EXECUTIVE SUMMARY

OF

EIA AND EMP STUDIES

OF

Kanhar Barrage Project

Garhwa, Jharkhand

Submitted by

Water Resources Department, (WRD), Jharkhand

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EXECUTIVE SUMMARY

1. INTRODUCTION

In the year of 2009, a task force of planning commission published report on Irrigation Potential of India. As per their assessment, annual average available water resource of the country is 1869 BCM. Within the limitations of physiographic conditions, socio political environment, constraints and the technology available at hand, the utilizable water resources of the country has been assessed as 1123 BCM, of which 690 BCM is from surface water and 433 BCM from ground water sources.

The proposed project is a major irrigation scheme which has the total culturable command area of 53,283 hectares. A fall of 60 meters at the end of main trunk canal is quite a site for hydro power generation. Though the availability of hydropower generation is available, the primary objective of the proposed project is to provide water for irrigation to the remote areas of the state which have been facing huge water crisis since both the pre & post partition of Bihar. The river Kanhar is the boundary line which divides the state Jharkhand from the state Chhattisgarh. A barrage in village Khuri at Garhwa district in Jharkhand on the River Kanhar will be constructed for diversion of water which creates submergence in both the states i.e. in Chhattisgarh.

2. PROJECT OVERVIEW

The proposed project is one of the long pending irrigation projects, the state government would like to get it executed as early as possible. Projects like Kanhar barrage has been pending for more than three decades. The Government of Jharkhand wants to get the project completed so that farmers get water while the government has concern over successive drought years and an uncertain monsoon in 2011. The project has been mandated to utilize share of Jharkhand in Kanhar waters of 0.43 MAF.
Kanhar Barrage Project envisages construction of a barrage across Kanhar River near Khuri village to impound the water up to the Full Reservoir Level (FRL) of EL. 368.60 m. This will enable diversion of river water to the Main trunk canal (MTC) through right bank. A 17.10 km long Main Trunk Canal (MTC) originates from the right bank, upstream of the barrage and shall terminate in reservoir upstream of Lawadoni village after negotiating of a fall of 60.0m. An Earthen Barrage (29.58 m height) with a ungated chute spillway, located on right bank, has been proposed at Lawadoni.

3. TOPOGRAPHY/GEOLOGY

The Vindhyans comprising chiefly of Khenjua-shales, Porcelanite, Limestone and Sandstones occupy a small area in the north-western part of Garhwa

district. The Gondwanas are represented by alteration of agrillaceous and arenaceous sediment & intervened with numerous coal seams. They are located in Palamu, Ranchi, Hazaribagh, Bokaro, Chatra, Dumka, Giridih, Dhanbad and Godda districts. Structurally the state can be divided into "Southern Singhbhum Province" and "Northern Chotanagpur Province" devided by Tamar – Khatra Fault (TKF) popularly known as the "Northern Singhbhum Shear Zone".

3.1 Seismicity

The project area falls within seismic Zone III as per seismic zoning map of India (IS 1893:2000).

3.2 Presence of economically important mineral deposit

No major occurrence of economic mineral deposit has been found in the study area.

3.3 Sensitive areas

No national park, sanctuary, defense establishment, archaeological monuments, notified eco-sensitive areas or protected areas under Wildlife (Protection) Act exists within the project area or within 10 Km distance from it.

4. HYDROLOGY

For the 90% dependable year 1976-77, December to March was identified as the period with lowest average flow for four consecutive months, with monthly average discharges estimated as 3.35, 3.59, 2.07and 0.62 m3/s, respectively. The average discharge of these months is 2.41 m3/s. The environmental release for the lean period, computed as 20% of the average flow of the four leanest months, is 0.48m3/s. However, as per discharge series for the year 1976-77, four consecutive leanest months works from February to May. The average discharge of these months is 1.00 m3/s. The environmental release for the lean period, computed as 20% of the average flow of the four leanest months, is 0.2 m3/s. However, considering in order with other nearby project, lean months as December to March, environmental release during lean period is considered as 0.48 m3/s, which is also on safer side.

During the 4 monsoon period (considered as June to September), 30% of inflow calculated on the basis of 90% dependable year will have to be released during these period.

For the non-lean, non-monsoon period, environmental release will be decided by committee as recommended by the Environmental Appraisal

Committee (EAC). At present same value of 0.48 m3/s has been considered as environment release for non-lean, non-monsoon period.
Based on approved water series from CWC, the 90% dependable year 1976-77, December to March was identified as the period with lowest average flow for four consecutive months. From the water series at Khuri Barrage site after excluding Chhattisgarh share, the monthly average discharges in year 1976-77, December to March, estimated as 1.78, 1.91, 1.10 and 0.33 m3/s, respectively. The average discharge of these months is 1.28 m3/s. The environmental release for the lean period, computed as 20% of the average flow of the four leanest months, is 0.26m3/s. However, as per discharge series for the year 1976-77, four consecutive leanest months works from February to May. The average discharge of these months is 0.53 m3/s. The environmental release for the lean period, computed as 20% of the average flow of the four leanest months, is 0.11m3/s..

5. BASELINE ENVIRONMNETAL STUDY AND IMAPACT PREDICTION

5.1 Physical Environment

EIA includes the study of various baseline parameters of environment viz. land, water, air, noise, flora, fauna and socio-economics. For overall prediction of impacts, the study area considered was 10 km radius covering all consequential project components for pre-monsoon, monsoon and post-monsoon seasons. All the parameters for baseline data were collected using standard methodologies.

5.1.1. Land environment

The total land requirement for Kanhar Barrage Project, consisting of "Barrage at Khuri Village/ Main Trunk canal (MTC)/ Reservoir at Lawadoni/ Left Main Canal (LMC)/ Right Main Canal (RMC)/ Pratap-pur (Kholra) Branch Canal/ All distributor/ All minors etc., have been assessed which has been further segregated between Forest & Non-Forest Area. The forest land requirement has been modified from 347.25Ha to 348.25Ha.

5.1.2 Soil environment

The soil resource map of Chhota Nagpur Plateau in Jharkhand and Chhattisgarh (NBSS Publication No Bihar 50, MP 59) has been used in the present study. The soil is predominantly loamy to sandy loam. the soil of the area belongs to Chhota Nagpur plateu(Eastern), Baghelkhand Plateau (Eastern), Central Highland, Pathar,Bundelkhand Upland (Alluvium) and Eastern Baghelkhand Plateau (Laterite)having map units 83, 89, 90, 92, 101, 105, 108, 110, 117, 133, 134, 135, 587, 598, 605, 620, 628, 644, 826, 827, 828, 829, 831, 832, 835, 837, 838, 839, 840, 841, 842, 846, 848, 849, 851 being soil of side and reposed slopes, and details of these are given in EMP report.

5.1.3 Water environment

The quality of surface water is generally good. pH varies from 6.73 to 7.9 indicating almost neutral nature. The total dissolved solids in all the samples are less except surface water sample at Panghalwa (max 492 mg/l) and Puraini Pond (max 422 mg/l). Presence of Total Coliform (90-390 MPN/100ml), Faecal coliform (15-233 MPN/100ml) are reported in all samples of surface water while none in ground water that may be attributed to anthropogenic activities. Dissolved oxygen varies from 4.5 to 7.1 mg/l in surface water samples and indicates that water is good for aquatic life. The other parameters are meeting the requirements of drinking water quality standard.

5.1.4 Air environment

The baseline status of the ambient air quality has been assessed through a scientifically designed ambient air quality monitoring network. Results of ambient air quality show that all the parameters are well within the National Ambient Air Quality Standards for residential, rural and other areas.

5.1.5 Noise environment

The major source of the noise in the study area is vehicular movement and roadside commercial activities. The ambient noise quality standards are 65, 55 and 50 dB (A) in day time and 55, 45 and 40 during night time for commercial, residential and silence zone respectively. The daytime noise level measured during 6:00 a.m. to 10:00 p.m. and nighttime measured from 10:00 p.m. to 6:00 a.m. The noise levels are within the prescribed limit in all the monitoring stations.

5.2 Biological environment

Biological environment baseline data for terrestrial and aquatic flora and fauna were made within the study area of 10 km radius from the barrage site. The Project site falls under the following forest types of Moist Tropical Forests, 3C 2(e) - Moist peninsular Sal forests and Dry Tropical Forests : 5B/C1 (e) – Dry peninsular Sal forests, 5B/C2 – Northern dry mixed deciduous forests, 5B/E6 – Aegle forest, 5B/E9 – Dry bamboo brake.

5.2.1 Floristic and faunal composition

(a) Terrestrial flora and fauna

As per survey conducted, a total of 153 species under 130 genera belonging to 53 families were recorded from different sampling sites in the project area of the Kanhar Barrage.

The study reveals that out of 153 species recorded from the project area, there are 72 trees, 22 shrubs, 29 herb species, 17 grasses and 13 climber species. Some of the examples are *Terminalia tomentosa, Adina cordifolia, Bauhinia spp., Albizia procera, Syzygium cumini, Mallotus philippensis, Anogeissus latifolia, Lagerstroemia parviflora, Woodfordia fruticosa, Bauhinia spp., Bombax ceiba, Butea monosperma, Madhuca longifolia etc.*

From the field survey and secondary source information, a total of 96 faunal species were recorded from the study area out of which 24 species of mammals, 48 species of birds, 13 species of reptiles, 5 species of amphibians and 6 species of butterflies were recorded in study area. Detailed list is given in Table 3.53, 3.54 and 3.55.

(b) Aquatic flora and fauna

Baseline information on aquatic fauna was collected for pre-monsoon, monsoon and post-monsoon in catchment area and submergence area through extensive field survey. Three categories of planktons i.e., green algae (Chlorophyceae), diatoms (Bacillariophyceae) and blue green algae (Cyanophyceae) were recorded. The stream being a freshwater body, the presence of Chlorophyceae was prominent. The planktons recorded from the sampling sites in the study area include green algae, blue green algae, diatoms, desmids, rotifers and protozoan. A total of 15 Phytoplankton and 8 Zooplankton were recorded from the study area.

5.3 Socio-Economic Environment

The study area covers part of Garhwa, Palamu, Surguja District in the state of Jharkhand and Chhattisgarh. Area and the villages/part of villages located in the 10 km. radius around the project area periphery. There are 223 villages/ wards/town that fall under the study area of the proposed project. The Schedule Caste (SC) population within the 1km. study area is 22.94 % of the total population with 51.27% Male and 48.73% are female. The Schedule Caste (SC) population within the study area is 22.94% of the total population with a sex ratio of 950 female/1000 males. Schedule Tribe (ST) population in the study area is 16.77% of the total population with a sex ratio of 974.

5.4 Impact Prediction

The baseline data collected and secondary sources information were networked to predict the impact due to proposed intervention during construction and operation phase of the project. Due to change in land use, excavation, tunneling, quarry and other related activities during construction will result in several adverse impacts on environment viz. (i) loss of vegetation/agriculture land, land use changes for various intervention (ii) deterioration in air, noise and surface water bodies quality (iii) compaction and contamination of soil due to uncontrolled disposal of solid waste (iv) unhealthy condition due to unsafe drinking water supply to labourers and discharge of sewage and (v) solid waste generation etc. Accordingly, various management plans have been proposed to mitigate the negative impacts.

6. OUTLINE OF ENVIRONMENTAL MANAGEMENT PLAN

In order to ameliorate the adverse impacts on the environment, a detailed environmental management plan has been proposed which is presented in EMP study report.

7. CATCHMENT AREA TREATMENT PLAN

Kanhar barrage project envisages construction of a barrage on river Kanhar near village Khuri underRanka Block of Garhwa district in Jharkhand, around 12 km downstream of proposed dam site at Barwadih. River Kanhar is one of the major right bank tributary of river Sone. The total catchment area upto its confluence with river Sone is 5903 km2, and total length is 218 km. Total catchment of the river Kanhar up to the proposed diversion site is 3375 Sq km. Using Silt Yield Index Model the erosion intensity were worked out and accordingly the area for treatment with engineering and biological measures were identified and cost for CAT is estimated to be **Rs. 4500.00 lakhs** .

8. MUCK MANAGEMENT PLAN

The proposed activity will generate 31.07 lac cum of muck due to excavation which includes swelling factor of 1.8 in the muck generation. Out of 31.07 cum, quantity of 2.4 lacs shall be account for Minor canal and glacis fall which shall be used for filling of roads. The balance amount of 28.6 cum shall be dumped in the designated dumping sites. Engineering and biological measures like providing of GI wire crates and retaining walls and compaction of muck has been recommended to provide stability to the profile of muck piles. Total cost on account of Muck Management Plan is estimated to be Rs. **971 lakhs.**

9. COMPENSATORY AFFORESTATION PLAN

The diversion of total forest land for non-forest purpose in the project involved is 348.25 ha. Therefore, compensatory afforestation is to be taken up in twice in extent to the area of diverted forest land i.e. 696.50 ha of denuded or degraded forest areas. The cost of compensatory afforestation for doubles the area may be **Rs. 3500.00 lakhs**.

10. RESTORATION OF QUARRY SITES

Approximately 151993 cum of fine aggregate/sand is required for producing 391692 cum of concrete for the construction of Kanhar Project. Four fine aggregate/river sand quarries at various locations i.e. Khuri, Dudhwal, Rehla and Ketar villages have been identified and extensively explored to ascertain the suitability and sufficiency for use as fine aggregate. Approximately 1,70,000 cum of clay core/impervious material is required for Lawadoni dam site. The quarry site is located at a distance of 1500m from Lawadoni dam axis. This quarry is entirely in the form of extensive agricultural and barren land which has been formed by the decomposition of bed rock.To restore the quarry site an allocation of **Rs. 65.00 lakhs** has been proposed.

11. SOLID WASTE MANAGEMENT PLAN

During the construction phase of the project, there will be an influx of technical staff, laborers and other service providers into the project area. The proposed project has also envisaged colony to house project employees including personnel for other utility services with their families. Sewage and solid waste will be generated from the colonies. It is very essential that from the planning stage, sewerage management and solid waste disposal facilities should be conceptualized to maintain the health of the people and the environment. The main sources of wastes in case of the proposed project can be divided into municipal waste from residential areas, solid wastes from labour camps and bio-medical wastes from Dispensary. It is recommended that an incinerator & composting facilities may be provided for bio-medical waste. A total provision of **Rs. 160.00 lakhs** has been earmarked for this purpose.

12. SUBSIDIZED FUEL SCHEME

The execution of project there under has been proposed to be carried out contractually to be completed in 60months time. Infrastructure facilities shall be developed paripassu with the construction activities. With the commencement of construction activities the deployment of labour force comprising of skilled/semi skilled/unskilled will take place and at a given point of time 1000 workforce shall be engaged. It is expected that 70% of the total work force shall be locally available and manpower to the tune of 300 persons shall be imported from other parts of the country. The temporary labour camps will be established at suitable location in the project area.

Kerosene is an easily available fuel having less operational hazards. Electricity supply should be arranged for lighting purpose to the tune of two 100 W bulbs per family and provision of street light should be made in the labour colony at the contractors cost. However use of CFL shall be encouraged from the consideration of saving of power and economy. For providing subsidized fuel scheme an allocation of **Rs. 133.60 lakhs** has been earmarked.

13. GREEN BELT DEVELOPMENT PLAN

In order to mitigate and minimize environmental impacts from air pollution, noise pollution, soil erosion etc. arising due to construction of project, greenbelt development around the project sites is a good option. Green canopy not only absorbs some of these pollutants but also improves the environment. Therefore, a "Green Belt Development Plan" by using the local species has been proposed around the project area, colonies and the project roads with cost allocation of **Rs. 24.60 lakhs**.

14. BIODIVERSITY MANAGEMENT PLAN INCLUDING FISHERIES MANAGEMENT PLAN

There are no conservation/ preservation areas in the form of any wildlife sanctuary, national park, etc. within 10 Km. radius of the study area of the proposed project. The project, therefore, does not pose any threat to an ecosystem or species of conservational significance. However, the biodiversity plan has been proposed to enhance the indigenous floral, faunal and aquatic diversity. Total 10 Schedule-I species are existing in the study area which includes four mammals namely Leopard (Panthera pardus fusca), Sloth Bear (Melursus ursinus), Indian Bison (Bos gaurus), Indian pangolin (Manis crassicaudata), Four birds i.e. Indian Peafowl or Mor (Pavo cristatus), Indian Grey Hornbill (Ocyceros birostris), Pariyah Kite (Milrus migrans), Shikra (Accepiter badius), and two reptiles Indian Rock Python (P. molurus molurus), and Monitor Lizard (Varanus bengalensis).

In view of the changes resulting on account of the construction of the barrage and Lawadoni dam, mitigation measures like creation of reservoirs, declaration of the areas as protected areas for the purpose of feeding and breeding, restoration of the upstream areas to simulate conditions required for the feeding and breeding, strengthening of the stocks of the native fish species by induced breeding of the wild stocks from nature are few of the conservation measures which need to be practiced in order to minimize the impacts caused due the proposed project. Moreover, necessary provisions are also required to be made in order to sustain the livelihood of fishermen community depended upon fishing from that area. Fish landing, water quality testing, fish fingerlings development etc activities shall be encouraged. The total cost for biodiversity as well as fisheries management plan has been estimated to be **Rs. 2.55 Crores.**

15. RESETTLEMENT AND REHABILITATION PLAN

M/s Mantec has prepared a standard R&R Plan for its project with very liberal grants and other provisions. A project survey was carried out to identify the persons who would be displaced by the project and to make an inventory of their assets that would be lost to the project, which would be the basis of calculation of compensation. There are 2581 affected households (HHs) with a total of 12265 project affected persons (PAPs). Of this, the number of PAPs in General Category is 2250 while the number of PAPs in SC and ST categories is 8470 & 1545 respectively. The project alignment has avoided the heavy built-up area by bypassing the habitation for avoiding large scales destruction and maintaining the safety and sanctity of these places. The total budget for resettlement action plan has been estimated at Rs.9762.77 lakhs, which covers compensation for land, physical assets affected and various resettlement and rehabilitation assistance including restoration of livelihoods. Out of the total resettlement budget, land acquisition alone comprises Rs.8678. 44 lakhs followed by compensation cost of structures likely to be affected as Rs.267.75 lakhs. R&R assistance cost comprises Rs.113.19 lakhs. Institutional cost, awareness programme and capacity building of executing authority etc. constitute Rs.238.50 lakhs of the total resettlement budget.

16. HEALTH MANAGEMENT PLAN

Provision towards health management plan has been indicated in the report. A budgetary layout of **Rs. 285.00 lakhs** has been proposed for this purpose.

17. ROAD MANAGEMENT PLAN

The project construction would entail significant vehicular movement for transportation of large quantities of construction material and heavy construction equipment. A new road would be laid and some of the existing roads in the project area would require improvements. To mitigate the negative impacts due to road, a management plan at a cost of **Rs. 125.00 lakhs** has been earmarked.

18. WATER AND AIR QUALITY MANAGEMENT

Various provisions have been discussed in this regard in the report. A layout of **Rs. 60.00 lakhs** have been proposed towards the cost of mitigation measures.

19. MONITORING ACTION PLAN

The monitoring and evaluation of environmental parameters indicates potential changes occurring in the environment which paves way for implementation of rectifying measures wherever required to maintain the status of the natural environment. Evaluation is also a very effective tool to judge the effectiveness or deficiency of the measures adopted and provides insight for future corrections. The Project proponent shall cause the Half Yearly Monitoring of the Environmental Safe Guard and measures taken for social and R&R issues to be carried out by a third party who is accredited by competent authority for the same. Therefore, suitable provisions have been suggested with a budgetary layout of **Rs. 74.00 lakhs**.

20. ENVIRONMENTAL COST ESTIMATES

The total amount of Rs. **200.00 Crores** has been earmarked for implementation of various Environmental Management Plans including R&R Plan.

21. PROJECT BENEFITS

The Proposed Project proposes to have several benefits. Among them few are discussed herein. The project will enhance the water availability for irrigation and drinking purpose of the state. This project in the Chhota Nagpur plateu region in Garhwa District of Jharkhand will improve the social and physical infrastructure in the project area and its surroundings. Communities & affected families will earn direct income during operation phase of the project. Further, the catchment area treatment plan will lead to enhanced vegetation profile which in turn will reduce soil erosion. Because of the project, fisheries will be benefited.

One of the key benefits of the project is generation of hydropower in phase-2 at Lawadoni site, which being renewable source of energy they are environment friendly. CO_2 emissions from Hydel power projects are minimal in comparison to thermal power plants. The project is entitled for carbon credit, which project proponent may pursue separately once the phase-2 is commissioned.