

**WEST BENGAL STATE ELECTRICITY
DISTRIBUTION COMPANY LIMITED**
(A Government of West Bengal Enterprise)



VOLUME- II: SIA REPORT



**TURGA PUMPED STORAGE
PROJECT**

(Previously known as Purulia Pumped Storage Extension Project on TurgaNala)

(4 X 250 MW)

APRIL2016

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CHAPTER-1 INTRODUCTION

1.1 INTRODUCTION

The Turga Pumped Storage Project on Turga nala is located in Purulia district of West Bengal. This is one of the four Pumped Storage Schemes initially identified by erstwhile WBSEB (now known as WBSEDCL). The Turga Pumped Storage Scheme envisages utilization of the waters of the river Turga in Ajodhya hills for peak power generation on a Pumped storage type development. The coordinates of Upper Dam site are 23°12'47"N and 86°04'20"E. Likewise, coordinates of the lower Dam site are 23°11'49"N and 86°04'13"E. The project site is approachable by a jeepable road taking off from Balrampur - Baghmundi state highway. The nearest rail head is located at Barabhum and nearest airport is located at Ranchi. The project location map is enclosed as Figure-1.1.



Figure-1.1 Project Location Map

1.2 PROJECT PROFILE

The Turga Pumped Storage Project envisages utilization of hydro potentiality of Ajodhya Plateau, an extension of Chhota Nagpur Plateau. The project envisages the construction of Upper Dam (C.A. 8.29 Sq. Km) across Turga Nala, a tributary of Subarnarekha river and a

water conductor system with an underground Power House on the downstream of Upper Dam and a Lower Dam having intermediate catchment of 4.37 sq. km (total C.A. 12.66 sq. km).

The Project is a Close Loop type Pumped Storage Scheme. It comprises two reservoirs at two different levels (the difference of water levels of the reservoirs will represent the effective “head” of the Project) and water conductor system will connect the two reservoir through an underground power house. During peak hours power will be generated by depleting the water reserve of the upper reservoir which will pass through the waterway and the generator and turbines installed at the power house and will be stored in the Lower Reservoir. During off peak hours the excess power from thermal stations will be fed back to pump the water from Lower Reservoir to Upper reservoir through power house where generators and turbines will then act as motors and pumps respectively. The same cycle of operation will be repeated during peak and lean period.

Since the Upper and Lower reservoirs of Turga Pumped Storage Project (Turga PSP) has limited effective storage capacity equivalent to five (5) hours of daily generation at full rated output, it is not possible for Turga PSP to operate on weekly or seasonal basis. Therefore, the Project is deemed to be operational on daily basis.

1.3 SALIENT FEATURES

The salient features of Turga Pumped Storage Project are given in Table-1.1.

Table-1.1: Salient Features of Turga Pumped Storage Scheme

1. LOCATION	
Country State District	India West Bengal Purulia
River	Turga Nala a tributary of Subarnarekha River
Dam Axis (Upper)	Left Bank Latitude 23 ⁰ 12' 47.2" & Longitude 86 ⁰ 04' 19.9" E 405064.831 , N 2567415.095(UTM) Right Bank Latitude 23 ⁰ 12' 46.2" & Longitude 86 ⁰ 03'54.16" E 404332.556 , N 2567391.165(UTM)
Dam Axis (Lower)	Left Bank Latitude 23 ⁰ 11' 48.8" & Longitude 86 ⁰ 04' 12.5" E 404843.406 , N 2565619.006(UTM) Right Bank Latitude 23 ⁰ 11' 50.7" & Longitude 86 ⁰ 03' 41.9" E 403973.742 , N 2565682.666(UTM)
Access to the Project	

Road	i) Kolkata to Chandil along NH 33 via Jamshedpur 380km ii) Chandil to Balrampur along NH 32 30km iii) Balrampur to Patherdhi along State-Highway 30km iv) Patherdhi to Project Site (Upper dam) 10km Total 450 km
Airport	Ranchi
Railhead (with unloading facilities)	Barabhum Railway Station (30km from project site) on the Howrah Purulia Broad Gauge Line of South Eastern railway 335km from Howrah via Adra 320 km from Howrah via Tatanagar
Port	Haldia, Kolkata
2. PROJECT	
Type	Pumped Storage Project (Closed Loop Type)
Power	1000MW
Installed Capacity	4 X 250 MW
Peak Operating duration	5 hours daily
3. HYDROLOGY	
Catchment Area	
Upper Dam	8.29 km ²
Lower Dam	12.66 km ²
Average Annual Rainfall in Basin	1334 mm
Average annual Run-off	
Upper Reservoir	4.51 Mm ³
Lower Reservoir	6.88 Mm ³
75% Dependable Run-off	
Upper Reservoir	3.68 Mm ³
Lower Reservoir	5.63 Mm ³
90% Dependable Run-off	
Upper Reservoir	2.93 Mm ³
Lower Reservoir	4.47 Mm ³
Maximum Design Flood (PMF)	
Upper Reservoir	280 m ³ /s
Lower Reservoir	428 m ³ /s
Annual Average Sediment Load	1045m ³ /Km ² /yr
4.0 CIVIL STRUCTURE	
4.1 UPPER RESERVOIR	
FRL	464.00 m
MDDL	441.40 m (With irrigation Storage depleted) 444.40 m(For Pumped storage Generation)
Pondage at FRL	21.6 Mm ³

Pondage at MDDL(at 441.40m)	5.9 Mm ³
Pondage at MDDL(at 444.44m)	7.4 Mm ³
Live Pondage	14.2 Mm ³
4.2 LOWER RESERVOIR	
FRL	316.5 m
MDDL	280.4 m
Pondage at FRL	18 Mm ³
Pondage at MDDL	3.8 Mm ³
Live Pondage	14.2 Mm ³
4.3 UPPER DAM	
Type	Rock fill with Central impervious core
Top of Dam	EL 467.5 m
Accepted Foundation Elevation	EL 404 m
Length of Dam at top	732 m
Max. Height of Dam	63.5m
Top width of dam	10.00 m
4.4 SPILLWAY ARRANGEMENT	
Type	Over Flow Ogee Type on Left Bank(Concrete)
Crest Elevation	EL 464.0m at FRL
MWL	EL 466m
Design Flood	280 m ³ /s
No. of Bays	4 Bays , 13m wide each
No. of Piers	3 Piers, 2 m wide each
Waterway	58 m
4.5 DIVERSION CUM BOTTOM OUTLET ARRANGEMENTS	
Type	Tunnel on left bank
Diversion Flood	109 m ³ /s
Length & Diameter	691m , 4m (Concrete Lined)

Invert Level of DT at Inlet	EL 410.0m
Invert Level of DT at Outlet	EL 408.0m
Bottom Outlet	
Length & Diameter	Same as Diversion Tunnel will act as Bottom Outlet
Invert of Bottom Outlet at Inlet	EL 423.5m
Invert of Bottom Outlet at Outlet	EL 408.0m
Deletion Time	27 hrs(Approx.)
4. 6 MAIN LOWER DAM	
Type	Concrete Gravity
Top of Dam	EL 320m
Foundation Elevation	EL 256 m
Length of Dam at top	872 m
Max. Height of Dam	64 m
No. of OF blocks	4 nos, 18m wide each
No. NoF Blocks	40 nos, 20m wide each
Top width of dam	10.00 m
4.7 LOWER SADDLE DAM	
Type	Rock fill with central impervious core
Top of Dam	EL 320.0 m

Foundation Elevation	EL 270 m
Length of Dam at top	595 m
Max. Height of Dam	50.0 m (from Bed level)
Top width of dam	10.00 m
4.8 SPILLWAY ARRANGEMENT	
Type	Over Flow Ogee Type
Crest Elevation	EL 316.5 m at FRL
MWL	EL 318.53m
Design Flood	428 m ³ /s
No. of Bays	5 Bays , 15m wide each
No. of Piers	4 Piers, 3 m wide each
Total Waterway	87 m
4.9 DEPLETION SLUICE	
Location	In Block No. 38
Size	1.5m(W) X 2.0(H)
Crest Elevation	EL 270m
Gate Chamber	7.7m(L)X 6m(W)X 5m(H)
Depletion Time	97 hrs.
4.10 DIVERSION ARRANGEMENT	
Coffer Dam with overflow spillway	Rockfill with earthen Core

Bed Level	EL265m
FRL/MWL	EL280m/283.5m
Diversion Flood	167 m ³ /s
Height of Cofferd Dam	20m
Spillway Crest	EL 280m
Spillway crest Length	35m
4.11 Power Intake	
Type H x W x No. x Line	Horizontal Type with anti-vortex lubbers 12.0m x 13.0m x 3 nos x 2 lines
4.12 Headrace Tunnel (Intake Tunnel)	
D x L x line	D 9.0 m x L 618.11 m x 2 lines
4.13 Penstock (Steel Lining)	
D x L x line After Bifurcation	D 9.0 m x L 224.37m x 2 lines D 6.4 m- D 4.4 m x L 73.73 m x 4 lines
4.14 Tailrace Tunnel	
Tailrace Tunnel No1 Tailrace Tunnel No2	D 7.0 m x L 126.90 m x 1 line D 7.0 m x L 114.40 m x 1 line D 10.0 m x L 419.14 m x 1 line D 7.0 m x L 102.90 m x 1 line D 7.0 m x L 89.40 m x 1 line D 10.0 m x L 402.77 m x 1 line
4.15 Tailrace Outlet	
Type H x W x No. x Line	Horizontal Type with anti-vortex lubbers 12.0m x 13.0m x 3 nos x 2 lines
4.16 Powerhouse	
-Type -Four Fixed Speed Pump/Turbine units -One Variable Speed Pump/Turbine unit + Three Fixed Speed Pump/Turbine units	Type; Underground Bullet shape L 160.00m x B 25.00 m x H 53.00 m L 160.00 x B 25.00 m x H 55.00 m
4.17 Transformer Room	
Type L x B x H	Underground Bullet shape L 139.17 m x B 16.00m x H 16.00m

4.18 Switch Yard	
Type W x B	Type; Open air Type W 165 m x B 50 m at EL 340 .00 m
5.0 Hydro-mechanical Equipment	
5.1 Intake Equipment	
Intake Trashrack Intake Maintenance Gate Intake Gate	3 sets x 2 lines, W 13.0m x H 12.0m Vertical lift fixed wheel type steel gate 2 sets W 7.0m x H 9.0m Vertical lift fixed wheel type steel gate 2 sets W 7.0m x H 9.0m
5.2 Steel Penstock	
- Type of penstock - Type, number of bifurcation - Inside diameter Before bifurcation After bifurcation - Total length	Embedded type welded steel penstock Internal reinforced type bifurcation 2sets 9.0 m (main pipe) 6.4-4.4 m (branch pipe) 975.7 m/lane (824.2 m : main pipe) (75.7 m/75.7 m: branch pipe to unit No.1(3), No.2(4))
5.3 Steel Liner of Tailrace Tunnel	
- Number of lane - Type of steel liner - Type, number of junction - Inside diameter Before junction After junction - Total length	4 lanes Embedded type welded steel liner Internal reinforced type junction 2 sets 7.0 m (branch pipe) 10.0 m (main pipe) 213.8 m (No.1), 164.4 m (No.2)
5.4 Draft Equipment	
- Quantity - Type of gate - Clear span - Clear height	4 sets High pressure slide type steel gate (Bonneted gate) with transition pipe 5.60 m 5.60 m
5.5 Tailrace Equipment	
Tailrace Trashrack Tailrace Gate	3 sets x 2 lines, W 13.0m x H 12.0m Vertical lift slide type steel gate 2 sets W 8.00 m x H 10.00 m
5.6 Bottom Outlet Equipment of Lower Dam	
Bulkhead Gate Auxiliary Gate Main Gate	Slide Type Steel Gate (Stoplog) 1 set W2.49m x H3.34m High Pressure Slide Type Steel Gate 1 set W 1.50m x H 2.00m High Pressure Slide Type Steel Gate 1 set W 1.50m x H 2.00m
5.7 Bottom Outlet Equipment of Upper Dam	
Trashrack	Vertical Fixed Type Steel Trashrack 1 set

Stoplog Auxiliary Gate Main Gate	W 4.0 m x H 4.0 m Slide Type Steel Gate 1 set W 4.0 m x H 4.0 m High Pressure Slide Type Steel Gate 1 set W 1.45m x H 1.80m Jet Flow Gate 1 set W 1.80m x H 1.80m
6.0 Electromechanical Equipment	
6.1 Pump Turbine	
Type	Francis type, vertical shaft reversible pump-turbine
Number of unit	Four (4) units
Effective head at normal static head	146.4 m
Maximum Turbine Output at normal effective head	255,500kW , 280,600kW (10% Overload)
Maximum Pump Input	285,000 kW
Maximum Turbine Discharge	197.0 m ³ /s
Maximum Pump Discharge	196.7 m ³ /s
Revolving Speed	187.5 rpm
6.2 Generator-Motor	
Type	Three (3) phase, alternating current synchronous, generator-motor, vertical shaft, rotating field, enclosed housing, rim-duct air-cooled and semi-umbrella type
Number of unit	Four (4) units
Rated Capacity	Generator; 306MVA Motor (output); 255 MW
Power Factor	Generator; 0.90 (lagging) Motor; 0.95 (leading)
Rated Voltage	18.0kV
Rated Current	2,574A

Rated Frequency	50 Hz
Rated Revolving Speed	187.5 rpm
Over Load Capacity	110 % rated capacity
6.3 Main Power Transformer	
Type	Indoor, oil-immersed, 3 single phase transformers with on-load tap changer (OLTC) for pumping operation
Number of unit	4 units
Rated Capacity	330 MVA
Rated Voltage	Primary; 18 kV Secondary; 400 kV adjustable range of the secondary voltage: -5% to +10%(3kV/tap)
Connection	Primary: Delta Secondary: Wye
Neutral Grounding System for Secondary Winding	Solidly Grounded
Basic Impulse Insulation Level (BIL)	Primary: 95 kV Secondary: 1,425 kV Neutral Secondary: 38 kV r.m.s(power frequency)
6.4 Generator-Motor Circuit Breaker	
Type	Indoor, Metal-enclose, SF6 gas blast and single pressure type
Number of Unit	Four (4) units
Rated Voltage	24 kV
Rated Normal Current	11,000 A
Rated Short Circuit Breaking Current	80 kA
6.5 Gas Insulated Switchgear	
6.5.1 Circuit Breaker	
Type	400 kV Gas Insulated Switchgear (GIS)
Number of Feeder	Nine (9) feeders including two (2) feeders for future expansion of transmission lines
Rated Voltage	420 kV
Rated Normal Current	2,000 A
Rated Short Time (2 sec) withstand Current	50 kA
Rated Lighting Impulse withstand Voltage	1,425 kV
6.5.2 Rating Disconnecting Switch	
Rated Voltage	420 kV
Rated Normal Current	2,000 A
Rated Frequency	50 Hz

Rated Short Time (2 sec) withstand Current	50kA	
Rated peak withstand Current	100 kA	
Rated Lighting Impulse withstand Voltage	1,425 kV	
6.5.3 Current Transformer		
Rated Primary Current	2,000A	
Rated Secondary Current	1 A	
Rated Frequency	50Hz	
Rated Lighting Impulse withstand Voltage	1,425 kV	
6.5.4 Rating Voltage Transformer		
Rated Primary Voltage	400 kV/ $\sqrt{3}$	
Rated Secondary Voltage	110 V/ $\sqrt{3}$	
Rated Frequency	50 Hz	
Rated Lighting Impulse withstand Voltage	1425 kV	
6.6 Diesel Engine Generator		
Number of Unit	Two (2) units	
Rated Capacity	1,000 kVA	
6.7 EOT Crane		
Type	Indoor, Low speed type Electric Overhead Traveling Crane	
Number of Unit	Two (2) units	
Rated Capacity	250 ton (Main hoist), 50 ton and 10 ton	
Span	24 m	
Lift Fixed Speed / Variable Speed	10.2 m / 11.2 m	
6.10 Project Cost (Price Level December 2014)		
	Option -I (4-fixed speed type)	Option -II (3-fixed speed type + 1-variable speed type)

Cost of Civil Works	2414.97	2442.46	
Cost of E & M Works	1869.13	2070.07	
Cost of Transmission Works	6.31	6.31	
Total Cost of The Project	4290.41	4518.84	
6.11 Project Benefit's			
	Option -I (4-fixed speed type)	Option -II (3-fixed speed type + 1-variable speed type)	
FIRST YEAR TARIFF	Rs 6.52 / KWH	Rs 6.77 / KWH	
LEVELISIED TARIFF	Rs 5.85 / KWH	Rs 6.07 /KWH	
6.12 Economic Evaluation			
	Evaluation Index	Evaluation Criteria	Evaluation
NPV	Option 1: Rs 3387 Crore Option 2: Rs 3209 Crore	> 0	Acceptable
B / C	Option 1: 1.63 Option 2: 1.58	> 1	Acceptable
EIRR	Option 1: 28.2 % Option 2: 26.3 %	> Opportunity cost of capital (12 %)	Acceptable

1.4 LANDUSE

The total land required for the project is 292.0 ha. The details are given in Table-1.2.

Table-1.2: Land requirement for proposed project

S. No.	Component	Area (ha)
1.	Upper Reservoir submergence at FRL	87.10
2.	Lower Reservoir submergence at FRL	49.00
3.	Dam site and other structure	13.90
4.	Quarry Site	32.00
5.	Construction facility	15.00
6.	Clay core Area	20.00
7.	Roads	10.00
8.	Stockpile area for construction material, etc.	30.00
9.	Other miscellaneous requirement	35.00
	Total	292.00

As per the present status, about 234 ha of land is Forest land and the remaining (58 ha) is non-forest government land and /or Private Land. Out of 58 ha of non-forest government land

and /or Private Land, 34 ha of land will be transferred from I & W Directorate, Government of West Bengal to Turga Pumped Storage Project. Remaining 24 ha of land to be arranged temporarily on leased basis.

Appropriate compensation measures as per ownership status has been suggested as a part of the Environmental Management Plan.

1.5 OUTLINE OF THE REPORT

The document for the Comprehensive EIA study for the proposed Turga Pumped Storage Project has been presented in four volumes. The details are given as below:

- Volume-I presents the Environmental Impact Assessment (EIA) Study
- Volume-II covers the Social Impact Assessment (SIA) Study
- Volume-III outlines the Environmental Management Plan (EMP) Report.
- Volume-IV outlines Public Hearing Proceeding Report

The present document (Volume-II) outlines the findings of the SIA study for the proposed Turga Pumped Storage project.

The contents of the document are organized as follows:

- Chapter-1** The Chapter gives an overview of the Turga Pumped Storage Project.
- Chapter-2** Delineates the profile of the villages the villages in the Study Area.
- Chapter-3** Describes the anticipated positive and negative impacts likely to accrue as a result of the construction and operation of the proposed Turga Pumped Storage Project on socio-economic aspects of Environment.
- Chapter-4** Presents the Local Area Development Plan for Turga Pumped Storage Project.
- Chapter-5** Outlines the Plan to maintain cultural identity of the locals.
- Chapter-6** Summarizes the cost required for implementation of Local Area Development Plan and Plan to maintain cultural identity of the locals

CHAPTER -2

SOCIO-ECONOMIC ASPECTS

2.1 GENERAL

The aim of the socio-economic study is to assess the overall impact on various facets of socio-economic environment due to establishment of the project and consequent land acquisition in the affected villages and its population in general and the project affected families (PAFs) in particular, whose livelihood would be affected. The baseline socio-economic scenario of the district and blocks in which the proposed project is located has been discussed. Thereafter the socio-economic status of the PAFs is described followed by the impacts of the proposed project on the socio-economic environment has to be elucidated.

The following sections highlight the overall socio-economic status prevailing in the affected villages as well as the study area.

The proposed project, because of its sheer size, will bring direct as well as indirect benefits to the population of District Purulia. As per the guidelines of the Ministry of Environment and Forest (MoEF), the study area was covered as a part of the socio-economic assessment. The Study Area is spread over in two blocks, namely, Bagmundi and Arsha. The Study Area comprises of about 69 villages, including project affected villages, in blocks Bagmundi (57 villages) and Arsha (12 villages).

2.2 POPULATION

The total population in the study area is of the order of 34316 persons as per Census of India 2011. The distribution of population and demographic profile in the study area villages is outlined in Table-2.1 and Figure-2.1.

Table-2.1: Demographic profile in Study Area Villages

S. No	Village Name	Total Population	Total Workers	Main Workers	Marginal Workers	Non Workers
	Block Bagmundi					
1	Jhabri	477	237	48	189	240
2	Karru	2588	1149	253	896	1439
3	Gandhudi	1295	353	30	323	942
4	Birgram	3722	1308	165	1143	2414
5	Sindri	4138	1700	1252	448	2438
6	Dabha	906	492	194	298	414
7	Tarang	1597	922	506	416	675
8	Nishchintpur	471	281	85	196	190
9	Uttamdi Alias Rengtudi	404	245	131	114	159
10	Bhursu	3096	1271	844	427	1825
11	Koreng	1407	608	216	392	799
12	Ukada	875	444	435	9	431
13	Burda	5159	2670	1265	1405	2489
14	Dungridi	194	106	53	53	88
15	Susnidi	127	74	32	42	53

S. No	Village Name	Total Population	Total Workers	Main Workers	Marginal Workers	Non Workers
16	Saramchaki	117	65	28	37	52
17	Babnijara	81	49	29	20	32
18	Pitidiri	567	274	82	192	293
19	Kushumtikri	132	78	1	77	54
20	Hesadi	729	411	143	268	318
21	Saharjuri	1038	581	96	485	457
22	Bongada	226	131	41	90	95
23	Sonahara	252	151	50	101	101
24	Kalha	422	168	98	70	254
25	Bhunighra	505	184	67	117	321
26	Telia Bhasa	367	211	4	207	156
27	Saldi	78	40	21	19	38
28	Bhitpani	240	133	0	133	107
29	Alkusi	67	22	13	9	45
30	Kurupahar	113	67	36	31	46
31	Baredi	1056	660	280	380	396
32	Khirabera	442	242	90	152	200
33	Dhundhikhap	304	174	52	122	130
34	Chorda	2568	1135	700	435	1433
35	Ghorabandha	3274	1886	928	958	1388
36	Ghaghra	126	30	1	29	96
37	Sarakdi	842	276	231	45	566
38	Chano	298	83	33	50	215
39	Pratappur	629	216	205	11	413
40	Patardi	1609	620	291	329	989
41	Gobindapur	3064	1317	726	591	1747
42	Madla	3070	1837	730	1107	1233
43	Shrabandi	1091	477	43	434	614
44	Tantan	451	169	128	41	282
45	Basudi	352	138	89	49	214
46	Matiala	180	76	57	19	104
47	Kudlung	889	514	161	353	375
48	Barria	3982	1349	133	1216	2633
49	Gosaidi	183	77	72	5	106
50	Baghmundi	4035	1400	680	720	2635
51	Ranga	726	210	94	116	516
52	Andhra Alias Hathinada	724	171	144	27	553
53	Ajodhya	1648	772	392	380	876
54	Kuchrirakha	237	133	57	76	104
55	Punia Shasan	430	232	90	142	198
56	Chhatni	823	454	5	449	369
57	Lahadungri	115	73	27	46	42
	Sub-total(A)	64538	29146	12657	16489	35392
	Block Arsha (B)					
58	Uparjari	3489	1923	1120	803	1566
59	Upargugui	2656	1410	496	914	1246
60	Bamni	225	138	121	17	87
61	Ghatiali	329	175	154	21	154
62	Kanriyardih	118	64	60	4	54
63	Parsiya	215	58	57	1	157

S. No	Village Name	Total Population	Total Workers	Main Workers	Marginal Workers	Non Workers
64	Sitarampur	310	88	85	3	222
65	Bhuiyandih	274	68	65	3	206
66	Gayalikocha	673	449	334	115	224
67	Puranaburudih	23	20	8	12	3
68	Tanasi	1046	542	190	352	504
69	Pattanr	612	235	201	34	377
	Sub-total(B)	9970	5170	2891	2279	4800
	Total (A+B)	74508	34316	15548	18768	40192

Source: Primary Census Abstract, 2011

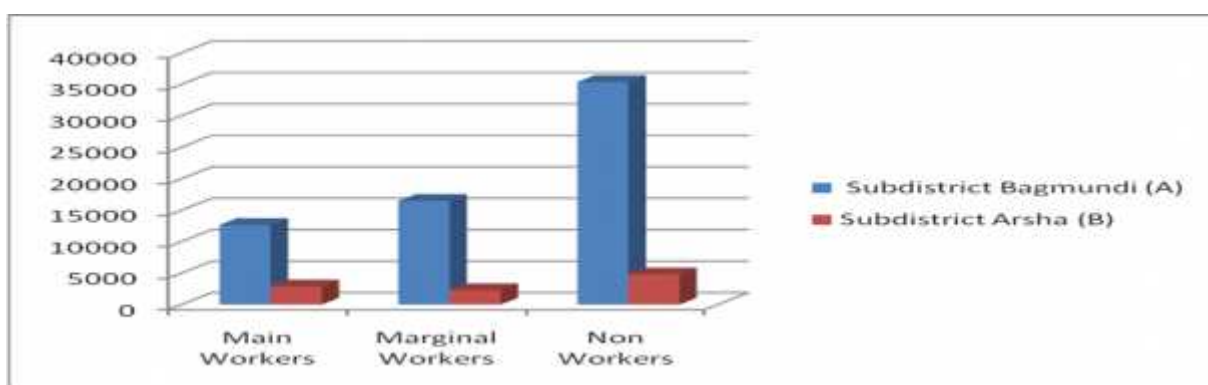


Figure-2.1: Demographic profile in the Study Area Villages

The male and female population in study area villages comprises about 51.12% and 48.88% of the total population respectively. The population comprising of infants and children below the age of 6 years constitute about 16.89% of the total population in the study area villages. The sex ratio study area villages is 956 females per 1000 males and the family size is around.

2.3 CASTE PROFILE

The distribution of population in study area villages on the basis of caste is summarized in Table-2.2 and depicted in Figure-2.2. It is observed that General Caste is dominant Caste in the study area villages accounting for 58.99% of the total population followed by Schedule tribe (28.61%) and Schedule Caste (12.39%).

Table-2.2: Caste profile in the Study Area Villages

S. No	Village Name	Total Population	Schedule Caste Population	Schedule Tribe Population	General Caste Population
	Block Bagmundi				
1	Jhabri	477	137	108	232
2	Karru	2588	141	126	2321
3	Gandhudi	1295	131	197	967
4	Birgram	3722	929	238	2555
5	Sindri	4138	286	185	3667
6	Dabha	906	196	109	601
7	Tarang	1597	199	44	1354

S. No	Village Name	Total Population	Schedule Caste Population	Schedule Tribe Population	General Caste Population
8	Nishchintpur	471	132	305	34
9	Uttamdi Alias Rengtudi	404	55	299	50
10	Bhursu	3096	599	195	2302
11	Koreng	1407	367	151	889
12	Ukada	875	9	75	791
13	Burda	5159	679	1372	3108
14	Dungridi	194	0	194	0
15	Susnidi	127	0	127	0
16	Saramchaki	117	0	117	0
17	Babnijara	81	0	81	0
18	Pitidiri	567	0	567	0
19	Kushumtikri	132	0	131	1
20	Hesadi	729	118	604	7
21	Saharjuri	1038	35	956	47
22	Bongada	226	2	224	0
23	Sonahara	252	0	252	0
24	Kalha	422	0	422	0
25	Bhunighra	505	0	498	7
26	Telia Bhasa	367	0	367	0
27	Saldi	78	0	78	0
28	Bhitpani	240	0	238	2
29	Alkusi	67	0	67	0
30	Kurupahar	113	0	113	0
31	Baredi	1056	63	417	576
32	Khirabera	442	0	0	442
33	Dhundhikhap	304	126	0	178
34	Chorda	2568	350	475	1743
35	Ghorabandha	3274	565	84	2625
36	Ghaghra	126	0	126	0
37	Sarakdi	842	8	0	834
38	Chano	298	0	33	265
39	Pratappur	629	60	62	507
40	Patardi	1609	199	17	1393
41	Gobindapur	3064	54	92	2918
42	Madla	3070	630	195	2245
43	Shrabandi	1091	201	0	890
44	Tantan	451	87	243	121
45	Basudi	352	0	92	260
46	Matiala	180	0	178	2
47	Kudlung	889	343	199	347
48	Barria	3982	599	738	2645
49	Gosaidi	183	5	134	44
50	Baghmundi	4035	576	513	2946
51	Ranga	726	8	714	4
52	Andhra Alias Hathinada	724	0	719	5
53	Ajodhya	1648	179	1237	232
54	Kuchrirakha	237	3	233	1
55	Punia Shasan	430	0	428	2
56	Chhatni	823	0	820	3

S. No	Village Name	Total Population	Schedule Caste Population	Schedule Tribe Population	General Caste Population
57	Lahadungri	115	0	115	0
	Sub-total(A)	64538	8071	16304	40163
	Block Arsha				
58	Uparjari	3489	261	878	2350
59	Upargugui	2656	276	982	1398
60	Bamni	225	0	225	0
61	Ghatiali	329	0	315	14
62	Kanriyardi	118	0	117	1
63	Parsiya	215	0	215	0
64	Sitarampur	310	298	10	2
65	Bhuiyandih	274	85	178	11
66	Gayalikocha	673	223	449	1
67	Puranaburudih	23	0	23	0
68	Tanasi	1046	15	1018	13
69	Pattanr	612	5	605	2
	Sub-total(B)	9970	1163	5015	3792
	Total (A+B)	74508	9234	21319	43955

Source: Primary Census Abstract, 2011

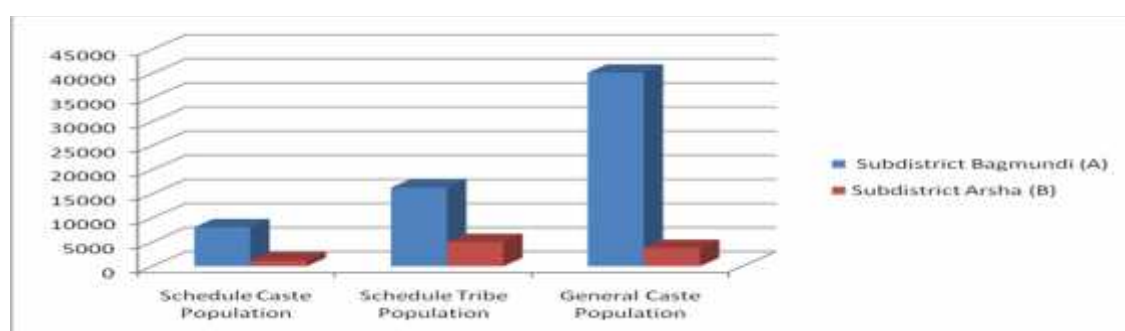


Figure-2.2: Caste profile in the Study Area Villages

2.4 LITERACY LEVELS

The details of literate and illiterate population amongst the total population of Study Area Villages are presented in Table-2.3 and Figure-2.3. It is observed that about 46.06% of the total population in the study area villages is literate, while about 53.94% population is illiterate. The male and female literacy rates are 58.43% and 33.1% respectively.

Table-2.3: Distribution of literate and illiterate population in the Study Area Villages

S. No	Village Name	Total Population	Population Literate	Male Literate	Female Literate	Population Illiterate	Male Illiterate	Female Illiterate
	Block Bagmundi							
1	Jhabri	477	205	141	64	272	109	163
2	Karru	2588	1174	818	356	1414	514	900
3	Gandhudi	1295	576	346	230	719	290	429
4	Birgram	3722	1726	1171	555	1996	723	1273
5	Sindri	4138	1950	1266	684	2188	814	1374
6	Dabha	906	413	244	169	493	203	290
7	Tarang	1597	864	569	295	733	238	495

S. No	Village Name	Total Population	Population Literate	Male Literate	Female Literate	Population Illiterate	Male Illiterate	Female Illiterate
8	Nishchintpur	471	189	130	59	282	97	185
9	Uttamdi Alias Rengtudi	404	215	145	70	189	76	113
10	Bhursu	3096	1203	799	404	1893	789	1104
11	Koreng	1407	823	515	308	584	246	338
12	Ukada	875	493	311	182	382	152	230
13	Burda	5159	2532	1631	901	2627	1071	1556
14	Dungridi	194	49	39	10	145	62	83
15	Susnidi	127	39	27	12	88	39	49
16	Saramchaki	117	51	34	17	66	18	48
17	Babnijara	81	19	13	6	62	28	34
18	Pitidiri	567	332	186	146	235	92	143
19	Kushumtikri	132	43	34	9	89	40	49
20	Hesadi	729	321	217	104	408	163	245
21	Saharjuri	1038	334	230	104	704	281	423
22	Bongada	226	63	44	19	163	57	106
23	Sonahara	252	75	44	31	177	73	104
24	Kalha	422	109	79	30	313	129	184
25	Bhunighra	505	215	142	73	290	123	167
26	Telia Bhasa	367	152	102	50	215	89	126
27	Saldi	78	14	9	5	64	32	32
28	Bhitpani	240	97	65	32	143	50	93
29	Alkusi	67	18	13	5	49	20	29
30	Kurupahar	113	25	23	2	88	39	49
31	Baredi	1056	420	269	151	636	264	372
32	Khirabera	442	171	106	65	271	112	159
33	Dhundhikhap	304	122	74	48	182	73	109
34	Chorda	2568	1416	896	520	1152	457	695
35	Ghorabandha	3274	1443	910	533	1831	749	1082
36	Ghaghra	126	70	36	34	56	23	33
37	Sarakdi	842	511	333	178	331	111	220
38	Chano	298	149	92	57	149	56	93
39	Pratappur	629	378	236	142	251	96	155
40	Patardi	1609	924	639	285	685	224	461
41	Gobindapur	3064	1743	1184	559	1321	415	906
42	Madla	3070	1420	886	534	1650	644	1006
43	Shrabandi	1091	649	402	247	442	157	285
44	Tantan	451	165	105	60	286	136	150
45	Basudi	352	199	129	70	153	47	106
46	Matiala	180	54	39	15	126	52	74
47	Kudlung	889	482	307	175	407	138	269
48	Barria	3982	1933	1234	699	2049	812	1237
49	Gosaidi	183	87	53	34	96	41	55
50	Baghmundi	4035	2340	1359	981	1695	736	959
51	Ranga	726	221	162	59	505	205	300
52	Andhra Alias Hathinada	724	264	165	99	460	186	274
53	Ajodhya	1648	686	490	196	962	400	562
54	Kuchrirakha	237	117	73	44	120	45	75
55	Punia Shasan	430	230	144	86	200	70	130
56	Chhatni	823	189	134	55	634	277	357
57	Lahadungri	115	49	31	18	66	24	42
	Sub-total(A)	64538	30751	19875	10876	33787	13207	20580
	Block Arsha							
58	Uparjari	3489	1411	949	462	2078	786	1292

S. No	Village Name	Total Population	Population Literate	Male Literate	Female Literate	Population Illiterate	Male Illiterate	Female Illiterate
59	Upargugui	2656	1233	814	419	1423	550	873
60	Bamni	225	65	39	26	160	64	96
61	Ghatiali	329	120	72	48	209	90	119
62	Kanriyardi	118	35	25	10	83	28	55
63	Parsiya	215	57	40	17	158	68	90
64	Sitarampur	310	155	110	45	155	56	99
65	Bhuiyandih	274	99	68	31	175	66	109
66	Gayalikocha	673	121	84	37	552	255	297
67	Puranaburudih	23	6	5	1	17	7	10
68	Tanasi	1046	201	143	58	845	379	466
69	Pattanr	612	63	33	30	549	278	271
	Sub-total(B)	9970	3566	2382	1184	6404	2627	3777
	Total (A+B)	74508	34317	22257	12060	40191	15834	24357

Source: Census of India 2011

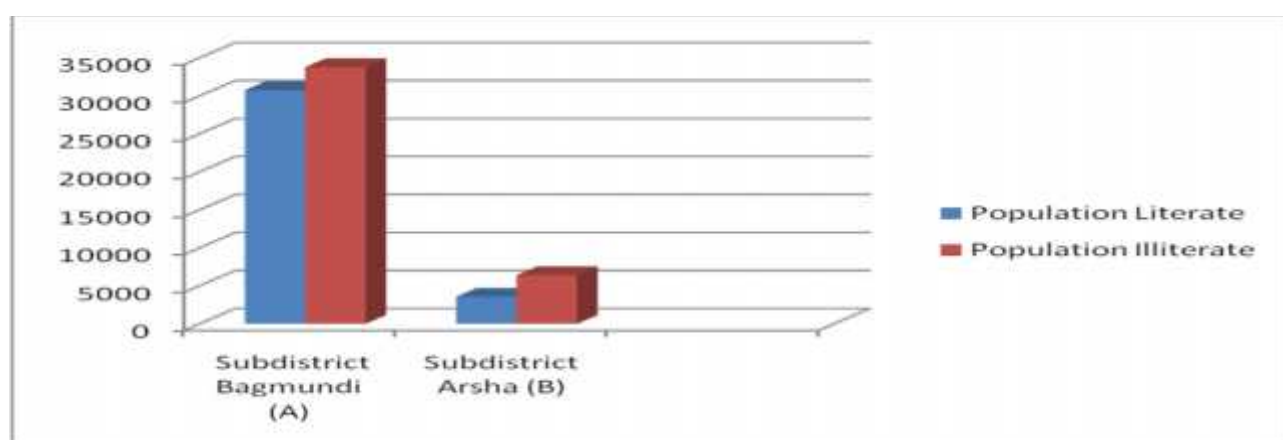


Figure -2.3: Literacy profile of the Study Area Villages

2.5 OCCUPATIONAL PROFILE

The details on occupational profile in the study area villages are given in Table-2.4. As per this table it is observed that 46.06% of the total population is engaged in some form of economically productive activity or vocational activity, and have been designated as Total Working population. On the other hand, Non-workers or persons who are dependent on the population, which is engaged in economically productive work accounts for about 53.94% of the total population. Amongst the working population, about 45.31% has been designated as Main workers while the remaining 54.69% are designated as Marginal workers.

Table-2.4: Occupational profile in the Study Area Villages

S.No	Village Name	Total Population	Total Workers	Main Workers	Marginal Workers	Non Workers
	Block Bagmundi					
1	Jhabri	477	237	48	189	240
2	Karru	2588	1149	253	896	1439
3	Gandhudi	1295	353	30	323	942
4	Birgram	3722	1308	165	1143	2414
5	Sindri	4138	1700	1252	448	2438

S.No	Village Name	Total Population	Total Workers	Main Workers	Marginal Workers	Non Workers
6	Dabha	906	492	194	298	414
7	Tarang	1597	922	506	416	675
8	Nishchintpur	471	281	85	196	190
9	Uttamdi Alias Rengtudi	404	245	131	114	159
10	Bhursu	3096	1271	844	427	1825
11	Koreng	1407	608	216	392	799
12	Ukada	875	444	435	9	431
13	Burda	5159	2670	1265	1405	2489
14	Dungridi	194	106	53	53	88
15	Susnidi	127	74	32	42	53
16	Saramchaki	117	65	28	37	52
17	Babnijara	81	49	29	20	32
18	Pitidiri	567	274	82	192	293
19	Kushumtikri	132	78	1	77	54
20	Hesadi	729	411	143	268	318
21	Saharjuri	1038	581	96	485	457
22	Bongada	226	131	41	90	95
23	Sonahara	252	151	50	101	101
24	Kalha	422	168	98	70	254
25	Bhunighra	505	184	67	117	321
26	Telia Bhasa	367	211	4	207	156
27	Saldi	78	40	21	19	38
28	Bhitpani	240	133	0	133	107
29	Alkusi	67	22	13	9	45
30	Kurupahar	113	67	36	31	46
31	Baredi	1056	660	280	380	396
32	Khirabera	442	242	90	152	200
33	Dhundhikhap	304	174	52	122	130
34	Chorda	2568	1135	700	435	1433
35	Ghorabandha	3274	1886	928	958	1388
36	Ghaghra	126	30	1	29	96
37	Sarakdi	842	276	231	45	566
38	Chano	298	83	33	50	215
39	Pratappur	629	216	205	11	413
40	Patardi	1609	620	291	329	989
41	Gobindapur	3064	1317	726	591	1747
42	Madla	3070	1837	730	1107	1233
43	Shrabandi	1091	477	43	434	614
44	Tantan	451	169	128	41	282
45	Basudi	352	138	89	49	214
46	Matiala	180	76	57	19	104
47	Kudlung	889	514	161	353	375
48	Barria	3982	1349	133	1216	2633
49	Gosaidi	183	77	72	5	106
50	Baghmundi	4035	1400	680	720	2635
51	Ranga	726	210	94	116	516
52	Andhra Alias Hathinada	724	171	144	27	553
53	Ajodhya	1648	772	392	380	876
54	Kuchrirakha	237	133	57	76	104
55	Punia Shasan	430	232	90	142	198

S.No	Village Name	Total Population	Total Workers	Main Workers	Marginal Workers	Non Workers
56	Chhatni	823	454	5	449	369
57	Lahadungri	115	73	27	46	42
	Sub-total(A) Block Arsha	64538	29146	12657	16489	35392
58	Uparjari	3489	1923	1120	803	1566
59	Upargugui	2656	1410	496	914	1246
60	Bamni	225	138	121	17	87
61	Ghatiali	329	175	154	21	154
62	Kanriyardi	118	64	60	4	54
63	Parsiya	215	58	57	1	157
64	Sitarampur	310	88	85	3	222
65	Bhuiyandih	274	68	65	3	206
66	Gayalikocho	673	449	334	115	224
67	Puranaburudih	23	20	8	12	3
68	Tanasi	1046	542	190	352	504
69	Pattanr	612	235	201	34	377
	Sub-total(B)	9970	5170	2891	2279	4800
	Total (A+B)	74508	34316	15548	18768	40192

Source: Census of India 2011

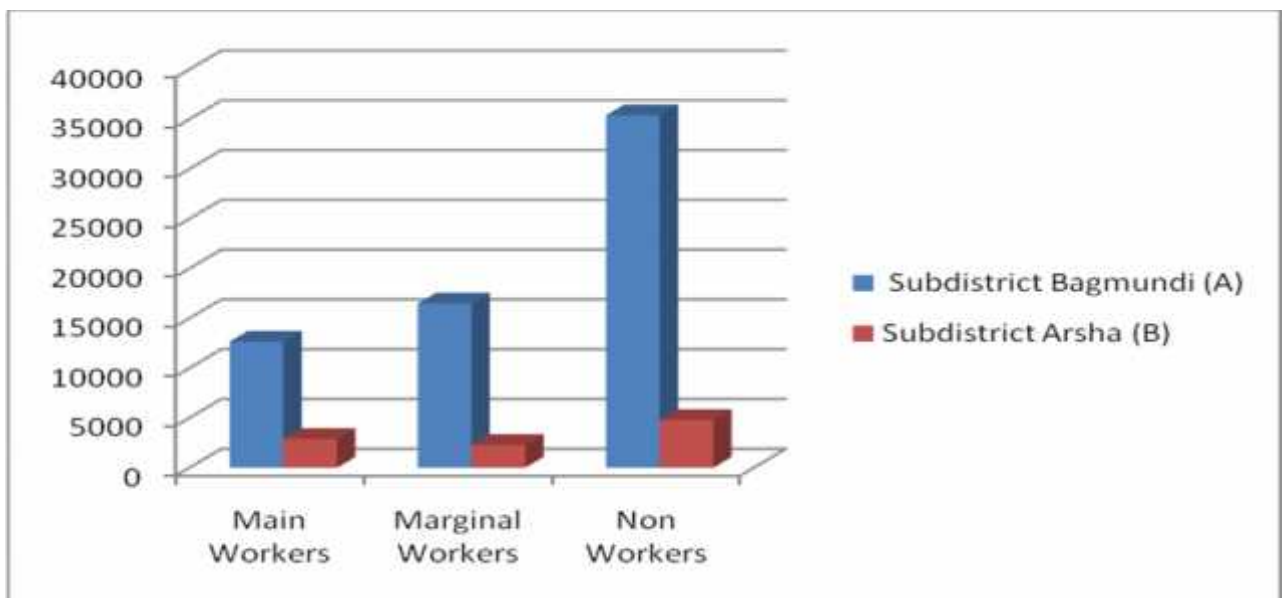


Figure -2.4: Occupational profile of Study Area Villages

CHAPTER-3

SOCIAL IMPACT ASSESSMENT

3.1 INTRODUCTION

Based on the project details and the baseline environmental status, potential impacts as a result of the construction and operation of the proposed Turga Pumped Storage Project on Social Aspects have been covered in the present Chapter.

A project of the magnitude similar to that of Turga Project is likely to entail both positive as well as negative impacts on the socio-economic fabric of the area. During construction and operation phases, a lot of allied activities will mushroom in the project area. The construction phase would require a large labour force. It is felt that a considerable number of the labour force would come from other parts of the country. Economic opportunities would increase both directly as well as indirectly. Infrastructure facilities are likely to increase. The present chapter covers the impacts on socio-economic environment.

The impacts have been categorized as below:

- Impacts during project construction phase
- Impacts during project operation phase

3.2 LAND REQUIREMENT

The total land required for the project is 292.0 ha. The details are given in Table-3.1.

Table-3.1: Land requirement for proposed project

S. No.	Component	Area (ha)
1.	Upper Reservoir submergence at FRL	87.10
2.	Lower Reservoir submergence at FRL	49.00
3.	Dam site and other structure	13.90
4.	Quarry Site	32.00
5.	Construction facility	15.00
6.	Clay core Area	20.00
7.	Roads	10.00
8.	Stockpile area for construction material, etc.	30.00
9.	Other miscellaneous requirement	35.00
	Total	292.00

As per the present status, about 234 ha of land is Forest land and the remaining (58 ha) is non-forest government land and/or Private Land. Out of 58 ha of non-forest government land and/or Private Land, 34 ha of land will be transferred from I&W Directorate, Government of West Bengal to Turga Pumped Storage Project. The remaining 24 ha of land shall be arranged temporarily on leased basis.

3.3 IMPACTS DURING CONSTRUCTION PHASE

The construction phase will last for about 5 to 6 years. The peak labour force 800 and technical staff required is estimated at about 200. The total number of persons inhabiting the area

including the service population will be about 4000. The construction phase of any project is rather an unsettled stage characterized by uncertainties and often disorders. The basic problem relates to management of large population, which migrate to the project area or near major construction sites, in search of jobs. It has been estimated that about 4000 persons will inhabit the area during construction phase, which is likely to last for a period of about 5 to 6 years.

The benefits however, are always not a certainty and depend on several factors. Often, they are directly related to the way construction phase is handled by the project authorities and their sensitivity to various socio-economic problems that could develop during this phase. The project will open a large number of jobs to the local population. Job opportunities will drastically improve in this area.

The availability of infrastructure is generally a problem during the initial construction phase. However, the construction workers can be subsidized for certain facilities like health, education, etc. The adequacy of water supply, sewage treatment, housing, etc. should therefore, be ensured before and adequate measures would be taken at the very start of the project.

3.3.1 Provide local services like water supply, education, healthcare, community forests etc.

The commissioning of the project will increase gross money flow in the project area. This will lead to significant impacts in the project area. The area will have increased demands for services, such as sewerage system, communication, transportation, medical and educational facilities, etc. It is presumed that all these developments would result in generation of additional employment. Thus, with the increased income levels, there will be an improvement in the local service facilities.

3.3.2 Employment opportunities

The construction phase will last for about 5 to 6 years. The peak labour force and technical staff required is estimated at about 1,000. The total number of persons inhabiting the area including the service population will be about 4,000. The construction phase of any project is rather an unsettled stage characterized by uncertainties and often disorders. The basic problem relates to management of large population, which migrates to the project area or near major construction sites, in search of jobs.

The construction of the proposed project would invariably create a number of direct employment opportunities. However, indirect employment opportunities would also be generated which would provide great impetus to the economy of the local area. Various types of businesses, such as shops, food-stalls, tea stalls, restaurants, workshops, etc. would

invariably come-up, which would be run by the more entrepreneurial local residents. Besides, a variety of suppliers, traders, transporters, service providers, etc., are also likely to concentrate in the vicinity of the project area. This would lead to demand for almost all types of goods and services. The locals would avail these opportunities arising from the project and increase their income levels.

The construction of the project will provide an impetus to the industrialization and urbanization in the area. Many of the barren lands in the vicinity of the project area are likely to be put to non-agricultural uses. The project would require lot of ancillary developments like shops, restaurant, workshops, etc. which will have a significant impact on the existing land use of the area. Job opportunities will drastically improve in this area. At present most of the population sustains on agriculture and allied activities. There are no major industries or other avenues of occupation in the area. The project will open a large number of jobs to the local population during project construction phase.

3.3.3 Business opportunities

Apart from direct employment, opportunities for indirect employment will also be generated which would provide great impetus to the economy of the local area. Various types of business like shops, food-stall, tea stalls, etc. besides a variety of suppliers, traders, transporters will concentrate here and benefit immensely as demand will increase significantly for almost all types of goods and services. The business community as a whole will be benefited. The locals will avail these opportunities arising from the project and increase their income levels. With the increase in the income levels, there will be an improvement in the infrastructure facilities in the area and the socio-economic status of the area will also be improved.

3.3.4 Subsidiary industrial opportunities

The project construction will improve the subsidiary industrial opportunities on account of commissioning of workshops, small vehicle and equipment repair shops etc. The locals will avail these opportunities arising from the project.

3.3.5 Governmental service enhancement opportunities

Besides upgrading local services like education, drinking water, health, communication, etc. other governmental services like security, bank, finance etc will improve in the area. Government will provide different services to the project, which will also help the locals. Due to increased economic activities and work force to the project area, government as well as private banks will be established. Besides bank saving and cooperative institutions will also develop at local level for saving the earnings.

3.3.6 Land acquisition and population displacement/involuntary resettlement

The important adverse impact during construction phase will be that, pertaining to land acquisition. About 292 ha of land is proposed to be acquired for the proposed Turga Pumped Storage Project. The details are given in Table-3.1. No family will be losing homestead. Some minimum private land is to be acquired on temporary basis and no permanent acquisition of private land is envisaged. Thus, issues related to Resettlement and Rehabilitation are not envisaged in the proposed Project.

Usually government or forest lands act as community property resources (for gathering firewood, fodder, fruits, etc.) for the local residents. Acquisition of forest or government lands would increase pressure on remaining forest and government lands.

3.3.7 Impacts on social services like: Educational, Health, Communication, Water Supply, Consumer Goods, and Sanitation etc.

During construction phase, a large labour force, including skilled, semi-skilled and un-skilled labour force of the order of about 1,000 persons, is expected to immigrate into the project area. It is felt that most of the labour force would come from other parts of the country. However, some of the locals would also be employed to work in the project. The labour force would stay near to the project construction sites.

The project will also lead to certain negative impacts. The most important negative impact would be during construction phase. The labour force that would work in the construction phase would settle around the project site. They would temporarily reside there. This may lead to pollution, due to generation of domestic wastewater, human waste, municipal solid waste etc. Besides, other deleterious impacts are likely to emerge due to inter-mixing of the local communities with the labour force. Differences in social, cultural and economic conditions among the locals and labour force could also lead to friction between the migrant labour population and the local population.

3.3.8 Impacts on Public health

Increase in water spread area

The construction of reservoirs would convert riverine ecosystem into a lacustrine ecosystem. The vectors of various diseases may breed in shallow parts of the impounded water. The magnitude of breeding sites for mosquitoes and other vectors in the impounded water is in direct proportion to the length of the shoreline. The increase in submergence area would lead to increase in incidence of vector-borne disease on account of proliferation of mosquitoes. As Turga PSP is a pumped storage project, so that water mass in both the reservoirs will fluctuate daily, and chances of breeding of vectors/mosquitoes in a fluctuating water body are much lesser than the stagnant water condition. However, project area could face

increased incidence of malaria as a result of various factors like aggregation of labour, formation of stagnant pools near labour camps, colonies, etc. Labour camps could be vulnerable to increased incidence of water-borne diseases, if adequate measures are not undertaken.

Aggregation of labour

About 1000 labourers and technical staff will congregate in the project area during peak construction phase. The total increase in population is expected to be of the order of 4000.

Most of the labour would come from various parts of the country. The labourer would live in colonies/camps provided by the Contractor. Proper sanitary facilities are generally provided. Hence, a proper surveillance and immunization schedule needs to be developed for the labour population migrating into the project area, to assess whether they are carriers of communicable diseases. If found positive, suitable measures need to be undertaken.

Excavations

The excavation of earth from borrow pits etc. is one of the major factor for the increase in prevalence of malaria. After excavation of construction material, the depressions are generally left without treatment where water gets collected. These pools of water, then serves as breeding grounds for mosquitoes.

The flight of mosquito is generally limited up to 1 to 2 km from the breeding sites. Since, no residential areas are located within 1 km from the reservoir, periphery, increased incidences of malaria are not anticipated. However, labour camps, etc. could be vulnerable to increased incidence of malaria, if proper control measures are not undertaken.

Inadequate facilities in labour camps

Improperly planned labour camps generally tend to become slums, with inadequate facilities for potable water supply and sewage treatment and disposal. This could lead to outbreak of epidemics of water-borne diseases. Adequate measures for supply of potable water and sewage treatment have been recommended as a part of Environmental Management Plan outlined in volume-II of this Report.

3.3.9 Influence on law and order

Construction period of Turga Pumped Storage Project (major work) will be 63 months. The peak labour and technical staff requirement is estimated to be around 1000, majority of which would belong to different socio-cultural background will temporarily migrate to the project area. They will interact and interrelate with the project management and with the local community which is a multi-ethnic, multi-cultural and multi-religious society. Furthermore, cash flow in the area may attract the workers towards gambling, alcohol consumption, stealing, and other such social evils. In such a situation, general breakdown of law and crime may occur. Some of the workers may take advantage of this situation.

Therefore, social disruptive behaviors are likely to increase in the project area during the construction period. Adequate measures need to be implemented to mitigate the impacts on this account.

3.3.10 Influence on occupational health, community health, and accidental risks

The construction phase of any project is rather an unsettled stage characterized by uncertainties and often disorders. The basic problem relates to management of large population, which migrates to the construction area in search of jobs.

It is normally experienced that untreated sewage would find its way into natural drainage system, and is likely to get collected as pools of sewage or it out-falls into the nearest water body along natural drainage pattern. Thus, it is important to provide appropriate sewage treatment facilities at the labour camp and at the construction site prior to disposal on land or in water body.

The garbage comprising of waste materials, e.g. packaging, polythene or plastic materials are likely to be generated during project construction and operation phase at the project site. The same needs to be properly collected and disposed at designated sites.

The main activities during construction, will be drilling, blasting, sorting and haulage of the muck may cause accidents and injuries. The most common injuries that might occur are due to falls from scaffoldings or other structures, injuries due to falling objects such as rocks or other construction equipment, traffic accidents, etc. Working in small underground area with poor light and ventilation could further pose threat to workers health. The construction of dam and other structures involves concrete mixing, concrete pouring, reinforcement banding/installing, steel ribs fabrication, welding, etc. Labour and technical staff working with concrete may be exposed to fine silicate particles that might cause lung diseases. The victims will most probably be construction worker although injuries to local people are also possible.

3.3.11 Impact on gender and child discrimination risks

The project shall ensure equal access to participation and decision making of women in mainstreaming a gender perspective in the development process. Project shall provide equal access to women for employment, equal remuneration, occupational health and safety, social security, etc.

During construction phase, large number of local as well as outsiders will be engaged directly and indirectly in project. If both parents will be employed in project they cannot give their time to children, as a result children get affected. Although, the project will have the provision of not employing children less than 18 years of age, poverty may force the parents to engage their children in some form of work like in tea stalls, collection of sand, aggregates etc. Since there would be extra earnings, children will be attracted to help their parents in

working with the project rather than going to school for education. This will definitely affect the educational pattern of the project area. At the same time, different project activities such as drilling, blasting and other construction activities pose safety concerns to the locals especially the children. It will be made mandatory for the contractor not to employ child labour in project construction activities.

3.3.13 Impacts due to occupational health and safety

The effect of high noise levels on the operating personnel has to be considered as this may be particularly harmful. It is known that continuous exposures to high noise levels above 90 dB(A) affects the hearing acuity of the workers/operators and hence, should be avoided. To prevent these effects, it has been recommended by Occupational Safety and Health Administration (OSHA) that the exposure period of affected persons be limited as per the maximum exposure period specified in Table-3.2.

Table-3.2: Maximum Exposure Periods specified by OSHA

Maximum equivalent continuous Noise level dB (A)	Unprotected exposure period per day for 8 hrs/day and 5 days/week
90	8
95	4
100	2
105	1
110	1/2
115	1/4
120	No exposure permitted at or above this level

3.4. IMPACTS DURING OPERATION PHASE

3.4.1 Improved access to social services (education, health, market etc)

Once the construction of the project starts, significant and visible impacts will be felt in the project area. It can be assumed that economic activities will boom in settlements close to the project facility sites. During construction phase, education centers, health post, market, etc will be improved. After construction phase, there will be withdrawal of economic activities which flourished during construction phase since most of the construction related workforce will leave the project area. However, it is likely that some economic activities will continue or be further promoted these areas, which will be a positive impact.

3.4.2 Rural electrification opportunities

The proposed project would lead to increased availability of power, which can be used for rural electrification. This would be implemented as per the norms and policies of Government of the central and state governments. The improved availability of power will improve the quality of life along with associated health benefits.

3.4.3 Local employment opportunities

The operation of the project will provide an impetus to the industrialization and urbanization in the area. Many of the barren lands in the vicinity of the project area are likely to be put to non-agricultural uses. The project would require lot of ancillary developments like shops, restaurant, workshops, etc. which will have a significant impact on the existing land use of the area. Job opportunities will drastically improve in this area. At present most of the population sustains on agriculture and allied activities. There are no major industries or other avenues of occupation in the area. The project will open a large number of jobs to the local population during project operation phase.

3.4.4 Subsidiary industrial opportunities

The project will generate 1825GWh of energy. This will be a big input in the National / State level power planning. With the availability of regular electric supply, possibility for the establishment of local and national level industries is always high. This will be a significant positive impact.

3.4.5 Governmental service enhancement opportunities

After completion of construction phase, there will be upgradation of local services like education, drinking water, health post and other social governmental services like security, bank, finance etc will increase at and around the project sites. Government will provide different services to the project, which will automatically help locals. During operation phase, some existing governmental service will continue for long time whereas some services will end by the end of the construction phase. Some government services like revenue office will get an opportunity to collect revenue.

3.4.6 Improvement of Growth centers/strip development

During construction phase there will increase in market centers focusing to the project workers. During this time, there will be strip settlement and market centers along the site of the existing road and nearby the camping areas. After construction phase, there will be reduction in construction workers so there will some change in settlement. However, most of the people will sustain during operation phase, but with less economic flow.

3.4.7 Local participation in the project activities

After the construction work is over, project will require some permanent posts for the smooth operation and regular maintenance of project components. Locals will be recruited for administrative and technical works according to their qualification and skills. These will give permanent employment source to some of the locals.

3.4.8 Noise generated due to powerhouse operation

Power House being underground, no major impacts are anticipated on ambient noise level due to operation of the project.

CHAPTER-4

LOCAL AREA DEVELOPMENT PLAN

4.1 INTRODUCTION

The present chapter outlines the Local Area Development Plan (LADP) for Turga Pumped Storage Project. The objective of the plan is to empower study area villages. LADP is being framed to extend benefits to not only the residents of the affected villages, but also to residents of the villages adjoining to project area which are also within the study area villages.

The following aspects have been covered under the Local Area Development Plan:

- Educational Facilities
- Health Care and Medical Facilities
- Infrastructure Development
- Economic Development
- Social and Cultural Development

A budget of 0.5% of the project cost has been earmarked for implementation of Local Area Development Plan (LADP).

4.2 LOCAL AREA DEVELOPMENT PLAN

4.2.1 UPGRADATION OF EDUCATIONAL FACILITIES

It is proposed to upgrade the primary schools in 25 villages in the periphery of the affected villages. The following activities are proposed under LADP activities:

- Up-gradation of school fixtures, equipment
- Improvement of drinking water facilities
- School bus service

It is suggested to Up-gradation of school fixtures, equipment, etc., and to improve drinking water facilities in one primary school in 35 study area villages. A lump-sum amount of Rs. 12.4 lakh per school is being made for this purpose. The details are given in Table-4.1. Since 35 primary schools are to be upgraded, an amount of Rs. 434 lakh needs to be earmarked for this purpose. In addition, an amount of Rs.120.0lakh has been earmarked for purchase of 6 school vans/mini-buses. Thus, total lump-sum amount of Rs. 554.0lakh has been earmarked for this purpose.

Table-4.1: Break up of cost required for up-gradation of existing primary schools

S. No.	Particular	Amount earmarked /school (Rs. lakh)	Amount earmarked for 35 schools (Rs. lakh)
1	Furniture & fixtures and equipment	3.0	105.0
2	Improvement of drinking water facilities	2.0	70.0
3.	Construction of toilets in schools	5.0	175.0
4.	Improvement of school library/kitchen for mid-day meals	2.4	84.0
	Sub-Total (A)	12.4	434.0

S. No.	Particular	Amount earmarked /school (Rs. lakh)	Amount earmarked for 35 schools (Rs. lakh)
1	Purchase of school vans/mini-buses x 6Nos.	20.0	120.0
	Sub-Total (B)		120.0
	Total (A + B)		554.0

4.2.2 SCHOLARSHIPS FOR STUDENTS

It is suggested to provide scholarships for local students. On the one hand school going students who are presently studying between Class-I to Class-XII, scholarships are suggested for an amount of Rs. 10,000 per year for a period of 12 years may be extended as scholarship to about 100 students in the Study Area Villages.

On the other hand, scholarships are also suggested for students going in for higher studies. Meritorious students from the above mentioned category or students who are presently pursuing higher studies will then be supported for their college/ higher education. A scholarship provision of Rs. 15,000 per year for meeting their fee and study material requirement along with Rs. 5,000 per year for meeting their hostel expenses for a period of 4 years is being made for meritorious students for higher studies. About 50 students are proposed to be covered under this scheme.

A total amount of Rs. 160.00 lakh may be earmarked for providing scholarships, details of which are given in Table - 4.2.

Table-4.2: Details of scholarships

S.No.	Activities	Amount (Rs. lakh)
1	Scholarship for School going students (100 students x 10000 per year for 12 years)	120.0
2	Scholarship for meritorious students-College/ higher education	
	a) Fees/course material (@ Rs.15,000/year x 50 students x 4 years)	30.0
	b) Hostel expenses (@ Rs. 5,000/years x 50 students x 4 years)	10.0
	Total	160.0

4.3 IMPROVEMENT OF PUBLIC HEALTH FACILITIES

It is proposed up-grade 2 existing Primary Health Sub-Centers as part of the LADP of the area. Up-gradation of this health care facility would involve renovation of existing structure/ construction of new wing, if required. Provision of new and/or latest gadgets and instruments, such as furniture, beds, laboratory equipment/instruments, computers wherever possible, installation of new floorings and ceilings, up-gradation/ construction of new of lavatories, electrification and adequate and proper lighting in rooms, facilities for cold storage of essential medicines, provision of drinking water facilities, etc. An amount of Rs.

44lakh (Rs. 22 lakh per PHSC x 2 PHSCs) has been earmarked for up-gradation of the existing PHSCs. The details are given in Table-4.3.

In addition, it is suggested to purchase 5 vans fitted with life saving equipment and stocked with medicines, which will function as a mobile clinics. It is further suggested to attach these mobile clinics to the 2 PHSCs from where these mobile units will operate. An amount of Rs. 150 lakh has been earmarked for this purpose.

A total amount of Rs. 194.0 lakh is being earmarked for extending health facilities under LADP. The details are given in Table-4.3.

Table-4.3: Budget for up-gradation of PHSCs

S.No.	Item	Amount earmarked per PHSC(Rs. lakh)	Amount earmarked for 2 PHSCs (Rs.lakh)
1	Furniture, Beds, lighting, facilities for cold storage, drinking water, etc.	6.0	12.0
2	Up-gradation of Pathological laboratory	8.0	16.0
3	Up-gradation of operation theater (labor room)	8.0	16.0
	Sub-Total (A)	22.0	44.0
4	Purchase of 5 mobile clinic vans	30.0	150.0
	Sub-Total (B)	30.0	150.0
	Total (A+B)		194.0

4.4 COMMUNITY TOILETS

It is proposed to construct the 10 community toilets in 30 villages. 5 toilets each for males and females shall be constructed in each village. An amount of Rs.1200lakh has been earmarked for purpose. The details of the budget for construction of 10 community toilets in each village is given in Table-4.4.

Table-4.4: Budget for construction of community toilet

S.No.	Item	Amount earmarked per village(Rs. lakh)	Amount earmarked for 30 villages (Rs.lakh)
1.	Civil Works(Seat, Tap, Walls, Roofetc)	20.00	600.0
2.	Plumbing	4.50	135.0
3.	Tubewell	3.00	90.0
4.	Electrification	2.00	60.0
5.	Sewer Connection	2.50	75.0
6.	Bio-Digesters	8.0	240.0
	Total	40.00	1200.0

4.5 ADDITIONAL INFRASTRUCTURAL FACILITIES SOUGHT FOR DURING PUBLIC HEARING

During Public Hearing local people demanded few new infrastructure facilities. The Project Proponent assured to provide the following facilities required by them:

- Potable Water Supply (Digging new Wells) in three villages as decided by district administration
- Digging new ponds in three villages as decided by district administration
- Development of Play Ground in three villages as decided by district administration
- Development & Renovation of Two Temples (Ram Mandir and Vaishno Devi Mandir)

The Budget allocated for the above mentioned works are given in Table-4.5 below:

Table-4.5: Budget Allocation for Additional Infrastructural Facilities Sought for During Public Hearing

Description		Budget (Rs. In Lakhs)
Potable Water facility - Digging of new wells	Total 3 nos: as decided by district administration in consultation with local people	5.00
Digging New Pond	Total 3 nos: as decided by district administration in consultation with local people	36.00
Development of Play Ground	Total 3 nos: as decided by district administration in consultation with local people	30.00
Development and Renovation of Temples	2 nos. (as indicated in the Proceedings of Public Hearing)	25.00
Total		96.00

4.6 BUDGET FOR LADP

An amount of Rs. 2204.0 lakh is being made for implementation of the LADP Activities. The details are shown in Table-4.6.

Table-4.6: Budget for implementation of Local Area Development Plan

S. No.	Items	Budget (Rs. Lakh)
1	Construction/Up-gradation schools in Study Area (refer Table-4.1)	554.0
2	Scholarships to students in the Study Area (refer Table-4.2)	160.0
3	Improvement of Public Health Facility (refer Table-4.3)	194.0
4	Construction of Community Toilets(refer Table-4.4)	1200.0
5	Additional Infrastructural Facilities Sought for During Public Hearing(refer Table-4.5)	96.0
	Total	2204.0

CHAPTER-5

PLAN FOR PROTECTION OF CULTURAL IDENTITY

5.1 INTRODUCTION

The congregation of large labour population during construction phase is expected to lead to significant impacts on the local population. It is proposed to implement measures so as to minimize social conflicts on account of interaction of the locals with the immigrating population. The key objectives are to:

- Ensure only essential interaction with the local population outside the project area, so that there shall be no impact due to migration of different culture and people in social and cultural life of the local population.
- Requisite interaction with locals will be managed with care and sensitivity through local personnel, in consultation with village Panchayat.

5.2 SUGGESTED MEASURES

- No exploitation of natural resources in and around the project area by the labourers / staff of WBSEDCL as well as of contractors will be allowed by the project authority.
- Necessary measures shall be initiated to curb any form of extraction of resources from the village outside the project area by the labourers / staff of WBSEDCL as well as of contractors.
- Project area shall be fully and effectively demarcated and fenced.
- Necessary arrangements to ensure that only necessary intervention take place with the locals will be made.
- Project will not allow any visitor to visit / interact with the locals outside the project area so that curious intrusions are avoided.

5.3 REGULATION OF TRAFFIC ON ROAD

The following measures are suggested:

- Traffic on road will be regulated strictly by limiting the traffic to the project works and to ensure that no intervention take place with the locals.
- Vehicles on road will be allowed to move under notified speed limit to avert possible road accidents.

- Traffic on road will be strictly monitored to ensure that there is no interaction between the locals and the labourers/ staff of WBSEDCL as well as contractors. Check gates at different locations shall be installed.

5.4 INSTITUTIONAL ARRANGEMENTS

The following measures shall be implemented

- Project authority shall be responsible for the implementation of the aforesaid policy. It shall lay down detailed tasks for each unit of the project in connection with the interaction with the locals.
- Project authority assisted by local administration having knowledge and experience in local community affairs will enforce and monitor implementation of the policy.
- Essential interaction with the locals will take place with the consultation of local administration, panchayat leaders and prominent citizens etc.
- Periodic review of this policy will be done so that the policy is dynamic and takes into account changing needs and circumstances.

5.5 ACTION PLAN

Following measures will be implemented to check and preserve the cultural identity of the local population:

- Project area shall be fenced to prevent unauthorized trespassing.
- Limited number of opening / check post shall be installed to guard the unauthorized entry/exist from the project area.
- All workers / officers shall be provided with the identity card.
- No worker shall be allowed to leave the project without any specific and genuine reason and permission.
- Specific passes shall be issued to the worker leaving the project area.
- Strict action shall be taken against the worker/officials not adhering the norms and regulations.
- A committee with participation of local leaders/prominent persons shall be constituted to deal with the problems arising due to any illegal activities by the workers.

5.6 SURVEILLANCE MEASURES

During construction phase, it is proposed to construct 3 (three) check posts to prevent unnecessary inter-mingling of labour population with the locals. Each check post will have two guards and will report directly to a supervisor. The staff manning these check posts have adequate communication equipments. Adequate infrastructure including check-posts, watch towers, accommodation, etc. shall be provided.

An amount of Rs. 98.12 lakh has been earmarked for this purpose. The details are given as below:

a) Salary

• Guards (6 nos.) @ Rs.8000 per month	Rs. 576,000
• One Supervisor @ Rs.20,000 per month	Rs. 240,000
• Total cost for one year	Rs. 816,000
Cost for 63 months	Rs. 53.12 lakh
(Assuming 10% increase per year)	

b) Communication equipment	Rs. 15 lakh
c) Infrastructure	Rs. 15 lakh
d) Purchase of Vehicles	Rs. 15 lakh
Total Cost	Rs.98.12 lakh

CHAPTER-6 COST ESTIMATES

6.1 COST FOR IMPLEMENTING MANAGEMENT PLAN FOR SOCIAL ASPECTS

The total amount to be spent for implementation of Management Plan for Social Aspects is Rs. 2302.12lakh. The details are given in Table-6.1.

Table-6.1: Cost for Implementing Social Management Plan

S. No.	Item	Cost (Rs.lakh)
1.	Local Area Development Plan (Refer Table-4.6)	2204.00
2.	Plan to maintain cultural identity (Refer Section 5.6)	98.12
	Total	2302.12



वाष्कोस लिमिटेड WAPCOS LIMITED

(भारत सरकार का उपक्रम)

जल संसाधन, नदी विकास व गंगा संरक्षण मंत्रालय

(A Government of India Undertaking)

Ministry of Water Resources, River Development & Ganga Rejuvenation

Date: 27.11.2015

UNDERTAKING

As per MoEF Office Memorandum no. J-11013/41/2006/-IA-III, dated 5th October, 2011, M/s. WAPCOS Limited, Gurgaon, Haryana herewith declares ownership of the contents (information and data) of the EIA Study for Turga Pumped Storage Project, West Bengal.

Aman Sharma
27/11/15

(Authorised Signatory)

डॉ. अमन शर्मा / Dr. Aman Sharma
वरि. महा प्रबंधक (गंगा संरक्षण एवं पर्यावरण)
Sr. General Manager (Ganga Rejuvenation & Envrt.)
वाष्कोस लिमिटेड / WAPCOS LIMITED
(भारत सरकार का उपक्रम / A Govt. of India Undertaking)
75-सी, सेक्टर - 18, गुडगाँव - 122015 (हरि.)
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National Accreditation Board
for Education and Training

NABET/EIA/RA068/085

Oct 09, 2015

Chairman cum Managing Director

WAPCOS Limited (A Government of India Undertaking)

Plot-76-C, Sector-18, Gurgaon – 122015, Haryana

(Kind Attention: **Mr. R.K. Gupta**)

Dear Sir,

Sub: Re-Accreditation

This has reference to your application to QCI-NABET for re-accreditation (RA) as EIA Consultant Organization and the assessment carried for same in your organization from Apr. 07-09, 2015.

We are pleased to inform you that based on the document and office assessments during RA, the Accreditation Committee has approved renewal of accreditation given to your organization for a period of three years from **Apr. 09, 2015 to Apr. 08, 2018** subject to coverage of balance Functional areas and specific response to NCs/Obs./Alerts issued, if applicable (Refer Annexure III) with the following details:

1. Annexure I - Scope of accreditation
2. Annexure II - List of experts with approved sectors/ functional areas
3. Annexure III - Non-Conformances/ Observations/ Alerts (NCs/ Obs./ Alerts)
4. Annexure IV - Observations on Quality Management System (QMS)
5. Annexure V - Terms and conditions of accreditation
6. Annexure VI - Result of assessment
7. Annexure VII - Guidelines for addressing Major Non-Conformances/ Observations/ Alerts
8. Annexure VIII - Format to be followed for mentioning the names of the experts involved in EIA reports prepared by **WAPCOS Limited**.

Result of RA including Non-Conformances/ Observations/ Alerts (NCs/ Obs./ Alerts) applicable to your organization as per RA are also posted on QCI website vide minutes of the Accreditation Committee meetings dated June 10, 2015. You are requested to take necessary actions to close the NCs/ Obs. as per guidelines and timeframe mentioned in Annexure VII of this letter. You are also advised to review eligibility of organization as per Version 3 of the Scheme (posted on NABET website) which has become effective from Sep 1, 2015 and meet its requirements by Dec. 31, 2015 positively.

You are required to make all payments to NABET as applicable, within one month from the date of invoice sent to you. Continuation of this accreditation of your organization is subject to the clearance of all dues by your organization, satisfactory compliance to Annexure III and V.

With best regards,

Yours sincerely,

(Abhay Sharma)
Assistant Director




Scope of Accreditation

Annexure I

NAME OF THE CONSULTANT ORGANIZATION: WAPCOS Limited (A Government of India Undertaking)
Plot-76-C, Sector-18, Gurgaon – 122015, Haryana

Sl. No.	Sector number		Name of Sector	Category A/B
	As per MoEF Notification	As per NABET Scheme		
1.	1 (a) (i)	1	Mining of Minerals- Open cast only	A
2.	1 (c)	3	River Valley, Hydrel, Drainage and Irrigation projects	A
3.	1 (d)	4	Thermal Power Plants	A
4.	7 (e)	33	Ports, harbours, jetties, marine terminals, break waters and dredging	A
5.	8 (a)	38	Building and large construction projects including shopping malls, multiplexes, commercial complexes, housing estates, hospitals, institutions	B
Total = 05 Sectors				
<i>Individual EIA Coordinators approved for different sectors are mentioned in Annexure II</i>				

The ACO has overall obtained more than 60 % marks and therefore qualifies for Cat. A.


(Abhay Sharma)
Assistant Director

NABET



NABL

National Accreditation Board for Testing and Calibration Laboratories

(An Autonomous Body under Department of Science & Technology, Govt. of India)

CERTIFICATE OF ACCREDITATION

SPECTRO ANALYTICAL LABS LTD.

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2005

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

E-41, Okhla Industrial Area, Phase-II, New Delhi

in the discipline of

CHEMICAL TESTING

(To see the scope of accreditation of this laboratory, you may also visit NABL website www.nabl-india.org)

Certificate Number T-0249

Issue Date 03/02/2015



Valid Until 02/02/2017

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the additional requirements of NABL.

Signed for and on behalf of NABL

N. Venkateswaran
Program Manager

Anil Relia
Director

Prof. Ashutosh Sharma
Chairman



NABL

National Accreditation Board for Testing and Calibration Laboratories

Department of Science & Technology, India

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in the discipline of

BIOLOGICAL TESTING

(To see the scope of accreditation of this laboratory, you may also visit NABL website www.nabl-india.org)

Certificate Number T-1073

Issue Date 02/03/2014

Valid Until 01/03/2016

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the additional requirements of NABL.

Signed for and on behalf of NABL

Prachi Kukreti
Convenor

Anil Relia
Director

Dr. T. Ramasami
Chairman



**West Bengal State Electricity Distribution Company limited
(A West Bengal Government Enterprise)**

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(April -2016)