

Terms of References for Comprehensive
Environmental Impact Assessment Study of
proposed Ken-Betwa link project

National Water Development Agency
(A Govt. of India Society under Ministry of Water Resources)

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Terms of References for Comprehensive Environmental Impact Assessment study of proposed Ken-Betwa Link Projects

1.0 Introduction

As per EIA Notification of 1994 and its subsequent amendments, It has been made mandatory to get environmental clearance for certain sectors, including river valley and hydro electric projects. The objective of this study is to prepare comprehensive Environmental Impact Assessment to get environmental and other mandatory clearances from Ministry of Environment and Forests and any other authorities.

2.0 SCOPE OF WORK

The broad scope of the work is to carry out Environment Impact Assessment of proposed Ken- Betwa link, assessment of positive impacts with its economic evaluation and prepare Environmental Management Plan (EMP) to mitigate the adverse effects, including the socio-economic aspects and R&R Plan for project affected people, dam break analysis and Disaster Management Plan. The scope also includes preparation of monitoring plan for implementation of EMP.

3.0 THE PROJECT

The Ken – Betwa link comprises the following components:

- Construction of Daudhan dam across river Ken, about 2.5 Km upstream of existing Gangau weir and near Daudhan village in Chhatarpur district of Madhya Pradesh;
- A 231 Km. long link canal (including 2 Km. long tunnel) offtaking from Daudhan dam and terminating into existing Barwa Sagar reservoir located across Barwa river, a tributary to Betwa river;
- Construction of six dams/barrages i.e Neemkheda dam, Kesari barrage, Barari barrage, Sindh dam, Thharr dam and Babnai dam in the upper Betwa basin (upstream of existing Rajghat dam) in Madhya Pradesh.

The objective of the Ken – Betwa link is to divert the balance water from Ken basin to Betwa basin for use in the Upper Betwa basin by substitution for providing irrigation in the water scarce Raisen and Vidisha districts of Madhya Pradesh, through six proposed dams/barrages.

3.1 STUDY AREA

The study area for the project can be considered as:

- 1 km either side of the link canal

- 10 km radius around the project area from the periphery of the project site

Submergence and catchment area for the dams/barrages/reservoirs, command areas in the down stream of the reservoirs and enroute of link canal and areas of backwater influence in the upstream. However, only direct draining tributaries and nalas in the reservoir shall be considered as part of the project.

4.0 AVAILABLE INFORMATION

Feasibility study of Ken – Betwa link has been completed and the web friendly version of the same is available on NWDA's website <http://www.nwda.gov.in>. The adequacy of the data and information contained in the feasibility study are to be assessed. Based on the adequacy check, any additional data collection requirements are to be identified and shall be collected as part of the preparation of EIA report.

5.0 PLANNING AND DEVELOPMENT OF DATA BASE

- Consequent upon the collection of environmental and socioeconomic data, desk studies shall be carried out so as to undertake preliminary planning and development of a comprehensive database. The data base shall be in such a format that can be used in web based GIS portal also.
- The database shall be generated with provisions of data inputs from multiple sources and shall be capable of generating outputs in the form of tables, graphs, reports & data files. The output files shall be used in conjunction with software, spreadsheets, word processors and statistical software.

6.0 ENVIRONMENTAL IMPACT ASSESSMENT

The Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) report shall be prepared considering all the relevant notifications issued by Ministry of Environment and Forest (MoEF) or any other competent authorities (viz. EIA notification, 1994 and subsequent notifications/amendments issued time to time) and in accordance to all the relevant guidelines issued by MoE&F or any other competent authorities. The EIA report shall be prepared considering all these notifications/guidelines required for obtaining Environmental Clearances from the regulatory/statutory authorities. The studies shall be carried out in an integrated manner considering the impact of both the connected basins.

As outlined in the notification cited above, Public hearing shall be carried out as per the requirements of the fulfillment of EIA notification as a part of consultation with civil society. The consultant shall also assist NWDA in obtaining the necessary Environmental clearance from regulatory/statutory authorities.

Details pertaining to the Environmental and Ecological Aspects are furnished below:

The sequence of steps to be followed for consideration and assessment of Environmental and ecological aspects shall be as follows:

- Assessment of alternate sites and justification for selecting the present site
- Study no project option
- Legal status of the proposed project site with respect to various applicable Environmental Legislations
- Baseline Environmental Data
- Environmental Impact Assessment
- Environmental Management Plan

6.1 BASELINE ENVIRONMENTAL DATA

Baseline Environmental Status of the project shall be established based on the baseline survey carried out for various relevant seasons (either fresh or based on available literature/authenticated documents supplemented by field studies) in accordance to the MoE&F requirements for all the following elements

- Air Environment
- Water Environment
- Land Environment
- Biological Environment (Aquatic and Terrestrial)
- Socioeconomic Environment

I. Air Environment

- Climatology and rain fall for hydrological consideration
- Meteorology for dispersion of air pollutant during construction activities
- Air Quality
- Noise

II. Water Environment

This will cover all the aspects of surface as well as ground water. This shall include but not limited to:

- Hydro-geological aspect (siltation)
- Hydrological cycle
- Surface Water Quality and flow including nutrient levels
- Ground water regime (ground water table, aquifers)
- Ground water quality

III. Land Environment

- Land use and land cover (e.g. Forest, agriculture, wasteland etc.) using satellite imagery
- Mineral resources
- Water use
- Water logging

IV. Biological Environment

- Forest cover
- Rare and endangered species
- Species which require management
- Species of economic significance
- Species of special interest to local population or tourists
- Aquatic fauna of commercial/recreational value and migratory fish species along with their spawning ground
- Habitat including breeding ground and access corridor for food and shelter
- Biodiversity

V. Socioeconomic Environment

- Archaeological Locations and places of worship
- Sources of water pollution (present as well as future)
- Dependence on water system
- Tourism
- Public Health
- Human settlements (occupational pattern, demographic profile, economic profile, agricultural practices etc.)

6.2 ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

Environmental Impact Assessment (EIA) shall be carried out for construction and operation phases using qualitative or quantitative methods (wherever possible) and using predictive modelling techniques.

The EIA study shall cover all the relevant environmental issues that have impact due to the proposed project including the following:

- Air Environment
- Water Environment
- Land Environment
- Biological Environment (Aquatic and Terrestrial)
- Socioeconomic Environment

I. Air Environment

- Impact on air quality due to construction
- Changes in microclimate
- Impact on ambient Noise level specially during construction period

II. Water Environment

- Likely change in the regime of the river
- Impact due to change in hydrological cycle
- Impact on siltation preferably using quantitative techniques
- Impact due to spread of contamination due to agro-chemicals and organic/heavy metals
- Impact due to transportation of fluorides, Nitrates, toxic chemicals, heavy metals
- Impact due to acidification of lakes and water bodies due to presence soils with rich minerals
- Impact on water quality (surface/ground)
- Impact on ground water levels and recharge potential
- Impact on ground water pollution due to seepage from canal system and reservoir (ground water level and quality)
- Impact due to change in waste assimilation capacity of the river system
- Impact on drainage system and existing water bodies in the project area (assessment by using GIS tools and satellite imageries. The imageries will be supplied by NWDA).

III. Land Environment

- Impact on land use/land cover and change in designated land-use in the project area i.e. submergence area due to construction of proposed dams, areas one Km either side of proposed link canal and areas under proposed command. The assessment can be done using the GIS tools and satellite imageries of the area (to be supplied by NWDA). However, it will have to be confirmed by ground truthing.
- Impact due to irrigation induced salinity and water logging
- Impact due to inundation of mineral resources
- Impact on soil erosion

IV. Biological Environment

Terrestrial environment

- Impact on forest area and National park and wildlife sanctuaries and other sensitive ecosystem.
- Impact on biota and biodiversity loss particularly with special reference to the rare and threatened species, endemic species of both animals and plants.
- Impact on habitat loss particularly with special reference to the rare and threatened species, endemic species of both animals and plants.

- Impact due to habitat change having effect like corridor loss and loss of migratory path for wildlife including birds.
- Impacts on the breeding grounds of species and on access of animals to food and shelter.
- Impact on animal distribution specially on tigers

Aquatic environment

- Impact on flora and fauna in the connecting basins as well as along the link.
- Impact on aquatic ecology including fisheries and endangered species
- Impact on sensitive ecosystem
- Impact due to bio-accumulation and bio-magnification in aquatic life and biota
- Impact due to change in ecological functioning of river system
- Impact on growth of aquatic weed
- Impacts on fish spawning and migration including impact on their breeding ground.
- River both at head as well as mouth regions would be considered while addressing the issues on wildlife and breeding places

V. Socioeconomic Environment

- Impact on public health due to vector borne diseases
- Impact on sensitive locations like archeological sites and places of worship etc.
- Impact on change in occupational pattern
- Impact on tourism
- Impact on human settlement

VI. Geological and Other Aspects

- Geology, Physiography and Topography of the area
- Bedrock formation
- Geological stability or instability
- Fault zones
- Seismicity

6.3 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

Based on environmental impact assessment, mitigation / enhancement measures need to be specified in the form of environmental management plan. The components of the EMP will inter-alia deal with the following as may be relevant to specific project site:

- Environmental safeguards (management) during construction activities
- Catchment Area Treatment
- Plan for restoration of quarry areas/burrow areas and areas for dumping excavated material.
- Management to arrest salinity/ alkalinity in the wake of recharge of water in the interlinking channels.

- Problems associated with transportation of silt across basins and utilization there of in environmentally/ecologically benign manner
- Compensatory Afforestation plan along with cost benefit analysis
- Plan for green belt (other than catchment area).
- Reservoir rim treatment plan
- Comments/observations/recommendations of Chief Wildlife Warden in case Wildlife habitat/migratory path exists within 10 kilometers of project site.
- Conservation plan for affected flora/fauna including rehabilitation plan for rare/endangered species including action plan for alternate breeding ground and access corridor for food and shelter.
- Action plan for control of irrigation induced water logging, salinity etc including strategies and policies with choice of species/crop for optimum use of water for agriculture to reduce adverse impacts of excessive irrigation including water logging.
- Action plan for command area development in respect of irrigation potential.
- Watershed management
- Ground water management including harnessing of ground water in conjunction with surface water.
- Land use management with special emphasis on water logging problem
- Management of flora and fauna in the connecting basins as well as along the link including action plan for alternate breeding grounds.
- Alien flora and aquatic weeds management
- Wetland management
- Protection of sensitive and archeological monument sites
- Action plan for health delivery systems
- Post project environmental monitoring plan
- Disaster Management plan including risk and dam break analysis
- Provision of free fuel to labours
- Soil fertility management plan
- Action Plan for release of assured lean season flow downstream of the dam

7.0 SOCIO-ECONOMIC ASPECTS AND PREPARATION OF R&R

A detailed socio-economic study of project affected people will be carried out.

7.1. SOCIO-ECONOMIC SURVEY

In order to perform the socio-economic studies, on-site socio-economic survey shall be carried out covering socio-economic profile of the region. The region shall include the project-affected areas likely to come under submergence or land acquisition and wider project influence areas comprising the catchment area, areas downstream of dam and upto confluence of major tributary, the command area, the area en-route the link canal where there could be secondary displacement. The following aspects shall be covered in the socio-economic surveys

- Demographic profile with social categories, number of households/families, type of housing, health and educational profile, migration patterns, if any.
- Land ownership and operational holding
- Existing cropping pattern of the project area and changes thereof due to commissioning of the project
- Agricultural practices including traditional knowledge on endemic species.
- Improvement in crop production and productivity
- Possible improvement in surface and ground water availability and benefits accrued to irrigated agriculture, drinking water use, industries and thermal power plants.
- Agricultural input pattern
- Economics of cultivation
- Non-agricultural Practices such as poultry, cattle raising etc
- Employment profile
- Income profile with sources of income
- Expenditure profile
- Other economic activities prevailing in the region
- Availability of social infrastructure
- Availability of economic infrastructure
- Gender issues

7.2 Secondary Data

Before start of the on-site socio-economic survey, available secondary information from various government agencies shall be collected. Relevant information from concerned state government and Census of India about infrastructure availability etc. at district/block/village level and from Survey of India on topography maps and satellite Imageries from NRSA are other sources of useful information to be collected before launching of on-site survey. Based on these information, design of questionnaire and methodology of field surveys shall be finalised.

The consultant shall make every effort to obtain these information from various Govt. agencies. However, NWDA shall extend help in issuing authorisation letters etc. whenever required by the Consultant.

7.3 Sample Design

The survey shall cover both project affected (displaced) and project influenced (benefiting) areas. Sample shall be distributed between project affected and influenced households on the basis of number of reservoirs and length of main canal and distributaries.

7.4 Questionnaire

Different mode of data collection such as sample survey, Participatory Rural Appraisal (PRA)/ Rapid Rural Appraisal (RRA) and focus group discussions shall be used in evaluating impact of ILR.

Questionnaire shall take into account all the relevant aspects mentioned above. Current Land prices and wages prevailing in the area is another important factor on which data should be collected in socio-economic survey. This shall help in assessment of cost of land acquisition for implementation of envisaged developments.

7.5 Resettlement & Rehabilitation(R&R) Aspects

While studying Resettlement and Rehabilitation (R&R) aspects techniques such as Rapid Rural Appraisal (RRA)/Participatory Rural Appraisal (PRA) and focus group discussion should be used to find out present situation in the area. This shall also involve collection of photographic records of the area likely to be submerged.

Information on following aspects should also to be collected.

- (a) Peoples own perception on the settlement aspects and kind of facilities they accept in the area where they will be settled after displacement.
- (b) Preferences of affected population about the compensation package, whether it should be in cash or kind.
- (c) What is the location preference for settlement by affected population, whether they want to be settled closer to their existing place of residence or at a distance
- (d) Participation of affected people in construction of canals/reservoirs should also be probed in.
- (e) Migration patterns into and out of the project area.

A detailed R&R package shall be prepared and National Policy on Resettlement & Rehabilitation for Project Affected Families-2003 (NPRR-2003) formulated by MoRD shall form basic minimum criteria for devising the R&R package. Due weightage should also be given to the R&R Policy / Act of M.P. State. However, in line with the section 1.6 of the NPRR-2003, the R&R package should not limit itself to the National R&R Policy-2003 and should look for a wider horizon with millennium development goals and Planning Commission targets. Also, the various schemes of the govt. for rural development and welfare should be combined to make R&R package attractive enough. The R&R Policy should clearly come out with the kind of infrastructure required to achieve these goals. While preparing the R&R package, the past practices and difficulties experienced in implementation of various provisions of R&R package should be kept in mind.

The consultant shall suggest a layout of modal village for resettlement of Project Affected peoples (PAPs).

7.6 Impact of Link Canal

Link canal will have both short- and long-term impact on economy. The short-term impact of the link canal on economy in general and regional economy in particular will be in the form of increased employment opportunities and growth of service sectors in the area. Impact of link canal on regional economy will depend on how strong the forward and backward linkages of construction and agriculture sectors are with the rest of the economy. In medium- to long-term major impact of link canal on economy will be through increased/assured irrigation, which will lead to increased agricultural production. All these aspects will be studied in detail.

Impact of Ken- Betwa link on different types of households such as agriculture dependent households, agricultural labourers, salaried earners, petty businessman etc. should be analysed. This will help in assessment of the project. Efforts should also be made to present pre and post canal commission employment profile.

7.7 Users Chargers

Socio-economic survey shall also cover aspects of user charges/cost recovery. Assuming that the full usage cost would be recovered from industry, power generation the only sector that needs attention for user charges is agriculture and household sector. Willingness to pay for assured/new irrigation by the beneficiary farmers should be tested through the survey, which will help authorities in finalization of user charges for water. Another important dimension that should be probed as far as possible is whether the consumer group should be entrusted the responsibility of maintenance of the water resources and collection of user charges.

8.0 Statutory Clearances

The consultant shall identify all the statutory clearances required to be taken for undertaking the project and provide all necessary assistance to NWDA in obtaining the clearances such as Environmental clearance, Forest clearance, Wildlife clearance, R&R clearance etc. from Govt. organizations, administrative ministries and statutory agencies.

9.0 Public Hearing

On completion of EIA the consultant shall submit all relevant documents/reports/records to NWDA for public hearing required under the Air and Water Pollution Act. The consultant shall fully assist NWDA in the public hearing, including furnishing the requisite replies/information to the questions/issues raised during the hearing.

10.0 No Objection Certificate (NOCs)

The consultant shall obtain the NOCs from concerned State Governments required under Air and Water Pollution Act.

11.0 Cost Estimation

The cost of all the environmental management measures proposed as per the environmental management plans (including R&R Plan) shall be worked out. The environmental and socio-economic benefits of the project shall also be worked out, to the extent possible.

12.0 Time Schedule

A time schedule of 18 months is envisaged for completion of the study as under:

- (a) Submission of Inception Report (10 copies) within two months delineating reconnaissance survey results, work elements proposed and methodology with time schedule.
- (b) Submission of first and second interim reports (10 copies) within eight and twelve months delineating baseline environmental status, and findings from earlier studies.
- (c) Submission of draft report (10 copies) within sixteen months.
- (d) Submission of 30 copies of final report within eighteen months.

13.0 Preparation of Work Plan and Time Schedule for study

The consultant, immediately on award of consultancy work, shall prepare a detailed micro level Time Schedule and submit for approval by the NWDA/Review Committee. Non-compliance of the Time Schedule shall attract penalty in the form of Liquidated Damage @ 0.5% of the total cost of the consultancy work per fortnight of delay or part thereof.

14.0 Reporting

14.1 Reporting Procedure

- A brief monthly progress report and detailed quarterly progress reports shall be submitted by the consultant to the NWDA for monitoring the progress of the assignment.
- After completion of preliminary planning and design, consultant shall finalise a detailed scheme for on-site survey requirements for the assigned study including development of a model questionnaire, EIA and EMP in consultation with NWDA.
- Prior to submission of the final report, 10 copies of draft reports shall be submitted for review and acceptance. Subsequently, after incorporation of the review comments, the final report shall be submitted.

14.2 EIA Report

The reporting of all the activities shall be in three components viz. data, text and drawings, if any. Simultaneous to the hard copy submissions, the EIA report shall also be submitted in soft copy i.e. CD. The text of the report shall be in MS WORD, data sheets shall be in MS EXCEL, and the drawings shall be in Auto CAD Rel. 14.

The EIA Reports shall also include all the relevant documents, analysis and results with back up calculations, drawings, inter active models and schemes, estimates etc. as per the scope of work. The EIA report shall be prepared as per suggested templates listed at Annexure-III.

Specified number of draft final reports alongwith all the Annex and subsequent final report shall be submitted in both hard and soft copies as per the Request for Proposal (RFP) document.

On completion of EIA report preparation, a web based GIS portal shall also be developed as per the requirement by NWDA for providing over all project information, highlighting the benefits. Therefore, the database, text drawings, any other output of the study of environmental and socio-economic aspects must be in such a format which can be straight away integrated with web based GIS portal. **(developing GIS portal shall not be the part of this study)**

**TEMPLATES FOR EIA REPORT
(Socio-economic and Environmental Aspects)**

The EIA Report shall be prepared as per the laid out guidelines and shall comprise of, as a minimum, the following volumes :

	Executive Summary
Volume No. I	Introduction Application form/MoEF questionnaire
Volume No. II	EIA Report Environmental Management Plans Public Hearing Document prepared by SPCB
Volume No. III	R & R Plan
Volume No. IV	CAT plan

**GLOSSARY OF TERMS
LIST OF ABBREVIATIONS**

In addition to above volumes, a separate volume SOCIO-ECONOMIC STUDIES shall also be prepared as per attachment-I (Same R&R plan as in Volume No. III can be used in this volume also)

SOCIO-ECONOMIC STUDIES

- 9.1 Socio-economic profile and survey**
 - 9.1.1 Regional profile from the available secondary data¹
 - 9.1.2 Salient features of the link
 - 9.1.3 Sample design and methodology
 - 9.1.3.1 Selection of villages
 - 9.1.3.2 Selection of households
 - 9.1.4 Questionnaire
 - 9.1.5 RRA/PRA and focus group discussion
 - 9.1.6 Regional profile from primary survey²

- 9.2 Impact of link canal**
 - 9.2.1 Short-term impact of link canal
 - 9.2.2 Long-term impact of link canal
 - 9.2.2.1 On income generation, consumption, savings and assets
 - 9.2.2.2 On income distribution & poverty by different household categories
 - 9.2.2.3 Likely changes in employment pattern in long-term

- 9.3 Resettlement and rehabilitation**
 - 9.3.1 Assessment of economic loss due to displacement
 - 9.3.2 Peoples perception towards rehabilitation package
 - 9.3.3 Rehabilitation & resettlement package
 - 9.3.4 Modalities for information dissemination, consultation and public hearings

- 9.4 Users charges and peoples participation**
 - 9.4.1 Peoples perceptions about payment of users charges if assured irrigation is provided
 - 9.4.2 People's participation in maintenance of water resources and collection of user's charges
 - 9.4.3 Water rights, pricing of water, sharing of benefits etc.

¹ Regional profile from secondary data should include the following : population (male, female and total), population distribution, sex ratio, literacy rate, distribution of main worker in different industry groups, distribution of households by availability of electricity, safe drinking water and toilet facilities, availability of other social and economic infrastructure etc.

² Regional profile from primary survey should include the following : land ownership pattern, cropping pattern, agricultural practices, economics of cultivation, employment profile, sources and usage of income, expenditure pattern, demographic profile, literacy pattern, availability of social and physical infrastructure etc.