilometres from the barrage axis/dam axis.
- (viii) FGL shall submit a return in Form S.P.6 depicting opening stock, extraction of sand for stowing purpose (quarterly), Colliery-wise despatch of such sand (quarterly) and closing stock to this Department with copies to Director, Mines & Minerals, West Bengal, (b) Chief Mining Officer, West Bengal at Asansol and (c) the concerned District Land & Land Reforms Officer.
- (ix) FGL shall pay cess and other dues for extraction of sand for stowing purpose as assessed by the concerned District Land & Land Reforms Officer in terms of Notification No. 2697-I, dt. 31.12.93 of Law Department, Govt. of West Bengal and Notification Nos. 4844(45)-C&S and 4845-C&S both dated 23.7.99 of the Land & Land Reforms Department, Government of West Bengal.
- (x) FGL shall also pay Surface Rent and Ground Rent

This Temporary Working Permit for extraction of sand for stowing purpose in favour of the Eastern Coalfields Limited shall remain valid till 28.02.2000. The target of extraction of sand for stowing purpose by ECL during the period is fixed at 50820000 (Five Crore Eight Lakh twenty thousand) cubic feet (cft.). ECL shall pay an advance Royalty of Rs. 10,97,712.00 (Supers Ten Lakh Ninetyseven Thousand Seven hundred Twelve) only (calculated as per the rates of royalty on sand for stowing purpose fixed by the Ministry of Steel and Mines, Government of India in its Notification dated 5.5.1987). Such advance Royalty shall be remitted by Eastern Coalfields Limited in favour of the Government of West Bengal through Treasury Chellan under the Leads: 0023Land Revenue-00-104-002: Collection of royalties from mines and minerals.

Such remittance shall be made positively within 25.3.99 and a copy of the duly receipted chellan shall be furnished to the State Government in this Department. On payment of advance Royalty, as above, the Eastern Coalfields Ltd. will commence extraction of sand for stowing purpose as granted by this Temporary Working Permit.

This grant of Temporary Working Permit supercedes the temporary working permits, if any, granted in favour of Eastern Coalfields Ltd. by another authority.

*note: The detailed map should be submitted early.*

*encs:* Annexure showing the schedule of land in respect of which this Temporary Working Permit for extraction of sand for stowing purpose is granted in favour of ECL.

*R. S. Ghosh*  
Deputy Secretary  
to the Government of West Bengal

Mem No. 415/1(12)-CI/2/24-85/99 Date: 6.3.99.

Copy forwarded for information and necessary action to:-

- 1) Land Reforms Commission, Govt. of West Bengal, Writers Bldg., C.I.
- 2) Chairman-cum-Managing Director, Eastern Coalfields Limited, Jharkhand, F.O. Dispurah, Dist. Bardwan, PIN - 713333.
- 3) District Magistrate, Bardwan/Birbhum/Bankura.
- 4) Director, Mines & Minerals, West Bengal (with copy of enclosure).
- 5) Chief Mining Officer, West Bengal at Asansol (with copy of enclosure).
- 6) District Land & Land Reforms Officer, Bardwan/Birbhum/Bankura (with copy of enclosure).
- 7) Office copy.
- 8) Spare copy.

*R. S. Ghosh*  
Deputy Secretary.

Government of West Bengal  
Commerce & Industries Department  
Group 2

334 - 1/3

No: 95-GI/2/SL-95/99

dt. 24.3.2000

From: The Dy. Secy. to the Govt. of West Bengal.

✓ To : The General Manager (L&M)  
Eastern Coalfields Ltd.,  
Sectoria, NO. Disergarh  
Dist. Burdwan  
PIN: 713333  
FAX NO: 0341-202113

Sub: Permanent Mining Lease for extraction of  
stowing sand in the Damodar-Ajoy and Sankar  
river beds for various mines of Eastern  
Coalfields Ltd.

Sir,

With reference to your letter nos. ECL:CMD:LR:SL(Sand)  
195 dt. 9.2.2000 and ECL/CMD/L&M/1957 dt. 15.12.99 on the subject  
mentioned above, the following observations are made :-

- (i) The application for long term mining lease for  
extraction of sand for stowing sand in respect of  
the applied area may be made to the State Government  
through the Chief Mining Officer, Mining Estate Branch  
of the Directorate of Mines & Minerals, West Bengal  
at Asansol;
- (ii) The applications should be made afresh in the  
prescribed form;
- (iii) The fresh application should be accompanied by  
application fee of the required amount in the  
prescribed manner. The application fee is a  
non-refundable amount of Rupees five hundred only.

16/3/2000

You are advised to submit the application for the  
grant of mining lease for extraction of sand for stowing  
purpose with all connected papers, as prescribed under  
Mines and Minerals Development and Regulation) Amendment  
Act, 1999 and Mineral Concession (Amendment) Rules, 2000, to  
the State Government through the Chief Mining Officer,  
West Bengal at Asansol.

Pending submission of the fresh applications and  
their processing, I am directed to inform that the Temporary  
Working Permit for extraction of sand for stowing purpose  
granted by the State Government in favour of your Company  
under this Deptt. memo.no. 95-GI/2/SL-95/99 dt. 6.3.99 read  
subsequent letters is hereby extended for a further period  
of 6 (six) months till 30.3.2000. The terms and conditions  
of the extended temporary working permit will remain the same  
as stipulated in the memo number quoted above. The area to be  
covered is 1694.06 acres.

22-03-00  
R.  
11.3.2000

contd.....2.

Your Company shall raise 50,20,000 sqft of sand for stowing purpose during the period and shall remit an advance royalty of Rs. 1,00,7712.00 (Rupees ten lakh ninetyseven thousand seven hundred twelve) only positively within 10.03.2000. Your Company shall also pay the cess and other mining dues as prescribed and as assessed.

All concerned are informed appropriately.

Deposited vide Cheque No. 009540 of 16-03-2000 through Primary Collection on 18-03-2000 through S.B.S. Account

*[Handwritten signature]*  
1

Yours faithfully,

*[Handwritten signature]*  
Deputy Secretary. 7/3/2000

No. 25/1(14)1/1/3L-95/99 dt. 24.2.2000

Copy forwarded for information and necessary action to:-

- 1) Director of Mines & Mineral, West Bengal;
- 2-4) District Magistrate, Bankura/Burdwan/Birbhum;
- 5) Additional District Magistrate, Asansol;
- 6-8) District Land & Land Reforms Officer, Bankura/Burdwan/Birbhum;
- 9) Chief Mining Officer, Mining Estate Branch, District of Mines & Minerals, West Bengal at Asansol;
- 10) +12) Mining Officer-in-charge, Zonal Office of Mining Estate Branch, Purulia/Sixt Zone;
- 13) Office Copy
- 14) Guard File.

*[Handwritten signature]*  
Deputy Secretary. 7/3/2000

Government of West Bengal  
Office of the Chief Mining Officer  
Court Rd. P.O. Asansol, Dist. Burdwan.

Receipt of Applications for Prospecting Licence/Mining Lease or Renewal  
( See rules 10(4) and 23(4) )

Memo. No. 532 /CMO

At. Asansol, the 17/7/2000

To  
The Director (Tech) Operations  
ECL, Sanctonin  
P.O. Dighasjoshi  
At. Panchhat

Sl.No. Burdwan Major 21/12/2000

Received the application with the following enclosures  
for a Prospecting Licence/Mining lease/Renewal of Prospecting Licence/  
renewal of mining lease of Shri/Sarvashree The Director Operations, ECL  
on 13.7.2000 for about 6.50 hectare of land located in Village/  
Govt. Forest Parbelin Taluk Neturia District Panchhat for  
Prospecting/ mining Stony sand mineral / minerals.

1. Application - - in - form 1 - - - 1 Copies -
2. Plan - - - 1 Copies
3. Original T/c to application fee of Rs - 500/- dt. 5.7.2000 Paid in 3.5.2 - 1/2
4. Original T/c for Preliminary expense of Rs. 1000 dt. 5.7.2000 Paid in 2.8.2 - 1/2
5. Photo Copy of the affidavit dt. 3.7.2000 for up to date 2000-01-12
6. Photo Copy of the affidavit dt. 3.7.2000 for clearance of mining area
7. Photo Copy of the affidavit dt. 3.7.2000 for publication of mining lease
8. Photo Copy of S.T.C. dt. 24.6.2000 valid for one year
9. Land Schedule of the area applied for -

Place : Asansol

Date :

Memo. No. \_\_\_\_\_ /CMO dt.

  
Chief Mining Officer  
West Bengal.

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Copy to :- The Assistant Secretary, Mines Branch, C & I. Deptt. G.O.E  
Writers' Buildings, Calcutta- 1, for information.

Chief Mining Officer  
West Bengal.

2/9/2000  
Eastern Coalfields Ltd. HQ

Government of West Bengal  
Commerce & Industries Department  
Group - II

Memo. No. 444 -CI/E/L-95/99. Dated : 31.3.2000.

From : The Joint Secretary to the Govt. of West Bengal.

To : The General Manager ( Lia ),  
Eastern Coalfields Ltd.,  
Sanctaria, P.O. Disergaon,  
Dist. Burdwan,  
PIN : 713333  
FAX NO : 0341-~~0000~~ ~~520455~~ 520455.

Subject: Permanent Mining Lease for extraction of stowing sand  
in the Damodar -Ajoy and Barakar river beds for various  
Mines of Eastern Coalfields Ltd.

Sir,

With reference to your letter no. dt. 29.3.2000 on the  
subject mentioned above, I am directed to inform you that your  
company's application for grant of mining lease for extraction of  
stowing sand is under process.

Pending final processing of your application, I am further  
directed to inform you that the Temporary Working Permit for  
extraction of sand for stowing purpose granted by the State Govt.  
in favour of your Company under this memo. no. 415-CI/E/L-95/99  
dated 6.3.99 read with subsequent letters and amended under this  
Deptt. memo. no. 95-CI/E/L-95/99 dt. 24.2.2000 is hereby extended  
for a further period of 9 (nint) months till 30.3.2000. The terms  
and conditions of the extended Temporary Working Permit will remain  
the same as stipulated in the memo. numbers quoted above. The  
area to be covered is 1094.06 acres.

Your Company shall raise 5000000 cft of sand for stowing  
purpose during the period and shall remit an advance royalty of  
Rs. 1097712.00 (Rupees ten lakh ninety seven thousand seven hundred  
twelve) only positively within 15.09.2000. The duly receipted  
cheques in original showing the payment of Rs. 1097712.00 may be  
furnished to this Department.

Your Company shall pay cess and other mining dues at the  
prescribed and as assessed. The Cess includes Rural Employment  
Cess, Primary Education Cess, PI Cess and Road Cess. Other mining  
dues includes Ground Rent, Surface Rent and Water Rent and Cess  
on such rents.

All concerned are informed accordingly.

Yours faithfully,  
*R. Kundu*  
Joint Secretary

Government of West Bengal  
Commerce and Industries Department  
Mines Branch  
4, Canal Street, Kolkata-700 016

No. 772-CI/O/Coal/002/02/M1 (Pt.)

Date: 31.12.2009.

From: The Assistant Secretary to the Government of West Bengal.

To: The Chief Mining Officer,  
Government of West Bengal,  
Court Road, P.O. Asansol,  
Dist. Burdwan.

Sub: Grant of mining lease on stowing sand to ECL.

In inviting the reference to the subject mentioned above he is directed to let this department know the present position as to the compliance with the requirements to grant mining lease on stowing sand to ECL, as decided in the meeting held on 07.07.2008 in the meeting hall of the ADM, Asansol. The decisions are follows:

- i) ECL will take clearance from MOEF, Government of India as a pre-condition to grant of mining lease;
- ii) Pollution Clearance has also to be obtained by ECL;
- iii) Availability report for 30 acres of land will be sorted out by Chief Mining Officer and District Land & Land Reforms Officer, Burdhum jointly and the out-come will be initiated to Government in the Commerce and Industries Department by Chief Mining Officer, West Bengal.

He is also directed to furnish a report to this department after ascertaining from ECL authorities their difficulties in complying with the requirements as decided in the meeting mentioned above.

This should be treated as most urgent and the intended report should reach this department within fifteen days from the date of receipt of this letter.

  
Assistant Secretary



GOVERNMENT OF WEST BENGAL  
Office of the Chief Mining Officer  
COURT ROAD, P. O. ASANSOL  
DIST. BURDWAN

Tele Fax: 0341-2252407

e-mail : [chiefminingofficer@gmail.com](mailto:chiefminingofficer@gmail.com)

Memo. No. 12 /CMO  
XXXIII/S/78

Dated Asansol, the 12<sup>th</sup> Jan., 2010.

To  
The Director (Technical), P&P,  
Eastern Coalfields Ltd.,  
Sanctoria, P.O. Dishergarh,  
Distt. - Burdwan (713333).

**Subject- Grant of mining lease on stowing sand in favour  
of ECL.**

Sir,

Pursuant to Notification No. S.O. 1533 dt. 14.09.2006 of the Ministry of Environment & Forest, Government of India prior 'Environmental Clearance' from the Ministry of Environment & Forest, Government of India is necessary before grant of mining lease for stowing sand over an area of 1796.34 acres in the river beds of Damodar and Ajoy in this State.

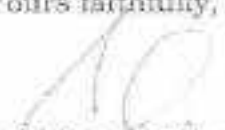
In a meeting in connection with stowing sand held on 07.07.2008, the Joint Secretary to the Govt. of West Bengal, C&I Deptt. requested ECL authorities to furnish the said clearance for early grant of mining lease.

Since you have not yet furnished such clearance certificate, the Govt. directs the undersigned to ascertain from you the difficulties you are facing in complying with the requirements as sought for. A copy of Memo. No. 772-CI/O/Coal/002/MI(Pt.) dt. 31.12.2009 of the Asst. Secy., C&I Deptt. addressed to the undersigned in this regard is enclosed for your ready reference.

You are requested to intimate the undersigned your views at an early date.

Encl : As stated.

Yours faithfully,

  
Chief Mining Officer  
Govt. of West Bengal



**EASTERN COALFIELDS LTD.**

(A SUBSIDIARY OF COAL INDIA LTD.)

SANCTORIA P.O. DISHERGARH

DIST. BURDWAN - 713333 (W.B.)

(0341) 523 576-78, 520 052-53, 523 579

GRAM : EASTCOAL FAX : 0341 520 495

Ref: ECL/CMD/LRE/127/M-Plan/ 91

Dated: 8.2.2010.

To:

General Manager (Environment)  
Eastern Coalfields Limited

Dear Sir,

**Sub: Clearance from MOEF and Pollution Clearance  
for Mining Lease for Stowing Sand**

This is to inform you that ECL had applied for permanent mining lease for extraction of stowing sand from the river beds of Ajay, Damodar & Barakar vide our letter no. ECL/CMD/LRE/Mining Lease (Sandy)933 dt. 12.7.2000 addressed to the Dy. Secretary, Govt. of West Bengal, C & I Dept., Cell - MI, Writers' Bldg., Kolkata - 700001 through the Chief Mining Officer, Govt. of West Bengal, Asansol - 713304 with all the requisite enclosures & Challan regarding the issue of Permanent Mining lease in the Districts of Burdwan, Birbhum, Bankura & Purulia. Subsequently, ECL had also submitted the Mining Plan duly approved by the Government of India, MOC.

Now, the Government of West Bengal asked to take clearance from MOEF. The copy of the said letters of CMC & Assistant Sec Govt. of WB are enclosed here with for your ready reference, which is self-explanatory.

You will kindly appreciate that Sand can not be considered as Minor mineral as per the provision of Rule 70 under "The Mineral Concession Rules 1950" only for its uses i.e. for the purpose of stowing in coal mines. Whereas, the same sand is being extracted as minor mineral from riverbeds of different rivers of West Bengal over several years as per the provisions of WBMM Rules. Further, Sand, as minor mineral, is being extracted from the same riverbed since very long years for various purposes by different agencies and with the help of same technique. ECL is also taking sand from different riverbeds for the purpose of stowing sand since last 57 years without clearance of MOEF and no adverse effect had been noticed till date.

In light of above, you are hereby requested to kindly take up the matter with the appropriate authority of MOEF whether any clearances is required for this purpose or not.

Yours faithfully,

  
General Manager (LRE)

Enc: As above

Copy to:

- D (DPP, ECL) / DT (OP) ECL
- GM (CS&R), JK Ropeways
- IS to CMD

Office Copy



## EASTERN COALFIELDS LTD.

(A SUBSIDIARY OF COAL INDIA LTD.)  
SANCTORIA, P.O. DISHERGARH  
DIST. BURDWAN - 713333 (W.B.)  
(0341) 523-526-78, 523-524-83, 523-528  
GRAM : EASTCOAL. FAX : 0341 528 469

ECL/CMD/LRE/127-SAND/93

Dated 10.02.2010

To,

Chief Mining Officer  
Govt of West Bengal  
Asansol

Dear Sir,

Sub: Grant of Mining Lease on stowing sand in favour of ECL

This has reference to your memo no 12/xxx/ILS/78 dated 12.01.2010 on the above subject, please consider our following points and arrange to issue the Mining Lease for extraction of stowing sand :-

- We had applied for permanent mining lease for extraction of stowing sand from the river beds of Ajay, Damodar-Barakar vide our letter no. ECL/CMD/LRE/Mining Lease (Sand)/933 dt. 12.7.2000 addressed to the Dy. Secretary, Govt. of West Bengal, C & I Dept., Cell - MI, Writers' Bldg., Kolkata - 700001 through the Chief Mining Officer, Govt. of West Bengal, Asansol - 713304 with all the requisite enclosures & challan regarding the State of Permanent Mining Lease in the Districts of Burdwan, Birbhum, Bardhaman & Murshidabad.
- The then Joint Secretary Govt of WB, C&I Department had asked to submit the Mining Plan for 1196.34 acrs, duly approved by Central Government vide memo no 106 dated 27.02.2001 which has been complied with by ECL. The copy is enclosed for your ready reference.
- After lapse of several years, during meeting on 07/07/2008 at Asansol Joint Secretary Govt. of WB told about the clearances of MOEF in this regard, but no minutes of the meeting had been issued.

Over and above some technical points, as appended below, may also be considered to issue the Mining Lease for extraction of stowing sand without such clearances:-

1. Sand can not be considered as Minor mineral as per the provision of Rule 7(i) under The Mineral Concession Rules 1960 only for its uses i.e. for the purpose of stowing in coal mines. Whereas, the same sand is being extracted as minor minerals from river beds of different rivers of West Bengal over several years as per the provisions of WBRMM Rules.
2. Extraction of sand from riverbed is not a in-situ removal of mineral like mining of other major mineral like coal. After each extraction of sand from riverbed further deposition of sand occurs and it is a natural phenomenon.

Contd 2

3. Sand is being extracted only from the centre of the riverbed and not beyond the permissible limit as per the statute without damaging embankment.
4. Sand, as minor mineral, is being extracted from the same riverbed since very long years for various purposes by different agencies and ECL is also taking sand from different riverbeds for stowing purpose, since last 35 years with the help of same technique and no adverse effect had been noticed till date.
5. No water or air pollution is done for this extraction of stowing sand.
6. As wet sand is being extracted there is no chance of dust pollution.
7. For submission of EIA/EMP documents for clearance from MOEF it will be very difficult to provide required data like studies of flora and fauna and it will take much time to study or field survey.
8. It will be also very difficult for ECL to conduct public hearing as these 1196.34 acres is not a continuous area, rather it is spread over in different locations.
9. Stowing in coal mines is a continuous process and is necessary not only for protection of surface features but also for providing safety in the mines and to the mine workers. Delay in issuing/granting of mining lease for stowing sand will jeopardize this purpose.

In light of above, you are requested to look into the matter and kindly arrange to grant the mining lease for extraction of stowing sand.

Yours faithfully,

General Manager (LRE)

Enc. As above

Copy to

- D(T) PP, ECL
- GM (Environment)
- GM (CS&R), JK Ropeways
- TS to CMD
- TS to D(T)OP, ECL

ईस्टर्न कोलफील्ड्स लिमिटेड  
(कोल इंडिया लिमिटेड का एक सहायक संस्था)  
अध्यक्ष सह प्रबंध निदेशक का कार्यालय  
संकतोड़िया पो- टीलेरगढ़, जिला- बर्धमान (प.पं)



EASTERN COALFIELDS LTD  
(A SUBSIDIARY OF COAL INDIA LTD.)  
Office of the Chairman cum Managing Director  
Sanctoria \* P.O. - Disbargarh \*  
Dist. - Bardwan (W.B.) - 713333

No. ECL/CMD/LRE/127/SAND/ 858

23 November 2012

To  
The Regional Director, RI - I  
CMPDIL, Asansol

Dear Sir,

**Sub: Application for E C in respect of obtaining Mining Lease for Extraction of Sand for stowing purpose in ECL from Brakar-Damodar & Ajay river beds in the Districts of Bardwan/Birbhum/Bankura & Purulia**

With reference to above we would like to inform you that ECL had applied for permanent mining lease for extraction of stowing sand from the river beds of Ajay, Damodar-Burakar in the Districts of Bardwan, Birbhum, Bankura & Purulia, on 12.7.2000 to the Dy. Secretary, Govt. of West Bengal, C & I Dept. Cell - MI, Writers' Bldg., Kolkata - 700001 through the Chief Mining Officer, Govt. of West Bengal, Asansol - 713304 with all the requisite enclosures & Challan.

In this context, Govt. of West Bengal informed vide Memo No 444-CI/E/3L-95/99 dated 31.8.2000 that the processing of long-term mining lease would take time and the State Government issued the Temporary Working Permit (TWP) for extraction of stowing sand and since then extension of this TWP is being given from time to time at every six months against our application on the terms & conditions of the memo no. 415-CI/E dt. 6.8.1999.

The then Joint Secretary Govt of WB, C&I Department had asked to submit the Mining Plans, duly approved by Central Government vide memo no 106 dated 27.02.2001 which has been complied with by ECL.

Further, during meeting on 07.07.2008 at Asansol Joint Secretary Govt. of WB told to submit the clearances of MOEF in this regard, but no minutes of the meeting had been issued. However, in the year 2010 Chief Mining Officer asked to submit of ECL's view regarding difficulties faced by Company for obtaining environment clearance which has been replied.

Now, Assistant Secretary Government of West Bengal, C&I department vide his memo no 689 dated 9.10.2012 asked to fulfill all the formalities for permanent mining lease (sand) for stowing purpose including obtaining of E.C. and stated in this memo that otherwise further extension of the temporary working permit will not be considered.

Therefore, we are sending herewith all aforesaid documents for your ready reference for making application in respect of E.C. of the aforesaid mining lease.

Please treat it as most urgent.

Yours faithfully,

*[Signature]*  
General Manager (LRE).

Encl. As above Hand to Hand by A. A. Saha.

Copy: TS to CMD, TS to DT OP, TS to DP

*[Handwritten signature]*

*Handwritten note:* ECL CMD for Sand mining



FROM : PARTHAKHATTERJEE MTC CL1

FRAX NO. : 01 33 3200765

05 Apr. 2013 02:50PM P 1

Government of West Bengal  
Commerce & Industries Department  
Miner Branch  
4, Abanindranath Tagore Sarani (Canning Street),  
Kolkata - 700 016

No.290 -CH/COAL/04/11/MINES

Date: 05.04.2013

From: The Secretary to the Government of West Bengal.

To: The General Manager (G.M.),  
Eastern Coalfields Limited,  
Sanctoria, P.O. Disnagarh,  
Dist. Bardwan,  
PIN-713 333 (W.B.)

Sub: Temporary Working Permit for extraction of sand for stowing purpose  
from the river beds of Ajoy and Damodar, Bankura in the districts of  
Burdwan/Birbhum/Bankura and Purulia.

Sir,

I am directed to refer to your letter No. ECL/CMD/LRP/127/SAND/164 dated 08.03.2013 and in continuation to this Dept's Letter No. 689-CH/Coal/02/02/M1 (Pt.) dated 09.10.2012 on the above subject and to say that the temporary working permit for extraction of sand for stowing purpose will expire on 31.03.2013. As the processing of the long term mining lease will take some more time the period of present working permit for extraction of Stowing Sand is hereby further extended for six months w.e.f. 01.04.2013 to 30.09.2013 on the same terms and conditions as mentioned in this Dept's memo no. 415-CH/COAL-95/99 dated 06.08.1999 as a very special case subject to submission of the up-to-date Royalty Clearance Certificate issued by the D.L.R.Cs concerned.

It is requested to make all out effort for fulfilment of all the formalities for long term lease which should be completed within the present extended time filling which further extension of temporary working permit for extraction of sand for stowing purpose will not be considered.

Yours faithfully

Secretary

No.290/1(14) - CH/COAL/04/11/MINES

Date: 05.04.2013

Copy forwarded for information and necessary action to:

1. D.M.M., West Bengal, 5, Council House St, 2<sup>nd</sup> Floor, B.B.D. Bag (West), Kolkata - 1.
2. District Magistrate, Bankura, P.O. & Dist. Bankura.
3. District Magistrate, Bardwan, Court Compound, P.O. & P.S. Bardwan, Dist. Bardwan, Pin- 713104.
4. District Magistrate, Birbhum, Prasenjit Basu's, P.O.Suri, Dist. Birbhum, Pin - 731 101.
5. District Magistrate, Purulia, P.O. & Dist. Purulia, Pin - 723 101.
6. A.D.M., Asansol, Bardwan, P.O. Asansol, Dist. Bardwan.
7. D.I.L.R.O., Bankura, P.O. & Dist. Bankura, Pin - 722 101.
8. D.I.L.R.O., Birbhum, P.O. Suri, Dist. Birbhum, Pin-731 101.
9. D.L.L.R.O., Bardwan, Rajbah, P.O. Rajbah, Dist - Bardwan, Pin - 713 103.
10. D.L.L.R.O., Purulia, P.O. & Dist. Purulia.
11. C.M.O., Asansol, Dist. Bardwan, Court Road, P.O. Asansol, Dist. Bardwan. (It is requested to interset with ECL authority to get the matter finalized).
12. M.O.C., Purulia Zone, Purulia, G.P. Branch Campus, North Lake Road, P.O. & Dist. Purulia, Pin-723 101.
13. M.O.C., Sun Zone, Birbhum, Sainicer, Filigera, P.O.Suri, Dist. Birbhum, Pin - 731 101.
14. Guard File.

Assistant Secretary

To → R D

CMPDIL R<sub>1</sub> 1

ईस्टर्न कोलफील्ड्स लिमिटेड  
(कोल इंडिया लिमिटेड का एक सहायक संस्था)  
असम-सह-राज्य निदेशक का कार्यालय  
संकटभिया-पो- दिशरगढ़, जिला- बर्धमान (प.पं.)



EASTERN COALFIELDS LTD  
(A SUBSIDIARY OF COAL INDIA LTD.)  
Office of the Chairman cum Managing Director  
Sanctoria • P.O - Dishergarh •  
Dist - Bardwan (W.B.) - 713333

No. ECL/CMD/LRE/127/SAND/754

Date: 6<sup>th</sup> Sept 2013

To,  
Dy. Secretary,  
Govt. of West Bengal, C & I Dept., Mines Branch,  
4 Conna Street, 4<sup>th</sup> Floor, A Wing, Kolkata - 700016.

Dear Sir,

**Sub: Extension of existing Temporary working Permit for Extraction of Sand for stowing purpose in FCI from Barakar-Damodar & Ajay river beds in the Districts of Bardwan/Birbhumi/Bankura & Purulia.**

We are in receipt of your letter no. 290-CI/COAL/04/11/MINES Dt. 5.4.2013 wherein it is mentioned that as the processing of long-term mining lease will take some more time the present working permit for extraction of stowing sand is hereby further extended for six months from 01.4.2013 to 30.9.2013 on the same terms & conditions as per your Dept's memo no. 415-CI/E/3L-95/99 dt. 06.08.1999. It was also asked to make all out effort for fulfilment of all formalities for long terms lease. This temporary working permit will expire after 30.9.2013.

This is to inform you that:

1. Regional Director of CMPDIL RI-1, Asansol prepared documents like Composite plan for making application for environment clearance in respect of aforesaid long terms mining lease in the Ajay and Damodar river beds.
2. The said application along with Form -1 (As per the FIA Notification 2006) has already been submitted.
3. The said application along with Form I and proposed terms of reference have been forwarded to the Director (IA), Ministry of Environmental & Forest, CGO Complex, Pariyavaran Bhavan, New Delhi by Mr. V.S Rana, Under Secretary to Ministry of Coal, Govt. of India, New Delhi. The copies are enclosed.

We have already paid the advance royalty of amount ₹ 10,97,712.00 on 14 May 2013 through T.R. Chaitan-7 at SBI, Asansol against existing Temporary Working Permit vide no. 290-CI/COAL/04/11/MINES Dt. 5.4.2013 for the period of from 01.4.2013 to 30.9.2013. We have also paid cess against the quantum of sand actually extracted during the period of 01.10.2012 to 30.3.2013 amounting (total) Rs 39.82 Lakhs in the month of July 2013 to the concerned district authorities as per Cess Act.

You are well aware that regular supply of sand for stowing purpose is absolutely necessary to avoid subsidence and danger to the life of the miners as well as to maintain targeted production of ECL.

In the light of above, you are hereby requested to kindly extend the TWP for the period of 01.10.2013 to 30.3.2014 so that uninterrupted supply of sand may be collected from the above river beds.

Yours Faithfully,

General Manager (LRE)

Encl: as above

Copy to:

- Addl. District Magistrate, Govt. of West Bengal, Asansol - 713304.
- Chief Mining Officer, Govt. of West Bengal, Court Road, Asansol - 713304.

Other distributions:

IS to CMD, IS to D(T) P&amp;P, IS to D(T) OP and GM, J&amp;K Popways

Government of West Bengal  
 Commerce & Industries Department  
 Mines Branch  
4, Abanindranath Tagore Sarani (Cinnac Street),  
 Kolkata - 700 016

No.659-C/O/COAL/DA/11/MINES

Date: 29.09.2014

From: The Assistant Secretary  
 to the Govt. of West Bengal.

✓ To: The General Manager (LRE),  
 Eastern Coalfields Limited,  
 Sanctoria, P.O. Dishargarh,  
 Dist. Burdwan, PIN-713 333 (W.B.)

Sub: Temporary Working Permit for extraction of sand for stowing purpose  
 from the river beds of Ajoy and Damodar, Barakar in the districts of  
 Burdwan/ Birbhum/ Bankura and Purulia.

Sir,

In reference to your letter No. ECI/CMD/LRE/150/SAND/950 dated 26.08.2014 and in continuation to this Deptt's Letter No No.325 -C/O/COAL/04/11/MINES Date: 10.04.2014 on extension of temporary working permit for extraction of sand for stowing purpose w.e.f. 01.10.2014. I am directed to state that the period for extraction of stowing sand is hereby further extended for six months w.e.f. 01.10.2014 to 31.03.2015 on the same terms and conditions as mentioned in this department memo no. 415-CI/E/31.-95/99 dated 06.08.1999. as a special case.

Any prayer for further extension of temporary working permit may not be considered without submission of Environment Clearance Certificate from the MOEF, Govt. of India.

Yours faithfully,

*[Signature]*  
 Assistant Secretary

✓ Gm (Project)

✓ Gm (P/Gr)

*[Signature]*

15/1/14

Government of West Bengal  
Commerce & Industries Department  
Mines Branch  
4, Abanindranath Tagore Sarani (Camac Street),  
Kolkata - 700 016

শুভাঙ্কর পুঙ্কর সন্দা বিকল্প  
Land Revenue & Mines Department  
GCL, N.B. Barakar  
D. No. 14/11 Date 2/11/15

Date: 15.05.2015

No. 559-C/O/COAL/04/11/MINES

From: The Assistant Secretary to the Government of West Bengal.

To: ✓ The General Manager (LRE),  
Eastern Coalfields Limited,  
Sanctoria, P.O. Dishergath,  
Dist. Bardwan,  
PIN-713 333 (W.B.)

Sub: Temporary Working Permit for extraction of sand for stowing purpose from the river beds of Ajoy and Damodar, Barakar in the districts of Bardwan/ Birbhum/ Baakera and Purulia.

Ref: Minutes of meeting dated 23.04.2015 conveyed vide this Department's Memo No. 331-C/O/COAL/04/11/MINES dt. 04.05.2015.

Sir,

Kindly refer to captioned subject and minutes of meeting held on 23.04.2015 conveyed vide this department's letter under reference. In this regard, I am directed to refer to your letter No. ECL/CMD/LRE/150/SAND/225 dated 04.05.2015 and to this Deptt.'s Letter No. 559-C/O/Coal/04/11/Mines dated 29.09.2014 on the above subject and to say that temporary working permit for extraction of sand for stowing purpose was granted till 31.03.2015.

In terms of the conditions prescribed vide Minutes dated 23.04.2015, regarding furnishing of Bank Guarantee of Rs. 10 lacs, on prorata reduction in number of Extraction Points and the affidavit filed by Shri Ajoy Kumar, GM, ECL on furnishing of Environment Clearance certificate from MoEF, GOI that the ECL has fulfilled, the period of present working permit for extraction of Stowing Sand is hereby extended for six months w.e.f. 01.04.2015 to 30.09.2015 for extraction of 7.5 lakh cubic meter.

It is hereby advised that ECL shall ensure fulfillment of requisite conditions for grant of long term lease for stowing sand within the present extended time without fail.

Yours faithfully,

  
Assistant Secretary

## Annexure – III

“Minutes of Meeting of the  
Sub-Committee ECL Board  
for “Evaluation, Appraisal  
and Approval of Projects” –  
Approval of Composite Sand  
Mining Plan in Ajoy &  
Damodar Riverbed”

(CONFIDENTIAL)



## EASTERN COALFIELDS LIMITED

Minutes of the 21<sup>st</sup> Meeting of the Sub-Committee of ECL Board for "Evaluation, Appraisal and Approval of Projects" held on Tuesday, the 28<sup>th</sup> July, 2015, at "Shyam Kunj," 4<sup>th</sup> Floor, 12-C, Lord Sinha Road, at 12:00 Noon.

## Present:

1	Shri V Peddanna	:	Chairman
2	Shri S Chakravarty	:	Director
3	Shri K S Patro	:	Director
4	Shri B R Reddy	:	Director

## Invitee:

1.	Shri Samir Ranjan Ghosh	Independent Technical Consultant	21.03, 04, 05 & 06
2.	Shri G Prasad	RD, RI-I, M/s CMPDIL	
3.	Shri N Jha	GM (P&P)	
4.	Shri A K Dhar	GM (Plg)	21.06

## In Attendance:

V R Reddy : General Manager (F)/Company Secretary

(i) Chairman extended a warm welcome to the Members present in the 20<sup>th</sup> meeting of the Sub-Committee of ECL Board for "Evaluation, Appraisal and Approval of Projects." Chairman also welcomed Shri Samir Ranjan Ghosh, who attended the meeting first time, as Independent Technical Consultant. Company Secretary apprised the Sub-Committee that 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> Lot agenda papers for the meeting have been sent by e-mail dtd. 11.07.2015, 24.07.2015 and 25.07.2015 respectively. Members of the Sub-Committee consented to consider the 2<sup>nd</sup> and 3<sup>rd</sup> Lot agenda papers also in the meeting.

(ii) Thereafter, the agenda items were taken up for deliberation and the decisions were as under:-

**SC(EAAP) 21.01** Grant of leave of absence.

(i) All Members were present in the meeting.

**SC(EAAP) 21.02** Confirmation of Minutes of the 20<sup>th</sup> Meeting of the Sub-Committee for "Evaluation, Appraisal and Approval of Projects" of ECL Board held on 25<sup>th</sup> May, 2015, in Kolkata.

(i) It was apprised to the Sub-Committee that no comments on the Minutes of the 20<sup>th</sup> Meeting of the Sub-Committee of ECL Board for "Evaluation, Appraisal and Approval of Projects" held on 25<sup>th</sup> May, 2015 was received from any of the members.

(ii) Hence, the Sub-Committee confirmed the Minutes of the 20<sup>th</sup> Meeting of the Sub-Committee of ECL Board for "Evaluation, Appraisal and Approval of Projects" held on 25<sup>th</sup> May, 2015, in Kolkata.

SC(EAAP) 21.03 Project Report of Nakrakonda Kumardihi-B OCP (April, 2015), Capacity: 3.00 MTY, Capital: ₹ 929.464 Crore (Departmental Option) & ₹ 181.3499 Crore (Outsourcing Option).

(i) Shri Gopal Prasad, RD, RI-I, M/s CMPDIL made a power point presentation on the Project Report of Nakrakonda Kumardihi-B OCP. The project capacity is 3.00 MTY and the projected capital outlay under Departmental Option is ₹ 929.464 Crore and under Outsourcing Option is ₹ 181.3499 Crore. Mineable coal reserve is 54 million tonne and OB to be removed is 316.6 million cum and OB to be re-handled is 19.60 million cum with average Stripping Ratio for excavated OB is 5.86 and average Stripping Ratio with Re-handled OB is 6.73. Grade of coal is GCV G-4. Mine life is 22 years.

(ii) To a query regarding Environment Clearance, he apprised the Sub-Committee that Environment Clearance for both the existing Mines have been granted under Cluster-12 but, as both the Mines have merged together to become Nakrakonda Kumardihi-B OC Project, so revision of Cluster No. 12 incorporating the proposed OCP would be required and EC needs to be obtained. Forestry Clearance is not required as there is no Forest Land involved for this Project.

(iii) To a query regarding requirement of land, he apprised the Sub-Committee that, total requirement of land is 723.09 Ha. Out of this land, 463.33 Ha land is already under the possession of ECL. The remaining land to be acquired is 259.76 Ha, which includes 235.39 Ha, Tenancy land and 24.37 Ha. Govt. land, 300 employments are to be provided. Total 164 PAFs are to be re-habilitated.

(iv) He also apprised the Sub-Committee that manpower requirement would be 828 in Departmental Option and 160 in Outsourcing Option, the OMS of the Project would be 13.72 under Departmental Option and 71.02 under Outsourcing Option.

(v) He further apprised the Sub-Committee that IRR under Departmental Option considering selling price of GCV G-4 grade of coal at 100% capacity utilisation would be 43.52%, at 85% capacity utilisation would be 34.60%, under Outsourcing Option, at 100% capacity utilisation is 202.20% and at 85% capacity utilisation is 172.35%. The Financial Appraisal has been done by M/s Infrastructure Development Consulting Services, Nagpur.

(vi) To a query regarding not opting for Departmental Option, since Projected IRR is more than 34%, GM (P&P) apprised the Sub-Committee that under Departmental Option around 828 highly skilled/technical persons are required, who are not available in Bankola Area, as the Area basically comprising UG Mines. The Area is running in losses, thereby affecting the overall productivity and profitability of the Company. If we go for Outsourcing Option, it will reduce the losses of the Area and improve overall position of the Area.

(vii) To a query as to the reasons for not considering R-II/R-III seam in the Project Report, GM (P&P) apprised the Sub-Committee that this seam is not considered in the Project Report due to acute shortage of external dumping space and coal from this seam would be extracted under UG method after completion of the OC operations.

(viii) To a query as to whether extraction of coal of R-II/R-III seam is profitable under UG Mining Technology or OC Mining Technology, he apprised the Sub-Committee that extraction of coal under OC Mining Technology is profitable.

(ix) In view of above, the Sub-Committee after detailed deliberation accorded in principle approval for the Project Report of Nakrakonda Kumardihi-B OCP (April, 2015) for a capacity of 3.0 MTY with a capital outlay of ₹ 181.3499 Crore under Outsourcing Option. The Sub-Committee also approved for constitution of a Committee consisting of GM (P&P), RD, RI-I or his representative, M/s CMPDIL, GM, Bankola Area and Shri Samir Ranjan Ghosh, Independent Technical Consultant to visit the Area and assess whether R-II/R-III seam can be worked by OC mining by including it in the Project Report considering the dumping space available. The Sub-Committee also directed the Committee to submit its report within a week's time and place the proposal along with the Committee's report in the next meeting of the Sub-Committee.

SC(EAAP) 21.04

Composite Mining Plan for Sand Mining from River bed of Damodar River (January, 2015) for stowing purpose in ECL UG Mines.

(i) Shri Gopal Prasad, RD, RI-I, M/s CMPDIL apprised the Sub-Committee that sand is being extracted by ECL for the last forty years on the basis of temporary leases/permits obtained from the Govt. of West Bengal, which is being renewed from time to time so far. Asst Secretary, Govt. of West Bengal, C&I Department has advised to fulfil all formalities including obtaining Environment Clearance for grant of long term lease for the stations earmarked for sand mining. For obtaining Environment Clearance, an application would be submitted to MoEF along with an approved Composite Mining Plan for sand mining for extraction of sand from Damodar river bed. Total land required for Composite Mining Plan for sand mining is 86.58 Ha. in river bed of Damodar river in Burdwan, Bankura & Purulia Districts of West Bengal. Sand mining would be done at 15 places in the river bed in 42 Km along the northern portion of the command area of ECL in Ranigunj Coalfields. Some part of the land carrying various infrastructures in the vicinity of mechanical sand gathering stations and connected transfer points is under the possession of JK Ropeways. The method of sand mining would be simple manual excavation where sand from the river bed is dug out with the help of Hand Shovels and loaded in to trucks manually. Sand would be collected in the lean season at day time only at seven manual stations, one mixed station and rest seven mechanical stations and loading would done with Departmental infrastructures existing at present. Mining of sand would be done in sustainable and scientific manner, which would not affect the water stream and would not disturb water aquifer. All safety rules and regulations would be followed. Appropriate air pollution control measures, water pollution, land degradation and plantation would be taken as per programme suggested in the approved EIA & EMPs. Mine Closure Plan has been prepared. Total sand mining would be around 1.5 M cum per year. Existing Departmental manpower of 254 persons would be used for this purpose. Existing capital investment is ₹ 177.88 Lakh and additional capital requirement would be ₹ 34.29 Lakh for the extraction and transportation of sand. For manual sand gathering there would be no capital investment. The existing facilities and available infrastructures in the respective Areas of ECL would suffice to cater the infrastructural need of sand mining. Revenue expenditure would be borne by the respective Areas of ECL.

(ii) In view of above, the Sub-Committee after detailed deliberation agreed and recommended the Composite Mining Plan for Sand Mining from River bed of Damodar River (January, 2015) for stowing purpose in ECL UG Mines at an additional capital investment of ₹ 34.29 Lakh for sand mining of 1.5 M cum per year for approval of the Board as brought out in the agenda.

SC(EAAP) 21.05

Composite Mining Plan for Sand Mining in River bed of Ajay River (December, 2014 ) for stowing purpose in ECL UG Mines.

(i) Shri Gopal Prasad, RD, RI-I, M/s CMPDIL apprised the Sub-Committee that sand is being extracted by ECL for the last forty years on the basis of temporary leases/permits obtained from the Govt. of West Bengal, which is being renewed from time to time so far. Asst Secretary, Govt. of West Bengal, C&I Department has advised to fulfil all formalities including obtaining Environment Clearance for grant of long term lease for the stations earmarked for sand mining. For obtaining Environment Clearance, an application would be submitted to MoEF along with an approved Composite Mining Plan for sand mining for extraction of sand from Ajay river bed. Total land required for Composite Mining Plan for sand mining would be 414.36 Ha. in Burdwan and Bankura Districts of West Bengal. Sand mining would be done at 21 places in river bed in 30 Km along the northern portion of the command area of ECL in Ranigunj Coalfields. The method of sand mining would be simple manual opencast excavation where sand from the river bed is dug out with the help of Hand Shovels and loaded in to trucks manually. Sand would be collected in the lean season at day time only. Loading would be done with Departmental infrastructures existing at present. Mining of sand would be done in sustainable and scientific manner, which would not affect the water stream and would not disturb water aquifer. All safety rules and regulations would be followed. Appropriate air pollution control measures, water pollution, land degradation and plantation would be taken as per programme suggested in the approved EIA & EMPs. Mine Closure Plan has been prepared covering

414.36 Ha. for Mechanical (Departmental) sand gathering infrastructures. Total sand mining would be around 2.00 M cum per year. No additional capital investment is required for extraction and transportation of sand. For manual sand gathering there would be no capital investment. The existing facilities and available infrastructures in the respective Areas of ECL would suffice to cater the infrastructural need of sand mining. Revenue expenditure would be borne by the respective Areas of ECL.

(ii) In view of above, the Sub-Committee after detailed deliberation agreed and recommended the Composite Mining Plan for Sand Mining from River bed of Ray River (December, 2014) for stowing purpose in ECL UG Mines for sand mining of 2.00 M cum per year for approval of the Board as brought out in the agenda.

**SC(EAAP) 21.06 Purushottampur OC Patch Part-I of Bankola Area by Outsourcing.**

(i) GM (Plg) made a power point presentation on Purushottampur OC Patch Part-I of Bankola Area under Outsourcing Option. He apprised the Sub-Committee that proposed Purushottampur OC Patch Part-I is at the North East side of the existing Nakrakonda Colliery. Mineable reserve within the proposed OC Patch has been estimated as 8.00 Lakh Tonne of coal and corresponding OB is 51.00 L cum with average Stripping Ratio of 1:6.37. Departmental HEMM for this OC Patch is not available. This OC Patch is the part of the Project Report of Nakrakonda Kumardihi-B OCP for extraction of 54 Million Tonne of coal and 316.6 million cum of OB. Since implementation of the PR involves several development activities like shifting of road, nallah, OH power lines etc. and acquisition of land would take considerable time, since exhaustion of Nakrakonda OC extension production is apprehended this year itself, production of Bankola Area would decline till Nakrakonda Kumardihi-B OCP starts production, hence, to maintain the production and to reduce losses of the Area, it is proposed to start this OC Patch with minimum capital outlay. Grade of coal is GCV G-4 and life of the Patch is two years. Total land involved for the proposed OC Patch is 70.09 Acres, out of which 12.07 Acres of land belongs to ECL, 57.29 Acres is private land and 0.73 Acres land is Govt. vested land. 28 number of employments are to be offered against acquisition of 57.29 Acres of private land.

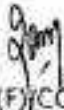
(ii) To a query as to whether Environment Clearance has been obtained for this OC Patch, GM (Plg) apprised the Sub-Committee that Environment Clearance for this OC Patch has been obtained under Cluster-12 for a peak capacity of 1.3 MTP.

(iii) He also apprised the Sub-Committee that Mine Closure Plan has been prepared. The estimated mine closure cost is ₹ 2.54 Crore. Capital outlay for this Patch is ₹ 4.55 Crore. Considering coal selling price of GCV Grade G-4, estimated profit from the Patch is ₹ 124.31 Crore.

(iv) In view of above, the Sub-Committee after detailed deliberation agreed and recommended the proposal for Purushottampur OC Patch Part-I of Bankola Area by Outsourcing for extraction of 8.0 Lakh Tonne of coal and removal of 51 Lakh cum of OB with a capital outlay of ₹ 4.55 Crore under Outsourcing Option along with acquisition of 58.02 Acres of land and offering 28 Nos. of employment for approval of the Board as brought out in the agenda.

\*\*\*\*\*

There being no other business to transact, the meeting ended at 01.30 P.M. with a vote of thanks to the chair.

  
GENERAL MANAGER (F)/COMPANY SECRETARY

CHAIRMAN

Dated: 3<sup>rd</sup> August, 2015.

**Annexure – IV**

**“Public Hearing Proceedings  
held in Bankura, Burdwan &  
Purulia Districts”**



**WEST BENGAL POLLUTION CONTROL BOARD**

(Department of Environment, Govt. of West Bengal)

Paribesh Bhawan, 10A, Block - LA, Sector-III

Bidhannagar, Kolkata-700 098, India

Tel : 2335 - 9088 / 7428 / 8211 / 6731 / 0261 / 5861 / 1625

Fax : 2335 - 2813

City Code : 33, Country Code : 91

Website : www.wbpcb.gov.in

Memo No. -2N-32/2015(E)

Dated: .08.2015

To,  
Dr. V. P. Upadhyay, Director  
Ministry of Environment, Forests & Climate Change,  
Govt. of India, Indira Paryavaran Bhawan,  
Jor Bagh Road, New Delhi - 110 003.

Sub: Public Hearing for the proposed Sand Mining in the Riverbed of Damodar River a part of which falls under PS Mejia and Saltora (total mining area of 113.50 Acres having total extraction capacity of 0.760 MCum/year) in Dist - Bankura, West Bengal by M/s. Eastern Coalfields Limited.

Sir,

I am enclosing herewith the following documents for the above mentioned project towards environmental clearance by the Ministry of Environment, Forests & Climate Change, Govt. of India.

- 1) Chronology of events leading to Public Hearing. (Annexure - I).
- 2) Minutes of Public Hearing dated 10.07.2015 at the Meeting Hall of Mejia Panchayet Samity, Dist - Bankura, West Bengal. (Annexure - II).
- 3) Copy of attendance of panel members and others in Public Hearing. (Annexure - III).
- 4) One CD containing the videography of the public hearing. (Annexure - IV).

Yours faithfully,

Sd/-  
(D. Sarkar)  
Senior Environmental Engineer (EIM Cell)  
West Bengal Pollution Control Board

Encla: As stated.

Memo No. 770(1) -2N-32/2015(E)

Dated: 05.08.2015

Copy to:  
The General Manager, J. K. Ropeways, M/s. Eastern Coalfields Limited, PO - Kajogram, Dist - Burdwan.

(D. Sarkar)  
Senior Environmental Engineer (EIM Cell)  
West Bengal Pollution Control Board



Copy to:  
- GM, JK Ropeways  
- GM, Satygram  
- V.P.D., RI-1  
- File

Handwritten initials and date 10/8/15

## Chronology of events leading to Public Hearing

- 1) Copy of the letter from the District Magistrate, Dist – Bankura dated 05.06.2015 (copy enclosed).
- 2) Letter of circulation of copies of Executive Summary and EIA / EMP of the project on 09.06.2015 (copy enclosed).
- 3) Notification of Public Hearing in two local dailies published on 09.06.2015 (copy enclosed).
- 4) Holding Public Hearing at the Meeting Hall of Mejia Panchayet Samity, Dist – Bankura, West Bengal on 10.07.2015.

Copies of Executive Summary with EIA/EMP report were available for public scrutiny in the offices of:

1. Office of the District Magistrate, Bankura, Govt. of West Bengal.
2. Office of the Additional District Magistrate (Gen), Dist – Bankura, Govt. of West Bengal
3. Office of the Sub-Divisional Officer, Bankura Sadar, Dist – Bankura
4. Office of the Block Development Officer, Saltora Block, Dist – Bankura
5. Office of the Block Development Officer, Mejia Block, Dist – Bankura
6. Office of the General Manager, D.I.C., Bankura
7. Office of the Sabhadhipati, Bankura Zilla Parishad
8. Office of the Mejia Panchayet Samity, Dist – Bankura
9. Office of the Saltora Panchayet Samity, Dist – Bankura
10. Office of the Ardhagram Gram Panchayet, Dist – Bankura
11. Office of the Saltora Gram Panchayet, Dist – Bankura
12. Office of the Arohagra Gram Panchayet, Dist – Bankura
13. Office of the Chief Engineer (O & E), Paribesh Bhawan, 10A, Block-LA, Sector-III, Salt Lake City, Kolkata – 700 098.
14. Office of the Senior Environmental Engineer, Kankinara Circle Office, VIII – Panpur, PO: Narayanpur, Dist – 24 Parganas (N)
15. Office of the Environmental Engineer, Durgapur Regional Office, Sahid Khudiram Sarani, City Centre, Durgapur, Dist – Burdwan, PIN – 713 216
16. Department of Environment, Govt. of West Bengal, Poura Bhavan, 4<sup>th</sup> Floor, FO-415/A, Sector – III, Salt lake, Kolkata 700 106.
17. Ministry of Environment, Forests & Climate Change, Eastern Zonal Office, Bhubaneswar.
18. Head Office of West Bengal Pollution Control Board, Paribesh Bhawan, 10A, Block-LA, Sector-III, Salt Lake City, Kolkata – 700 098.

Government of West Bengal  
Office of the District Magistrate, Bankura  
General Department

EIM-0923  
15/06/15  
Dated 05/ 06 / 2015

Memo No. 1132 /G

To  
The Senior Environmental Engineer (EIM Cell)  
West Bengal Pollution Control Board  
Department of Environment, Government of West Bengal  
Paribesh Bhawan, 10A, Block-LA  
Sector-III, Bidhannagar  
Kolkata- 700098

Sub: - Public Hearing from the proposed sand mining in the river bed of Damodar river falling under P.S Mejia & Saltora, in District- Bankura by M/S Eastern Coalfields Ltd.

Ref: - Memo No- 834-2N-482/2003 dated: 19.12.2014 of your office

In reference to the subject cited above, this is to inform you that the Public Hearing for the proposed aforesaid project will be held on 10.07.2015 at the Meeting Hall of Mejia Panchayet Samity from 12:00 noon onwards. Sri N.T. Taso Lepcha, W.B.C.S (Exe), Addl. District Magistrate (Gen), Bankura will preside over the said hearing.

This has a reference to the letter vide Memo No- 402-2N-32/2015(E) dated: 18.05.2015 of your office.

Yours faithfully

For District Magistrate

BANKURA

Dated 05/ 06 / 2015

Memo No. 1132 /L(8)/G

Copy forwarded for information and necessary action to:

1. The Sub Divisional Officer, Bankura Sadar
2. The Officer-in-Charge, Industrial Cell, Bankura
- 3-4. The Sabhapati, Mejia/ Saltora Panchayet Samity
- 5-6. The Block Development Officer, Mejia/ Saltora
- 7-8. C.A to D.M/ A.D.M (Gen), Bankura with request to place it before their concerned authorities for their kind perusal.

For District Magistrate

BANKURA

Dated 05/ 06 / 2015

See File

15/06/15



WEST BENGAL POLLUTION CONTROL BOARD

(Department of Environment, Govt. of West Bengal)

Parthesh Bhawan, 10A, Block - CA, Sector III

Bidhannagar, Kolkata-700 098, India

Tel: 2335 1008 / 7425 / 8211 / 8731 / 0261 / 8861 / 5868 / 1025

Fax: 2335 5868 / 2911

City Code: 33, Country Code: 91

Website: www.wbpcb.gov.in


Memo No. <sup>476(1-12)</sup> 2N-32/2015(1)

Dated: 09.06.2015

CIRCULAR

It is hereby informed that a Public Hearing will be held on 10.07.2015 at 12:00 noon at the Meeting Hall of Mejia Panchayet Samity, Dist - Bankura, West Bengal for the proposed Sand Mining in the Riverbed of Damodar River a part of which falls under PS Mejia and Salora (total mining area of 113.50 Acres having total extraction capacity of 0.760 MCum/year) in Dist - Bankura, West Bengal, by M/s. Eastern Coalfields Limited. Paper notification in this respect may kindly be seen in "The Telegraph" and "Ananda Bazar Patrika".

In this regard copies of the draft EIA / EMP report and Executive Summary of the project along with soft copies are sent herewith for record and for access to the general public for their information and participation of locally affected persons in the Public Hearing on 10.07.2015. Special care against any damage or pilferage of the draft EIA / EMP report and Executive Summary copies should be taken as these are very much limited in-number.

  
(D. Sarkar)

Senior Environmental Engineer (EIM Cell)  
West Bengal Pollution Control Board

etc

(b)

Memo No. 476(18)-2N-32/2015(I)

Dated: 09.06.2015

Copy forwarded with copies of draft EIA / EMP report, Executive Summary (English and Bengali) along with soft copies:-

1. Office of the District Magistrate, Bankura, Govt. of West Bengal. 1 Set of Executive summary in English & Bengali and one draft EIA / EMP report
2. Office of the Additional District Magistrate (Genl. Dist) - Bankura, Govt. of West Bengal - Do -
3. Office of the Sub-Divisional Officer, Bankura Sadar, Dist - Bankura - Do -
4. Office of the Block Development Officer, Sabara Block, Dist Bankura - Do -
5. Office of the Block Development Officer, Meja Block, Dist Bankura - Do -
6. Office of the General Manager, D.I.C., Bankura - Do -
7. Office of the Sahadhipati, Bankura Zilla Parishad - Do -
8. Office of the Meja Panchayat Samity, Dist - Bankura - Do -
9. Office of the Saltora Panchayat Samity, Dist - Bankura - Do -
10. Office of the Ardhagram Gram Panchayat, Dist - Bankura - Do -
11. Office of the Saltora Gram Panchayat, Dist - Bankura - Do -
12. Office of the Ardhagra Gram Panchayat, Dist - Bankura - Do -
13. Office of the Chief Engineer (O & E), Paribesh Bhawan, 10A, Block-1A, Sector-III, Salt Lake City, Kolkata - 700 098. - Do -
14. Office of the Senior Environmental Engineer, Kankirora Circle Office, Vill - Paapur, PO: Nayanganur, Dist - 24 Parganas (N) - Do -
15. Office of the Environmental Engineer, Durgapur Regional Office, Shid Khandiram Sarani, City Centre, Durgapur, Dist - Bankura, PIN - 713 216 - Do -
16. Department of Environment, Govt. of West Bengal, Pura Bhawan, 4<sup>th</sup> Floor, FD-415/A, Sector - III, Salt lake, Kolkata 700 106. - Do -
17. Ministry of Environment, Forests & Climate Change, Eastern Zonal Office, Bhubaneswar. - Do -
18. Head Office of West Bengal Pollution Control Board, Paribesh Bhawan, 10A, Block-1A, Sector-III, Salt Lake City, Kolkata - 700 098. - Do -

(D. Sarkar)

Senior Environmental Engineer (EIM Cell)  
West Bengal Pollution Control Board

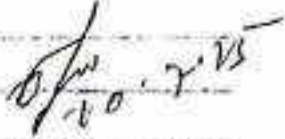


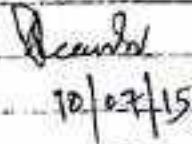
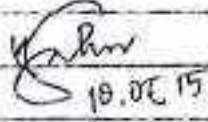
17/06/15  
09/06/15



Statement of attendance of the Panel members of the <sup>Panel III</sup> Public Hearing for the Proposed Sand Mining in the Riverbed of Damodar River a part of which falls under Pz Mejia and Sattora (total mining area of 113.50 Acres having total extraction capacity of 0.760 m cum/Year) in

Dist - Bankura, West Bengal. by M/s Eastern Coalfields Limited.

Public Hearing held on 10.07.2015 at 12:00 noon at the meeting Hall of Mejia panchayat Samity, Dist Bankura West Bengal.

Sl. No.	Name of the Panel Members	Signature
01.	Sri N.T. Taso Lepcha, W.B.C.S (Exe). Addl. District Magistrate (Gen) Dist - Bankura.	
02.	Sri A. Mukhopadhyay, W.B.C.S (Exe). S.D.O. Bankura.	
03.	Sri S. Biswas, W.B.C.S (Exe) B.D.O, Mejia, Dist - Bankura.	
04.	Sri A. Fouzdar, Env. Engineer, W.B.P.C.B.	 10/07/15
05.	Sri K. Sahoo, Asst Env Engineer, WBPCB	 10.07.15

Other Persons & Govt officials present in the  
Public Hearing on 10.07.2015 at 12:00 noon

Pub  
5

SL NO.	Name of Persons with Address	Signature
1	ST of ZITING S/S	ST of ZITING S/S
2	Mukta Ram Das Kundapur	Mukta
3	Niranjan Bannu Andhra	Niranjan
4	Indrajit Ray Andhra	Indrajit Ray
5	Ram Niranjan Acharya - Bhubaneswar (A)	Ram Niranjan
6	Sri Balakrishna Majit (Salma Andhra)	Sri Balakrishna
7	Falguni Kr. Chattopadhyay, Kalikapur / Andhra	Falguni Kr. Chattopadhyay
8	Ranjit Kumar Chatterjee, Dhanu, (Andhra)	Ranjit Kumar
9	Kuntal Mondal	Kuntal Mondal
10	Indrajit Majit	Indrajit Majit
11		
12	Moguna Das	Moguna Das
13	ST of ZITING S/S	
14	Temu Bannu 10.07.2015 (Kalikapur)	
15	Ganesh Mondal ( )	
16		
17		
18	Asis Kumar Das, Majit, Salma Andhra	Asis Kumar Das
19	Ganesh Mondal - Gran Jambhata	Ganesh Mondal
20	Chinmay Ray Majit	Chinmay Ray
21	Jadab Ray Majit	Jadab Ray
22	Prasanta Ray	Prasanta Ray
23	Rayu	Rayu
24	Rayu Sarada	Rayu Sarada
25	Banjay Ray Majit	Banjay Ray
26	UPM Ray	UPM Ray
27	ST of ZITING S/S	
28	ST of ZITING S/S	
29	Mahadev Hembra, Renavanti, Jharia	Mahadev Hembra
30	12 Mithun, Hembra, Andhra	12 Mithun
31	Malay Mondal, Bhubaneswar	Malay Mondal
32	Debasis Mondal, Bhubaneswar	Debasis Mondal

Other Persons & Govt officials Present in the  
Public Hearing on 10.7.2015 at 12:00 noon

Sl NO.	Name of the Persons with Address	Signature
33	Sucjit Barua Jee. Chaza	Sucjit Barua
34	Paribasa Pal Kalidasa pur	Paribasa Pal
35	Tarun Mondal Bhaer	Tarun Mondal
36	Ram Pado Pal	R. P Pal
37	Kali Das PWA	Kali Das PWA
38	Jayun Helder Methia Bazar	Jayun Helder
39		
40	Jayanta Mukherjee ARDHAGRAM	Jayanta Mukherjee
41	Pradip Kumar	
42	Biswadev Roy	
43		
44	Rohit Dasgupta - ARDHAGRAM	Rohit Dasgupta
45		J. Dasgupta
46		J. Dasgupta
47	Sibas Dhar Megha	Sibas Dhar
48	Mukti Poda Chatterjee Gingsha pa Sabra	Mukti Poda Chatterjee
49	Syed Saad ul Ghusna	Syed Saad ul Ghusna
50	Sumit Ghosh Ardhaagram	Sumit Ghosh
51	Chand Khan Lalbar	Chand Khan
52	Bipon Barui Gopal Nagar	Bipon Barui
53	Tibar Kamakar Majer	Tibar Kamakar
54	Sujay Mukherjee - Ardhaagram	Sujay Mukherjee
55	Kanu Mukherjee - Megha Panchajanya	Kanu Mukherjee
56		
57	Hiran Moy MUKHERJEE Megha Panchajanya	Hiran Moy MUKHERJEE
58	Ashok Mondal Ardhaagram	Ashok Mondal
59	Damodar Barui	Damodar Barui
60	Suikanta Gope	
61	Kalyan Maji	Kalyan Maji
62	Ujjwal Dhar	Ujjwal Dhar
63	Satyajit Roy	Satyajit Roy
64		

Other Persons & Govt officials Present in the  
Public Hearing on 10.07.2015 at 12:00 noon

SL NO.	Name of the Persons with Address	Signature
65	Hemadran Chakraborty Archigram	
66	P. K. Chakraborty Meera	
67	Baidyanath Choudhury Archigram	
68	Kalidasa Choudhury	
69	Bibhuti Das Archigram	
70	Pradyumn Das Archigram	
71	Tapan K. Halder Nafin Bazar	
72	Kamlesh Choudhary Pathagram	
73	Pradyumn Das Archigram	
74	Pradyumn Das Archigram	
75	Pradyumn Das Archigram	
76	Pradyumn Das Archigram	
77	SATYANARAYAN ROY	S. K. Das
78	Nirmal Bhowmik Nijama	Nirmal Bhowmik
79	Ujjwal Gope Archigram	Ujjwal Gope
80	Piyush Mohi Pathagram	Piyush Mohi
81	Sudhansu Gope Archigram	Sudhansu Gope
82	Somnath Chakraborty Chulni	S. Somnath Chakraborty
83	Dinabandhu Roy Nena P.S.	Dinabandhu Roy
84	Bappa Gope Archigram	Bappa Gope
85	Ujjwal Mondal Archigram	Ujjwal Mondal
86	S. C. Kumar, Engr. Dept, ECL, HQ	S. C. Kumar
87	S. K. Sinha, ENVT, Dept, ECL, HQ.	S. K. Sinha
88	Suresh Bandy Archigram	Suresh Bandy
89	Biswanath Das Archigram	Biswanath Das
90	Pradyumn Das Archigram	Pradyumn Das
91	Pradyumn Das Archigram	Pradyumn Das
92		
93		
94		
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96		

**PROCEEDINGS OF THE PUBLIC HEARING FOR THE PROPOSED SAND MINING IN THE RIVER BED OF DAMODAR RIVER HAVING PEAK CAPACITY-1.5 MCUM/YEAR FALLING UNDER P.S-MEJIA & SALTORA (TOTAL MINING AREA OF 113.50 ACRES HAVING TOTAL EXTRACTION CAPACITY OF 0.760 MCUM/YEAR) IN DIST-BANKURA, WEST BENGAL BY M/S EASTERN COALFIELDS LIMITED HELD ON 10.07.2015 AT 12:00 HR AT THE MEETING HALL OF MEJIA PANCHAYAT SAMITY, DIST.- BANKURA, WEST BENGAL.**

M/s. Eastern Coalfields Limited submitted an application to West Bengal Pollution Control Board for conducting Public Hearing for the proposed sand mining in the river bed of Damodar river having total peak capacity-1.5 mcum/year falling under P.S-Mejia & Saltora (total mining area of 113.50 acres having total extraction capacity of 0.760 mcum/year) in Dist-Bankura. As per the EIA notification S.O.1533 dated 14<sup>th</sup> September, 2006 of the MoEF, Govt. of India, Environment Clearance of the said project is required to be obtained from the MoEF, Govt. of India after conducting public hearing.

Accordingly, WBPCB after observing all formalities, held the public hearing on 10<sup>th</sup> July, 2015 at 12:00 Hr at the Meeting Hall of Mejia Panchayat Samity. All the Panel members were present in the hearing. Sri N.T Taso Lepcha, W.B.C.S (Exe), Additional District Magistrate (Gen), Bankura presided over the public hearing. List of the panel members and the others present in the public hearing are enclosed.

The hearing started with a welcome note from Sri Anajn Fouzdar, Environmental Engineer, West Bengal Pollution Control Board. He explained about the provisions of the above stated MoEF notification and also informed the audience about the draft proposal of M/s. Eastern Coalfield Limited for the proposed sand mining in the river bed of Damodar river in the District of Bankura.

Sri N.T Taso Lepcha, W.B.C.S (Exe), Additional District Magistrate (Gen), Bankura explained the necessity of public hearing and significance of the opinions/ suggestion of the people present in the public hearing.

Sri A. Mukhopadhyaya, W.B.C.S (Exe.), Sub-Divisional Officer, Bankura requested the project proponent to explain in details about the proposed project for discussion among the panel members and others present in the hearing.

Representative of CMPDI, Environmental Consultant on behalf of M/s. Eastern Coalfield Limited, narrated about the project details and the proposed pollution control devices through Power Point presentation emphasizing on the likely environmental impacts arising out of the same as well as the proposed pollution abatement measures to be taken by them. He has pointed out that a brief description has already been circulated among the people present at the hearing. Presently, there are 15 sand mining stations in the riverbed of Damodar and total area of these stations is 213.86 acre located in the district of Bankura, Burdwan & Purulia. In the district of Bankura, there are only 7 nos. of station having total sand extraction capacity-0.76 MCUM/year. He mentioned that sand collection is restricted to 1.5m to 2m and confined to lean season (non-monsoon period only) and excavated sand will be used only for stowing of coal mines. He also mentioned that the removal is done without affecting the base flow of the river in such manner as to maintain the smooth flow of the river during the monsoons. The sand will be mined manually at some stations and at others with the help of dredgers, scrapers and pontoons. No drilling & blasting will be involved and there will be no chance of dust generation and effluent generation. He also assured that local people shall be consulted in each stage of the project. He has also mentioned that this would generate employment for local people and take neighbouring villagers into confidence in each stage of the project.

Sri A. Mukhopadhyaya, W.B.C.S (Exe.), Sub-Divisional Officer, Bankura requested the project proponent to explain in details regarding the chances of contamination of ground water/ surface water and employment opportunity of the local people.

During the discussions, the panel members and the others present in the public hearing made queries / suggestions with respect to the proposed project which are noted below:

Sri Biswajit Mukherjee of Vill-Bhara welcomed the project & requested the project proponent to look after the additional employment opportunity and road development of the locality.

Sri Asish Kr. Das of Vill-Majit welcomed the project and mentioned that ECL is doing sand mining for more than 20 years and no such pollution related problems are faced by the local public. He also mentioned that sand stowing is required to protect the surface from subsiding and to maintain mine safety. He also requested the project proponent to develop a community hall in the locality.

Sri Ramniranjan Acharya of Vill-Bhara mentioned that coal is essential for development of industries in the locality and the area as a whole has potential for development of industries. He requested the project proponent for overall development of the locality including road development, community centre and development of local schools.

Sri Rampada Paul of Vill-Kalidaspur, Sri Biswajit Roy of Vill-Bhara & Sri Mukul Biswas of Vill-Majit requested the project proponent for development of community hall in the locality.

Sri Malay Mukherjee of Vill-Mejia informed that ECL has already taken steps for road development and he requested that more plantation to be developed in the locality and development of local infrastructure should be done in consultation with local panchayat.

Sri Anajit Fouzdar, Environmental Engineer, West Bengal Pollution Control Board requested the project proponent to respond the different issues raised by the participants.

General Manager, Satgram Area, ECL appreciated the concern expressed by the different participants and welcomed their suggestions. He informed that water required for sand mining will be recirculated and there is no chance for contamination with the ground or surface water. He also assured that more plantation program will be taken up shortly and preferences will be given to the local people for employment. He also mentioned that the issues raised by the various participants will be addressed adequately before finalizing the environmental management plan.

Sri N.T Taso Lepcha, W.B.C.S (Exe), Additional District Magistrate (Gen), Bankura emphasized that all possible measures should be ensured by the project proponent towards the mitigation of all environmental hazards and various points raised by the people present in the hearing. The project is welcomed only after incorporation of all the pollution control measures and Corporate Social Responsibility programme proposed by the Project Proponent. He assured the audience that the proceedings of this public hearing shall be duly forwarded to the MoEF, Govt. of India and further expressed his gratitude to the audience for their active participation in this public hearing.

  
10.07.15

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Sri A. Fouzdar  
Environmental Engineer  
West Bengal Pollution Control Board

  
10.07.15

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Sri N.T Taso Lepcha; W.B.C.S (Exe),  
Additional District Magistrate (Gen),  
Bankura

PROCEEDINGS OF THE PUBLIC HEARINGS  
FOR

THE PROPOSED SAND MINING IN THE RIVER BED OF DAMODAR RIVER FALLING UNDER  
PS – ANDAL, RANIGANJ AND KULTI (IN TOTAL MINING AREA OF 83.86 ACRES HAVING  
EXTRACTION CAPACITY OF 0.590 MCUM/YEAR) IN DIST – BURDWAN, WEST BENGAL  
PROPOSED BY M/S EASTERN COAL FIELDS LIMITED  
HELD ON 14.07.2015 AT 12:00 HOURS AT THE PANCHAYAT SAMITY MEETING HALL OF  
RANIGANJ PANCHAYAT SAMITY, DIST – BURDWAN, WEST BENGAL

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M/s Eastern Coal Fields Limited (ECL) submitted an application to West Bengal Pollution Control Board for conducting Public Hearing for their proposed sand mining in the river bed of Damodar River falling under PS – Andal, Raniganj and Kulti (in mining area of 83.86 acres having extraction capacity of 0.590 MCum/year) in Dist – Burdwan, West Bengal. As per the EIA Notification S.O. 1533 dated 14<sup>th</sup> September, 2006 of the Ministry of Environment & Forest, Govt. of India, Environmental Clearance for the said project is required to be obtained from the MoEF, Govt. of India after conducting the Public Hearing.

Accordingly, West Bengal Pollution Control Board after observing all formalities conducted the Public Hearing on 14.07.2015 at 12:00 hours at the Panchayat Samity meeting hall of Raniganj Panchayat Samity, Dist – Burdwan, West Bengal. All the panel members were present in the hearing. Sri Hrisibikes Mudi, WBSO (Sd), Addl. District Magistrate (Zilla Parishad), Dist. Burdwan presided over the hearing. List of the panel members and the others present in the public hearing is enclosed.

The hearing started with a welcome note from **Shri S.Ganguly, Environmental Engineer**, West Bengal Pollution Control Board. He explained about the provisions of the above stated MoEF notification and also informed the audience about the draft proposal of M/s Eastern Coal Fields Limited for sand mining in the river bed of Damodar River falling under PS – Andal, Raniganj and Kulti (in mining area of 83.86 acres having extraction capacity of 0.590 MCum/year) in Dist – Burdwan, West Bengal.

**Addl. District Magistrate (Zilla Parishad)**, Dist. Burdwan also welcomed the audience and gave a brief introduction about the proposed project. He then requested the project proponent (PP) to explain in details about the proposed project, giving emphasis on the environmental aspects in particular, for discussion among the panel members and others present in the hearing.

**Sri Sumanta Ganguly of CMPDL**, Asansol (Environmental Consultant of the project) on behalf of the PP narrated the details of the proposed project and the pollution control measures to be taken for the same through power point presentation. He explained the location details of the project, details of sand mining procedure from the river bed, probable environmental impacts of such process activities including transportation of sand through roads and measures proposed by M/s Eastern Coal Fields Limited to combat the effects. Sri Ganguly assured the audience that no mining activity will be conducted within one hundred meter of the river embankment and mining will be restricted to a depth of one meter only. He mentioned about the baseline status of Air, Water & Noise Quality of the area which are well within the standards. He further elaborated on the steps to be taken for developing the society through activities under Corporate Social Responsibility of the company.

During the discussion the panel members and the others present in the public hearing made **queries / suggestions with respect to the proposed project, which are noted below:**

**Sri C.Ghosh of Ramprasadpur** stated that the experience of the local residents regarding effects of on-going sand mining activity in the area is very bad. Air pollution generated during transport of sand in uncovered condition by very old vehicles causes serious problem for the local people. Road conditions

are horrible due to heavy transport load and efforts for maintenance of such roads have never been initiated by the ECL authorities; Sri Ghosh further stated that accidents due to bad road conditions, submergence of agricultural land as well as playground in the river course due to unlawful sand mining near the embankment are regular phenomena in the adjoining area. He requested the PP to ensure transport of sand in properly covered vehicles. Sri Ghosh further requested the ECL authorities to ensure that the conditions of local roads are maintained in good condition and proper steps are taken so that the biodiversity along the bank of the river is not affected by their proposed sand mining activity. He further requested the PP to ensure that proper replenishment of deposited sand is allowed between two successive mining seasons in order to avoid permanent damage to the river bed leading to diversion of course of river and other related environmental nuisances. Sri Ghosh finally requested the ECL authorities to initiate extensive CSR activities in and around the proposed project site for the overall socio-economic development of the area.

**Addl. District Magistrate (Zilla Parishad), Dist. Burdwan** requested the PP to explore the possibility of utilizing fly ash instead of sand for stowing of mines; The ECL representatives informed that there are some inherent technical difficulties for such change over. At this the ADM requested them to furnish relevant documents in support of their claim.

**Sri P. Bhattacharya of Madanpur** stated that he has lost major portion of his agricultural land near the embankment due to submergence in the river course due to unlawful sand mining. He requested the ECL authorities as well as the local administration to arrange for compensation for land losers like him. Sri Bhattacharya further stated that large number of plots of agricultural land situated on the two sides of the road through which sand transportation is done have lost their fertility due to deposition of layer of sand on them caused by such indiscriminate sand transportation in uncovered condition. He further requested the ECL authorities as well as the local administration to address this issue immediately.

**Addl. District Magistrate (Zilla Parishad), Dist. Burdwan** requested the local residents to submit specific written proposals to him regarding their views about different aspects of the proposed project as well as on-going sand mining activity in the locality which were being discussed during the public hearing.

**Sri U. Dhibar of Vill – Nupur and Member, Ballavpur Gram Panchayat** stated that he was not informed well in advance about the schedule of the Public Hearing and requested the ADM to call for an administrative meeting involving the respective Panchayat Pradhans to discuss the issues related to the proposed project. The ADM requested Sri Dhibar to submit a written application to him regarding this issue.

**Addl. District Magistrate (Zilla Parishad), Dist. Burdwan** then requested the ECL authorities and Shri S. Ganguly, Environmental Engineer, West Bengal Pollution Control Board to confirm whether all concerned were informed about the Public Hearing according to the guidelines given in the EIA Notification S.O. 1533 dated 14<sup>th</sup> September, 2006 of the Ministry of Environment & Forest, Govt. of India and requested Sri Ganguly to submit the relevant documents in this regard to the ADM at as soon as possible. Sri Ganguly assured that the same has been done strictly as per the Notification and committed to submit the relevant documents to the ADM at the earliest.

**Shri P. Khan of Vill – Narayankuri of Egaru Gram Panchayat** stated that sand mining is being conducted in their area for at least a decade and two. Sri Khan expressed his grievance regarding very bad road conditions of the area, lack of initiative regarding plantation program and implementation of CSR program by ECL authorities. Sri Khan further informed the audience that localized indiscriminate mechanical mining of sand has led to dangerous depth in some spots in the river bed in their locality which may lead to serious accident at any time. He requested the ECL authorities and the local

administration to look in to the matter immediately. He further stated that due to indiscriminate pumping of water from the river for water supply project of Raniganj municipal area the natural river course may get affected seriously; they requested the ADM to intervene in this matter and initiate remedial measure in this regard at the earliest.

**Sri D.Paul of Vill – Nupur and Sri K. Banerjee of Ramprasadpur** expressed their grievances regarding terrible road condition and lack of maintenance of the same, erosion of land due to illegal sand mining inside the river course as well as near the embankment, air pollution caused during sand transportation in uncovered vehicles and lack of CSR activities. Sri Banerjee also stated that the roads in concern has become very narrow due to illegal encroachment leading to regular accidents and inconvenience to the local residents. He also complained that the local people are confused regarding who is the appropriate authority to approach for addressing such problems since it is not clear to them whether the onus lies with the local administration or the ECL authorities. Addl. District Magistrate (Zilla Parishad), Dist. Burdwan requested them to submit written representation in this regard addressing the District Magistrate, Burdwan.

**Sri N.Mondal and Sri P.Mondal of Vill – Nupur** requested the ECL authorities as well as local administration to formulate a realistic compensation package for those who has lost their agricultural land due to unscientific and illegal sand mining inside the river course as well as near the embankment and implement the same at the earliest.

At this juncture, Addl. District Magistrate (Zilla Parishad), Dist. Burdwan requested the ECL authorities to ensure that each of their sand carrying vehicles can be properly identified through clearly visible dedicated holograms etc. and the local administration should be informed in detail about the vehicles which are dedicated for their sand excavation and transport of the same. The ADM expressed his hope that this will be effective for identifying and controlling illegal sand mining.

**Sri Dinanath Mondal of Vill – Nupur** requested the ECL authorities to plan their sand transportation route in such a way so that transportation through local villages can be avoided.

**Sri S.Mondal, Savapati, Raniganj Panchayat Samity** expressed his concern about the fact that about 150-200 acres of agricultural land in Narayankuri area has already been submerged by the river due to change of river course; he requested the ECL authorities as well as the local administration to initiate proper measures to prevent further loss of agricultural land in this manner. The Savapati further stated that indiscriminate dumping of over burden originating from different mining projects of the locality in and around the river bed has also contributed to such nuisance. He further requested all concerned to ensure easy availability of sand for the local construction works. Finally Sri Mondal requested the ECL authorities to initiate extensive CSR activities including development of local infrastructure, maintenance of local roads, plantation program, upgradation of local schools and health centres etc.; he further requested them to involve the local administration as well as local public representatives in such endeavours.

**Shri S. Ganguly**, Environmental Engineer, West Bengal Pollution Control Board then requested the project proponent to address the issues raised in the public hearing.

**Shri S.Banerjee, General Manager of Kunustoria Area of ECL** assured the gathering that they will ensure that sand is transported in totally covered trucks and water sprinkling will be done regularly in order to prevent fugitive emission during sand transportation. Sri Banerjee further assured that the whole process of sand excavation from the river bed will be executed following most modern guidelines in order to ensure that there is no adverse effect on the river course, its embankment, the bridges on the river and the local biosphere as well; he assured that they will excavate only the amount of sand annually which

will be replenished naturally during the next monsoon season and under all circumstances excavation up to the permissible depth will be strictly followed. Sri Banerjee also assured the gathering that ECL authorities will continue their road repairing and construction activities to ensure that the road conditions do not deteriorate to cause trouble to the local residents. He further assured the gathering that they will continue their CSR activities involving the local administration and representatives of local people.

**Shri S.Ganguly, Environmental Engineer.** West Bengal Pollution Control Board suggested that the project proponent should include all the issues discussed in the public hearing, in the final EIA/EMP report and address the issues properly during implementation of the project. He further assured the audience that the deliberations presented by the audience in the hearing are being recorded and unedited videography of the whole proceedings will be forwarded to the appropriate authorities for their consideration. Sri Ganguly also mentioned that West Bengal Pollution Board will upload the proceedings of the public hearing to their website.

**Addl. District Magistrate (Zilla Parishad), Dist. Burdwan** emphasized that all possible measures should be ensured by the project proponent towards the mitigation of environmental problems and implementation of CSR commitments. Finally, Addl. District Magistrate expressed his gratitude to the audience for their active participation in this public hearing and concluded the session.

 14.7.15.  
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Shri S.Ganguly  
Environmental Engineer  
West Bengal Pollution Control Board

 14.7.2015  
-----  
[ Hrishikes Mudi, WPCS (Exe.) ]  
Addl. District Magistrate (ZP), Burdwan

(Hrishikes Mudi)  
Additional District Magistrate (ZP)  
Burdwan

**PROCEEDINGS OF THE PUBLIC HEARING FOR THE PROPOSED SAND MINING IN THE RIVERBED OF DAMODAR RIVER FALLING UNDER PS – NETURIA (IN MINING AREA OF 16.50 ACRES HAVING EXTRACTION CAPACITY OF 0.100 MCUM/YEAR) IN THE DISTRICT OF PURULIA, WEST BENGAL BY M/S. EASTERN COALFIELDS LIMITED HELD ON 24.07.2015 AT 12:00 HRS. AT THE "SAMPRITI SADAN", PANCHAYAT SAMITY HALL AT NETURIA, DIST – PURULIA, WEST BENGAL.**

M/s. Eastern Coalfields Limited submitted an application to West Bengal Pollution Control Board for conducting Public Hearing for the proposed Sand Mining in the Riverbed of Damodar River falling under PS – Neturia (in Mining Area of 16.50 Acres having extraction capacity of 0.100 Mcum/year) in the District of Purulia, West Bengal. As per the EIA notification S.O.1533 dated 14<sup>th</sup> September, 2006 of the MoEF, Govt. of India, Environment Clearance of the said project is required to be obtained from the Ministry of Environment, Forests & Climate Change, West Bengal after conducting public hearing.

Accordingly, WBPCB after observing all formalities, held the public hearing on 24<sup>th</sup> July, 2015 at 12:00 Hrs. at the "Sampriti Sadan", Panchayat Samity Hall at Neturia, Dist – Purulia, West Bengal. All the Panel members were present in the hearing. Sri P. K. Maiti, Additional District Magistrate (Dev.), Purulia presided over the public hearing. List of the panel members and the others present in the public hearing are enclosed.

The hearing started with a welcome note from Sri S. Bhattacharya, Environmental Engineer, West Bengal Pollution Control Board. He explained about the provisions of the above stated MoEF notification and also informed the audience about the draft proposal of M/s. Eastern Coalfields Limited for the proposed Sand Mining in the Riverbed of Damodar River falling under PS – Neturia (in Mining Area of 16.50 Acres having extraction capacity of 0.100 Mcum/year) in the District of Purulia, West Bengal.

Sri P. K. Maiti, Additional District Magistrate (Dev.), Purulia explained the necessity of public hearing and significance of the opinions / suggestion of the people present in the public hearing.

Representative of CMPDI, Environmental Consultant on behalf of M/s. Eastern Coalfield Limited, narrated about the project details and the proposed pollution control devices through Power Point presentation emphasizing on the likely environmental impacts arising out of the same as well as the proposed pollution abatement measures to be taken by them. He has pointed out that a brief description has already been circulated among the people present at the hearing. He mentioned that excavated sand will be used only for stowing of coal mines. He also mentioned that the removal will be done without affecting the base flow of the river in such manner so as to maintain the smooth flow of the river during the monsoon. The sand will be mined manually at some stations and at others with the help of dredgers, scrapers and pontoons. No drilling & blasting will be involved and there will be no chance of dust generation and effluent generation. He has also mentioned that this would generate employment for local people and take neighbouring villagers into confidence in each stage of the project.

Shri Karunamoy Singh of Neturia village mentioned that roads in the locality are damaged due to transportation of overloaded trucks with sand, coal etc. He requested the administration to look into the matter and for maintenance of roads.

Shri Shibram Chakraborty of Simulia village informed that overloaded truck carrying sand without any cover are plying in the locality for transportation of sand from the mined area, damaged Rabindra Setu, a local bridge. He requested for necessary action to repair the bridge and also demanded that no trucks should be allowed to ply without proper cover.

Shri Arup Mishra of Parbelia village wanted to know why M/s. Eastern Coalfields Limited is going for sand mining.

Shri Ujjal Das of Vamuria village requested M/s. Eastern Coalfields Limited authority to provide electricity, water supply and maintenance of road in the nearby area through their CSR activity.

Shri K. P. Yadav, Shabhapati, Neturia Panchayat Samity requested the district administration for taking steps to prevent illegal sand mining in the locality.

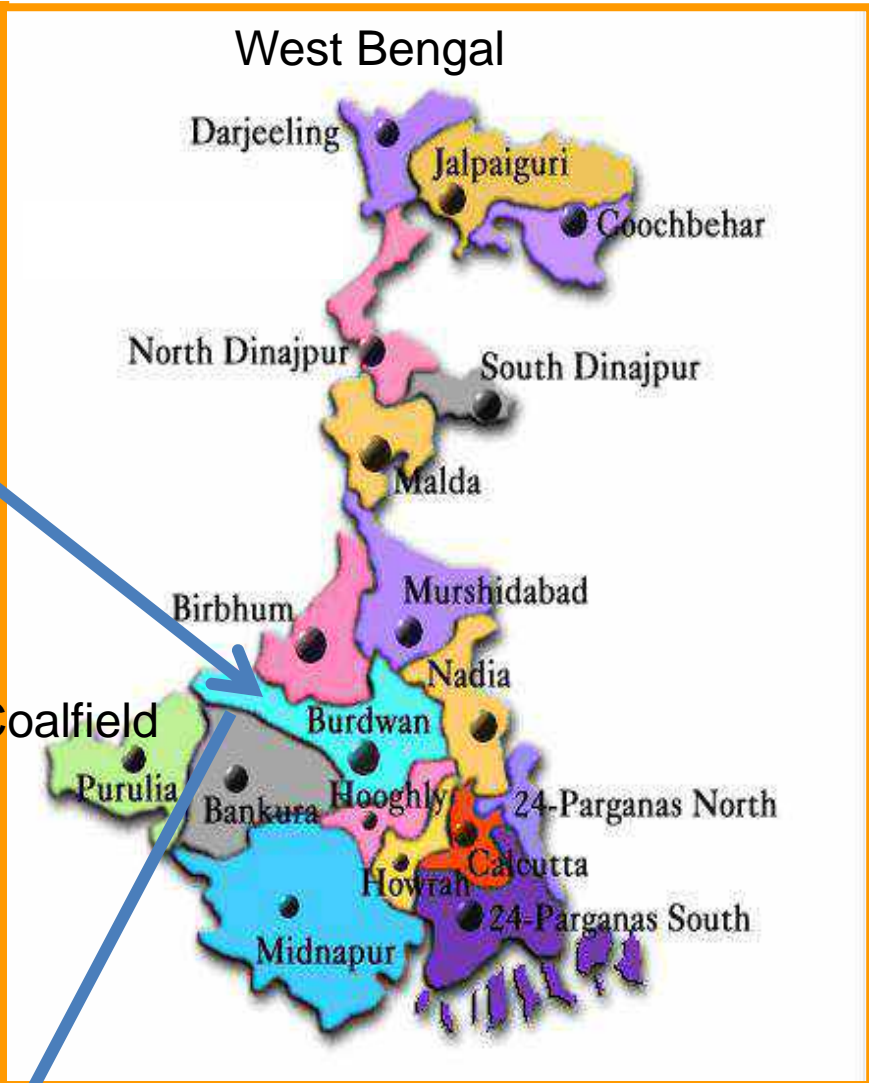
Shri S. R. Bharti, General Manager, M/s. Eastern Coalfields Limited appreciated the concern expressed by the different participants and welcomed their suggestions. He informed that M/s. Eastern Coalfields Limited being a Govt. of India company undertakes lot of social activities through CSR programme. He welcome all the suggestions and mentioned that all the commitment will be fulfilled during the execution of the project.

Sri P. K. Maiti, Additional District Magistrate (Dev.), Purulia emphasized that all possible measures should be ensured by the project proponent towards the mitigation of all environmental hazards and various points raised by the people present in the hearing. The project is welcomed only after incorporation of all the pollution control measures and Corporate Social Responsibility programme proposed by the Project Proponent. He requested the project proponent to extend their CSR activity for development of the adjoining area.

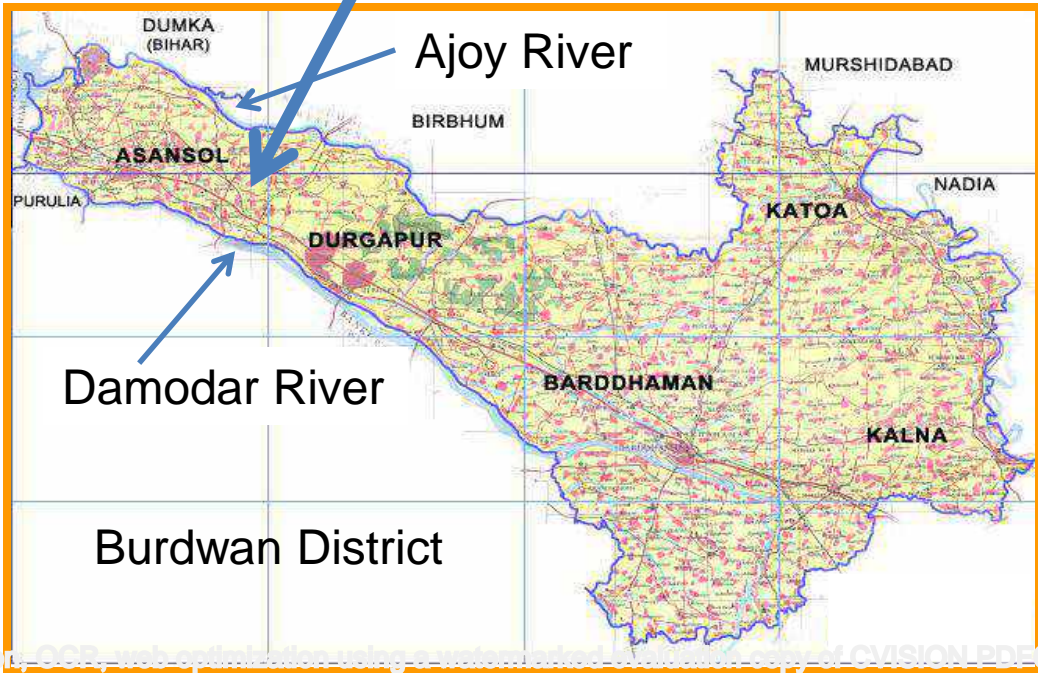
The public hearing was concluded by Sri P. K. Maiti, Additional District Magistrate (Dev.), Purulia with thanks to the audience.

  
Sri S. Bhattacharya  
Environmental Engineer  
West Bengal Pollution Control Board  
**Environmental Engineer**  
**Asansol Regional Office**  
**W. B. Pollution Control Board**

  
Sri P. K. Maiti,  
Additional District Magistrate (Dev.),  
Purulia  
**Additional District Magistrate (Dev.)**  
**PURULIA**

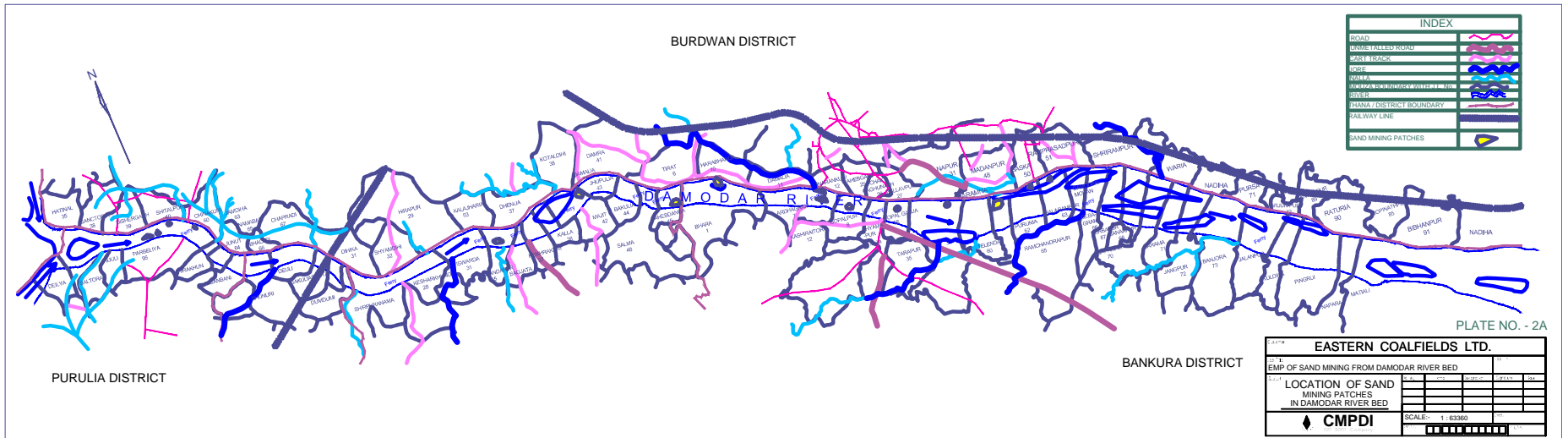


Raniganj Coalfield

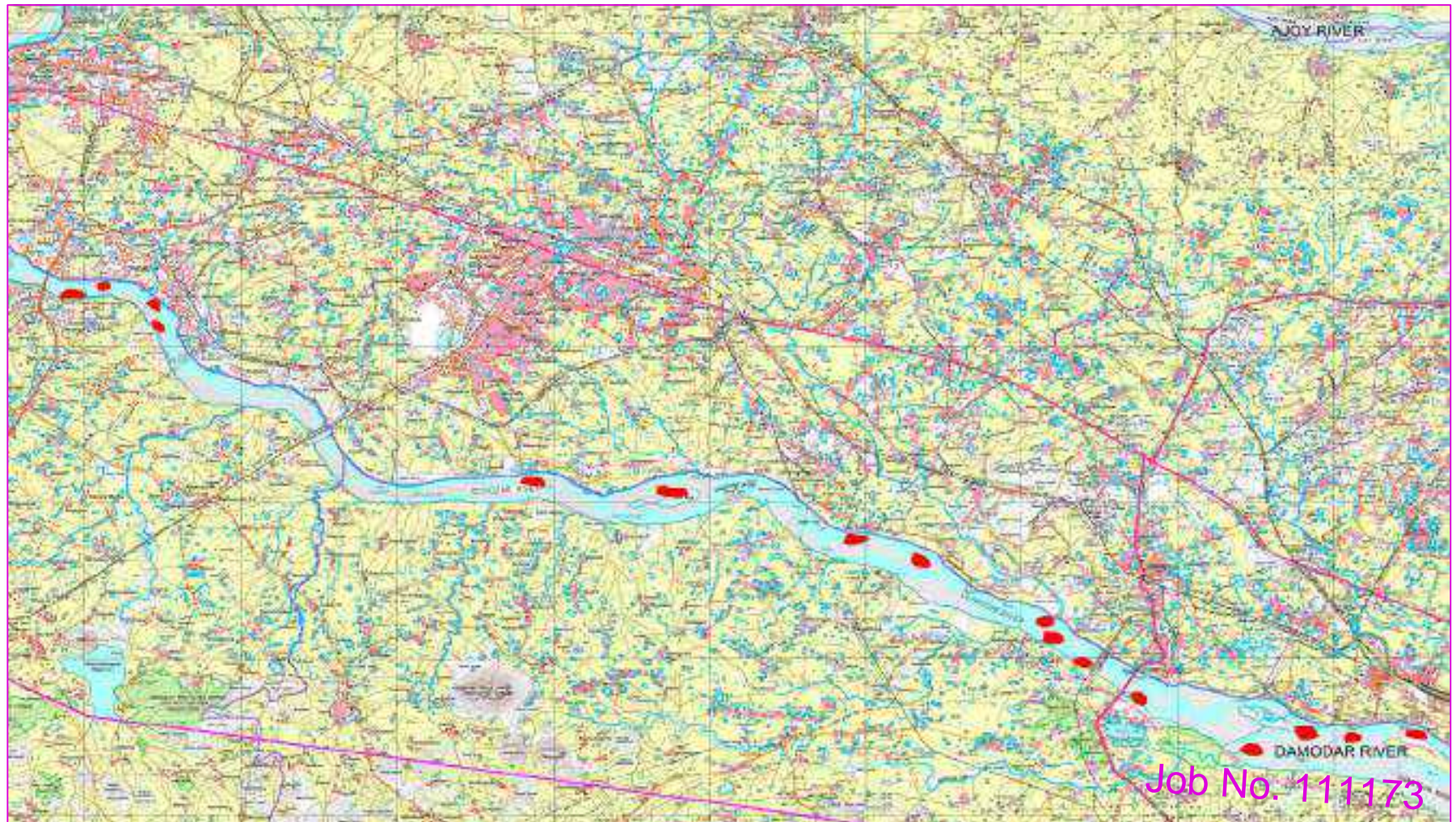


Damodar River

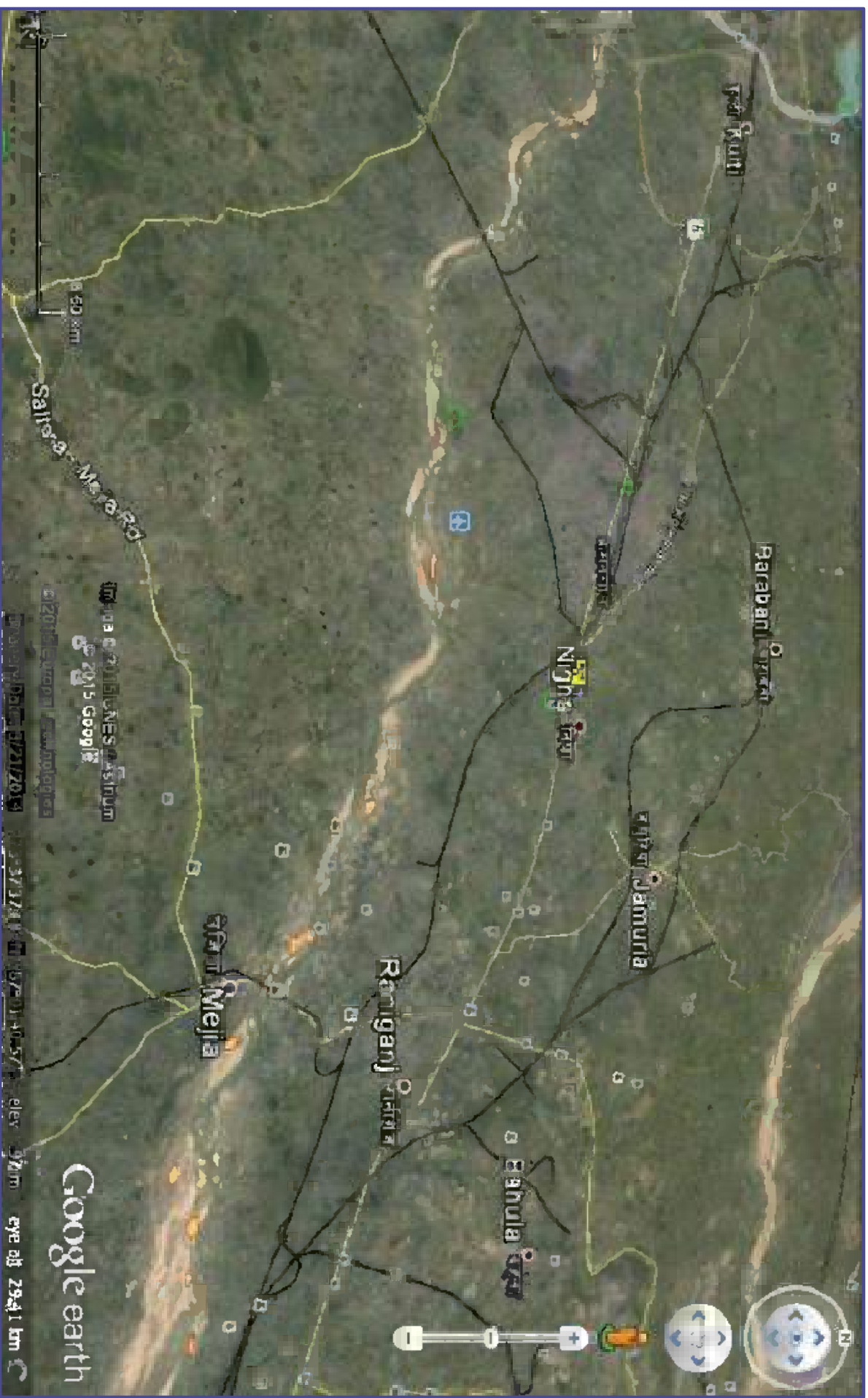
Burdwan District



## Plate - 2B Location of sand stations on toposheet



# Plate 2C Location of sand stations on google earth



Job No. 111173

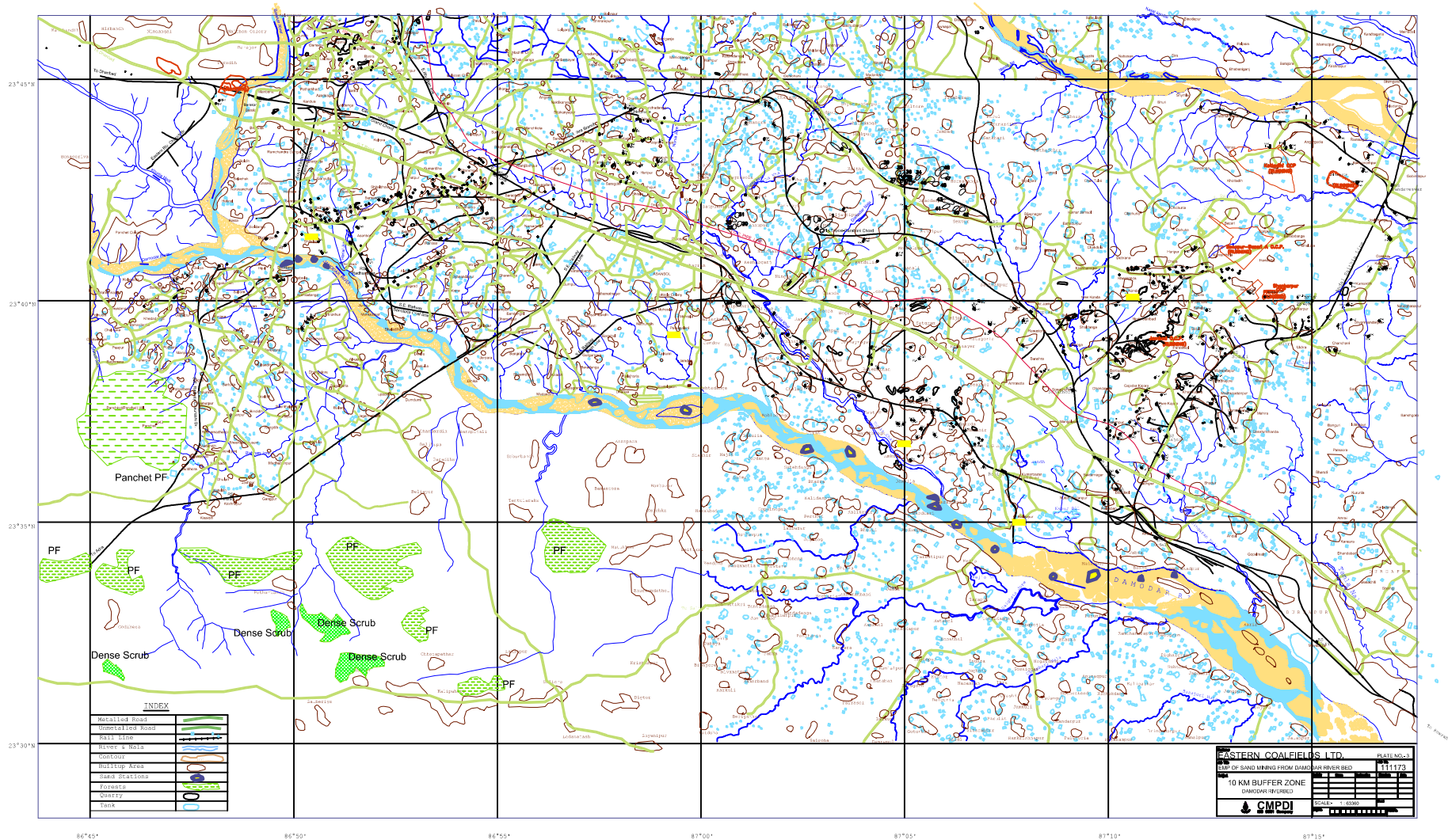
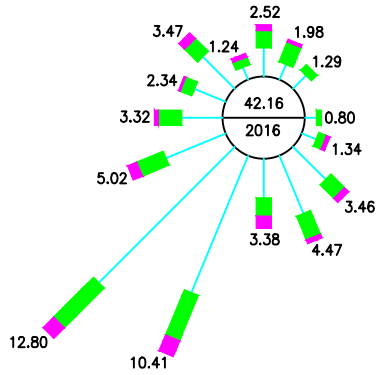


FIG : III.1 SEASONAL WINDROSE



SEASON : SUMMER-2012

PERIOD : 1st APR'12 - 23rd JUN'12



SCALE : 1 CM = 2.5% (NOS. IN PERCENTAGE)

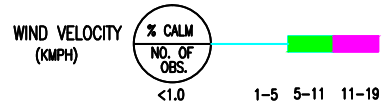


FIG : III.2 DAY TIME & NIGHT TIME WINDROSES

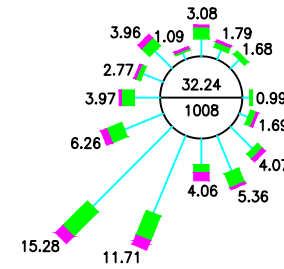


SEASON : SUMMER-2012

PERIOD : 1st APR'12 - 23rd JUN'12

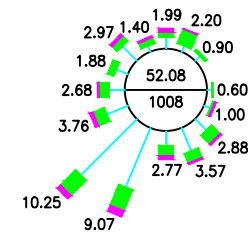
DAY TIME

TIME: 06.00hrs. TO 18.00hrs.

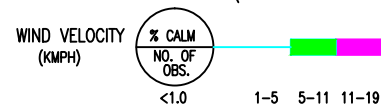


NIGHT TIME

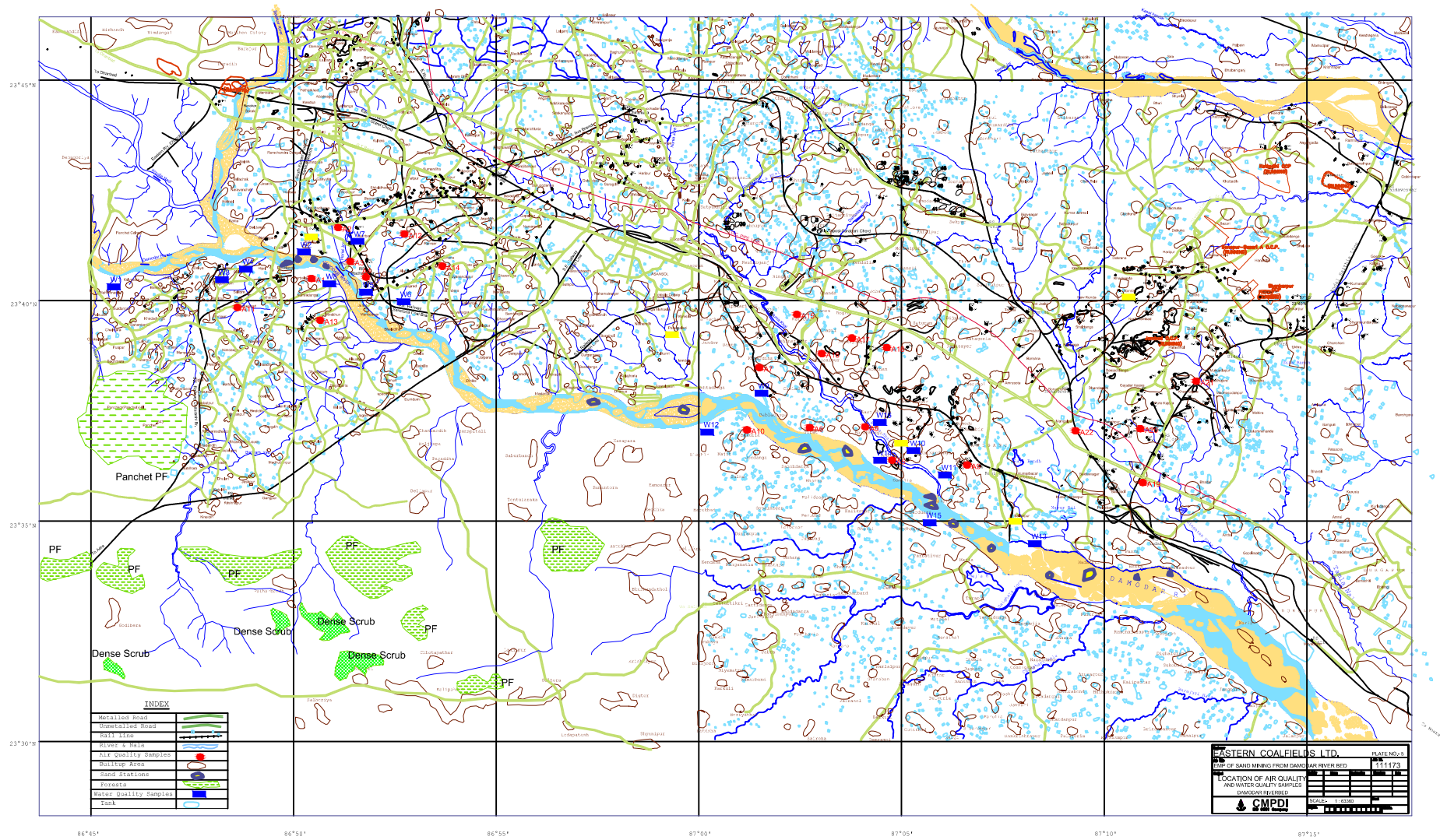
TIME: 18.00hrs. TO 06.00hrs.

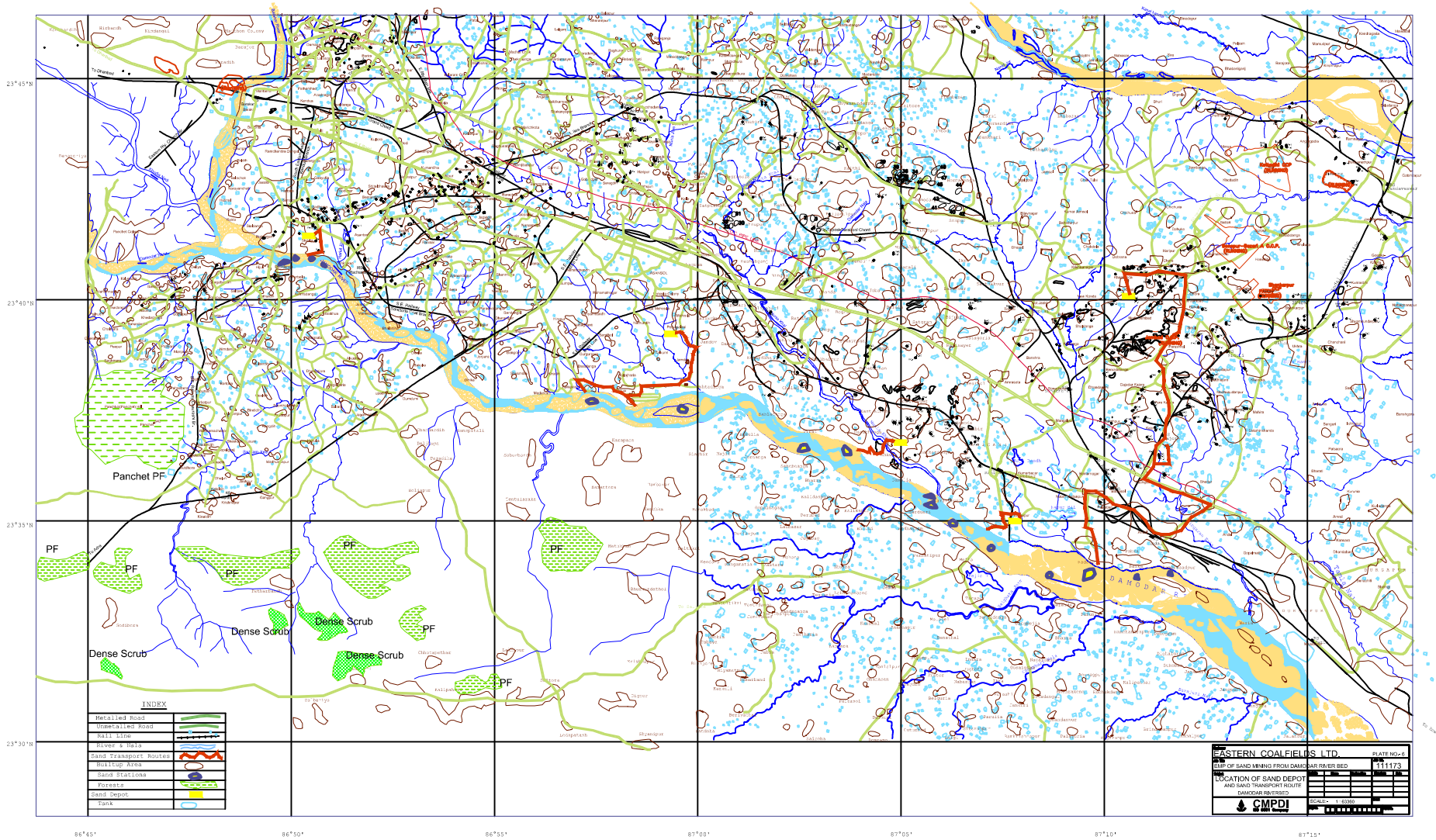


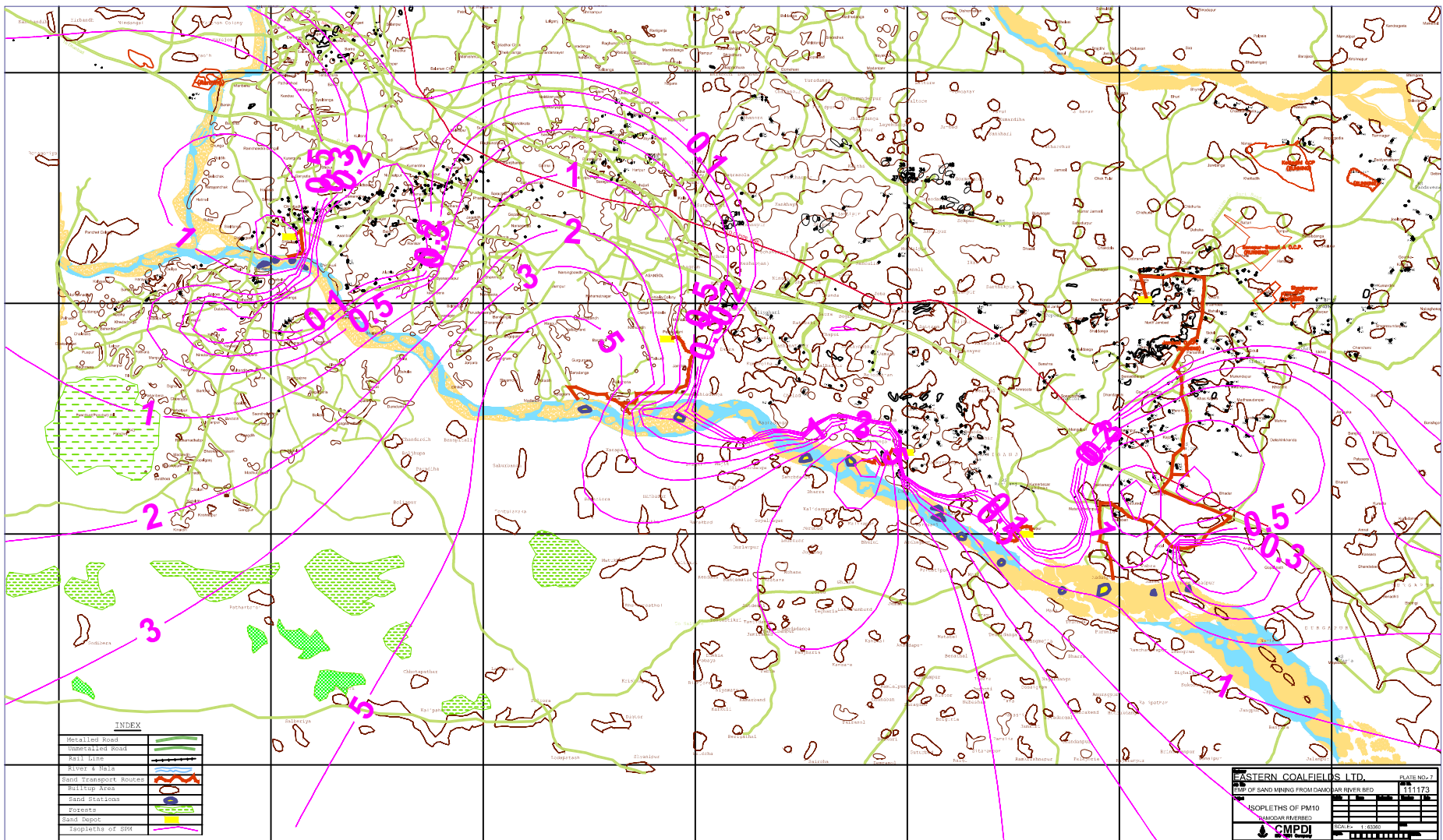
SCALE : 1 CM = 5% (NOS. IN PERCENTAGE)



EASTERN COAL FIELDS LIMITED		PLATE NO 4
EIA/EMP FOR SAND MINING IN DAMODAR RIVERBED		
WIND ROSE DIAGRAM - SEASON SUMMER'12		
Scale	Not to scale	Sheet No. 1
Drawn by	CMPDI	Checked by
Scale	ISO 8001 Company	Scale







**LEGEND**

	RAIL
	RIVER
	DREDGER (OPERATIVE)
	DREDGER (INOPERATIVE)
	STATION (OPERATIVE)
	STATION (INOPERATIVE)
	ROAD
	SCRAPER (OPERATIVE)
	SCRAPER (IN-OPERATIVE)
	SCAPER HOPPER (OPERATIVE)
	SCAPER HOPPER (IN-OPERATIVE)
	MONO-CABLE ROPEWAY (OPERATIVE)
	MONO-CABLE ROPEWAY (INOPERATIVE)
	BI-CABLE ROPEWAY (OPERATIVE)
	BI-CABLE ROPEWAY (INOPERATIVE)
	SAND DUMP
	SEPERATOR (IN-OPERATIVE)
	LONG DISTANCE BELT CONVEYOR

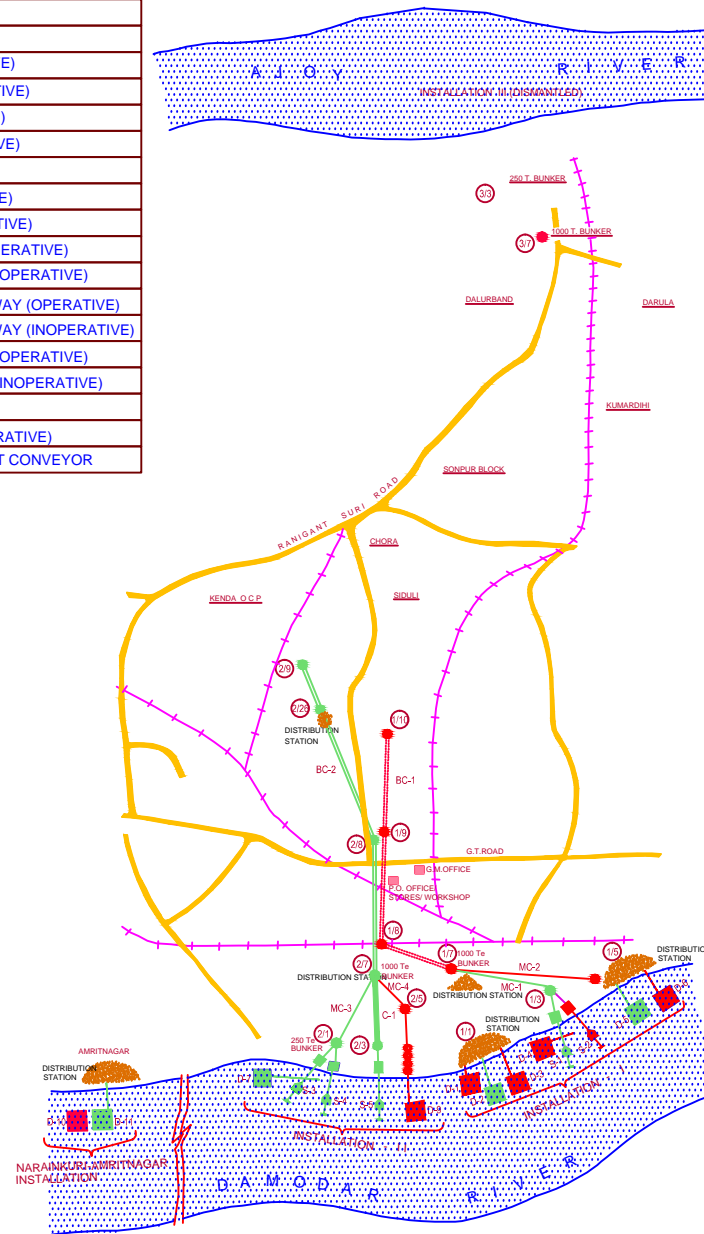


Fig. 1: Location Plan of JK Ropeways, ECL Showing Station-wise Installations

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FOR COMPANY USE ONLY

**RESTRICTED**

The information given in this report is not to be communicated either directly or indirectly to the press or to any person not holding an official position in the CIL/Government.

# **Pre-feasibility Report**

(as per format on MoEF Website)

for

## **Composite Plan for Mining of Sand**

(for the purpose of Stowing in Underground Mines of ECL in Raniganj Coalfield)

in

## **Damodar & Barakar Riverbed**

(1.5 Million M<sup>3</sup> per annum in total ML of 86.58 Ha)

## **Eastern Coalfields Limited**

(Original Report Prepared in August, 1999 and approved by Deptt. of Coal, GOI in November, 1999)

(September, 2013)

Prepared at

Regional Institute – I

**Central Mine Planning & Design Institute Ltd.**

(A Subsidiary of Coal India Ltd.)

G. T. Road (West End)

Asansol - 713 304



# **CMPDI**

ISO 9001:2008 Company

## 1.0 Background & Basis of Proposal

Most of the underground mines in ECL employ the Bord & Pillar method of working, where, after initial development, the standing pillars have to be extracted. These pillars can be extracted either by caving and allowing the surface to subside or stowing the de-coaled area with sand in cases where various surface features like buildings, roads, railway lines etc. are to be protected or safety of the mine or the workers has to be ensured against the danger from water and fire in the overlying seams. Due to growth of the population and various developmental works, considerable surface area is now covered with various surface features. Beside this, in most of mines, the top seams have already been worked and are filled up with water. Further, land acquisition for caving is becoming difficult with time. In the given circumstances, most of the pillar extraction in ECL has to be undertaken with sand stowing to ensure maximum recovery of coal blocked in pillars.

Thus, sand is required for the purpose of stowing in underground mines after extraction of coal. About 3.5 million cubic meters per annum of sand is required for stowing purpose in the mines of ECL falling in Raniganj Coalfield. To meet this requirement, sand is obtained from Ajay and Damodar rivers flowing on the northern and southern flanks of Raniganj Coalfield, respectively. Sand from these two rivers is being extracted by ECL for the last 40 years on the basis of temporary leases / permits obtained from the Govt. of West Bengal.

In order to have long term lease for sand mining, a report on Mining and Environment Management Plan for Grant of Mining Lease for Stowing Sand on Damodar Riverbed to meet the requirement of stowing sand in the underground mines of Eastern Coalfields Ltd. was prepared in August, 1999 and was approved by the Director, Ministry of Mines and Minerals, Deptt. of Coal, Govt. of India, New Delhi on 19<sup>th</sup> November, 1999.

In this report it was proposed to mine sand from 39 patches at 15 locations in the riverbed of Damodar River after the point of confluence with Barakar River flowing along the southern portion of the command area of ECL in Raniganj Coalfield as given in Table – I below and shown in Plan – I of the report.

Sand mining at these locations is being carried out on the basis of Temporary Working Permits issued by the Govt. of West Bengal which is being renewed from time to time.

However, Environment Clearance is to be obtained from MoEF before renewal of sand mining lease. Accordingly, the Assistant Secretary, Government of West Bengal, C&I department vide his memo no. 689 dated 09/10/2012 has advised fulfilling of all the formalities which includes

obtaining Environmental Clearance from MoEF for grant of long – term lease for the locations earmarked for sand mining in the Damodar Riverbed.

As such, ECL has to apply to MoEF in Form – 1 for obtaining the Terms of Reference for preparation of EIA & EMP as a pre-requisite to obtaining long-term lease for mining of sand from the said sites on Damodar Riverbed.

Since all the 15 locations are in the same riverbed of Damodar River and spread in patches over 42 kms of its course through the Raniganj Coalfield, it was felt that a composite application for sand mining in the Damodar Riverbed be made covering all the 15 patches rather than making piecemeal applications. The total area of these patches is 213.86 Acre (86.58 Ha) which is only a very small fraction of the total riverbed area falling within the Raniganj Coalfield.

## **2.0 Introduction to the Project & Background Information**

### **2.1 A note on Eastern Coalfields Ltd. & Identification of Project Proponent**

Raniganj Coalfield, which falls under Eastern Coalfields Ltd. is the birth place of coal mining in the Country. In 1774, first mining operation in the Country was started in this Coalfield by Sumner & Heatly. In 1820, first Coal Company M/s. Alexander & Company was established. In 1835, first Indian Enterprise i.e. M/s. Carr & Tagore Company was formed. In 1843, the first joint stock coal Company i.e. M/s. Bengal Coal Company was formed. Since then, underground coal mining operation had been continuing in Raniganj Coalfields by numerous small owners. Raniganj Coalfield remained the principal producer of coal in India in 19th Century and considerable period of the 20th Century.

In 1973, all Non-coking Coal Mines were nationalized and brought under Eastern Division of Coal Mines Authority Limited. In 1975 Eastern Coalfields Limited, a Subsidiary of Coal India Limited (C.I.L) was formed and inherited all the private sector coal mines of Raniganj Coalfields.

ECL mining leasehold area is 753.75 Sq.Kms and surface right area is 237.18 Sq.Kms. It is situated in two States-West Bengal and Jharkhand. Raniganj Coalfield is spreading over Burdwan, Birbhum, Bankura and Purulia Districts in West Bengal. At present ECL has 98 no. of operating mines out of which 77 are underground mines, 21 are opencast mines. The existing manpower in Eastern Coalfields Limited as on 01.07.2013 is 72973.

The major area of operation of ECL is Raniganj Coalfield in Burdwan District bounded by Ajoy River in North and Damodar River in South. Parts of Raniganj Coalfield like Kasta is located on

the North of Ajay, Mugma on the west of Barakar River, while Kalidaspur/Ardhagram and Parbelia are on South of Damodar River.

As on 1.4.2012, the total coal reserve in ECL command area upto 600 metre depth is 49.17 Billion tonne out of which 30.61 billion tone is in the State of West Bengal and 18.56 Billion tonne is in the State of Jharkhand.

The J K Ropeways under ECL is the organization looking after the mining of sand for stowing purposes in the underground mines of ECL. It is headed by General Manager (J K Ropeways) who reports to Director (T), Operations. The leases are maintained by the LRE Deptt. at ECL Headquarters headed by General Manager (LRE) reporting to Director (T), Planning. The environment cell operates under General Manager (Env) also reporting to Director (T), Planning.

## **2.2 Brief Description & Nature of the Project**

The application is for obtaining environmental clearance for existing leases for sand mining in the riverbed of Damodar River which flows along the southern boundary of Raniganj Coalfield. ECL is carrying out sand mining at 15 locations over a stretch of 42 kms in Damodar River – bed for the last more than 40 years on the basis of lease and necessary approvals obtained from the West Bengal Government. The sand collected from the river is used in underground mines of ECL for optimum extraction of coal in terms of conservation and avoiding subsidence and land degradation to the maximum extent as per the approved method of working (i.e. as per DGMS permission). There is no other proven material for hydraulic stowing except sand. There is no commercial sale of the sand.

The total area under existing sand mining lease is 213.86 Acre (86.58 Ha). About 1.5 million m<sup>3</sup> of sand will be mined annually (Peak extraction) which is a small fraction of the quantity deposited each year during the monsoons. Thickness of sand in the riverbed varies from 8 – 17 m.

Environmental clearance is required for the purpose of lease renewal for which a composite application is being made rather than obtaining clearances for all locations/plots separately (please refer table below).

Table - 1

Mouza & Plotwise land in Damodar Riverbed where sand is being extracted for stowing purpose

Station No.	P.S.	J.L. No.	Mouza	Gram Panchayat	Plot No.	Area (Acre)	Maximum extraction per year (M Cum)	Method of mining
1	Mejia	8	Gopalpur	Ardhagram	1094	6.00	0.030	Manual
2	Mejia	7	Ardhagram	Ardhagram	1324, 1325	46.00	0.360	Diesel Operated Dredger
3	Mejia	36	Gopalganj	Ardhagram	657	6.00	0.030	Manual
4	Saltora	42	Majit	Durlavpur	1731, 1736	10.00	0.050	Manual
5	Saltora	45	Sahebdanga	Durlavpur	1	25.00	0.150	Manual
6	Mejia	1	Bhara	Ardhagram	1819, 1824	6.00	0.120	Pontoon
					1629	4.00		
					1814	2.00		
					1	4.00		
7	Mejia	35	Anandpur	Durlavpur	1	4.50	0.020	Manual
8	Andal	51	Ramprasadpur	Ramprasadpur	1983, 665, 667 – 681, 683 – 685, 687 – 698, 804 - 819	13.20	0.050	Diesel Operated Dredger
9	Andal	50	Baska	Madanpur	1071, 1073, 1075, 1076, 1217, 1218, 1220 -1223, 1205, 1234		0.050	Electrically operated Scraper
10	Andal	48	Madanpur	Madanpur	3, 1215 - 1222, 2330, 2335, 2337 – 2339, 2454, 2520, 2547, 2578, 2579, 2444	33.66	0.150	Diesel Operated Dredger
11	Raniganj	31	Napur	Raniganj	1891, 2391, 2394 – 2396		0.060	-do-
12	Raniganj	12	Narayankuri	Raniganj	217, 231 - 233		0.060	-do-
13	Kulti	40	Sitalpur	Kulti Municipality	1620	24.50	0.180	Manual
					637	5.75		
14	Kulti	60	Chinakuri	Kulti Municipality	278	6.75	0.040	Pontoon & Manual
15	Neturia	95	Parebelia	Bhamuria	1, 901, 3567	16.50	0.100	Manual
Total						213.86	1.450	
						i.e 86.58 Ha	Peak : 1.5	

Location of the above patches is given in Plate – 1

### 2.3 Need for the project and its importance to the Country and Region

Presently, sand is the only material suitable for stowing in underground mines. Fly – ash generated from power plants is being considered for use in stowing in place of sand and some pilot projects have been undertaken in this respect. However, its efficacy is yet to be proven and there are other practical difficulties involved which need to be sorted out. Thus, for the time being there is no feasible alternative to sand for the purpose of stowing.

Most of the underground mines in ECL employ the Bord & Pillar method of working, where, after initial development, the standing pillars have to be extracted. These pillars can be extracted either by caving and allowing the surface to subside or stowing the de-coaled area with sand in cases where various surface features like buildings, roads, railway lines etc. are to be protected

or safety of the mine or the workers has to be ensured against the danger from water and fire in the overlying seams. Due to growth of the population and various developmental works, considerable surface area is now covered with various surface features. Beside this, in most of mines, the top seams have already been worked and are filled up with water. Further, land acquisition for caving is becoming difficult with time. In the given circumstances, most of the pillar extraction in ECL has to be undertaken with sand stowing to ensure maximum recovery of coal blocked in pillars.

Stowing not only provides protection against subsidence effectively if carefully done and makes underground mining safer especially in the case there are overlying workings, but is also more environment friendly as the overlying strata of aquifers do not get disturbed. Damage to aquifers can lower the water table in the mining area and cause degradation of agricultural lands. Sand stowing is, therefore, essential for safety as well as conservation and an environment friendly method of mining.

Thus, availability of sand is essential for safety of the mines as well as for conservation of coal. Pillar extraction needs to be undertaken with stowing to recover about 80% of coal blocked in pillars and it is imperative to maintain continued supply of sand in adequate quantity for ensuring safety and productivity of the underground mines.

## 2.4 Demand – Supply Gap

The present requirement of sand for stowing in the mines of ECL in Raniganj Coalfield is around 2 million cubic meters per annum, out of which 1 million cubic meters is sourced from Damodar Riverbed. In future, with likely augmentation of production from underground mines, total requirement of stowing sand is likely to go up to 3.5 million cubic meters with 1.5 million cubic meters to be sourced from Damodar Riverbed. Thus, in future there is likely to be an increase in demand from the present level of 1 million cubic meters to 1.5 million cubic meters.

### Calculation of reserves

- ✓ Sand is found up to the depth ranging from 8 meters to 17 meters. Thus,  
Depth – 8 m, Width – 1500 m, Stretch of river – 42 Km
- ✓ Total sand reserves =  $8 \times 1500 \times 42000 = 504$  million  $m^3$
- ✓ Total extractable sand (60%) =  $504 \times 0.6 = 302.40$  million  $m^3$
- ✓ Total area of sand mining leasehold = 86.58 Ha
- ✓ Total sand available for extraction by ECL = 4.16 million  $m^3$
- ✓ Total sand proposed to be mined annually at peak level with due regard to replenishment =  $865800 \times 1.7m$  (average) = 1.5 million  $m^3$

## **2.5 Employment Generation**

With increased sand extraction, there is likelihood of increase in employment potential. It is proposed to employ only local labour force for extraction of sand from the riverbed.

### **3.0 Project Description**

#### **3.1 Type of the project with interlinked projects**

The application is for obtaining environmental clearance for existing leases for sand mining in the riverbed of Damodar River which flows along the southern boundary of Raniganj Coalfield and is linked to the existing underground mines which require sand for stowing purpose. ECL is carrying out sand mining at 15 locations over a stretch of 42 kms in Damodar River – bed for the last more than 40 years on the basis of lease and necessary approvals obtained from the West Bengal Government. The sand collected from the river is used in underground mines of ECL for optimum extraction of coal in terms of conservation and avoiding subsidence and land degradation to the maximum extent as per the approved method of working (i.e. as per DGMS permission). Environmental clearance is required for the purpose of lease renewal for which a composite application is being made rather than obtaining clearances for all locations/plots separately. The salient features of the project are as below –

- The sand collection is restricted to 1.5m to 2.0m (average depth of about 1.7 m considering the total leasehold of 86.58 Ha) and confined to lean season (non – monsoon period) only. The removal is done without affecting the base flow of the river and in such manner as to maintain the smooth flow of the river during the monsoons. This helps in protection of the banks from erosion.
- The sand will be mined manually from surface of river-bed.
- There is no drilling and blasting involved.
- There is no rehabilitation & resettlement involved.
- There is no dust generation and liquid effluent generation during collection of sand.
- The transport of sand from the sand ghat is done through tippers covered with tarpaulin / thick plastic sheets.
- All necessary facilities like shelter, drinking water, safety equipment, etc are provided to the workers deployed for the collection of sand from the river bed.

### 3.2 Location

The application is for obtaining environmental clearance for existing leases for sand mining in the riverbed of Damodar River which flows along the southern boundary of Raniganj Coalfield. ECL is carrying out sand mining at 15 locations over a stretch of 42 kms in Damodar River – bed. The location of these patches are given in Table – 1 above and is shown in Plate – 1. They fall under three districts, namely, Burdwan on the northern bank of Damodar and Bankura & Purulia on the southern.

#### A Note on Damodar River

The River Damodar originates in Chandwa in Palamau district of Jharkhand, in the Chotanagpur Plateau, and flows eastward for about 592 km through the states of Jharkhand and West Bengal to the estuary of the River Hooghly. It has a number of tributaries and subtributaries, such as Barakar, Konar, Bokaro, Haharo, Jamunia, Ghari, Guaia, Khudia and Bhera. The Barakar is the most important tributary of the Damodar. It originates near Padma in Hazaribagh district of Jharkhand and meets the Damodar near Dishergarh in West Bengal.

Damodar River basin is the repository of 46% coal reserves in India and is one of the richest mineralized zones of the country with a high growth of mining and industrial development, demographic and urban growth extending over a large area of Jharkhand and West Bengal.

In order to contain the annual floods which devastated West Bengal, two dams across the rivers Barakar and Damodar were built at Maithon in 1957 and Panchet in 1959. Both the dams are some 8 km upstream of the confluence point of the rivers. From the point of confluence, the river flows easterly between the districts of Burdwan on the north bank and Purulia district and later on Bankura district on the southern bank. The Raniganj coalfield extends upto 42 kms with most of the mines on the northern bank.

The present proposal is to obtain permanent mining lease of 39 patches in 15 locations along the 42 kms downstream stretch of the Damodar River from the said point of confluence with Barakar River as highlighted in the figure below - .



### 3.3 Alternate Sites

The sites as mentioned above are under mining lease of ECL since inception and the leases are renewed periodically by the state govt. The application is being made for environment clearance for the existing leases and no additional/alternate areas have been considered.

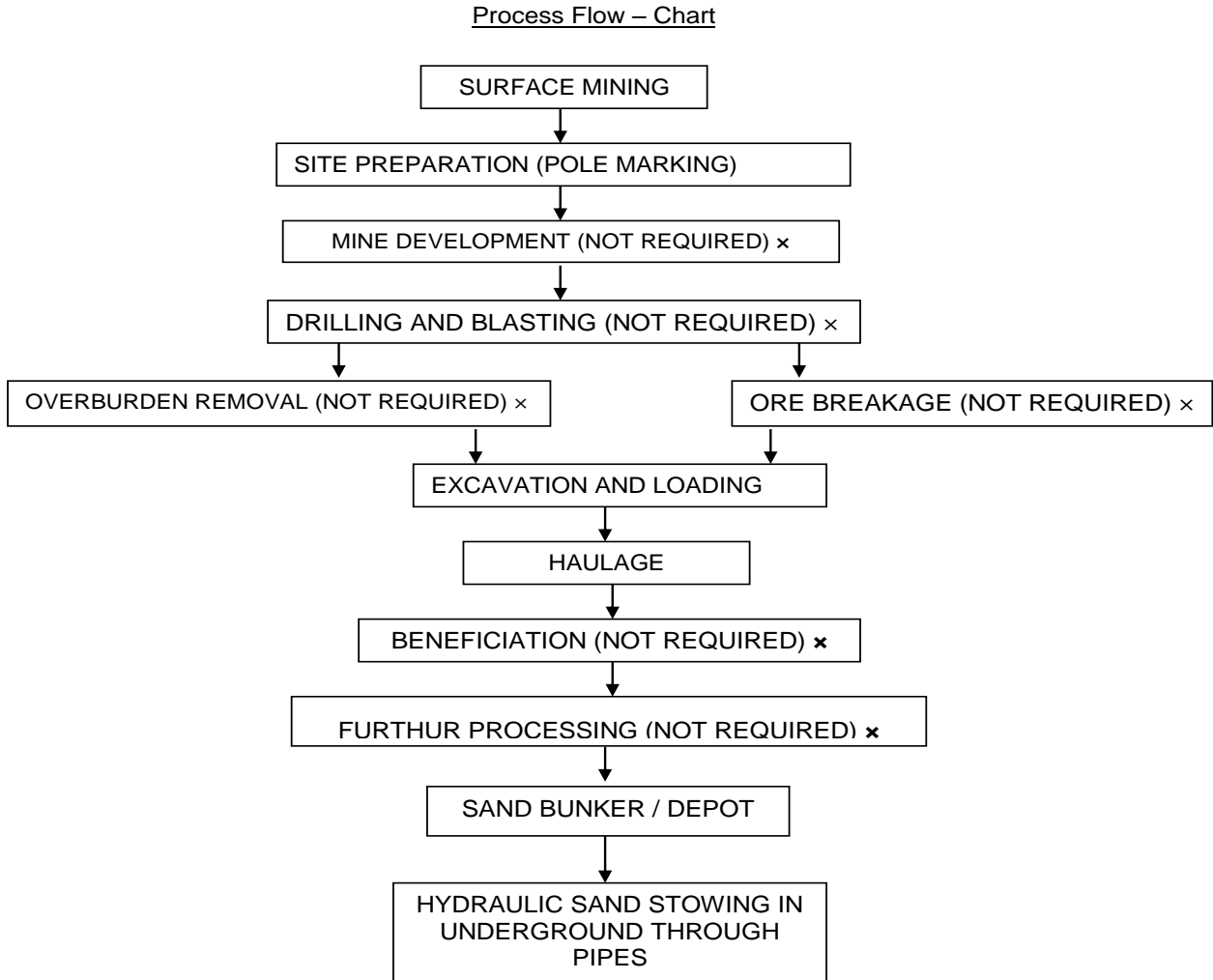
### 3.4 Size of the project and Magnitude of Operation

The total area under existing sand mining lease is 213.86 Acre (86.58 Ha) spread over 39 patches at 15 locations in the riverbed of Damodar as given in the Table – 1 above. These patches are spread over the river course along the Raniganj Coalfield and cater to the sand requirement for stowing in the underground mines along the river. 1.5 million m<sup>3</sup> of sand will be mined annually (Peak extraction).from these patches. The maximum depth of sand extraction varies from 1.5 m to 2 m. Sand is transported to the mines directly by trucks or stored at convenient locations for distribution to the linked underground mines.

### 3.5 Project Description with Schematic Flow Chart of operations

- Sand is excavated manually from the sites and loaded in trucks for transportation to various mines / sand depots.
- The sand collection is restricted to 1.5m to 2.0m (average depth of about 1.7 m considering the total leasehold of 86.58 Ha) and confined to lean season (non – monsoon period) only. The removal is done without affecting the base flow of the river and in such manner as to maintain the smooth flow of the river during the monsoons. This helps in protection of the banks from erosion.
- There is no drilling and blasting involved.
- The distance of transportation is around 5 to 6 kms. The transport of sand from the sand ghat is done through tippers covered with tarpaulin / thick plastic sheets.

A flow chart of operations starting from the riverbed and leading up to the mine is given below –



### 3.6 Availability of Water from Mines

Water is required for the following purposes during the process –

1. Sprinkling on transport roads to arrest dust
2. Mixing with sand in appropriate ratio for hydraulic sand stowing through pipes
3. Potable water requirement for manpower engaged in various activities

The above water requirement is met from mine water which is available in adequate quantity in all the mines and there are no competing users for this water. The water used for mixing with sand for stowing is recycled. Mobile sprinklers filled with mine water ply along the sand transport routes at regular intervals for wetting of the roads. Potable water is supplied to the workers from filtration plants which filter mine water for potable use.

### **3.7 Availability of Power**

Power is available from WBSEB and Disergarh Power Supply Co. at all the mines round the clock. Diesel fuel required for truck transportation of sand and mobile sprinklers is also available at the mines.

### **3.8 Waste Generation**

There is no waste generation of any type in the entire process.

## **4.0 Site Analysis**

### **4.1 Connectivity**

The sand mining patches are well connected to the mines / depots by roads which are regularly maintained by the company.

The Grand Trunk Road (NH 2) runs across the Raniganj Coalfield providing excellent connectivity to all parts of the state and outside. The highway has been broadened as part of the Golden Quadrilateral project and now allows two lane traffic each way. A bypass enables highway traffic to avoid the congested areas of Asansol, Neamatpur, Kulti and Barakar.

The railway track from Kolkata to Delhi passes through the coalfield and bifurcates into the main line and the grand chord line, at Sitarampur railway junction, a little to the west of Asansol. Another railway track links Asansol with Adra and then to Jamshedpur via Purulia and Kharagpur via Bankura. A branch line connects Andal with Sainthia on the Sahibgunj loop. Thus, the subdivision is well connected to all parts of the countries. All trains linking Kolkata with north India pass through Raniganj & Asansol.

### **4.2 Landform, Landuse and Land ownership**

The landform is the riverbed of Damodar River along the Raniganj Coalfield and is the main course of the river. The river course is owned by the State of West Bengal and falls under the districts of Burdwan, Bankura & Purulia. The sand is mined on the basis of lease and temporary working permits renewed from time to time. There is no other land use within the river course.

### **4.3 Topography**

The river flows from west to east and a major portion of the Raniganj Coalfield is under its catchment. A map of the river is given as Plate – 1.

Physiographically, the Raniganj coalbelt overlies the granite plateau fringe of Chotanagpur with a general elevation of about 100 meters. Permo carboniferous rock formations of Talcher, Barakar, Barren Measures, Raniganj & Panchet series are exposed in many planes with small isolated occurrences of upper Gondwanas near the southern boundary fault. Among the rock formations, the Raniganj & Barakar series contain some of the thickest & best coals of India (Bose, 1968).

General RL of the area varies between 80 to 100 m. The area consists of barren, rocky and rolling country with a laterite soil. The topography of the area is undulating and gently sloping towards Damodar River, which forms the southern boundary and controls the drainage of the area. The area is drained by a few seasonal streams like Nunia Nala, Singaran Nala and a number of ephemeral streams.

### **4.4 Eco sensitive areas falling within 10 kms of the river course**

There is no eco – sensitive / protected area within 10 kms of the river or the coal mines.

### **4.5 Existing Infrastructure**

All the infrastructure relating to sand mining and stowing as outlined in the process flow chart above, is already existing and no addition / alteration is required. The sand mining is carried out under the management of J K Ropeways as already mentioned above.

### **4.6 Soil Classification**

There is no soil in the riverbed which is covered with sand up to a depth ranging from 8 m to 17 m. Sand is extracted up to a maximum depth of 1.5 m to 2 m.

Coarse, gritty soil blended with rock fragments has been formed from the weathering of pegmatites, quartz veins and conglomeratic sandstones. This soil is of reddish colour, medium to coarse in texture, acidic in reaction, low in nitrogen, calcium, phosphate and other plant nutrients. Water holding capacity of this soil increases with depth as well as with the increase of clay portions. Although the soil is generally not fit for cultivation, paddy can be grown in the areas which become waterlogged during the monsoons.

#### 4.7 Climatic Data

##### Rainfall

The area receives rainfall by South-West monsoon. Rainy season sets in the middle of June and lasts till September. The normal average rainfall is 1400 mm.

##### Climate

The climate is tropical with hot dry summer, a good rainy season and cool winter. Thunder storms accompanied with severe squalls occur in pre-monsoon months. This is locally known as 'Kal Baisakhi'. Dust storms also occur occasionally in April and May. Morning fog occurs in the winter months.

The area is characterized by humid to sub-humid climate. During summer the hot spell prevails from March to middle of June. Rainy season starts from middle of June to end to September. Winter starts from the middle of November and continues till the end of February. The area experiences great heat from April to June, when the maximum temperature crosses 45<sup>o</sup>c. December is the coldest month when the minimum temperatures fall down to as low as 1<sup>o</sup> C.

##### Longterm Meteorological Data

Meteorological data based on long term trends observed at IMD Station at Asansol are shown below –

Month	Temperatures (°C)				Relative Humidity (%)	Average Precipitation (in)	No. of Rainy Days	Total Rainfall	Prominent Wind Direction	Wind Speed (mph)	
	Av Daily Max	Av Daily Min	Hist Max	Hist Min						Average	Hist Max
Jan'12	75.5	54.8	85	45	65.16	0.05	5	1.53	N/NW	1	46
Feb'12	86	58	98	49	46	0.01	2	0.31	N/NW	1	5
Mar'12	96	66	105	58	34	0.04	2	1.26	N/NW	1	5
Apr'12	100	73	107	62	51.9	0.04	4	1.28	S/SW	2	23
May'12	103	76	114	67	54	0.07	8	2.38	S/SW	2	69
June'12	101	78	115	68	62.8	0.17	12	5.31	S/SW	2	39
July'12	91	77	96	71	84	0.30	21	9.53	S/SW	2	88
Aug'12	91	78	95	75	84	0.28	19	9.05	S/SW	1	106
Sep'11	88	75	94	70	86.5	0.08	5	2.38	S/SW	1	34
Oct'11	90	72	93	63	74.6	0.02	3	0.56	N/NW	0	8
Nov'11	86	63	91	58	65.7	0.01	2	0.39	N/NW	0	4
Dec'11	81	54	88	45	59.6	0.00	0	0.00	N/NW	1	6

#### 4.8 Social Infrastructure

The area is characterized by Asansol and Raniganj (parts of the Asansol Subdivision), two densely populated habitations. Mining operations have not only affected the physical & biological structure of the area, but have also led to an overall change of the surroundings i.e. the socio - economic scenario. The loss of agricultural land & coming up of new settlements and industries have brought about a drastic change on demography & lifestyle. The development of mining led to establishment of other industries which has changed the land use & landholding pattern all over the coalfield. The rural settlements of the region became urban with a shift in their functional structure. Prior to mining development, the means of livelihood of the local inhabitants were based on agriculture & forest. But the development of mining has brought about job opportunities with ECL, IISCO and their associated contractors & ancillary industries, thus eliminating many traditional sources of income. The Asansol and Durgapur subdivisions of Burdwan district are now the most important industrial regions of the State of West Bengal. Apart from mining which is the prime industry, steel plants are located at Burnpur and Durgapur along with an important locomotive centre at Chittaranjan providing employment to a large number of people. Besides, there are large and small mills producing tiles, clay products, pottery; paper cutlery etc. The district has one University and several colleges and technical institutions located in Asansol & Durgapur Subdivisions.

Development in the subdivision is carried out by the newly formed Asansol Durgapur Development Authority. ADDA promotes industrial estates, housing schemes, urban infrastructure development for industrialisation of this region, to provide solutions to industries and entrepreneurs. Its projects include roads, bridges, drainage, transport, water supply, irrigation. It develops schools, colleges and amusement parks. The area has numerous banks, with branches of almost all major nationalized banks and private sector banks.

Although Asansol & Raniganj are predominantly Bengali speaking, there is mixed population of Bengali, Hindi and Urdu speaking people. English is the language of business communication and once widely spoken. After the railway works came, there was a substantial British and Anglo-Indian population. English medium schools started to impart education in English from as early as 1877. The first Christian Brother School in India, St. Patrick's School, Asansol, was started in 1891. The students from this and other English medium schools provided the elite work force that was needed to operate the British Indian Railways, the British Indian Army, the Indian Civil Services and the coal mines.

Due to large scale influx of migrants from all parts of the country, the community living here now is multicultural and there are a large number of Biharis, Punjabis, Marwaris, Gujaratis, Muslims

and other non-Bengalis. There is no Indian festival that is not celebrated and the people of all communities take part in them with equal fervour.

Eastern Coalfields Ltd. Is the principal employer with a manpower of over 50000 in the mines of Raniganj Coalfield and other establishments.

### 5.0 & 6.0 Planning Brief and Proposed Infrastructure

Since this application deals with obtaining environmental clearance for existing sand mining leases and no change whatsoever is to be made to the leaseholds and infrastructure already available, no fresh proposal or planning is required.

### 7.0 Rehabilitation & Resettlement

There is no R & R related to the sand mining proposal

### 8.0 Project Schedules / Cost Estimates

In order to ensure availability and un – interrupted supply of sand to the underground mines, environmental clearance is a pre – requisite as renewal of lease is dependent on it. The infrastructure is already in place. As such, it is expected to prepare draft EIA & EMP based on TOR to be issued by MoEF at the earliest. A tentative schedule is provided as under -

SI No.	Activity	Anticipated date of Completion	Approximate Cost (Rs Lakh)
1	One season Baseline Data Generation & EIA related studies	6 months	50.0
2	Preparation of Draft EIA & EMP for Public Hearing	2 months after completion of activity at SI No. 1.	50.0
3	Final EIA & EMP and Environmental Clearance	Within 3 months from the date of PH	10.0
4	Obtaining Permit for sand extraction based on EC	1 month from the date of EC	10.0

**9.0 Analysis of Proposal**

Underground mining technology is primarily dependent on sand for stowing purpose during the depillaring process when the coal blocked in developed pillars is extracted. Also, in course of time the surface is increasingly getting populated and built – up, and as such there is limited or virtually no scope for allowing the surface to subside. Hence the proposal is paramount in view of safety of the mines and surface features as well as from the point of view of coal conservation.

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# **Form-I as per EIA Notification, 2006**

**For**

## **Composite Sand Mining Plan in Damodar & Barakar River-Bed**

**(For the purpose of stowing in underground mines)**

**Peak Production- 1.5 million m<sup>3</sup>**

**(Total Area to be mined- 86.58 Ha)**

**Eastern Coalfields Limited**

**(June, 2013)**

**Prepared at**

**Regional Institute – I**

**Central Mine Planning & Design Institute Ltd.**

**(A Subsidiary of Coal India Ltd.)**

**G. T. Road (West End)**

**Asansol - 713 304**



**CMPDI**

**ISO 9001:2008 Company**

**Form-I as per EIA Notification, 2006  
for  
Sand Mining in Damodar River-Bed  
(for the purpose of stowing in underground mines)  
Eastern Coalfields Limited**

**(I) Basic Information**

Salient Features of the proposal

- ECL is carrying out sand mining at 15 locations over a stretch of 42 kms in Damodar River – bed for the last more than 40 years on the basis of lease and necessary approvals obtained from the West Bengal Government.
- The sand collected from the river is used in underground mines of ECL for optimum extraction of coal in terms of conservation and avoiding subsidence and land degradation to the maximum extent as per the approved method of working (i.e. as per DGMS permission). There is no other proven material for hydraulic stowing except sand. There is no commercial sale of the sand.
- The total area under existing sand mining lease is 213.86 Acre (86.58 Ha). About 1.5 million m<sup>3</sup> of sand will be mined annually (Peak extraction) which is a small fraction of the quantity deposited each year during the monsoons. Thickness of sand in the riverbed varies from 8 – 17 m.
- Environmental clearance is required for the purpose of lease renewal for which a composite application is being made rather than obtaining clearances for all locations/plots separately (please refer table below).
- The sand collection is restricted to 1.5m to 2.0m (average depth of about 1.8 m considering the total leasehold of 86.58 Ha) and confined to lean season (non – monsoon period) only. The removal is done without affecting the base flow of the river and in such manner as to maintain the smooth flow of the river during the monsoons. This helps in protection of the banks from erosion.
- The sand will be mined manually from surface of river-bed.
- There is no drilling and blasting involved.
- There is no rehabilitation & resettlement involved.
- There is no dust generation and liquid effluent generation during collection of sand.
- The transport of sand from the sand ghat is done through tippers covered with tarpaulin / thick plastic sheets.
- All necessary facilities like shelter, drinking water, safety equipments etc are provided to the workers deployed for the collection of sand from the river bed.

Mouza & Plotwise requirement of land where sand is being extracted for stowing  
purpose  
Damodar River Bed

Station No.	P.S.	J.L. No.	Mouza	Gram Panchayat	Patch No.	Plot No.	Area (Acre)	Maximum extraction per year (M Cum)	Method of mining
1	Mejia	8	Gopalpur	Ardhagram	1	1094	6.00	0.030	Manual
2	Mejia	7	Ardhagram	Ardhagram	1	1324, 1325	46.00	0.360	Diesel Operated Dredger
3	Mejia	36	Gopalganj	Ardhagram	1	657	6.00	0.030	Manual
4	Saltora	42	Majit	Durlavpur	1	1731, 1736	10.00	0.050	Manual
5	Saltora	45	Sahebdanga	Durlavpur	1	1	25.00	0.150	Manual
6	Mejia	1	Bhara	Ardhagram	1	1819, 1824	6.00	0.120	Pontoon
					2	1629	4.00		
					3	1814	2.00		
					4	1	4.00		
7	Mejia	35	Anandpur	Durlavpur	1	1	4.50	0.020	Manual
8	Andal	51	Ramprasadpur	Ramprasadpur	1	1983, 665, 667 – 681, 683 – 685, 687 – 698, 804 - 819	13.20	0.050	Diesel Operated Dredger
9	Andal	50	Baska	Madanpur	1	1071, 1073, 1075, 1076, 1217, 1218, 1220 -1223, 1205, 1234		0.050	Electrically operated Scraper
10	Andal	48	Madanpur	Madanpur	1	3, 1215 - 1222, 2330, 2335, 2337 – 2339, 2454, 2520, 2547, 2578, 2579, 2444	33.66	0.150	Diesel Operated Dredger
11	Raniganj	31	Napur	Raniganj	1	1891, 2391, 2394 – 2396		0.060	-do-
12	Raniganj	12	Narayankuri	Raniganj	1	217, 231 - 233		0.060	-do-
13	Kulti	40	Sitalpur	Kulti Municipality	1	1620	24.50	0.180	Manual
					2	637	5.75		
14	Kulti	60	Chinakuri	Kulti Municipality	1	278	6.75	0.040	Pontoon & Manual
15	Neturia	95	Parebelia	Bhamuria	1	1, 901, 3567	16.50	0.100	Manual
	Total						213.86	1.450	
							i.e 86.58 Ha	Peak : 1.5	

Job No. 111173

1	Name of the project	Composite Plan for Sand Mining on Damodar River Bed for the purpose of stowing in underground mines of Eastern Coalfields Ltd. in Raniganj Coalfield. Mining of sand to be carried out in 213.86 Acre (86.58 Ha) spread over 15 locations (pl refer table above) along the river bed over a stretch of about 42 kms (Please refer Plate – I)
2	S. No. in the schedule	1 (a)
3	Proposed capacity / area / length / tonnage to be handled / command area / lease area / number of wells to be drilled	Capacity – 1.50 Million Cubic Meters per year (Peak) Combined Area of leasehold sites of sand mining in Damodar river – bed = 213.86 Acre (86.58 Ha)
4	New / Expansion / Modernization	Sand is being extracted from the bed of River Damodar, flowing along the South of Raniganj Coalfield for the last more than 40 years for the purpose of stowing as per the lease approvals and accompanying guidelines of the Government of West Bengal. However, for the purpose of renewal of these sand mining leases for obtaining sand for stowing in the underground mines, Assistant secretary, Government of West Bengal, C&I department vide his memo no. 689 dated 09/10/2012 has advised fulfilling of all the formalities which includes obtaining Environmental Clearance from MoEF. Hence, a composite plan for mining of sand from the river Damodar (existing sand mining sites located close to each other) has been prepared and application is being made for EC
5	Existing Capacity/Area etc	Capacity – 1.50 Million Cubic Meters per year (Peak) Combined Area of leasehold sites of sand mining in Damodar river – bed = 213.86 Acre (86.58 Ha) Pl refer table above
6	Category of Project. i.e. 'A' or 'B'	A
7	Does it attract the general condition? If yes, Please specify	No.
8	Does it attract the specific condition? If	No

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	yes, Please specify	
9	Location	Refer Plate - I
	Mouza	Gopalpur, Ardhagram, Gopalganj, Majit, Sahebdanga, Bhara, Anandpur, Ramprasadpur, Baska, Madanpur, Nupur, Narayankuri, Sitalpur, Chinakuri, Parbelia
	Tehsil/Block	Kulti, Asansol, Raniganj, Andal, Durgapur, Kanksa
	Districts	Burdwan, Purulia, Bankura
	State	West Bengal
10	Nearest railway station / airport along with distance in kms.	Several stations from Kulti to Durgapur
11	Nearest Town, city, District Headquarters along with distance in kms.	Aerial distance of Asansol is minimum 6 kms to maximum 30 kms from the river bed of Damodar. Several smaller towns are located closer to the river.
12	Village Panchayats Zilla Parishad Municipal Corporation, Local body (complete postal Addresses with telephone nos. to be given)	Gopalpur, Ardhagram, Gopalganj, Majit, Sahebdanga, Bhara, Anandpur, Ramprasadpur, Baska, Madanpur, Nupur, Narayankuri, Sitalpur, Chinakuri, Parbelia (Mouza's)
13	Name of the applicant	J.N. Biswal GM (Environment) Eastern Coalfields Limited.
14	Registered Address	<b>Company Headquarters:</b> Eastern Coalfields Ltd. PO- Sanctoria, Dist : Burdwan, West Bengal
15	Address for correspondence:	
	Name	J.N. Biswal
	Designation (Owner / Partner / CEO)	GM (Environment), Eastern Coalfields Limited.
	Address	Barachak House, PO – Sitarampur, Dist : Burdwan (WB)
	Pin Code	713359
	E-mail	<a href="mailto:envecl@yahoo.com">envecl@yahoo.com</a>
	Telephone No.	0341 – 2254510
	Fax No.	-
16	Details of Alternative Sites examined, if any.	Village- District-State (Not Applicable) 1.

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	Location of these sites should be shown on a toposheet	2. 3.
17	Interlinked Projects	The sand extracted from the river is being used in the working underground coal mines of Eastern Coalfields Ltd. for stowing during the depillaring of coal pillars. It will ensure the safety of mines and prevent subsidence.
18	Whether separate application of interlinked Project has been submitted	The process of obtaining environment clearances for all the existing mines of ECL on the basis of clusters has already been initiated. TORs have been received for the clusters and cluster – wise EIA/EMPs are being prepared for submission to the SPCBs for holding public consultation.
19	If yes, date of submission	The process was started in 2008 and is likely to be completed by the year 2014 – 15.
20	If no, reason	Not Applicable
21	Whether proposal involves approval / clearance under 1. The Forest (Conservation) Act, 1980 2. The Wildlife (Protection) Act, 1972 3. The CRZ Notification, 1991	No No No
22	Whether there is any Government Order/ Policy relevant/relating to the site	No
23	Forest land involved (hectares)	NIL
24	Whether there is any litigation pending against the project and/or land in which the project is proposed to be set up? (a) Name of the Court (b) Case No. (c) Orders / directions of the Court, if any, and its relevance with the proposed project	No

**(II) Activity****1. Construction, operation or decommissioning of the Project involving actions, which will cause physical changes in the locality (topography, land use, changes in water bodies, etc.)**

S.No.	Information/Checklist confirmation	Yes /No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
1.1	Permanent or temporary change in land use, land cover or topography including increase in intensity of land use	Yes	The Damodar river bed will be put to use in selected places in phased manner where there are plenty of reserves and without affecting the

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S.No.	Information/Checklist confirmation	Yes /No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
	(with respect to local land use plan)		nearby banks. The estimated thickness of sand layer is 8 – 17 m while sand mining will be restricted to 2 m. (PFR & Site Information) The void created by sand extraction is replenished during monsoon. Thus, the sand mining does not involve any change in existing topography or land use.
1.2	Clearance of existing land, vegetation and buildings?	No	The proposed plan involves extraction of sand from the river bed only and does not require any clearance of existing land, vegetation and buildings as such features do not exist.
1.3	Creation of new land uses?	No	The project does not involve any creation of new land uses. The sand removed from the river bed gets fully replenished during monsoon.
1.4	Pre-construction investigations e.g. bore houses, soil testing?	No	-
1.5	Construction works?	No	-
1.6	Demolition works?	No	-
1.7	Temporary sites used for construction works or housing of construction workers?	No	Local labour will be employed by the contractor.
1.8	Above ground buildings, structures or earthworks including linear structures, cut and fill or excavations	No	No civil work is required in sand mining areas.
1.9	Underground works including mining or tunneling?	No	-
1.10	Reclamation works?	No	-
1.11	Dredging?	Yes	Dredgers may be utilized for sand mining at few locations.
1.12	Offshore structures?	No	Not applicable.
1.13	Production and manufacturing processes?	Yes	The sand will be extracted manually from the riverbed and loaded on to tippers for transportation to the mines under cover of tarpaulin / thick plastic sheets.
1.14	Facilities for storage of goods	No	Sand after extraction will be transported

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S.No.	Information/Checklist confirmation	Yes /No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
	or materials?		directly to underground collieries or stored at depots for distribution by trucks. There is no requirement for storage facility near river bed.
1.15	Facilities for treatment or disposal of solid waste or liquid effluents?	No	No solid waste of effluents will be generated.
1.16	Facilities for long term housing of operational workers?	No	Local labour will be employed by the contractor.
1.17	New road, rail or sea traffic during construction or operation?	No	The sites along the river are approachable by kachha & pucca roads. The existing road infrastructure is enough to cater to the transportation of sand from river bed to collieries.
1.18	New road, rail, air waterborne or other transport infrastructure including new or altered routes and stations, ports, airports etc?	No	-
1.19	Closure or diversion of existing transport routes or infrastructure leading to changes in traffic movements?	No	-
1.20	New or diverted transmission lines or pipelines?	No	-
1.21	Impoundment, damming, culverting, realignment or other changes to the hydrology of watercourses or aquifers?	No	Removal of sand will be carried out far from the river banks. So, no bank erosion is contemplated due to sand mining. The sand will be mined during lean season to a depth of 1.5 to 2.0 meters only in such manner as to maintain the natural course and flow of water during the monsoons. The above activity will help maintain the natural course of the river and, thereby, also protect the land and villages adjoining the river banks from flooding and erosion. The shallow voids left after removal of sand will be completely replenished during the monsoons. As such there will be no change in hydrology.

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S.No.	Information/Checklist confirmation	Yes /No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
1.22	Stream crossings?	No	-
1.23	Abstraction or transfers of water from ground or surface waters?	No	The water requirement for the operational workers will be met by nearby dugwells/tubewells.
1.24	Changes in water bodies or the land surface affecting drainage or run-off?	No	Please refer SI 1.21 above
1.25	Transport of personnel or materials for construction, operation or decommissioning?	Yes	Removal of sand from the river bed will be done manually and transported for sand stowing directly to the underground mines / depots of Eastern Coalfields Ltd.
1.26	Long-term dismantling or decommissioning or restoration works?	No	
1.27	Ongoing activity during decommissioning which could have an impact on the environment?	No	
1.28	Influx of people to an area -- either temporarily or permanently?	No	
1.29	Introduction of alien species?	No	
1.30	Loss of native species or genetic diversity?	No	
1.31	Any other actions?	No	

**2. Use of Natural resources for construction or operation of the Project (such as land, water, materials or energy, especially any resources which are non-renewable or in short supply):**

S.No.	Information/checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
2.1	Land especially undeveloped or agricultural land (ha)	No	Mining will be done scientifically in parts of the bed of Damodar River. The sand removed will be replenished during the monsoons. Land Ownership: Govt. land provided on lease to ECL
2.2	Water (expected source & competing users) unit: KLD	No	
2.3	Minerals (MT)	Yes	Only sand will be extracted (1.50 million cubic meters per year).

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S.No.	Information/checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
2.4	Construction material , stone, aggregates and soil (expected source – MT)	No	
2.5	Forests and timber (source – MT)	No	Not Applicable
2.6	Energy including electricity and fuels (source, competing users) Unit: fuel (MT), energy (MW)	Yes	The sand mining will be manual. Diesel will be required for truck transportation of sand to the mines.
2.7	Any other natural resources (use appropriate standard units)	No	Not Applicable

**3. Use, storage, transport, handling or production of substances or materials, which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health.**

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
3.1	Use of substances or materials, which are hazardous (as per MSIHC rules) to human health or the environment (flora, fauna, and water supplies)	No	Not Applicable
3.2	Changes in occurrence of disease or affect disease vectors (e.g. insect or water borne diseases)	No	Not Applicable
3.3	Affect the welfare of people e.g. by changing living conditions?	Yes	The sand mining will offer employment opportunities to the local labour force.
3.4	Vulnerable groups of people who could be affected by the project e.g. hospital patients, children, the elderly etc.,	No	
3.5	Any other causes	No	Not Applicable

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**4. Production of solid wastes during construction or operation or decommissioning (MT/month):**

<b>S.No.</b>	<b>Information/Checklist confirmation</b>	<b>Yes/No</b>	<b>Details thereof (with approximate quantities/rates, wherever possible) with source of information data</b>
4.1	Spoil, overburden or mine wastes	No	Sand will be extracted in its existing form from the river bed and transported directly for sand stowing in the underground mines of Eastern Coalfields Ltd. or stored at strategic locations for distribution to coal mines. No solid wastes will be generated.
4.2	Municipal waste (domestic and or commercial wastes)	No	There is no requirement of housing for the project, hence no municipal waste will be generated.
4.3	Hazardous wastes (as per Hazardous Waste Management Rules)	No	Not applicable
4.4	Other industrial process wastes	No	Not applicable
4.5	Surplus product	No	Not applicable
4.6	Sewage sludge or other sludge from effluent treatment	No	Not applicable
4.7	Construction or demolition wastes	No	Not applicable
4.8	Redundant machinery or equipment	No	Not applicable
4.9	Contaminated soils or other materials	No	Not applicable
4.10	Agricultural wastes	No	Not applicable
4.11	Other solid wastes	No	Not applicable

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**5. Release of pollutants or any hazardous, toxic or noxious substances to air (kg/hr)**

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
5.1	Emissions from combustion of fossil fuels from stationary or mobile sources	Yes	Diesel will be burnt by the dumpers during transport of sand.
5.2	Emissions from production processes	No	Sand in the river bed is moist and hence very little or no dust will be produced during the process of sand mining.
5.3	Emissions from materials handling including storage or transport	Yes	There will be minor emissions i.e. dust, vehicular exhaust anticipated during loading, unloading and transportation of sand. Regular water sprinkling on roads will be carried out to reduce dust during transportation. The water utilized for this purpose will be mine water.
5.4	Emissions from construction activities including plant and equipment	No	
5.5	Dust or odours from handling of materials including construction materials, sewage and waste	Yes	There will be emissions anticipated during loading, unloading and transportation of sand.
5.6	Emissions from incineration of waste	No	Not applicable
5.7	Emissions from burning of waste in open air (e.g. slash materials, construction debris)	No	Not applicable
5.8	Emissions from any other sources	No	Not applicable

**6. Generation of Noise and Vibration, and Emissions of Light and Heat:**

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
6.1	From operation of equipment e.g. engines, ventilation plant, crushers	No	The sand will be removed manually

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6.2	From industrial or similar processes	No	
6.3	From construction or demolition	No	
6.4	From blasting or piling	No	No blasting or piling is proposed.
6.5	From construction or operational traffic	Yes	Vehicular movement for transportation of mined sand from site will generate noise. Regular and proper maintenance of vehicles will reduce the impact.
6.6	From lighting or cooling systems	No	Not applicable
6.7	From any other sources	No	Not applicable

**7. Risks of contamination of land or water from releases of pollutants into the ground or into sewers, surface waters, groundwater, coastal waters or the sea:**

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
7.1	From handling, storage, use or spillage of hazardous materials	No	No hazardous waste will be generated.
7.2	From discharge of sewage or other effluents to water or the land (expected mode and place of discharge)	No	-
7.3	By deposition of pollutants emitted to air into the land or into water	No	-
7.4	From any other sources	No	-
7.5	Is there a risk of long term build up of pollutants in the environment from these sources?	No	-

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**8. Risk of accidents during construction or operation of the Project, which could affect human health or the environment:**

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
8.1	From explosions, spillages, fires etc from storage, handling, use or production of hazardous substances	No	No storage at site. Sand will be directly transported to underground mines/sand depots.
8.2	From any other causes	No	
8.3	Could the project be affected by natural disasters causing environmental damage (e.g. floods, earthquakes, landslides, cloudburst etc)?	No	<p>Since the project involves removal of sand from river bed during the lean season and the river is perennial in nature without any history of flash floods since the construction of Maithon &amp; Panchet dams on the Barakar &amp; Damodar Rivers respectively, it is immune to any such disaster. The sand removed gets replenished during the monsoons.</p> <p>In fact the mining of sand up to a level of 2 m will help protect the river banks and nearby villages from flooding and erosion by maintaining the natural course and flow of river. Aquatic fauna will remain undisturbed as the base flow of the river will remain unaffected.</p> <p>Thus the impact will be positive in term of protection by natural hazards causing environmental damage</p>

**9. Factors which should be considered (such as consequential development) which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality:**

S. No.	Information/Checklist confirmation	Yes/ No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
9.1	Lead to development of supporting facilities, ancillary development or development stimulated by the project which could have impact on the environment e.g.: <ul style="list-style-type: none"> <li>• Supporting infrastructure (roads, power supply, waste or waste water treatment, etc.)</li> <li>• housing development</li> <li>• extractive industries</li> <li>• supply industries</li> <li>• other</li> </ul>	Yes	Sand stowing in underground mines will help maintain their working safety and prevent surface subsidence which may cause environmental damage. No supporting infrastructure is required since the sites have good connectivity with local roads and highways.
9.2	Lead to after-use of the site, which could have an impact on the environment	No	Since it is a river bed excavation, arrival of monsoon every year will replenish the sand. Thus, there will be no change in landuse and the river bed cannot be used for any other purpose.
9.3	Set a precedent for later developments	No	-
9.4	Have cumulative effects due to proximity to other existing or planned projects with similar effects	No	

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**(III) Environmental Sensitivity**

<b>S. No.</b>	<b>Areas</b>	<b>Name/ Identity</b>	<b>Aerial distance (within 15 km.) Proposed project location boundary</b>
1	Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value	None	Not applicable
2	Areas which are important or sensitive for ecological reasons -Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests	Yes	Damodar River In the lean months, the proposed sand mining will not expose the base flow of the river and hence there will not be any adverse impact on the river course or aquatic life in the river.
3	Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration	None	Not applicable
4	Inland, coastal, marine or underground waters	None	Not applicable
5	State, National boundaries	None	Not applicable
6	Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas	None	Not applicable
7	Defence installations	None	Not applicable
8	Densely populated or built-up area	None	
9	Areas occupied by sensitive man-made land uses (hospitals, schools, places of worship, community facilities)	No	Small dispensaries, schools, places of worship & community facilities catering to the needs of local population exist at some distances from the river bank and the same are likely to remain unaffected by the sand mining.
10	Areas containing important, high quality or scarce resources (ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals)	None	
11	Areas already subjected to pollution or environmental damage. (those where existing legal environmental standards are exceeded)	None	
12	Areas susceptible to natural hazard which could cause the project to present environmental problems (earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions)	None	River bed sand mining activities will be restricted to dry season only.

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Declaration

I hereby give the undertaking that the data and information given in the application and enclosures are true to the best of my knowledge and belief and I am aware that if any part of the data and information submitted is found to be false or misleading at any stage, the project will be rejected and clearance given, if any, to the project will be revoked at our risk and cost.

Dated:

R R Sharma,  
General Manager  
J K Ropeways,  
Eastern Coalfields Limited  
PO - Kajora Gram, District-Burdwan, West Bengal,  
West Bengal PIN- 713338

Given under the seal of organisation on  
behalf of whom the applicant is signing

**(IV). Proposed Terms of Reference for EIA studies**

Following aspects are proposed to be covered in the EIA/ EMP document:-

1. Composite map of the course of Damodar Rivers through Raniganj Coalfield showing the sites of extraction of sand from river bed.
2. The study area or buffer zone will be the area upto 10 km on either side of the river.
3. Present land use of buffer zone based on toposheet drawings and satellite images.
4. Drainage map of the study area.
5. Transportation details showing linkages of sand from sites of mining to mines.
6. Description of the present environmental scenario based on one-season (non-monsoon) primary base-line data on Ambient Air Quality (PM<sub>2.5</sub>, PM<sub>10</sub>, SO<sub>2</sub>, NO<sub>x</sub>), Water Quality, Noise Level, Soil Characteristics, Flora & Fauna & Socio-economic & Health Status of the population.
7. A detailed study of the present status of the riverine system and aquatic fauna of the Damodar River.
8. Anticipated impacts of the proposed sand mining activity on aquatic life and the riverine system.
9. Prediction of impact on following components of environment:-
  - i) Air including noise
  - ii) Water
  - iii) Land
  - iv) Soil
  - v) Flora & Fauna
  - vi) Socio-economic scenario
  - vii) Vehicular density
10. Environmental management plan for mitigation of impacts.
11. Detail of health-care facilities available for local population.
12. Safety and risk-analysis study.

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13. Detail of public consultation (if required) including videography of the proceedings of public-hearing and issues raised by the public and replies of the project proponent.
14. Brief description of profiles of various agencies involved in the preparation of the EIA/EMP report.
15. To suggest an organizational structure for implementation of the control measures.
20. Status of approvals.
21. The generic structure of the EIA will be based on the guidelines as per EIA Notification, 2006.