

KARNATAKA NEERAVARI NIGAMA LIMITED
(A Government of Karnataka Enterprise)

REQUEST FOR PROPOSALS (RFP NO.....)

**SELECTION OF CONSULTANTS FOR PREPARATION OF DPR TO RESTORE
THE TUNGABHADRA DAM TO ITS ORIGINAL CAPACITY/UTILISATION BY
STUDYING VARIOUS ALTERNATIVES.**



KARNATAKA NEERAVARI NIGAM LIMITED

(A Government of Karnataka Enterprise)

KARNATAKA NEERAVARI NIGAMA LIMITED
(A Government of Karnataka Enterprise)
4th floor, Coffee board building,
No.1 Dr. B.R.Ambedakar Veedi, Bangalore-560001

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SECTION 1. LETTER OF INVITATION

[Location and Date]

Dear [Name of Consultant]:

1. Karnataka Neeravari Nigama Limited invites Proposals from Consultants for preparation of DPR to restore the Tungabhadra dam to its original capacity/Utilisation by studying various alternatives. More details on the Services are provided in the attached Terms of Reference.

2. The RFP has been addressed to the consultants shortlisted based on the application submitted pursuant to EOI No: WRD/KNNL/02 on 25/10/2014 and addendum-1 issued on 25/11/2014.

3. The Consultant will be selected under Quality-and Cost-Based Selection (QCBS) and procedures described in this RFP.

4. The RFP includes the following documents:

Section 1 - Letter of Invitation
Section 2 - Information to Consultants
Section 3 - Technical Proposal - Standard Forms
Section 4 - Financial Proposal - Standard Forms
Section 5 - Terms of Reference
Section 6 - Standard Form of Contract.

6. Please inform us, upon receipt:

- That you received the letter of invitation; and
- Whether you will submit a proposal alone or in association with other entity as Joint Venture with joint and several responsibilities.

Yours sincerely,

Managing Director,
Karnataka Neeravari Nigam Limited
Bengaluru..

SECTION 2. INFORMATION TO CONSULTANTS

1. Introduction

1.1 The Client named in the “Data Sheet” will select a firm among those listed in the Letter of Invitation, in accordance with the method of selection indicated in the Data Sheet.

1.2 The consultants are invited to submit a Technical Proposal and a Financial Proposal, as specified in the Data Sheet (the Proposal) for consulting services required for the Assignment named in the Data Sheet. The Proposal will be the basis for contract negotiations and ultimately for a signed contract with the selected Consultant.

1.3 The Assignment shall be implemented in accordance with the phasing indicated in the Data Sheet. When the Assignment includes several phases, the performance of the consultant under each phase must be to the client’s satisfaction before work begins on the next phase.

1.4 The Consultants must familiarize themselves with local conditions and take them into account in preparing their Proposals. To obtain first-hand information on the Assignment and on the local conditions, consultants are encouraged to pay a visit to the Client before submitting a Proposal, and to attend a pre-proposal conference if one is specified in the Data Sheet. Attending the pre-proposal conference is optional. The Consultant’s representative should contact the officials named in the Data Sheet to arrange for their visit or to obtain additional information on the pre-proposal conference. Consultants should ensure that these officials are advised of the visit in adequate time to allow them to make appropriate arrangements. Apart from this, the Client may, before the deadline for the submission of the proposals, give an opportunity to the interested consultant to suggest any improvement in the Terms of Reference provided in Section 5, in the form of presentation to the Client. The time and date shall be intimated by the Client.

1.5 The Client will provide the inputs specified in the Data Sheet, assist the firm in obtaining licenses and permits needed to carry out the services, and make available relevant project data and reports.

1.6 Please note that (i) the costs of preparing the proposal and of negotiating the contract, including a visit to the Client, are not reimbursable as a direct cost of the Assignment; and (ii) the Client is not bound to accept any of the Proposals submitted.

1.7 KNNL expects consultants to provide professional, objective, and impartial advice and at all times hold the Client’s interests paramount, without any consideration for future work, and strictly avoid conflicts with other assignments or their own corporate interests. Consultants shall not be hired for any assignment that would be in conflict with their prior or current obligations to other clients, or that may place them in a position of not being able to carry out the assignment in the best interest of the Client.

1.7.1 Without limitation on the generality of this rule, consultants shall not be hired under the circumstances set forth below:

(a) A firm which has been engaged by the Client to provide goods or works for a project, and any of their affiliates, shall be disqualified from providing consulting services for the same project. Conversely, firms hired to provide consulting services for the preparation or

implementation of a project, and any of their affiliates, shall be disqualified from subsequently providing goods or works or services related to the initial assignment (other than a continuation of the firm's earlier consulting services) for the same project.

(b) Consultants or any of their affiliates shall not be hired for any assignment which, by its nature, may be in conflict with another assignment of the consultants.

1.7.2 As pointed out in para. 1.7.1 (a) above, consultants may be hired for downstream work, when continuity is essential, in which case this possibility shall be indicated in the Data Sheet and the factors used for the selection of the consultant should take the likelihood of continuation into account. It will be the exclusive decision of the Client whether or not to have the downstream assignment carried out, and if it is carried out, which consultant will be hired for the purpose.

1.8 It is GOK's policy to require that consultants observe the highest standard of ethics during the execution of such contracts. In pursuance of this policy, the GOK:

(a) defines, for the purposes of this provision, the terms set forth below as follows:

(i) "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value to influence the action of a public official in the selection process or in contract execution; and

(ii) "fraudulent practice" means a misrepresentation of facts in order to influence a selection process or the execution of a contract to the detriment of GOK, and includes collusive practices among consultants (prior to or after submission of proposals) designed to establish prices at artificial, noncompetitive levels and to deprive GOK of the benefits of free and open competition.

(b) will reject a proposal for award if it determines that the firm recommended for award has engaged in corrupt or fraudulent activities in competing for the contract in question;

(d) will declare a firm ineligible, either indefinitely or for a stated period of time, to be awarded GOK-financed contract if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing, a GOK-financed contract; and

(e) will have the right to require that, GOK to inspect consultant's accounts and records relating to the performance of the contract and to have them audited by auditors appointed by GOK.

1.9 Consultants shall not be under a declaration of ineligibility for corrupt and fraudulent practices issued by GOK in accordance with the above sub para 1.8 (d).

1.10 Consultants shall be aware of the provisions on fraud and corruption stated in the standard contract under the clauses indicated in the Data Sheet

2. Clarification and Amendment of RFP Documents

2.1 Consultants may request a clarification of any item of the RFP document up to the number of days indicated in the Data Sheet before the Proposal submission date. Any request for clarification must be sent in writing by paper mail, or electronic mail to the Client's address indicated in the Data Sheet. The Client will respond by paper mail, or electronic mail to such requests and will send copies of the response (including an explanation of the query but without identifying the source of inquiry) to all invited consultants who intend to submit proposals.

2.2 At any time before the submission of Proposals, the Client may, for any reason, whether at its own initiative or in response to a clarification requested by an invited firm, modify the RFP documents by amendment. Any amendment shall be issued in writing through addenda. Addenda shall be sent by paper mail, or electronic mail to all invited consultants and will be binding on them. The Client may at its discretion extend the deadline for the submission of Proposals.

3. Preparation Of Proposal

3.1 Consultants are requested to submit a Proposal (para 1.2) written in the language(s) specified in the Data Sheet.

Technical Proposal

3.2 In preparing the Technical Proposal, consultants are expected to examine the documents comprising this RFP in detail. Material deficiencies in providing the information requested may result in rejection of a Proposal.

3.3 While preparing the Technical Proposal, consultants must give particular attention to the following:

Where the shortlisted consultant is a Joint Venture/Consortium there shall be no change in the members of the Joint Venture/Consortium.

It is desirable that the majority of the key professional staff proposed be permanent employees of the firm or have an extended and stable working relation with it.

Proposed key professional staff must at a minimum have the experience indicated in the Data Sheet.

Alternative key professional staff shall not be proposed, and only one curriculum vitae (CV) may be submitted for each position.

Reports to be issued by the consultants as part of this assignment must be in the language(s) specified in the Data Sheet. It is desirable that the firm's personnel have a working knowledge of the Client's official language.

3.4 The Technical Proposal should provide the following information using the attached Standard Forms (Section 3):

(i) A brief description of the consultant's organization and an outline of their experience during the last 5 (five) years on assignments (Section 3B) of a similar nature. For each assignment, the outline should indicate, inter alia, the profiles and names of the staff provided, duration of the assignment, contract amount, and firm's involvement.

(ii) Any comments or suggestions on the Terms of Reference and on the data, a list of services, and facilities to be provided by the Client (Section 3C).

(iii) A description of the methodology and work plan for performing the assignment (Section 3D).

(iv) The list of the proposed staff team by speciality, the tasks that would be assigned to each staff team member, and their timing (Section 3E).

(v) CVs recently signed by the proposed key professional staff and the authorized representative submitting the proposal (Section 3F). Key information should include number

of years working for the firm/entity, and degree of responsibility held in various assignments during the last three (3) years.

(vi) Estimates of the total staff effort (professional and support staff; staff time) to be provided to carry out the Assignment, supported by bar chart diagrams showing the time proposed for each key professional staff team member. (Sections 3E and 3G).

(vii) A detailed description of the proposed methodology and staffing. ,

(viii) Any additional information requested in the Data Sheet.

3.5 The Technical Proposal shall not include any financial information.

Financial Proposal

3.6 In preparing the Financial Proposal, consultants are expected to take into account the requirements and conditions of the RFP documents. The Financial Proposal should be submitted in the format given in Section 4. It includes all costs associated with the Assignment, including (a) remuneration for staff , and (b) transportation (national and local, for mobilization and demobilization), services and equipment (vehicles, office equipment, furniture, and supplies), office rent, insurance, printing of documents, surveys; if it is a major component of the assignment.

3.7 Consultants shall express the price of their services in Indian Rupees.

3.8 The Data Sheet indicates how long the proposals must remain valid after the submission date. During this period, the consultant is expected to keep available the key professional staff proposed for the assignment. The Client will make its best effort to complete negotiations within this period. If the Client wishes to extend the validity period of the proposals, the consultants who do not agree have the right not to extend the validity of their proposals.

4. Submission, Receipt, And Opening Of Proposals

4.1 The original Proposal (Technical Proposal and Financial Proposal; see para 1.2) shall be prepared in indelible ink. It shall contain no inter-lineation or overwriting, except as necessary to correct errors made by the firm itself. Any such corrections must be initialed by the person or persons who sign(s) the Proposals.

4.2 An authorized representative of the Consultant initials all pages of the Proposal. The representative's authorization is confirmed by a written power of attorney accompanying the Proposal.

4.3 For each Proposal, you should prepare the number of copies indicated in the Data Sheet. Each Technical Proposal and Financial Proposal should be marked "Original" or "Copy" as appropriate. If there are any discrepancies between the original and the copies of the Proposal, the original governs.

4.4 The completed Technical and Financial Proposal must be submitted on or before the time and date stated in the Data Sheet. Any Proposal received after the closing time for submission of proposals shall be returned unopened.

4.5 After the deadline for submission of proposals the Technical Proposal shall be opened immediately by the evaluation committee. The Financial Proposal will be opened after evaluation of Technical proposals.

5. Proposal Evaluation

General

5.1 From the time the proposals are opened to the time the contract is awarded, if any consultant wishes to contact the Client on any matter related to its proposal, it should do so in writing at the address indicated in the Data Sheet. Any effort by the firm to influence the Client in the Client's proposal evaluation, proposal comparison or contract award decisions may result in the rejection of the consultant's proposal.

5.2 Evaluators of Technical Proposals shall have no access to the Financial Proposals until the technical evaluation, including its approval by competent authority is obtained

Evaluation of Technical Proposals

5.3 The evaluation committee appointed by the Client as a whole, and each of its members individually, evaluates the proposals on the basis of their responsiveness to the Terms of Reference, applying the evaluation criteria, sub-criteria (typically not more than three per criteria) and mark system specified in the Data Sheet and the presentation made on the Technical Proposal. Each responsive proposal will be given a technical score (S_t). A proposal shall be rejected at this stage if it does not respond to important aspects of the Terms of Reference or if it fails to achieve the minimum technical score indicated in the Data Sheet.

Public opening and Evaluation of Financial Proposals; Ranking

5.4 After the evaluation of quality is completed, the Client shall notify those consultants whose proposals did not meet the minimum qualifying mark or were considered non-responsive to the RFP and Terms of Reference, indicating that their Financial Proposals will be returned unopened after completing the selection process. The Client shall simultaneously notify the consultants that have secured the minimum qualifying mark, indicating the date and time set for opening the Financial Proposals. The opening date shall not be sooner than one week after the notification date. The notification may be sent by registered letter, or electronic mail.

5.5 The Financial Proposals shall be opened publicly in the presence of the consultants' representatives who choose to attend. The name of the consultant, the quality scores, and the proposed prices shall be read aloud and recorded when the Financial Proposals are opened. The Client shall prepare minutes of the public opening.

5.6 The evaluation committee will determine whether the Financial Proposals are complete,

5.7 The lowest Financial Proposal (F_m) will be given a financial score (S_f) of 100 marks. The financial scores (S_f) of the other Financial Proposals will be computed as indicated in the Data Sheet. Proposals will be ranked according to their combined technical (S_t) and financial (S_f) scores using the weights (T = the weight given to the Technical Proposal; P = the weight given to the Financial Proposal; $T + P = 1$) indicated in the Data sheet $S = S_t \times T\% + S_f \times P\%$ (S = Ranking). The Consultant achieving the highest combined technical/ financial score will be invited for negotiations.

6. Negotiations

6.1 Negotiations will be held at the address indicated in the Data Sheet. The aim is to reach agreement on all points and sign a contract.

6.2 Negotiations will include a discussion of the Technical Proposal, the proposed methodology (work plan), staffing and any suggestions made by the firm to improve the Terms of Reference. The Client and Consultant will then work out final Terms of Reference, staffing, and bar charts indicating activities, staff, periods in the field and in the home office, staff-months, logistics, and reporting. The agreed work plan and final Terms of Reference will then be incorporated in the “Description of Services” and form part of the contract. Special attention will be paid to getting the most the Consultant can offer within the available budget and to clearly defining the inputs required from the Client to ensure satisfactory implementation of the Assignment.

6.3 Unless there are exceptional reasons, the financial negotiations will not involve amount specified in the Financial Proposal.

6.4 Having selected the Consultant on the basis of, among other things, an evaluation of proposed key professional staff, the Client expects to negotiate a contract on the basis of the experts named in the Proposal. Before contract negotiations, the Client will require assurances that the experts will be actually available. The Client will not consider substitutions during contract negotiations unless both parties agree that undue delay in the selection process makes such substitution unavoidable or that such changes are critical to meet the objectives of the assignment. If this is not the case and if it is established that key staff was offered in the proposal without confirming their availability, the Consultant may be disqualified.

6.5 The negotiations will conclude with a review of the draft form of the contract. To complete negotiations the Client and the Consultant will initial the agreed contract. If negotiations fail, the Client will invite the firm whose proposal received the second highest score to negotiate a contract.

7. Confidentiality

7.1 Information relating to evaluation of proposals and recommendations concerning awards shall not be disclosed to the consultants who submitted the proposals or to other persons not officially concerned with the process, until the winning Consultant has been notified that it has been awarded the contract.

DATA SHEET

Information to Consultants

Clause Reference	
1.0	The name of the Client is: KARNATAKA NEERAVARI NIGAMA LIMITED
	The method of selection is: Quality-and Cost-Based Selection (QCBS)

1.1	A technical and a Financial Proposals are requested: Yes
1.2	<p>The name, objectives and description of the Assignment are:</p> <p>Selection of Consultants for preparation of DPR to restore the Tungabhadra dam to its original capacity/utilisation by studying various alternatives.</p> <p>The main objectives of the studies are :</p> <p>Conduct the capacity and sedimentation study of the TB Reservoir.</p> <p>Deploy best consultant team to carry out studies and implement the work.</p> <p>Estimate the current capacity of TB Reservoir using latest technical know-how assisted by the differential global positioning system</p> <p>Estimate the quantity of silt to be removed from the reservoir to restore to its original design capacity/Utilization.</p> <p>Examine various alternatives of restoring the design capacity of TB reservoir/Utilization and provide opinion</p> <p>Evaluate cost benefit analysis of the alternatives.</p> <p>Document best practices-global experience.</p> <p>suggest best alternative. (s)</p> <p>Proposal for methodology to restore the design capacity/Utilization using the most appropriate and latest technologies, strictly adhering to the safety conditions and logistical guide lines stipulated by GOI laws/ acts.</p> <p>Provide a cost estimate for each solution with a timeline of activities.</p> <p>Prepare a Detailed Project report (DPR) of Global standards.</p> <p>Evaluate project implementation and provide a report.</p> <p>Study on effect of climate change and Environmental Impact Assessment on the flows and water availability must be considered while arriving at the optimal capacity of the proposed reservoir.</p> <p>Sedimentation study and its impact on stage-discharge relationship and the storage reservoir.</p> <p>Preparation of Detailed Project Report as per the guidelines of CWC for approval of the scheme.</p> <p>To study the causes of siltation and prevention measures to reduce the formation of silt.</p>
1.3	The Assignment is phased: No
1.4	<p>A pre-proposal conference will be held: Yes</p> <p>Date:- 16-11-2015</p> <p>Time:- 11:00 AM</p> <p>Venue:-Office of the Managing Director</p> <p>KARNATAKA NEERAVARI NIGAMA LIMITED (A Government of Karnataka Enterprise) 4th floor, Coffee board building,</p>

	<p>No.1 Dr. B.R.Ambedakar Veedi, Bangalore-560001 The name(s), address(es), and telephone/numbers of the Client's Official(s) are:</p> <ol style="list-style-type: none"> 1) Managing Director, Karnataka Neeravari Nigama Limited, 4th floor, Coffee board building, No.1 Dr. B.R.Ambedakar Veedi, Bangalore-560001. Telephone:22283074/78, Tele Fax:22386015 . Email: techknnl@gmail.com 2) Chief Engineer Chief Engineer, KNNL, Irrigation Central Zone, Munirabad. Phone No: 08539-270026 Email: ceiczmr@yahoo.co.in 3) Superintending Engineer Superintending Engineer, KNNL, Tungabhadra Project Circle Munirabad. Phone No: 08539-270236 Email: setpc@gmail.com 4) Executive Engineer Executive Engineer,(I/C) T.R. Division, Munirabad. Phone No: 08539-270306 Email: trdmrb@gmail.com
2.0	The Client will provide the following inputs: The Client will provide all the information available with respect to the assignment.
2.1	The Client envisages the need for continuity for downstream work: Yes.
2.2	Clarifications may be requested upto 7 (seven) days before the pre- proposal conference. The address for requesting clarifications is: KARNATAKA NEERAVARI NIGAMA LIMITED (A Government of Karnataka Enterprise) 4th floor, Coffee board building, No.1 Dr. B.R.Ambedakar Veedi, Bangalore-560001 Telephone:22283074/78, Tele Fax:22386015 . Email: techknnl@gmail.com
3.0	Proposals and Reports which are part of the assignment should be submitted in the following language(s): English
3.1	(i) Shortlisted consultant may associate with other shortlisted consultant: No (ii) The time period for completion of the assignment is 6 months from the date of agreement.
3.2	Additional Information in the Technical Proposal includes: The consultant would be required to make a presentation on the Technical Proposal to the evaluation committee constituted by the Client.
3.3	Proposals must remain valid 180 (One hundred and Eighty) days after the submission date
4.0	Consultants must submit an original and one additional copy of each proposal.

4.1	<p>The proposal submission address is: KARNATAKA NEERAVARI NIGAMA LIMITED (A Government of Karnataka Enterprise) 4th floor, Coffee board building, No.1 Dr. B.R.Ambedakar Veedi, Bangalore-560001 Telephone:22283074/78, Tele Fax:22386015 . Email: techknnl@gmail.com</p> <p>The information on the outer envelope should also include: Selection of Consultants for preparation of DPR to restore the Tungabhadra dam to its original capacity/ Utilisation by studying various alternatives.</p>
4.2	<p>Proposals must be submitted not later than the following date and time: ____ Date: 9/12/2015 Time: up to 5:30 PM.</p>

5.0

SL NO	DESCRIPTION	Points
1	DETAILED METHODOLOGY AND PROVIDING INNOVATIVE SOLUTION FOR THE STUDY	60
2	THE SHORTLISTED BIDDER/ CONSULTANTS HAVE TO MAKE A PRESENTATION BEFORE THE EMPLOYER ON THE DATE INTIMATED BY THE EMPLOYER. THE PRESENTATION SHALL BE FOCUSED ON THE TECHNICAL APPROACH AND WORK PLAN. THE CONSULTANTS SHALL ALSO CORRELATE IN THE PRESENTATION ITS PAST EXPERIENCE OF THE RELEVANT PROJECT EXECUTED BY THEM AND EXPERIENCE AND SKILLS OF THE KEY PROFESSIONALS PROPOSED TO BE DEPLOYED TO PROVE ITS CAPABILITIES AND PREPAREDNESS TO EXECUTE THE WORK ADHERING PLANNED TECHNICAL APPROACH AND WORK PLAN	30
3	KEY PROFESSIONAL REQUIREMENT	10

THE NUMBER OF POINTS TO BE GIVEN UNDER EACH OF THE EVALUATION CRITERIA ARE:

5.1

THE NUMBER OF POINTS TO BE GIVEN UNDER EACH OF THE EVALUATION SUB-CRITERIA FOR DETAILED METHODOLOGY AND PROVIDING INNOVATIVE SOLUTION:

SL.NO	DESCRIPTION	POINTS
1	<p>Alternative No. 1:- Increasing the live storage of existing Tungabhadra reservoir by increasing the height of Dam and spill way. For this the agencies should have done the following studies.</p> <p>1. Assessment of the stability of existing Dam, structures and foundation.</p> <p>2. Assessment of additional submergence of land, its impact like Rehabilitation and Resettlement, Environmental Impact Assessment. etc including cost benefit analysis.</p> <p><i>If a study is made and detailed project report submitted for a work of similar nature, work done certificate shall be produced.</i></p> <p><i>Narrative report on methodology in finding the solutions for the present task adopting the above alternative.</i></p>	5 3
2	<p>Alternative No.2:- Construction of new Dam/ Dams either Up-stream or down-stream of existing Dam or at any other suitable location. For this the agencies should have done the following studies.</p> <p>1) Hydrological study and all other studies required for constructions of new dam of capacity 32 TMC and above.</p> <p>2) Survey, investigation, soil exploration, stability and structural design, preparation of DPR and all other studies required for construction of new</p>	

		<p>dam of capacity 32 TMC and above.</p> <p>3) Assessment of submergence of and study of other issues connected with submergence like Rehabilitation and Resettlement, Environmental Impact Assessment etc.</p> <p>4) Suggest details of linking new dam to the existing command of Tungabhadra Project.</p> <p>5) Preparation of DPR including all above and calculation of cost benefit analysis.</p> <p><i>If a study is made and detailed project report submitted for a work of similar nature, work done certificate shall be produced.</i></p> <p><i>Narrative report on methodology in finding the solutions for the present task adopting the above alternative.</i></p>	<p>5</p> <p>3</p>
3	<p>Alternative No.3:- Diverting the floods in Tungabhadra river during the peak monsoon by having a flood flow channel and creating additional storage in the adjoining areas. For this the agencies should have done the following studies.</p> <p>1. Study and provide detailed report on quantity of water diverted during surplus period and provide detailed hydrological study and hydraulic design of canals, structures.</p> <p>2. Study of all other issues connected with constructions of new canal and storages and suggests methods of linking it to the present canal network.</p> <p><i>If a study is made and detailed project report submitted for a work of similar nature, work done certificate shall be produced.</i></p> <p><i>Narrative report on methodology in finding the solutions for the present task adopting the above alternative.</i></p>	<p>5</p> <p>3</p>	

	<p>4 Alternative No.4:- Desilting of Tungabhadra reservoir has to be considered. For this, the agencies should have done the following studies.</p> <p>1. Assessment of silt quantity and qualitative analysis of its components like clay, sand, minerals etc to estimate its economic value.</p> <p>2. Method of silt removal and disposal which include identification of place of disposal and the cost involved along with recommendations on other issues connected with desilting.</p> <p>3. Study of cost of recovery of desilting by assessing economic value of silt.</p> <p style="text-align: center;"><i>If a study is made and detailed project report submitted for a work of similar nature, work done certificate shall be produced.</i></p> <p style="text-align: center;"><i>Narrative report on methodology in finding the solutions for the present task adopting the above alternative.</i></p>	<p style="text-align: center;">5</p> <p style="text-align: center;">3</p>
	<p>5 Alternative No.5:- Suggestions which include combination of any two or more alternatives mentioned above.</p> <p style="text-align: center;"><i>If a study is made and detailed project report submitted for a work of similar nature, work done certificate shall be produced.</i></p> <p style="text-align: center;"><i>Narrative report on methodology in finding the solutions for the present task adopting the above alternative.</i></p>	<p style="text-align: center;">5</p> <p style="text-align: center;">3</p>
	<p>6 Alternative No.6:- Other Options:</p> <p>Consultant is free to suggest any other feasible solution/ solutions, and should justify the alternative in terms of technical and economical viability which will meet the desired objective</p> <p style="text-align: center;"><i>If a study is made and detailed project report submitted for a work of similar nature, work done certificate shall be produced.</i></p> <p style="text-align: center;"><i>Narrative report on methodology in finding the solutions for the present task adopting the above alternative.</i></p>	<p style="text-align: center;">5</p> <p style="text-align: center;">3</p>
	<p>7 DETAILED METHODOLOGY AND PROVIDING TECHNOLOGICAL VIABLE SOLUTION AFTER MAKING COMPARATIVE ANALYSIS OF THE ABOVE ALTERNATIVES</p>	<p style="text-align: center;">12</p>
<p>THE MINIMUM TECHNICAL SCORE REQUIRED TO PASS IS:</p>		<p>75 POINTS</p>

5.2

SPECIFIC EXPERIENCE OF THE CONSULTANTS RELATED TO THE ASSIGNMENT SHALL MEAN THAT THE CONSULTANT SHOULD HAVE SUCCESSFULLY COMPLETED COMBINATION OF PROJECTS RELATED TO:

I. International/Interstate river aspects with experience in optimization of operating policies for multipurpose river valley projects, design of suitable hydraulic structures along the course of the river to regulate the water for downstream requirements

II. Satisfactorily completed the DPR involving Feasibility study, Detailed Engineering, detailed design of Storage structures including preparation of Detailed cost estimates and BOQ for the above mentioned projects .

Key professional requirement

The Following key professional staff will be considered for evaluations.

SI No	Designation	No's	Remarks
1	2	3	4
1	River valley development Specialist/Team Leader	1	Post graduation and above with an Experience of ten years and above in international/National projects of similar nature.
2	LIDAR Expert	1	
3	Domain expert	1	
4	Water Institutions Specialist	1	Under graduation and above with an Experience of five years and above in international/National projects of similar nature.
5	Environmental Specialist	1	
6	Hydro Geologist	1	
7	Structural Design Expert	1	
8	Geotechnical Expert	1	
9	Hydrology, Water resources Expert	1	
10	Land Acquisition, Valuation Techno Legal Expert dealing with interstate river disputes.	1	

5.3

The formula for determining the financial scores is the following:

[$S_f = 100 \times F_m/F$, in which S_f is the financial score, F_m is the lowest price, and F the price of the proposal under consideration]

Proposals will be ranked according to their combined technical (S_t) and financial (S_f) score using the weights (T = the weight given to the Technical Proposal; P = the weight given to the Financial Proposal; $T + P = 1$)

$$S = S_t \times T\% + S_f \times P\%$$

The weights given to the technical and Financial Proposals are:

T= 0.80 and

P= 0.20

6.0

The address for negotiations is:

KARNATAKA NEERAVARI NIGAMA LIMITED

(A Government of Karnataka Enterprise)

4th floor, Coffee board building,

No.1 Dr. B.R.Ambedakar Veedi, Bangalore-560001

Telephone:22283074/78, Tele Fax:22386015 . Email: techknnl@gmail.com

7.0

The assignment is expected to commence on (month, Year) at (location)

Date:-

Location:- Tungabhadra Dam Project Area.

Sincerely,
(Name of the client)

SECTION 3. TECHNICAL PROPOSAL - STANDARD FORMS

- 3A. Technical Proposal submission form.
- 3B. Consultant's references.
- 3C. Comments and suggestions on the Terms of Reference and on data services, and facilities to be provided by the Client.
- 3D. Description of the methodology and work plan for performing the assignment.
- 3E. Team composition and task assignments.
- 3F. Format of Curriculum Vitae of proposed key professional staff.
- 3G. Time schedule for professional personnel.
- 3H. Activity (work) schedule.

3A. Technical Proposal Submission Form

[Location, Date]

FROM: (Name of Consultant)

TO:

The Managing Director,
KARNATAKA NEERAVARI NIGAMA LIMITED
(A Government of Karnataka Enterprise)
4th floor, Coffee board building,
No.1 Dr. B.R.Ambedkar Veedi, Bangalore-
560001
Telephone:22283074/78, Tele Fax:22386015
Email: techknnl@gmail.com

Ladies/Gentlemen:

Subject: Selection of Consultants for preparation of DPR to restore the Tungabhadra dam to its original capacity/utilisation by studying various alternatives

We, the undersigned, offer to provide the consulting services for the above in accordance with your Request for Proposal dated [Date], and our Proposal. We are hereby submitting our Proposal which includes a Technical Proposal, and a Financial Proposal sealed under separate envelopes.

If negotiations are held during the period of validity of the Proposal, i.e., before [Date] we undertake to negotiate on the basis of the proposed staff. Our Proposal is binding upon us and subject to the modifications resulting from contract negotiations.

We understand you are not bound to accept any Proposal you receive.

We remain,

Yours sincerely,

Authorized Signature:
Name and Title of Signatory:
Name of Consultant:
Address:

3B. consultant's References

Relevant Services Carried Out in the Last Five Years That Best Illustrate Qualifications

Using the format below, provide information on each reference assignment for which your firm/entity, either individually as a corporate entity or as one of the major companies within an association, was legally contracted. Consultants would be required to provide certificate of satisfactory completion of work from the client/statutory auditor.

Assignment Name:		Country:
Location within Country:		Key professional staff Provided by Your Firm/entity(profiles):
Name of Client:		No. of Staff:
Address:		
Start Date (Month/Year):	Completion Date (Month/Year):	Approx. Value of Services (Rs.):
Name of Associated Consultants, if any:		No. of Months of Key professional staff, provided by Associated Consultants:
Name of Senior Staff (Project Director/Coordinator, Team Leader) involved and functions performed:		
Narrative Description of Project:		
Description of Actual Services Provided by Your Staff:		

Consultant's Name: __

3C. Comments And Suggestions Of Consultants On The Terms Of Reference And On Data, Services, And Facilities To be Provided By The Client

On the Terms of Reference:

- 1.
- 2.
- 3.
- 4.
- 5.

On the data, services, and facilities to be provided by the Client

- 1.
- 2.
- 3.
- 4.
- 5.

Consultant's Name:

.

**3D. Description of the Methodology And Work Plan
For Performing The Assignment**

3E. Team Composition and Task Assignments

1. Key Professional

Sl. No.	Name	Position	Task
1.			
2.			
3.			
4.			
..			
..			

2. Support Staff

Sl. No.	Name	Position	Task
1.			
2.			
3.			
4.			
..			
..			

**3F. Format Of Curriculum Vitae (CV) For
Proposed Key professional staff**

Proposed Position: ____

Name of Consultant: _

Name of Staff: _____

Profession: ____

Date of Birth: .

Years with Firm/Entity: _____Nationality: _

Membership in Professional Societies: _____

Detailed Tasks Assigned: ____

Key Qualifications:

[Give an outline of staff member's experience most pertinent to tasks on assignment. Describe degree of responsibility held by staff member on relevant previous assignments and give dates and locations. Use about half a page.]

Education:

[Summarize college/university and other specialized education of staff member,]

Employment Record:

[Starting with present position, list in reverse order every employment held. List all positions held by staff member since graduation, giving dates, names of employing organizations, titles of positions held, and locations of assignments.]

Languages:

[For each language indicate proficiency: excellent, good, fair, or poor; in speaking, reading, and writing]

Certification:

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experience.

_____Date: _

[Signature of staff member and authorized representative of the Consultant] Day/Month/Year

Full name of staff member: _____

Full name of authorized representative: _____

3G. Time Schedule For Professional Personnel

Sl. No.	Name	Position	Reports Due/Activities	Months (in the form of a Bar Chart)*												Number of Months	
				1	2	3	4	5	6	7	8	9	10	11	12		
1.																	Subtotal (1)
2.																	Subtotal (2)
3.																	Subtotal (3)
4.																	Subtotal (4)

Full-time: _____ Part-time: _____

Reports Due: _____

Activities Duration: _____

Signature: _____

* The Schedule should be for the period of completion of assignment (Authorized Representative)

Full Name: _____

Title: _____

Address: _____

3H. Activity (Work) Schedule

A. Field Investigation and Study Items:

		Monthwise Program (in form of Bar Chart) ++ [1st, 2nd, etc. are months from the start of assignment]											
Sl. No.	Item of Activity (Work)	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th

++ The Program should be period of completion of assignment.

B. Completion and Submission of Reports

Reports: *	Programme: (Date)
1. Inception Report	
2. Interim Progress Report	
3. Draft Detailed Project Report	
4. Final Detailed Project Report	

SECTION 4. FINANCIAL PROPOSAL - STANDARD FORMS

4A. Financial proposal submission form.

4B. Summary of cost.

4C. Break down of cost.

4A. FINANCIAL PROPOSAL SUBMISSION FORM
[Location, Date]

FROM: (Name of Consultant)

TO:

The Managing Director,
KARNATAKA NEERAVARI NIGAMA LIMITED
(A Government of Karnataka Enterprise)
4th floor, Coffee board building,
No.1 Dr. B.R.Ambedakar Veedi, Bangalore-
560001
Telephone:22283074/78, Tele Fax:22386015
Email: techknnl@gmail.com

Ladies/Gentlemen:

Subject: **SELECTION OF CONSULTANTS FOR PREPARATION OF DPR TO RESTORE THE TUNGABHADRA DAM TO ITS ORIGINAL CAPACITY/UTILISATION BY STUDYING VARIOUS ALTERNATIVES - FINANCIAL PROPOSAL.**

We, the undersigned, offer to provide the consulting services for the above in accordance with your Request for Proposal dated : _____, and our Proposal (technical and Financial Proposals). We would require a sum of _____ (amount in words and figures) for providing the consultancy services **inclusive of service tax**.

Our financial proposal shall be binding upon us subject to the modifications resulting from contract negotiations, up to expiration of the validity period of the Proposal, i.e., [Date].

We undertake that, in competing for (and, if the award is made to us, in executing) the above contract, we will strictly observe the laws against fraud and corruption in force in India namely "Prevention of Corruption Act 1988".

We understand you are not bound to accept any Proposal you receive.

We remain,

Yours sincerely,

Authorized Signature:
Name and Title of Signatory:
Name of the Consultant:

Address:

4B. SUMMARY OF COSTS

No.	Description @	Amount (Rupees)
I	Remuneration for Key professional staff	
II	Supporting Staff	
III	Transportation	
IV	Duty Travel to Site	
V	Office Rent	
VI	Office Supplies, Utilities and Communication	
VII	Office Furniture and Equipment	
VIII	Reports and Document Printing	
IX	Surveys	
	TOTAL COST	
	Consultancy Services Tax	
	TOTAL COSTS (Including Service Tax)	

Note: The ceiling cost of the consultancy is as shown in the Summary of Costs. Payments will be made as per stipulations of the Special Conditions of Contract. The break-up of cost as given in formats 4C is to facilitate assessment of reasonableness of costs and conducting negotiations in accordance with clause 6 of the Information to Consultants.

@ Modify the items as appropriate for the consultancy assignment.

4C. BREAKDOWN OF COSTS (RS)

I REMUNERATION FOR STAFF

			(Rs.)		(Rs)
	<u>Professional staff</u>				
	Sub-Total				
	<u>Key professional staff</u>				
	Sub-Total				

SM = Staff Month

II. Support Staff

No.	Position	Name	Staff Months	Rate* (Rs)	Amount(Rs)
1					
2					
3					
4					
				Total :	

* Provide the breakup of the rates to show the basic salary, social costs and overhead.

III Transportation (Reimbursable) *

Total:

IV. Duty Travel to Site (Reimbursable)*

Total:

V Office Rent (Reimbursable) *

Total:

*Prepare details as appropriate for the consultancy assignment.

VI. Office Supplies, Utilities and Communication (Reimbursable)

No.	Item*	Months	Monthly Rate (Rs)	Amount in (Rs)
1.				
2.				
3.				
4.				

TOTAL : -----

* Prepare details as appropriate for the consultancy assignment.

VII. **Office Furniture and Equipment (Reimbursable)**

No.	Description(*)	Unit	Quantity	Rate ()	Amount ()
1	<u>Office Furniture (Purchase)</u>				
2					
3					
4					
5					
6					
1	<u>Office Equipment (Purchase)*</u>				
2					
3					
4					
5					
6					
				<u>Total</u>	

* Prepare details as appropriate for the consultancy assignment

VIII. **Reports and Document Printing**

No.	Description*	Number	No. of Copies	Rate per Copy (Rs.)	Amount (Rs.)
1					
2					
3					
4					
5					
				Total	

IX. **Topographical Surveys (if any)***

- Prepare details as appropriate for the consultancy assignment

SECTION 5.

Terms Of Reference

5.1 Introduction:

Tungabhadra river is one of the tributaries of Krishna river in south India, Tungabhadra river derives its name from confluence of two streams the Tunga & Bhadra, both of which rise in wooded eastern slopes of the western ghats in the Karnataka state and flow east wards. After confluence of two streams at Kudali near Shivamogga, the Tungabhadra river runs for 531 Km and joins river Krishna in Sangmeshwara near Kurnool in the state of Andhra Pradesh. The river runs for 382 Km in Karnataka there after forms the boundary between Karnataka & Andhra Pradesh for 58 Kms, flows for the remaining 91 Kms in the Andhra Pradesh.

The Tungabhadra dam is constructed across the Tungabhadra River, a tributary of the Krishna River. The dam is near the town of Hospet in Karnataka. It is a multi purpose dam serving Irrigation, electricity generation flood control, etc, this is a joint project of erstwhile Hyderabad state and erstwhile Madras Presidency when the construction was started: later it became a joint project of Karnataka and Andhra Pradesh after its completion in 1953.

The dam creates the biggest reservoir on the Tungabhadra river with 100.855 TMC of gross storage capacity at full reservoir level (FRL) 498m MSL, an water spread area of 378 square kilometer, the dam is 49.5 meter high above its deepest foundation. The two left bank canals and RayaBasavanna canal on right side of the reservoir supply water for Irrigation entirely in Karnataka state. Two right bank canals are constructed, one at low level and the other at high level serving Irrigation in Karnataka and Rayal seema region of Andhra Pradesh, Hydropower units are installed on canal drops. The reservoir water also assist downstream projects, Rajolibanda Diversion Scheme, K.C canal and Vijayanagar canals. The identified water use from the project is 230 TMC ft as allocated by the Krishna water Disputes Tribunal. Karnataka and Andhra Pradesh got 151.49 TMC ft and 78.51 TMC ft water use entitlement respectively.

5.2 Allocation of water to various states under Krishna Water Dispute Tribunal Award (KWDT Award)

As more priority was provided to irrigation in the initial five year plans, the states of the nascent republic embarked on construction of new projects for utilization of water resources. This eventually led to conflicting interests in the inter-state rivers and the disputes among the states on sharing the waters of the inter-state rivers prolonged without finding any viable solution to the vexed issues. This was precisely the case with the river Krishna and its basin States.

So, the Government of India in the year 1969 constituted the Krishna water Disputes Tribunal (KWDT) to adjudicate the water disputes among the basin states of Maharashtra, Karnataka and Andhra Pradesh. The Tribunal in its award of 1976 while allocating waters of the Krishna to the basin states gave allocation, in a water year, 230 TMC ft of the water stored in the Tungabhadra Reservoir for the states of Karnataka and Andhra Pradesh. The evaporation losses, in a year, from the reservoir water assessed as 18 TMC ft and the same were divided equally for left and right side. So the evaporation losses to be accounted by Karnataka and Andhra Pradesh in their canal systems are 12.5 and 5.5 TMC ft respectively.

The award of the Tribunal also provided that within its share a state was permitted to divert water from one system to another system. In the process of adjudication of the disputes, the tribunal reviewed the functions of the Tungabhadra Board and observed that the Board would continue to prepare the working table for utilization of the water of the reservoir and regulate the sharing of water between the states of Karnataka and Andhra Pradesh as per the allocation made in the award. The Tribunal also examined the necessity of continuing to retain charge of the works on or connected with the project, which are common to the two states until another control body is established. Thus the function of the Tungabhadra Board has backing of the Tribunal.

ALLOCATION OF WATER TO KARNATAKA AND ANDHRA PRADESH STATES(TELANGANA AND SEEMANDHRA) UNDER TUNGA BHADRA PROJECT AS PER KRISHNA TRIBUNAL AWARD

As per KWDT award the allocation made to various canal systems under Tungabhadra project is as under:

SL NO	CANAL SYSTEM	WATER ALLOCATION IN TMC
A	KARNATAKA	
1	POWER CANAL+RBLLC	19.00
2	RIGHT BANK HIGH LEVEL CANAL	17.50
3	RAYABASAVA CHANNELS	7.00
4	RIVER ASSISTANCE FOR VNC+ RDS(2.00+0.49)	2.49
5	LEFT BANK MAIN CANAL+ LEFT BANK HIGH LEVEL CANAL	93.00
	SUB TOTAL OF A	138.99
B	ANDHRA PRADESH	
1	RIGHT BANK LOW LEVEL CANAL(RBLLC)	24.00
2	RIGHT BANK HIGH LEVEL CANAL	32.50
3	RIVER ASSISTANCE FOR RDS+KC CANAL(6.51+10.00)	16.51
	SUB TOTAL OF B	73.01

	GRAND TOTAL EXCLUDING EVAPORATION (A+B)	212.00
C	EVAPORATION LOSSES	
	KARNATAKA	12.50
	ANDHRA PRADESH	5.50
	SUB TOTAL OF C	18.00
	GRAND TOTAL ALLOCATION FOR TUNGABHADRA PROJECT UNDER K-8 SUB BASIN(A+B+C)	230.00

5.3 Sedimentation details of Tungabhadra Reservoir are as follows:

Periodic assessment of the capacity of the Reservoir has been made since impounding of water in 1953. The gross storage capacity of the Reservoir was assessed in 1953 as 3,751.17 MCum(132.47 TMC) at FRL 497.738m(1633 ft) and dead storage capacity as 32.83 MCum(1.160TMC) at 472.440m (1550ft). A siltation rate of 4.29 ha m/100 Sq. KM/year (0.427 TMC/Year) was adopted in the design of the project.

Periodic assessment of the capacity of the Reservoir has been made since impounding of water in 1953.

CAPACITIES OF TUNGABHADRA RESERVOIR FROM 1953 TO 2008.

Capacity in TMCft

Year of Survey	Dead capacity	Storage	Live Storage	Gross storage	Annual rate of decrease in reservoir capacity(between successive surveys)	Remarks
1953	1.159		131.312	132.473	-	Original survey
1963	7.04		114.411	114.66	1.7812	To find annual rate of decrease in reservoir capacity for the year 1972, the original capacity of the reservoir in 1953 has been considered.
1972	0.073		121.007	121.08	0.5995	
1978	Nil		117.695	117.695	0.5642	
1981	Nil		115.680	115.680	0.6717	
1985	Nil		111.832	111.832	0.9620	
1993	Nil		111.50	111.50	0.0415	
2004	Nil		104.34	104.34	0.652	
2008	Nil		100.855	100.855		

Note: Dead storage is below RL 472.440m

Live storage in between RL 472.44m and 497.738m

SALIENT FEATURES OF TUNGABHADRA PROJECT

1	Name of the Project	Tungabhadra		
2	River basin	Krishna		
3	Name of stream/Sub basin	Tungabhadra		
4	Location			
	a) Near by village/ town	Mallapuram		
	b) Taluk	Hospet		
	c) District	Bellary		
	d) Latitude	15 15' 19" N		
	e) Longitude	76 20' 10" E		
5	Catchment area (Sq.Kms)	28177		
6	Estimated annual Yeild in (TMC)	407.107		
7	Storage in TMC Year	1953	1993	2004
	a) Gross	132.471	111.507	104.34
	b) Live	131.312	111.507	104.34
	c) Dead	1.159	0	0
8	Planned utilisation in TMC	Pertaining to Karnataka state only as per master plan.		
	a) Withdrawals by canals	119.50		
	b) Reservoir losses	12.50		
	c) Gross utilisation	132.00		
9	Irrigable area	363738 Ha		
10	Submersiion			
	a) Area (Ha)	37810		
	b) Village affected (Nos)	90		
	c) Population affected (Nos)	54452		
11	Dam			
	a) Type	Composit		
	b) Height (Mtr)			
	i) Above river bed	35.37		
	ii) Above foundation level	49.39		
	iii) Average heigt of composite dam	21.30		
	iv) Average height of earthen dam	9.10		
	c) Length (Mtr)			
	i) Masonry dam including Spillway (701M)	1040		
	ii) Composit dam (Mtrs)	546.8		
	iii) Earthen Dam (Mtrs)	152.4		
	d) MWL (Mtr)	497.74		
	e) FRL (Mtr)	497.74		
	f) MDDL (Mtr)	477.01		
12	Spillway			
	a) Location	Central		
	b) Length (Mtr)	701		
	c) Flood lift (Mtr)	6.10		
	d) Discharge capacity in cumes	18406		

	e) Gates	33 Nos. (18.29m x 6.10m) Vertical crest gates.	
13	Canals		
	a) Right Bank Canal (0.00Km to 21.09Km, the canal is called power canal and from there for a length of 348.20Km it is called RBLLC)	Power canal	RBLLC
	i) Length in Km	21.09	348.20
	ii) Capacity in cumes	70.79	50.97
	iii) Area in Ha.	101106 Ha (Karnataka – 37518 Ha Andhra Pradesh – 63588 Ha)	
	b) Left Bank Main Canal		
	i) Length in Km	227.00	
	ii) Capacity in cumes	116.10	
	iii) Area in Ha.	2,45,616	
	c) Right Bank High Level Canal		
	i) Length in Km	196.43	
	ii) Capacity in cumes	113.27	
	iii) Area in Ha.	1,57,877 (Karnataka – 80939 Ha Andhra Pradesh – 76937 Ha)	
	d) Left Bank High Level Canal		
	i) Length in Km	15.00	
	ii) Capacity in cumes	0.95	
	iii) Area in Ha.	468	
14	Power Generation		
	A) Hampi Power House		
	a) No. of Power units	4 Nos. 9000 KW each	
	b) Capacity (in MW)	36	
	B) Dam Power House Right side		
	a) No. of Power units	4 Nos. 9000 KW each	
	b) Capacity (in MW)	36	
	C) Dam Power House Left side		
	a) No. of Power units	3 Nos. 9000 KW each	
	b) Capacity (in MW)	27	

5.4 PROJECT OBJECTIVES

The main objectives of this studies are :

- ✓ Conduct the capacity and sedimentation study of the TB Reservoir.
- ✓ Deploy best consultant team to carry out studies and implement the work.
- ✓ Estimate the current capacity of TB Reservoir using latest technical know-how assisted by the differential global positioning system
- ✓ Estimate the quantity of silt to be removed from the reservoir to restore to its original design capacity.
- ✓ Examine various alternatives of restoring the design capacity/utilisation of TB reservoir and provide opinion.
- ✓ Evaluate cost benefit analysis of the alternatives.
- ✓ Document best practices-global experience.
- ✓ suggest best alternatives. (s)

-
- ✓ Proposal a methodology to restore the design capacity/utilisation using the most appropriate and latest technologies, strictly adhering to the safety conditions and logistical guide lines stipulated by Go I laws/ acts.
 - ✓ Provide a cost estimate for each solution with a timeline of activities.
 - ✓ Prepare a Detailed Project report (DPR) of Global standards.
 - ✓ Evaluate project implementation and provide a report.

5.5 Report deliverables:

Inception Report:

The inception report shall be submitted to the Client by the consultant within 21 days from the date of entering into the agreement and shall comprise the following:

- ✓ Project Appreciation and Reconnaissance survey
- ✓ Detailed Approach and Methodology to meet the requirement of TOR; including scheduling of various sub-activities to be carried out for completion of various stages of the work stating out clearly their approach & methodology for project preparation after due inspection of the entire project stretch and collection/collation of necessary information
- ✓ Task Assignment and Manning Schedule
- ✓ Work Programme
- ✓ Quality Assurance Plan (QAP)
- ✓ Proforma for data collection and Engineering surveys.

Feasibility Report:

Feasibility report shall be submitted to the Client by the consultant within 60 days comprising of the proposal for alternative locations including the finalized Techno Economical location of reservoir for detailed studies. The report shall cover the following:

- ✓ Reconnaissance report
- ✓ Report on preliminary survey
- ✓ Alternative studies conducted
- ✓ Preliminary Analysis
- ✓ Preliminary report on all the tasks as per Scope of work
- ✓ Finalization of Techno Economical location of proposed reservoir

Detailed Project Report

The DPR reporting shall be as per the guidelines for Preparation of Detailed Project Reports of Irrigation and Multi purpose Projects. The Detailed Project Report shall be prepared as per the laid out guidelines (Refer Annex-3.2) and shall have the following Annex as a minimum.

- The overall plan of the envisaged development
- Results of Assessment of Feasibility Reports
- Results of the EIA & Socio-economic studies.
- Results of the Topographic & Allied Surveys
- Results of Geological & Geophysical Investigations
- Results of the Geotechnical & Construction material Investigations

- Results of the Hydrological and Meteorological Investigations
- Results of the Numerical Model Studies and assessments
- Detailed Layouts and Engineering Drawings.
- Construction Programme.

s part of reporting, the following Action Plan documents shall also be prepared and submitted as Annex to the main report.

- Action Plan for Compensatory Afforestation
- Action Plan for Water Logging & Salinity
- Action Plan for De-siltation
- Action Plan for Catchment Area Treatment
- Action Plan for Eco-system
- Action Plan for Tourism
- Action Plan for Water Quality Maintenance
- Action Plan for Disaster Management
- Action Plan for Project Implementation and Monitoring

The reporting of all the activities shall be in three components viz.data, text and drawing.

Simultaneous to the hard copy submissions, the DPR shall also be submitted in soft copy i.e. CD. The text of the report shall be in MS WORD, data sheets shall be MS EXCEL, and the drawings shall be in Auto CAD.

The DPR 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. Specified number of draft final reports along with all the Annex and subsequent final report shall be submitted in both hard and soft copies.

Submissions

All approved drawings original in tracing	:	One copy
All drawings to scale in colour	:	Five copies
All reports	:	Five copies
Soft copies (in editable format)	:	Two copies on CD

5.6 Time Frame:

Sl No	Description of Milestones	Timelines from the date of signing the Agreement
1.	Inception Report	21 days
2.	Feasibility Report	60 days
3.	Draft Detailed Project Reports with cost estimates	150 days
4.	Final Detailed Project Report	180 days

5.7 Terms of payment:

Key Date No	Description of Milestones	Timeline	Payment milestone
1.	Inception Report	On approval of Inception Report by Client	10%
2.	Feasibility Report	On approval of Feasibility Report by Client	30%
3.	Draft Detailed Project Report with cost estimates	On approval of draft Detailed Project Report by Client	30%
4.	Final Detailed Project Report	On approval of draft final Detailed Project Report by Client	30%

- 10% of the agreed lump sum amount of the project will be released as advance after the approval of the inception report subject to production of bank guarantee for the equivalent amount by the consultant issued by nationalized / scheduled banks valid for a period not less than 6 months.
- Further 30% of the agreed lump sum amount will be released after submission of the feasibility report by the consultant and acceptance of the same by the Client.
- The further 30% of the agreed lump sum amount will be released after submission of the draft report (DPR) as per standard practice by the consultant to the Client.
- Based on the recommendation of the Client and subject to corrections if any to be effected in the DPR the balance 30% of the lump sum amount will be released by the Client after getting such corrections attended and seeking competent approval of the Estimate Review Committee and the Board of KNNL to the DPR.
- No payments under this contract will carry interest.

SECTION 6-

STANDARD FORM OF CONTRACT

CONTRACT FOR CONSULTANT'S SERVICES

between

KARNATAKA NEERAVARI NIGAMA LIMITED
(A Government of Karnataka Enterprise)
4th floor, Coffee board building,
No.1 Dr. B.R.Ambedakar Veedi, Bangalore-560001

and

[Name of Consultants]

Dated

:

I. FORM OF CONTRACT

This CONTRACT (hereinafter called the "Contract") is made the _____ day of the month of _____, 20____, between, on the one hand, Karnataka Neeravari Nigama Limited (hereinafter called the "Client") and, on the other hand, _____(hereinafter called the "Consultants").

*[*Note: If the Consultants consist of more than one entity, the above should be partially amended to read as follows:*

".....(hereinafter called the "Client") and, on the other hand, a joint venture consisting of the following entities, each of which will be jointly and severally liable to the Client for all the Consultants' obligations under this Contract, namely, _____ and _____ (hereinafter called the "Consultants.")"]

WHEREAS

- (a) the Client has requested the Consultants to provide certain consulting services as defined in the General Conditions of Contract attached to this Contract (hereinafter called the "Services");
- (b) the Consultants, having represented to the Client that they have the required professional skills, and personnel and technical resources, have agreed to provide the Services on the terms and conditions set forth in this Contract;

NOW THEREFORE the parties hereto hereby agree as follows:

1. The following documents attached hereto shall be deemed to form an integral part of this Contract:

- (a) The General Conditions of Contract (hereinafter called "GC");
- (b) The Special Conditions of contract (hereinafter called "SC");
- (c) The following Appendices:

- Appendix A: Description of the Services _____
- Appendix B: Reporting Requirements _____
- Appendix C: Key Personnel _____
- Appendix D: Services and Facilities to be provided by the Client _____
- Appendix E: Form of Guarantee for Advance Payments _____

[Note: If any of these Appendices are not used, the words "Not Used" should be inserted below next to the title of the Appendix on the sheet attached hereto carrying the title of that Appendix.]

- 2. The mutual rights and obligations of the Client and the Consultants shall be as set forth in the Contract, in particular:
 - (a) The Consultants shall carry out the Services in accordance with the provisions of the Contract; and

-
- (b) The Client shall make payments to the Consultants in accordance with the provisions of the Contract.

IN WITNESS WHEREOF, the Parties hereto have caused this Contract to be signed in their respective names as of the day and year first above written.

**FOR AND ON BEHALF OF
KARNATAKA NEERAVARI NIGAMA LIMITED**

By
(Authorized Representative)

FOR AND ON BEHALF OF
[NAME OF CONSULTANT]

By
(Authorized Representative)

[Note: If the Consultants consist of more than one entity, all of these entities should appear as signatories, e.g., in the following manner:]

FOR AND ON BEHALF OF EACH OF
THE MEMBERS OF THE CONSULTANTS

[Name of Member]

By
(Authorized Representative)

[Name of Member]

By
(Authorized Representative)
etc.

II. GENERAL CONDITIONS OF CONTRACT

1. GENERAL PROVISIONS

1.1 Definitions

Unless the context otherwise requires, the following terms whenever used in this Contract have the following meanings:

- (a) "Applicable Law" means the laws and any other instruments having the force of law in India, as they may be issued and in force from time to time;
- (b) "Contract" means the Contract signed by the Parties, to which these General Conditions of Contract (GC) are attached, together with all the documents listed in Clause 1 of such signed Contract;
- (c) "Effective Date" means the date on which this Contract comes into force and effect pursuant to Clause GC 2.1
- (d) "Contract Price" means the price to be paid for the performance of the Services, in accordance with Clause 6;
- (e) "GC" means these General Conditions of Contract;
- (f) "Government" means the Government of Karnataka;
- (g) "Local currency" means Indian Rupees;
- (h) "Member", in case the Consultants consist of a joint venture of more than one entity, means any of these entities, and "Members" means all of these entities; 'Member in Charge' means the entity specified in the SC to act on their behalf in exercising all the Consultants' rights and obligations towards the Client under this Contract.
- (i) "Party" means the Client or the Consultants, as the case may be, and Parties means both of them;
- (j) "Personnel" means persons hired by the Consultants as employees and assigned to the performance of the Services or any part thereof; and 'key personnel' means the personnel referred to in Clause GC4.2 (a)
- (k) "SC" means the Special Conditions of Contract by which these General Conditions of Contract may be amended or supplemented;
- (l) "Services" means the work to be performed by the Consultants pursuant to this Contract as described in Appendix A; and
- (m) 'Third party' means any person or entity other than the Government, the Client or the Consultants.

1.2 Law Governing the Contract

This Contract, its meaning and interpretation, and the relation between the Parties shall be governed by the Applicable Law.

1.3 Language

This Contract has been executed in English language, which shall be the binding and controlling language for all matters relating to the meaning or interpretation of this Contract.

1.4 Notices

Any notice, request or consent made pursuant to this Contract shall be in writing and shall be deemed to have been made when delivered in person to an authorized representative of the Party to whom the communication is addressed, or when sent by registered mail, telex, telegram or facsimile to such Party at the address specified in the SC.

1.5 Location

The Services shall be performed at such locations as are specified in Appendix A and, where the location of a particular task is not so specified, at such locations, whether in Karnataka or elsewhere, as the Client may approve.

1.6 Authorized Representatives

Any action required or permitted to be taken, and any document required or permitted to be executed, under this Contract by the Client or the Consultants may be taken or executed by the officials specified in the SC.

1.7 Taxes and Duties

The Consultants and their Personnel shall pay such taxes, duties, fees and other impositions as may be levied under the Applicable Law, the amount of which is deemed to have been included in the Contract Price.

1.8 Headings

The headings shall not limit, alter or affect the meaning of this Contract.

1.9 Authority of Member in Charge

In case the Consultants consist of a joint venture of more than one entity, the Members hereby authorize the entity specified in the SC to act on their behalf in exercising all the Consultants rights and obligations towards the Client under this Contract, including without limitation the receiving of instructions and payments from the Client.

2. Commencement, Completion, Modification and termination of Contract

2.1 Effectiveness of Contract

This Contract shall come into effect on the date the Contract is signed by both Parties or such other later date as may be stated in the SC.

2.2 Commencement of Services

The Consultants shall begin carrying out the Services within fifteen (15) days after the date the Contract becomes effective, or at such other date as may be specified in the SC.

2.3 Expiration of Contract

Unless terminated earlier pursuant to Clause 2.7, this Contract shall terminate at the end of such time period after the Effective Date as is specified in the SC.

2.4 Modification

Modification of the terms and conditions of this Contract, including any modification of the scope of the Services or of the Contract Price, may only be made by written agreement between the Parties.

2.5 Force Majeure

2.5.1 Definition

For the purposes of this Contract, "Force Majeure" means an event which is beyond the reasonable control of a Party, and which makes a Party's performance of its obligations under the Contract impossible or so impractical as to be considered impossible under the circumstances and includes, but is not limited to, war, riots, civil disorder, earthquake, fire, explosion, storm, flood or other adverse weather conditions, strikes, lockouts or other industrial action (except where such strikes, lockouts or other industrial action are within the power of the Party invoking Force Majeure to prevent), confiscation or any other action by Government agencies.

Force Majeure shall not include (i) any event which is caused by the negligence or intentional action of a Party or such Party's Experts, Sub-consultants or agents or employees, nor (ii) any event which a diligent Party could reasonably have been expected to both (A) take into account at the time of the conclusion of this Contract, and (B) avoid or overcome in the carrying out of its obligations hereunder.

Force Majeure shall not include insufficiency of funds or failure to make any payment required hereunder.

2.5.2 No Breach of Contract

The failure of a Party to fulfill any of its obligations under the contract shall not be considered to be a breach of, or default under this Contract insofar as such inability arises from an event of Force Majeure, provided that the Party affected by such an event (a) has taken all reasonable precautions, due care and reasonable alternative measures in order to carry out the terms and conditions of this Contract, and (b) has informed the other Party as soon as possible about the occurrence of such an event.

2.5.3 Extension of Time

Any period within which a Party shall, pursuant to this Contract, complete any action or task, shall be extended for a period equal to the time during which such Party was unable to perform such action as a result of Force Majeure.

2.5.4 Payments

During the period of their inability to perform the Services as a result of an event of Force Majeure, the Consultants shall be entitled to continue to be paid under the terms of this Contract, as well as to be reimbursed for additional costs reasonably and necessarily incurred by them during such period for the purposes of the Services and in reactivating the Service after the end of such period.

2.5.5 Consultation

Not later than thirty (30) days after the Consultants, as the result of an event of Force Majeure, have become unable to perform a material portion of the Services, the Parties shall consult with each other with a view to agreeing on appropriate measures to be taken in the circumstances.

2.6 Suspension:

The Client may by written notice of suspension to the Consultants, suspend all payments to the Consultants hereunder if the Consultants fail to perform any of their obligations under this contract, including the carrying out of the Services, provided that such notice of suspension (i) shall specify the nature of the failure, and (ii) shall request the Consultants to remedy such failure within a period not exceeding thirty (30) days after receipt by the Consultants of such notice of suspension.

2.7 Termination

2.7.1 By the Client

The Client may terminate this Contract, by not less than thirty (30) days' written notice of termination to the Consultants, to be given after the occurrence of any of the events specified in paragraphs (a) through (d) of this Clause 2.7.1 and sixty (60) days' in the case of the event referred to in (e):

- a. if the Consultants do not remedy a failure in the performance of their obligations under the Contract, within thirty (30) days of receipt after being notified or within such further period as the Client may have subsequently approved in writing;
- b. if the Consultants (or any of their Members) become insolvent or bankrupt;
- c. if, as the result of Force Majeure, the Consultants are unable to perform a material portion of the Services for a period of not less than sixty (60) days; or

-
- d. if the consultant, in the judgment of the Client has engaged in corrupt or fraudulent practices in competing for or in executing the Contract.
 - e. For the purpose of this clause:

“corrupt practice” means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the selection process or in contract execution.

“Fraudulent practice” means a misrepresentation of facts in order to influence a selection process or the execution of a contract to the detriment of GOK, and includes collusive practice among consultants (prior to or after submission of proposals) designed to establish prices at artificial non-competitive levels and to deprive GOK of the benefits of free and open competition.
 - f. if the Client, in its sole discretion and for any reason whatsoever, decides to terminate this Contract.

2.7.2 **By the Consultants**

The Consultants may terminate this Contract, by not less than thirty (30) days' written notice to the Client, such notice to be given after the occurrence of any of the events specified in paragraphs (a) through (c) of this Clause 2.7.2:

- (a) If the Client fails to pay any monies due to the Consultants pursuant to this Contract and not subject to dispute pursuant to Clause 7 hereof within forty-five (45) days after receiving written notice from the Consultants that such payment is overdue;
- (b) If the Client is in material breach of its obligations pursuant to this Contract and has not remedied the same within forty-five (45) days (or such longer period as the Consultants may have subsequently approved in writing) following the receipt by the Client of the Consultants' notice specifying such breach;
- (c) If, as the result of Force Majeure, the Consultants are unable to perform a material portion of the Services for a period of not less than sixty (60) days.

2.7.3 **Cessation of Rights and Obligations**

Upon termination of this Contract pursuant to Clause GC 2.7 , or upon expiration of this Contract pursuant to Clause GC 2.3, all rights and obligations of the Parties hereunder shall cease, except :

- (i) such rights and obligations as may have accrued on the date of termination or expiration;
- (ii) the obligation of confidentiality set forth in Clause GC 3.3 hereof;
- (iii) any right which a Party may have under the Applicable Law.

2.7.4 Cessation of Services

Upon termination of this Contract by notice of either Party to the other pursuant to Clauses GC 2.7.1 or GC 2.7.2 hereof, the Consultants shall, immediately upon dispatch or receipt of such notice, take all necessary steps to bring the Services to a close in a prompt and orderly manner and shall make every reasonable effort to keep expenditures for this purpose to a minimum. With respect to documents prepared by the Consultants and equipment and materials furnished by the Client, the Consultants shall proceed as provided, respectively, by Clauses GC 3.7 and GC 3.8 .

2.7.5 Payment upon Termination

Upon termination of this Contract pursuant to Clauses 2.7.1 or 2.7.2, the Client shall make the following payments to the Consultants:

- (a) remuneration pursuant to Clause 6 for Services satisfactorily performed prior to the effective date of termination;
- b) except in the case of termination pursuant to paragraphs (a) and (b) of Clause 2.7.1, reimbursement of any reasonable cost incident to the prompt and orderly termination of the Contract.

3. Obligations of the Consultants:

3.1 General

The Consultants shall perform the Services and carry out their obligations hereunder with all due diligence, efficiency and economy, in accordance with generally accepted professional techniques and practices, and shall observe sound management practices, and employ appropriate advanced technology and safe methods. The Consultants shall always act, in respect of any matter relating to this Contract or to the Services, as faithful advisers to the Client, and shall at all times support and safeguard the Client's legitimate interests in any dealings with third parties.

3.2 Conflict of Interests

3.2.1 Consultants Not to Benefit from Commissions, Discounts, etc.

The remuneration of the Consultants pursuant to Clause 6 shall constitute the Consultants' sole remuneration in connection with this Contract or the Services, and the Consultants shall not accept for their own benefit any trade commission, discount or similar payment in connection with activities pursuant to this Contract or to the Services or in the discharge of their obligations under the Contract, and the Consultants shall use their best efforts to ensure that the Personnel, and agents of either of them, similarly shall not receive any such additional remuneration.

3.2.2 Procurement Rules of Funding Agencies

If the Consultants, as part of the Services, have the responsibility of advising the Client on the procurement of goods, works or services, the Consultants shall comply

with any applicable procurement guidelines of the funding agencies and shall at all times exercise such responsibility in the best interest of the Client. Any discounts or commissions obtained by the Consultants in the exercise of such procurement responsibility shall be for the account of the Client.

3.2.3 Consultants and Affiliates Not to engage in certain Activities

The Consultants agree that, during the term of this Contract and after its termination, the Consultants and their affiliates, as well as any of its affiliates, shall be disqualified from providing goods, works or services (other than the Services and any continuation thereof) for any project resulting from or closely related to the Services.

3.2.4 Prohibition of Conflicting Activities

Neither the Consultants nor the Personnel shall engage, either directly or indirectly, in any of the following activities:

- (a) during the term of this Contract, any business or professional activities in the Government's country which would conflict with the activities assigned to them under this Contract; or
- (b) after the termination of this Contract, such other activities as may be specified in the SC.

3.3 Confidentiality

The Consultants, and the Personnel of either of them shall not, either during the term or within two (2) years after the expiration of this Contract, disclose any proprietary or confidential information relating to the Project, the Services, this Contract, or the Client's business or operations without the prior written consent of the Client.

3.4 Insurance to Be Taken out by the Consultants

The Consultants (a) shall take out and maintain, at their own cost but on terms and conditions approved by the Client, insurance against the risks, and for the coverage, as shall be specified in the SC; and (b) at the Client's request, shall provide evidence to the Client showing that such insurance has been taken out and maintained and that the current premiums have been paid.

3.5 Consultants' Actions Requiring Client's Prior Approval

The Consultants shall obtain the Client's prior approval in writing before taking any of the following actions:

- (a) appointing such members of the Personnel not listed by name in Appendix C ("Key Personnel"), and
- (b) any other action that may be specified in the SC.

3.6 **Reporting Obligations**

The Consultants shall submit to the Client the reports and documents specified in Appendix B in the form, in the numbers, and within the periods set forth in the said Appendix.

3.7 **Documents Prepared by the Consultants to Be the Property of the Client**

All plans, drawings, specifications, designs, reports and other documents and software submitted by the Consultants in accordance with Clause 3.6 shall become and remain the property of the Client, and the Consultants shall, not later than upon termination or expiration of this Contract, deliver all such documents and software to the Client, together with a detailed inventory thereof. The Consultants may retain a copy of such documents and software. Restrictions about the future use of these documents, if any, shall be specified in the SC.

3.8 **Equipment and Materials Furnished by the Client**

Equipment and materials made available to the Consultants by the Client or purchased by the Consultants with funds provided by the Client shall be the property of the Client and shall be marked accordingly. Upon termination or expiration of this Contract, the Consultants shall make available to the Client an inventory of such equipment and materials and shall dispose of such equipment and materials in accordance with the Client's instructions. While in possession of such equipment and materials, the Consultants, unless otherwise instructed by the Client in writing, shall insure them at the expense of the Client in an amount equal to their replacement value.

3.9 **Liability of the Consultants**

Subject to additional provisions, if any, set forth in the SC, the Consultants liability under this Contract shall be as provided by the Applicable Law.

4. **Consultants' Personnel**

4.1 **Description of Personnel**

The titles, agreed job descriptions, minimum qualifications and estimated periods of engagement in the carrying out of the Services of the Consultants' Key Personnel are described in Appendix C. The Key Personnel listed by title as well as by name in Appendix C are hereby approved by the Client.

4.2 **Removal and/or Replacement of Personnel**

- (a) Except as the Client may otherwise agree, no changes shall be made in the Key Personnel. If, for any reason beyond the reasonable control of the Consultants, it becomes necessary to replace any of the Key Personnel, the Consultants shall forthwith provide as a replacement a person of equivalent or better qualifications.
- (b) If the Client finds that any of the Personnel have (i) committed serious misconduct or has been charged with having committed a criminal action, or (ii) have reasonable cause to be dissatisfied with the performance of any of the Personnel, then the Consultants shall, at the Client's written request specifying

the grounds therefor, forthwith provide as a replacement a person with qualifications and experience acceptable to the Client.

- (c) The Consultants shall have no claim for additional costs arising out of or incidental to any removal and/or replacement of Personnel.

5. Obligations of the Client

5.1 Assistance and Exemptions

Unless otherwise specified in the SC, the Client shall use its best efforts to ensure that the Government shall:

- a) issue to officials, agents and representatives of the Government all such instructions as may be necessary or appropriate for the prompt and effective implementation of the Services;
- b) assist the Consultants and the Personnel employed by the Consultants for the Services from any requirement to register or obtain any permit to practice their profession or to establish themselves either individually or as a corporate entity according to the Applicable Law;
- c) provide to the Consultants and Personnel any such other assistance as may be specified in the SC.
- d) Provide the Consultants and Personnel with work permits and such other documents as shall be necessary to enable the Consultants and Personnel to perform the Services;

5.2 Services and Facilities

The Client shall make available to the Consultants and the Personnel, for the purposes of the services and free of any charge, the services, facilities and property described in Appendix D at the times and in the manner specified in said Appendix D, provided that if such services, facilities and property shall not be made available to the Consultants as and when so specified, the Parties shall agree on (i) any time extension that it may be appropriate to grant to the Consultants for the performance of the Services, (ii) the manner in which the Consultants shall procure any such services, facilities and property from other sources, and (iii) the additional payments, if any, to be made to the Consultants as a result thereof.

6. Payment to the Consultants:

6.1 Lump Sum Remuneration

The Consultant's total remuneration shall not exceed the Contract Price and shall be a fixed lump sum including all staff costs, printing, communications, travel, accommodation, and the like, and all other costs incurred by the Consultant in carrying out the Services described in Appendix A. Except as provided in Clause 5.2, the Contract Price may only be increased above the amounts stated in clause 6.2 if the Parties have agreed to additional payments in accordance with Clause 2.4.

6.2 Contract Price

The Contract price is Rs. -----

6.4 Terms and Conditions of Payment

Payments will be made to the account of the Consultants and according to the payment schedule stated in the SC. Unless otherwise stated in the SC, the first payment shall be made against the provision by the Consultants of a bank guarantee for the same amount, and shall be valid for the period stated in the SC. Any other payment shall be made after the conditions listed in the SC for such payment have been met, and the Consultants have submitted an invoice to the Client specifying the amount due.

7. Settlement of disputes

a) If any dispute or difference of any kind whatsoever were to arise between the Executive Engineer / Superintending Engineer and the Contractor regarding the following matter namely.

(i) The meaning of the specifications design, drawings and instructions herein before mentioned.

(ii) The quantity of workmanship or materials used on the work and

(iii) Any other question, claim, right, matter, thing whatsoever, in any way arising out of or relating to the contract, designs, drawings, specifications, estimates, instructions, or orders or those conditions or failure to execute the same whether arising during the progress of the work, or after the completion, termination or abandonment thereof, the dispute shall, in the first place, be referred to the Chief Engineer who has jurisdiction over the work specified in the contract. The Chief Engineer shall, within a period of Sixty days from the date of being requested by the contractor to do so, give written notice of his decision to the contractor. If the contractor is aggrieved by the decision of the Chief Engineer, or if the Chief Engineer fails to give written notice of his decision within the above said period of sixty days, the contractor may appeal to the Managing Director, KNNL, within 60 days from the receipt of written notice of the Chief Engineer's decision of from the expiry of first named period of 60 days.

(b) Subject to the Managing Director's decision on appeal and subject to other form of settlement hereafter provided, the Chief Engineer's decision in respect of every dispute or difference so referred shall be final binding upon the contractor. The said decision shall forthwith be given effect to and contractor shall proceed with the execution of the work with all due diligence.

Remedy when Managing Director's decision on appeal is not acceptable to contractor

(c) In case the decision of the Managing Director is not acceptable to the contractor, he may approach the law courts in the jurisdiction for settlement of dispute after giving due written notice in this regard to the Managing Director within a period of ninety days from the date of receipt of the written notice of the decision of the Managing Director.

Time limit for notice to approach law court by contractor

(d) If the Managing Director has given written notice to the contractor of his decision on his appeal and no written notice to approach the law court has been communicated to him by the contractor within a period of ninety days from

receipt of such notice, the said decision shall be final and binding upon the contractor.

Time limit for notice to approach law court by contractor when decision is not given by Managing Director

(e) If the Managing Director fails to give notice of decision within a period of his ninety days from the receipt of the contractor's appeal, the contractor may within ninety days after the expiry of the above named period of ninety days approach the Law Courts in the jurisdiction giving due notice to the Managing Director.

(f) Whether the claim is referred to the Chief Engineer or Managing Director to the Law Courts, as the case may be, the contractor shall proceed to execute and complete the works with all due diligence pending settlement of the said dispute or differences.

Obligations of the Executive Engineer and contractor shall remain unaltered during considerations of dispute:

(g) The reference of any dispute or difference to the Chief Engineer or Managing Director or the Law Court may proceed notwithstanding that the work shall then be or be alleged to be complete, provided always that the obligations of the Executive Engineer and the contractor shall not be altered by reason of the said dispute or difference being referred to the Chief Engineer or Managing Director or the Law Court during the progress of the works.

Aggravated Contractor to Approach Civil Court:

(h) It is clearly understood and agreed upon by both the parties that no part of the above clause shall be construed to be an Arbitration Clause. In the event of any dispute or difference arising between the parties to this contract; upon exhausting the remedies under clauses 29(a) to (g); the only remedy available shall be to approach the jurisdictional Civil Court by filing a suit in accordance with law.

8. Fairness and Good Faith

8.1 Good Faith

The Parties undertake to act in good faith with respect to each other's rights under this Contract and to adopt all reasonable measures to ensure the realization of the objectives of this Contract.

8.2 Operation of the Contract

The Parties recognize that it is impractical in this Contract to provide for every contingency which may arise during the life of the Contract, and the Parties hereby agree that it is their intention that this Contract shall operate fairly as between them, and without detriment to the interest of either of them, and that, if during the term of this Contract either Party believes that this Contract is operating unfairly,

The Parties will use their best efforts to agree on such action as may be necessary to remove the cause or causes of such unfairness, but no failure to agree on any action pursuant to this Clause shall give rise to a dispute subject to settlement in accordance with Clause GC 7 hereof.

III. SPECIAL CONDITIONS OF CONTRACT

Number of Amendments of, and Supplements to, Clauses in the General
GC Clause * Conditions of Contract

Client : The Managing Director,
KARNATAKA NEERAVARI NIGAMA LIMITED
(A Government of Karnataka Enterprise)
4th floor, Coffee board building,
No.1 Dr. B.R.Ambedakar Veedi, Bangalore-
560001
Telephone:22283074/78, Tele Fax:22386015
Email: techknnl@gmail.com

Consultants : _____

Attention : _____
Telex : _____
Facsimile : _____
E-mail :-----

1.4 Notice shall be deemed to be effective as follows:

- (a) in the case of personal delivery or registered mail, on delivery;
- (b) in the case of telexes/e-mail, 24 hours following confirmed transmission; and
- (c) in the case of facsimiles, 24 hours following confirmed transmission.]

1.6 The Authorized Representatives are:

For the Client : Chief Engineer, KNNL,
Irrigation Central Zone, Munirabad.
e-mail: iczmr@yahoo.co.in

For the Consultant : _____

[Note: Fill in the blanks]

1.7.1 The consultants and the personnel shall pay the taxes, duties, fees, levies and other impositions levied under the existing, amended or enacted laws during life of this contract and the client shall perform such duties in regard to the deduction of such tax as may be lawfully imposed.

1.7.2 However the Consultancy Services tax payable for this Consultancy Services shall be paid/ reimbursed by the Client separately.]

2.1 The date on which this Contract shall come into effect is:

-
- 2.2 The time period shall be 15 (fifteen) days or such other time period as the parties may agree in writing
- 2.3 The period shall be six (06) months or such other period as the parties may agree in writing.
- 3.4 The risks and the coverage shall be:
- (1) Third Party motor vehicle liability insurance as required under Motor Vehicles Act, 1988, in respect of motor vehicles operated in India by the Consultants or their Personnel or their Personnel, for the period of Consultancy;
 - (2) Third Party liability insurance, with a minimum coverage for Rs. 20 (twenty) lakhs for the period of Consultancy;
 - (3) Client's liability and workers' compensation insurance in respect of the Personnel of the Consultants, in accordance with the relevant provisions of the Applicable Law, as well as, with respect to such Personnel, any such life, health, accident, travel or other insurance as may be appropriate;
 - (4) Professional liability insurance, with a minimum coverage equal to total contract value for this consultancy; and
 - (5) Insurance against loss of or damage to (i) equipment purchased in whole or in part with funds provided under this Contract, (ii) the Consultants' property used in the performance of the Services, and (iii) any documents prepared by the Consultants in the performance of the Services.
- 3.7 The Consultants shall not use these documents for purposes unrelated to this Contract without the prior written approval of the Client.
- 3.9 Limitation of the Consultants Liability towards the Client
- (a) Except in case of gross negligence or willful misconduct on the part of the Consultants or on the part of any person or firm acting on behalf of the Consultants in carrying out the Services, the Consultants, with respect to damage caused by the Consultants to the Client's property, shall not be liable to the Client:
 - (i) for any indirect or consequential loss or damage; and
 - (ii) for any direct loss or damage that exceeds (A) the total payments for Professional Fees made or expected to be made to the Consultants hereunder, or (B) the proceeds the Consultants may be entitled to receive from any insurance maintained by the Consultants to cover such a liability, whichever of (A) or (B) is higher.

-
- (b) This limitation of liability shall not affect the Consultants liability, if any, for damage to Third Parties caused by the Consultants or any person or firm acting on behalf of the Consultants in carrying out the Services.

6.2 The amount of Contract is Rs. _____ .

6.4 The account is :Rs]

Payments shall be made according to the following schedule :

Note : (a) the following installments are indicative only; (b) if applicable, detail further the nature of the report evidencing performance, as may be required, e.g., submission of study or specific phase of study, survey, drawings, draft bidding documents, etc., as listed in Appendix B, Reporting Requirements. In the example provided, the bank guarantee for the repayment is released when the payments have reached 50 per cent of the lump sum price, because it is assumed that at that point, the advance has been entirely set off against the performance of services.

- a. Ten (10) percent of the lump sum amount shall be paid upon submission of the inception report and submission of a bank guarantee for the same equivalent amount valid for a period not less than 6 months.
 - b. Thirty (30) percent of the lump sum amount shall be paid upon submission of the interim report.
 - c. Thirty (30) percent of the lump sum amount shall be paid upon the submission of the draft final detailed project report.
 - d. Thirty (30) percent of the lump sum amount shall be paid upon approval of the draft final detailed project report.
- 6.5 **Payment shall be made within 45 (forty five) days of receipt of the invoice and the relevant documents specified in Clause 6.4, and within 60 (sixty) days in the case of the final payment.**

No interest will be provided in case of delayed payment beyond the specified time.

IV. APPENDICES

Appendix A: Description of the Services

[Give detailed descriptions of the Services to be provided; dates for completion of various tasks, place of performance for different tasks; specific tasks to be approved by Client, etc.]

A.1 Collection and review of available data

Collection of all necessary data including details of existing networks for basin development, feasibility report and review of the data determining the nature, extent, adequacy, validity, nearest GTS BM, Toposheets of the area, meteorological details of the area, current schedule of rates, issue rates and royalty charges for construction materials etc, complete as per the specification and standard guidelines and identifying the data gaps, which shall include but not limited to the following aspects:

- General and Salient features
 - Topography, Geological & Geotechnical
 - Construction Materials
 - Hydrological and Hydro geological
 - Power and Existing Hydraulic works
 - Tourism
 - Sociological and Socio-economic
 - Environmental
 - Infrastructure
 - Legal, and Cadastral details
 - Meteorological data from IMD (Viz., Rainfall, Humidity, Temperature, Wind Speed, Solar radiation and other variables).

The consultants are required to collect the information regarding the earlier feasibility reports prepared by KPCL and continue the further studies for preparation of DPR by adopting the advanced technology.

A.1.1 Planning and development of data base:

Consequent upon the collection of data, desk studies shall be carried out so as to undertake preliminary planning and development of a comprehensive database. This shall form the basic input for all future reference and shall be a mosaic of spatial data with linkage of non-spatial attribute data. The broad activities shall include:

A.1.2 Development of Database

Study and review the information, as available, on land and water resources including identification of gaps, data adequacy and inconsistency to be checked and reconciled.

- Detailed study the river course from downstream side of Bhadra dam upto RajoLibanda Diversion Scheme on Toposheets, available satellite imageries, identification of suitable locations for locating impounding reservoirs, assessment of storage capacities as per standard guidelines of Central Board of Irrigation and Power (CBIP) publications, CWC guidelines on River valley projects.
- Collect and interpret topographic maps, satellite images and aerial photographs or images to generate multi-layered geo-referenced digital maps on a G.I.S. platform, with the basic inputs of available information. The collected data will have to be linked with the earlier data set for deriving the information on required aspects. At times if one data set does not reflect the details, required additional data set is to be collected, analysed and linked.
- These comprehensive maps shall cover the following aspects:
 - Geomorphology.
 - Geology and Structural elements including lineaments.
 - Soil type, texture and depth.

- Slope Map (angle and aspect).
- Drainage analysis.
- Hydrogeology along with Ground water potential zone.
- Surface water bodies and wetlands.
- Drought Assessment.
- Flood damage and Risk Assessment.
- Forest Coverage and Biennial forest mapping.
- Resources viz. mineral deposits, ornamental stones, construction materials
- Construction Borrow area.
- RAMSAR Wetland Protocols.
- Any other spatial and temporal data etc.
- Extent of use of remote sensing techniques for DPR works to be decided on case to case basis depending on site conditions.
- The other map layers shall include surface water, soil type, geology, and geomorphology and hydrogeology themes.
- Derived thematic maps shall also be prepared based on the available information on irrigation and agricultural practice.
- The developed comprehensive multi-layered maps shall be integrated with collateral data; socio-economic data etc. and an action plan shall be developed.
- The Remote Sensing based information shall be integrated appropriately in the on-site surveys and investigations.
- All the remote sensing data shall be obtained from / through the organisations of Dept. of Space, Govt. of India viz. National Data Center, NRSA, Hyderabad and ANTRIX Corporation, Bangalore.

A.2 Survey and investigations

- Carrying out reconnaissance survey for the locations identified on Topo sheets, fixing location on ground, study of dam location, and finalization of locations of Dam for conducting detailed study. The location of the Dam and impounding reservoir shall be most ideal in terms of storage capacity, possibility of power generation, minimum submergence of land on the upstream, generally avoiding forest submergence, availability of good foundation strata etc. as per the standard guidelines of Survey of India.
- For segments that need to be covered in detail by on-site investigations, topographic and hydrographic surveys shall be carried out by ARIAL LIDAR, DGPS and digital total stations and echo sounders respectively. However, in order to have a precise and faster coverage regarding the topographic information for reservoir the airborne surveys/satellite data may also be used.
- Carrying out double check tertiary leveling from nearest GTS Bench Mark and establishing TBMs on both flanks of the river at identified locations of Impounding Reservoirs, and at every 500m interval all along the river on upstream of the river up to FRL level. Benchmarks shall be established on permanent structure like culverts, exposed rocks, survey boundary stones etc., and establishment of control points on the same using DGPS instrument complete as per the standard guidelines of Survey of India.
- Topographical survey for taking Cross sections at regular intervals as specified by CWC :
 - All along the course of River from the downstream side of Bhadra dam, if applicable/necessary.
- Block level survey for a width of 500 m U/s and D/s at the proposed dam locations shall be carried out at every 10 m interval grid for detailed design of the Dam as per the standard guidelines of Survey of India

- However, for the entire basin topographic and other details shall be extracted from the available Survey of India Topo sheets in the scale of 1: 50,000 and 1: 25,000.
- Broad requirement of topographic surveys for the various components of the project as per norms, is briefly indicated below:
 - River Surveys (bathymetric)
 - Reservoirs and Capacity surveys.
 - Head works such as Dams, Dykes, Weirs and Barrage.
 - Intake and Out fall points.
 - Bypassing arrangement for en-routing the hydro power.
 - Power House site, Switchyard, Tail race, surge shaft etc.
 - Plant site & Colony.

In addition to the aforesaid topographic surveys the following allied surveys shall also be undertaken in order to define suitability of the project site.

- Archeological Survey
- Resources Surveys viz. minerals
- Source for Construction Materials
- Surveys for assessment of existing infrastructure facilities
- Right of Way and Right of Use
- Legal and Cadastral Surveys

Inputs from the detailed surveys shall be incorporated with the comprehensive maps prepared. GIS software such as Arc GIS, Arc View or similar shall form the front end for pictorial representation and analysis. Subsequently the results of the entire field campaign shall be superimposed on these geo-dataset.

Note: All the level should be w.r.t. Mean sea levels (MSL) only.

For detailed guidelines refer Annex-2.1. Guidelines for Topographic & Allied Surveys.

A.2.1 Geological & Geophysical investigations

Geological, Geomorphological and Geophysical investigations shall be carried out using competent organisations approved by Owner and detailed geological reports and maps covering the following shall be prepared:

Regional Geological Assessment

Based on the available data, maps, feasibility reports and airborne survey results the regional geological setting shall be assessed. Following minimum maps and cross section details shall be prepared:

- Regional Geological Maps.
- Regional Geological Cross Sections.
- Seismo-Tectonic Maps.

Detailed Local Geology and Geophysical Assessments

Subsequent to regional assessment, detailed geological and geophysical studies shall be carried out for the following project facilities, but not limited to the following:

- Reservoirs.

- Dams and Dykes.
- Head Works, and energy dissipation area.
- In take, Out fall points and regulator site .
- Bypassing arrangement for en-routing the hydro power.
- Power House site.
- Sources of construction material.
- Communication routes.

The detailed studies shall cover the following

Digital Terrain Model

- Stratigraphic sequence
- Litho logy and Structural Set-up
- Seismio-tectonic Set-Up
- Drainage and Ground water assessment.
- Soil cover and Bed Rock profile.
- Mineral deposits, its nature and quantum
- Suitability of site for construction and for borrow area.
- Estimation of quantities of the materials
- Preparation of maps, and layouts
- Identification of any feature with adverse impact on the design such as rock falls, structurally weak zones, stress in rock, geothermal gradients.
- Design aspects such as reservoir leakage, water tightness along the rim etc.

For detailed guidelines refer Annex-2.2. Guidelines for Geological and Geophysical Investigations.

A.2.2 Geotechnical Investigations:

Detailed geotechnical investigations for various structures & components such as dams & appurtenants, tunnels & adit areas, pump and power house shall be carried out using competent organisations approved by Owner to establish the soil & rock strata along with their properties in sufficient detail for engineering and construction.

The investigations shall include boring in soil, coring in rock, pits & drifts, sampling, in-situ tests, laboratory test & reporting.

- Minimum requirements of the number & depth of borings/pits/drifts are listed in Annex-2.3. Guidelines for Geotechnical Investigations.
- Disturbed & undisturbed samples shall be collected at 1.5m interval or change of strata.
- In situ testing shall include standard penetration tests, cone penetration tests, plate load tests, permeability tests, field density tests, other in-situ tests as per design requirements.
- Laboratory testing shall include compressibility, strength, mechanical & chemical tests to adequately establish the properties of soil & rock.
- For underground works, where high rock stress are anticipated field tests to determine their extent and magnitude shall be carried out.
- Detailed report including foundation recommendations.

Subsequent to completion of Geological, Geophysical and Geotechnical investigations, following minimum deliverables shall be prepared:

- General geological assessment report of Project Geologist
- Geological Logs of drill holes
- Three-dimensional geological logs of drifts
- Detailed geological cross sections along the structures
- Detailed geological maps of the project site including dams & structures

For detailed guidelines refer Annex-2.3. Guidelines for Geotechnical Investigations.

A.2.3 Construction Material Survey

Adequate coverage survey shall be carried out at the proposed site for identification of suitable site for construction material. This shall cover:

- Investigation for identification of locations of potential quarries for sand, soils, core materials, rock and aggregates etc. and preparation of maps, identifying the borrow areas
- Estimation of quantities of the materials at different locations
- Collection of samples from borrow areas
- Testing of samples and evaluation of its suitability
- ASR study for coarse aggregates
- Preparation of location maps, road maps etc. showing the transport road upto the borrow area, relating the same to the construction site(s)
- Identification of source for Steel, Cements, Limestone and Bricks

Location maps of the borrow areas, estimates of the quantity of material for each location, details of sample collection/testing of the materials, suitability of the material, road maps showing the transport road upto the borrow area in relation to the construction site(s) shall be provided

For detailed guidelines refer Annex-2.4. Guidelines for Construction Material Survey

A.2.4. Hydrological and Meteorological Survey

Based on the review of available database, the following parameters shall be collected from the respective regional/ local agencies for validation of model studies to be used for assessments. Required on-site assessments shall cover all seasons and transitional periods. Multi sensor-weather stations (self-recording automatic weather stations) for met data collection shall be used.

While, determination of project Maximum Flood and Standard Project Flood shall form the main objective of the hydro-meteorological surveys and data analysis.

Following are the list of parameters for Hydrological and Meteorological Surveys:

1	Rainfall	2	Wind
3	Cyclone	4	Cloud Cover
5	Humidity	6	Visibility
7	Temperature	8	River Flows
9	Sedimentation	10	Water Quality
11	Evaporation	12	Sunshine

The above data and any other data necessary for the generation of flow duration curve and storage capacity curves, flood & drought estimation and submergence etc., should be given.

An index map with bar chart shall be prepared showing location of the stations along with the available and collected data. A brief note shall also be attached to the map stating the extent of data, data quality, utility and consistency for DPR purpose. Based on the hydrological and meteorological data an analysis of water flows, sediment flows, evaporation and by power potential study are to be made.

For detailed guidelines refer Annex-2.5. Guidelines for Hydrological Investigations

Updation of Database

The developed database shall be updated with the inputs collected through on-site field investigation campaigns. This shall be further augmented with additional inputs from preliminary environmental and socio-economic aspects. This updated database shall form the basic input for all further studies, analysis and computations and a convenient retrieval system shall be built-in into the database.

A.3 WATER RESOURCES ASSESSMENT STUDIES

The water assessment studies shall be carried out in detail for optimum utilization of water resources including water-planning studies in a comprehensive manner and the various steps to be followed for the purpose of the study shall generally include but not limited to the following:

A.3.1 Assessment of Data

- Compilation of historical updated data of discharges at nodal/derived locations and preparation of records on 10-daily basis, for about 30 years or more, as available with CWC and state Govts. along with data available at Reservoir and weir sites.
- Compilation of 10-daily withdrawals/utilisation for irrigation/other uses as available for various affecting points on the rivers/canals/weirs etc. including pumping data to assess present utilisations/committed uses.
- Data of existing/ongoing/contemplated (proposed) projects as regards to utilisations for various uses.
- Data of regenerations as available from irrigation, industrial, domestic and other utilisations.
- Demographic data of various townships/villages located in the basins with assessment of present/proposed utilisation.

- Preparation of hydrological, metrological and environmental database including the proposed development scenario.
- Representative periods with drought, medium and high flood conditions shall be selected for analysis of hydraulic conditions.
- Study of climate change and its impact on the flows and water availability must be considered while arriving at the optimal capacity of the proposed reservoirs.
- Sedimentation study and its impact on stage-discharge relationship for measuring the flow in the Cauvery Basin as well as the reservoirs capacity.

A.3.2 Numerical Model Studies and Assessments

- Studies for validation of hydrological data, compilation and processing including extension and generation of data, preparation of hydrological inputs for simulation studies.
- Assessment of historic flows at identified locations and assessment of surpluses or deficits for each basin and sub basin at identified locations.
- Assessment of existing water requirements, requirements with proposed schemes in the command of basin
- Assessment of flood and its control.
- Assessments for groundwater recharge vis-à-vis impact on wetlands and water quality etc.
- Assessments of sedimentation in existing reservoirs based on data available with CWC and state governments. However, conjunctive use of available SRS data may also be used with Hydrographic surveys data.
- Preparation of Conceptual layouts for numerical model studies for the proposed facilities. This shall also include model studies to ascertain the possible impacts and its mitigation measures and disaster management plans.

Assessment of effect of project on hydro-geologic regime. For achieving the above objectives, validated numerical model studies shall be undertaken for the aspects, but not limited to the following:

- Rainfall - Run off
- Water in-flow including low, normal and flood scenarios
- Impact of Reservoir and Reservoir Operation
- Hydro-power
- Water Supply
- Diversion and Routing
 - Evapo-Transpiration
 - Surface to ground water re-charge
 - Sedimentation
 - Conjunctive use of Hydrographic and SRS data
 - Hydraulic structures
 - Risk Analysis

Detail are furnished at Annex-2.6. Guidelines for Model Studies and Assessments.

A.4 ENGINEERING & DESIGN STUDIES

Engineering and other allied studies shall be carried out to ensure that the benefits envisaged are sustainable over a long period besides quality aspects and operational requirements. These shall include but not limited to the following:

A.4.1 Hydrological-Meteorological & Hydro-geological Assessments

- Compilation, processing and validation of hydrological, hydro-geological and meteorological data
- Reservoir level, capacity and fixation of hydrologic criteria for design flood for dam/weir/barrage/cross-drainage structures etc.
- Determination of design flood, flood during construction and flood cushion for reservoir Fixation of spillway capacity, maximum flood outflow through spill way and capacity of head regulators
- Dam Break Analysis & flood routing.
- Reservoir sediment studies, area-capacity curves and life of reservoir
- Afflux & back water studies at structures and confluence points
- Estimation of yield and probabilities
- Preparation of Catchment Area (direct draining) plan for proposed reservoirs.
- Preparation of hydro-geological mapping indicating the status of ground water at different locations over time
- Submergence studies for reservoirs.
- Water tightness of Reservoir
- Direct draining catchment area erosion upstream of reservoir and catchment area treatment
- Impact on existing structures due to envisaged schemes of the project.
- Morphological Assessments
- Hydrological review of Tungabhadra Reservoir. The updation of elevation area capacity curve can be carried out by using remote sensing technique.

A.4.2 Geological & Geotechnical Assessment

- Regional geological assessment of the area and detailed geological assessment of project site.
- Geotechnical assessment for foundations structures, dam site, reservoir and appurtenant.
- Seismic assessment of the area with recommended seismic coefficient for the project site and facilities.
- Identification of any distinctive feature with possible adverse impact on the proposed facilities.
- Delineation of areas of Rock falls and Subsidence.

A.4.3 Engineering Assessment

Studies shall be carried out for confirmation / realignment of the site and type of water storage facilities. These shall include finalization of location, layout, alignment and dimensions of the Hydraulic structures, etc. for the facilities listed as below:

- Dam & Head works.
- Spillways and Energy Dissipation Arrangements

- Power House & water conveyance system.
- Tunnels

-
- Pumping Stations, if applicable
 - Balancing Reservoirs

The present network of the existing facilities, the possible potentials and the possibilities of utilising the network in connection with the construction of the project shall be studied, techniques identified and remedial measures for updating the network shall be discussed and the cost of such updation shall be prepared and included in the project cost.

The selected design along with the hydraulic conditions and seismic co-efficients shall be finalised as per standards.

Front End Engineering

Structural and hydraulic design of the various components including head works, tunnel, pump house and lifting arrangement, power house and other facilities, CAD works, infrastructure network, etc. shall be carried out and necessary drawings shall be prepared in sufficient details for facilitating preparation of bill of quantities for various items of work and preparation of cost estimates, for undertaking benefit-cost analysis of the project. The essential structural calculations including stability analysis, loading programs, forces & stresses considered, seismicity factors, etc., shall be recorded in respect of the various important structures of the project. Assumptions, if any shall be considered for drawing up the Front End Engineering Document (FEED). Such assumptions and their basis shall also be clearly furnished. The aspects to be considered for the design of different structures shall include but not limited to the following:

Head Works (Storage/Diversion Structure) :

- Summary of geological, geotechnical, seismic and hydraulic parameters and assessments.
- Type of structure (earth/rockfill/masonry/concrete dam/barrage/well) layout of dam, spillway and appurtenant works.
- Design flood and sediment studies.
- Siltation studies and soil conservation plans in Catchment for monsoon and non-monsoon periods.
 - Slope protection and reservoir rim stability studies
 - River diversion arrangements
 - Section and economic zoning of earth/ rock-fill dams
 - Cutoff, key arrangements
 - Upstream blanket, rip-rap, filters, rock-toe
 - Stability analysis and factor of safety (operating, draw-down and seismic)
 - Grout curtain and drainage or alternative foundation treatments
 - Uplift
 - Sliding factor

Energy dissipation arrangements

- Spillway gates, hoisting arrangements and stop plugs
- Spillway bridge
- River sluices
- Galleries, adits, shafts, stairs, wells etc.

Tunnel, Adit and Portals

- Nature of overburden
- Shape and size of tunnel
- Velocity in the tunnel, critical velocity
- Design of lining/support system (temporary and permanent)
- Stability of slopes in the portal areas and along the alignment
- Design of grouting

Lifting arrangement

- Foundation of pump house
- Stability analysis of slopes in the pump house and surrounding areas
- Quantum of lift
- Design of pumps and its foundations
- Water hammer studies
- Design of rising mains and anchoring arrangements and analysis of its stability
- Fixing the capacity of balancing reservoir including the duration for storage
- Design of earth embankments, outlets for the balancing reservoir.

Power facilities

- Design of intake gates and trash racks.
- Design of power channel, fixing capacity, bed slopes, side slopes, bed width and lining details
- Design of fore-bay including gates and hoists
- Design of tunnel and pressure shafts
- Reservoir water balancing
- De-silting arrangements
- Design of penstocks and surge shaft considering economic studies for diameter fixation, criterion for water hammer, surge shaft shape and size, structural design of surge shaft
- Stability of slopes in the penstock alignment
- Anchor blocks for penstock
- Power-house design including stability of power-house and slopes around power-house area.
- Design of appropriate power generation units (turbine and accessories) including schematization of various components
- Design of tail race
- Design of power and electrical facilities
- Switchyard design
- Instrumentation

Flood Control and Drainage Works

- Study of flood data, flood damages (year wise)

- Existing flood storages, flood control works, natural depressions and wetlands
- Flood control by the proposed project
- Design of flood control measures including cost estimation
- Drainage characteristics of the basin
- Existing drainage pattern and its sufficiency
- Drainage requirements including alternative layout of drains
- Design of drainage works including cost estimation
- Flood route & emergency action plan

Miscellaneous

- Instrumentation to monitor the performance of various structures such as dams, tunnels, barrages etc. This shall include instrumentation to monitor stresses, deformation, seepage, pore pressure and vibration.
- Reservoir stability measures.
- Industrial and Urban use of water resources including transportation, storage, treatment and water cess.

Infrastructure Studies

- Existing and proposed roads and rail-heads with connectivity, related to the various components of the project
- Telecommunication scenario in the project area with details about the existing and proposed Telecommunication Network
- Details of the existing power availabilities and transmission network including future planning
- Details of existing water supply including future requirements
- Need for any re-routing of existing road and rail-way networks, power system, or other facilities
- Plant colony

Power

- Present status of power in the region including projected power requirements over a period of 50 years.
- Power potential study and finalisation of operating levels of reservoirs
- Study on unit size and power installation
- Power absorption study
- Design and cost estimation of all the components
- Possible power generation through the subject scheme, and cost of energy proposed to be generated per Kwh, including comparison with alternative sources available in the region.
- Power transmission, distribution and operational requirements as per the Central Electrical Regulatory Authority Guidelines.
- Fitment of proposed scheme in planning of power development in the region.
- Supportive studies covering load flow, short circuit and stability.
- Power Requirements for pumped storage schemes including costs.
- Determination of installed capacity of power taking the peak loads (Necessary loads curves to be provided).
- Maximization of Hydro power.

Tourism

- Existing transport System and Navigability of the river reaches
- Commercial and traffic surveys for tourism purpose for determining the potential.
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- Requirements of dredging for de-bottlenecking and construction of new facilities. And use of the dredged / excavated materials for reclamation or sale to users.
- Existing toll rates and fees
- Proposal and Action Plan to develop tourism sector and means of developing local tourism interests including recreation centers around the reservoir and floating recreation centers.

A.5. PREPARATION OF EIA & EMP REPORTS

The Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) report as a part of Detailed Project Report (DPR) 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 MoEF or any other competent authorities. The EIA report will be prepared considering all these notifications/guidelines required for obtaining Environmental Clearances from the regulatory/statutory authorities besides the requirement of Impact Assessment Agency (IAA) spelled out during the review of the EIA report.

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 of the affected area.

As part of the assignment, the Consultant shall, in consultation with the Client, associate with the Forest Department for collection of necessary available data including obtaining required permissions.

As part of the assignment the bidder should study and report the Man-Animal conflicts

Guidelines for EIA & EMP and Methodologies for data collection and monitoring as specified in the Guidelines for preparation of EIA and EMP by MoEF are furnished at Annex-2.7.

A.6 CONSTRUCTION, MANPOWER DEPLOYMENT & PLANT PLANNING

The entire development scheme shall be differentiated into various units such as head works and reservoirs, hydro-power generation. Accordingly, each unit shall be further divided for development in stages. The identification of such stages shall be such that the construction activity can be undertaken concurrently.

- Details of year-wise construction program for each of the major components of the project shall be prepared.
- Bar chart showing the system program, quantity-wise, item-wise and year-wise target of construction shall be prepared.
- Detailed planning for procurement of key construction materials like cement, steel, explosives, petroleum, oil and lubricants shall be prepared including various alternative sources of supply, supply route, possible bottlenecks and other related aspects.
- An action plan for construction monitoring and scheduling shall also be prepared for implementation of the Project. This shall include Project Cost, Financial Analysis and Time Schedule for execution.

The aspects to be considered for the construction planning of different structures shall include:

- River Diversion Planning
- Construction material quarries and haulage plans
- Construction Plant requirements – materials and equipment
- Stores and Workshop facilities, temporary buildings and their disposal
- Permanent Buildings, Colony, Plant site and Attendant facilities
- Provision of water and power supply during construction
- Construction Program formulation – CPM/PERT Charts
- Materials Planning – quantum, haulage and storing
- Equipment Planning – Type, procurement details and usage
- Manpower Planning – organization needed and mobilization
- Excavation and Disposal plans- quantum, disposal sites and etc.
- Financial planning – Funds/cash flow requirements
- Monitoring mechanisms for complaints of any nature

A.7 PREPARATION OF PROJECT OPERATIONAL PHILOSOPHY

- The Project shall have various structures such as reservoirs, head regulators, pump houses and lifting arrangements, hydro power stations, tunnels, etc.
- An overall project operational guideline and philosophy shall be prepared for the envisaged facilities.
- A performance monitoring system shall be identified and the proposed action plan for such a monitoring system shall be prepared. This shall have provisions of performing the impact assessment at a regular interval after completion of the project. This shall also ensure assessment of impacts that may evolve long after completion of the project and is non-existent as of now.

A.8 SOCIO ECONOMIC ASPECTS AND PREPARATION OF R&R

The project shall not cause any R&R issues and it is contemplated to plan & design of balancing reservoir in such a way that the project shall cause minimum submergence so that forest & ecology shall be protected.

A.9 BENEFIT COST RATIO CALCULATION

The Benefit Cost Ratio (BCR) calculation shall be prepared based on all such impacts. The project shall be grouped under separate units such as Head works, Hydro-electric installations, Water supply works etc.

Detailed cost of each of the units shall be separately calculated based on the design, front end engineering, bill of quantities, cost of materials including transportation upto sites, cost of labour, cost of Petroleum Oil and Lubricants (POL), etc.

For details and guidelines for preparation of benefit cost ratio and cost allocations the consultant shall refer to the Guidelines prepared by Ministry of Water Resources (MoWR) and Central Electricity Authority (CEA).

The capital cost of the components shall be assessed after adding the cost of surveys and investigations, cost of engineering, cost of work, cost of establishment, tools and plant, cost of land acquisition, cost of environment management and any other related cost including cost of possible anticipated negative impact which is to be directly borne by the project.

The unit rates of material and labours shall be obtained from the prevalent rates for specific area / basin for costing purpose. Ongoing similar projects in the area / basin can form the basis for the rates or otherwise the same shall be analysed as required.

The operation and maintenance cost of the structures during construction shall also be added and the abstract of costs of various components and the project should be prepared.

Costs for monitoring of assessment of impacts, during and after construction shall also be taken into account.

In addition the following components shall also be addressed:

- Benefits from additional employment viz. during execution of the project both direct and in-direct employment opportunity, jobs created in other rural and urban industries.
- Benefits from water supply
- Benefits from savings of existing expenditure due to supply of drinking water, power generation etc.
- Benefits from Flood & Drought control, Hydro power generation, Tourism
- Benefits from rejuvenated wetlands, compensatory afforestations, beneficial impacts of catchment area restoration and treatment, beneficial impacts of the reservoir viz. Stimulation of economic scenario, increased fisheries, improved micro-climate.

All tangible and intangible benefits shall be evaluated and quantified for arriving with the total benefit figure.

A.10 FINANCIAL AND ECONOMIC ANALYSIS

Financial analysis shall include assessment of Benefit Cost Ratio and evaluation of the estimated project cost both in terms total cost of the project and annual cost for the entire duration of the project execution. Based on above analysis, prioritization of implementation of the various components of the project shall be prepared.

This study shall also include aspects such as water pricing, water laws, water trade, water rights and economic & efficient use of water (limited to append the information). During the financial analysis, past project experiences shall be studied and reflected as part of the DPR preparation activities. Guidelines for detailed Financial Analysis are given in Annex-2.9.

Preparation of Detailed Project covering all the aspects as per Guide Lines of Central Water Commission for river valley projects for construction of impounding reservoir across Cauvery River complete as directed by Engineer-in-charge.

Appendix-B: Reporting Requirements

(List format, frequency, contents of reports and number of copies: person to receive them: dates of submission, etc .. If no reports are to be submitted, state here “ Not applicable”)

B.1 Report deliverables:

Inception Report:

The inception report shall be submitted to the Client by the consultant within 21 days from the date of entering into the agreement and shall comprise the following:

- ✓ Project Appreciation and Reconnaissance survey
- ✓ Detailed Approach and Methodology to meet the requirement of TOR; including scheduling of various sub-activities to be carried out for completion of various stages of the work stating out clearly their approach & methodology for project preparation after due inspection of the entire project stretch and collection/ collation of necessary information
- ✓ Task Assignment and Manning Schedule
- ✓ Work Programme
- ✓ Quality Assurance Plan (QAP)
- ✓ Proforma for data collection and Engineering surveys.

B.2 Feasibility Report:

Feasibility report shall be submitted to the Client by the consultant within 60 days comprising of the proposal for alternative locations including the finalized Techno Economical location of reservoir for detailed studies. The report shall cover the following:

- ✓ Reconnaissance report
- ✓ Report on preliminary survey
- ✓ Alternative studies conducted
- ✓ Preliminary Analysis
- ✓ Preliminary report on all the tasks as per Scope of work
- ✓ Finalization of Techno Economical location of proposed reservoir

B.3 Detailed Project Report

The DPR reporting shall be as per the guidelines for Preparation of Detailed Project Reports of Irrigation and Multi purpose Projects. The Detailed Project Report shall be prepared as per the laid out guidelines (Refer Annex-3.2) and shall have the following Annex as a minimum.

- The overall plan of the envisaged development
- Results of Assessment of Feasibility Reports
- Results of the EIA.
- Results of the Topographic & Allied Surveys
- Results of Geological & Geophysical Investigations
- Results of the Geotechnical & Construction material Investigations
- Results of the Hydrological and Meteorological Investigations
- Results of the Numerical Model Studies and assessments

-
- Detailed Layouts and Engineering Drawings

As part of reporting, the following Action Plan documents shall also be prepared and submitted as Annex to the main report.

- Action Plan for Compensatory Afforestation
- Action Plan for Water Logging & Salinity
- Action Plan for De-siltation
- Action Plan for Catchment Area Treatment
- Action Plan for Eco-system
- Action Plan for Tourism
- Action Plan for Water Quality Maintenance
- Action Plan for Disaster Management
- Action Plan for Project Implementation and Monitoring

The reporting of all the activities shall be in three components viz.data, text and drawing.

Simultaneous to the hard copy submissions, the DPR shall also be submitted in soft copy i.e. CD. The text of the report shall be in MS WORD, data sheets shall be MS EXCEL, and the drawings shall be in Auto CAD.

The DPR shall also include all the relevant documents, analysis and results with back calculations , drawings, inter active models and schemes, estimates etc. as per the scope of work. Specified number of draft final reports along with all the Annex and subsequent final report shall be submitted in both hard and soft copies.

Submissions

All approved drawings original in tracing	:	One copy
All drawings to scale in colour	:	Five copies
All reports	:	Five copies
Soft copies (in editable format)	:	Two copies on CD

Appendix C: Key Personnel

[List under: C-1 Titles [and names, if already available], detailed job descriptions and minimum qualifications. experience of Key Personnel to be assigned to work , and staff-months for each.

Appendix D: Services and Facilities to be provided by the Client

[List here under:

*D-1 Services, facilities and property to be made available to the Consultants by
the Client.]*

Appendix E: Form of Bank Guarantee for Advance Payments

(Reference SC Clause 6.4 of Contract)

(To be stamped in accordance with Applicable Stamp Act, if any)

Ref: _____ Bank Guarantee: _____ Date: _____

Dear Sir,

In consideration of M/s. KARNATAKA NEERAVARI NIGAMA LIMITED (hereinafter referred as the "Client", which expression shall, unless repugnant to the context or meaning thereof include it successors, administrators and assigns) having awarded to M/s. _____ (hereinafter referred to as the "Consultant" which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns), a contract by issue of client's Contract Agreement No. _____ dated _____ and the same having been unequivocally accepted by the Consultant, resulting in a Contract valued at _____ for _____ Contract (hereinafter called the "Contract")

(scope of work)

and the Client having agreed to make an advance payment to the Consultant for performance of the above Contract amounting to _____ (in words and figures) as an advance against Bank Guarantee to be furnished by the Consultant.

We _____ (Name of the Bank) having its Head Office at _____ (hereinafter referred to as the Bank), which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators executors and assigns) do hereby guarantee and undertake to pay the client immediately on demand any or, all monies payable by the Consultant to the extent of _____ as aforesaid at any time upto _____ @ _____ without any demur, reservation, contest, recourse or protest and/or without any reference to the consultant. Any such demand made by the client on the Bank shall be conclusive and binding notwithstanding any difference between the Client and the Consultant or any dispute pending before any Court, Tribunal, Arbitrator or any other authority. we agree that the Guarantee herein contained shall be irrevocable and shall continue to be enforceable till the Client discharges this guarantee.

The Client shall have the fullest liberty without affecting in any way the liability of the Bank under this Guarantee, from time to time to vary the advance or to extend the time for performance of the contract by the Consultant. The Client shall have the fullest liberty without affecting this guarantee, to postpone from time to time the exercise of any powers vested in them or of any right which they might have against the Client and to exercise the same at any time in any manner, and either to enforce or to forebear to enforce any covenants, contained or implied, in the Contract between the Client and the Consultant any other course or remedy or security available to the Client. The bank shall not be relieved of its obligations under these presents by any exercise by the Client of its liberty with reference to the matters aforesaid or any of them or by reason of any other act or forbearance or other acts of omission or commission on the part of the Client or any other indulgence shown by the Client or by any other matter or thing whatsoever which under law would but for this provision have the effect of relieving the Bank.

The Bank also agrees that the Client at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Consultant and notwithstanding any security or other guarantee that the Client may have in relation to the Consultant's liabilities.

Notwithstanding anything contained herein above our liability under this guarantee is limited to _____ and it shall remain in force upto and including _____ and shall be extended from time to time for such period (not exceeding one year), as may be desired by M/s. _____ on whose behalf this guarantee has been given.

Dated this _____ day of _____ 19____ at _____

WITNESS

(signature)

(signature)

(Name)

(Name)

(Official Address)

Designation (with Bank stamp)

Attorney as per Power of
Attorney No. _____ Dated _____

Note : The bank guarantee shall be issued either by a bank (Nationalized/Scheduled) located in India

Annex-2.1

GUIDELINES FOR TOPOGRAPHIC & ALLIED SURVEYS

1.0 GENERAL

As part of the field investigation campaign for preparation of Detailed Project Report (DPR) , detailed topographic surveys shall be carried out. The following sections enumerate the minimum requirements for undertaking the topographic surveys, so as to establish the field setting of the project site.

2.0 METHODOLOGY

The minimum requirements for carrying out the surveys shall be as follows:

Sl. No	Description	Extent of surveys	Scale / Contour Interval	Remarks
1.	From u/s of Tungabhabara Reservoir Dam.	i) Upstream L-section upto MWL + 5m or to a point up to which the back water effect is likely to extend from the axis of the structure, whichever is higher. In case of any headworks situated upstream within MWL+5m or the farthest point affected by back water, L-Section to be taken upto the headworks.	1:10,000 H, 1:100 V	Levelling at 50m interval along the fair weather deep channel.
		ii) Downstream 10 km from the axis of the structure or upto nearest headwork whichever is higher	- do -	- do -
	b) X-Section	i) Upstream X-section at every 50 m intervals nearing to the dams and 100m intervals upto MWL + 5m or 1 km on either side of the firm bank whichever is higher and for a distance of 2 km from the axis of	1:2500 H 1:100 V	Levelling at 50m intervals.

		ii) Downstream X-section at every 50 m intervals nearing to the dams and 100m intervals upto historical/observed HFL+1m on either side of firm bank for a distance of 2 to 5 km from the axis of the structure depending	- do -	- do -
		iii) Along the axis of the structure	1:2500H 1: 100 V	- do -
2.	Reservoirs	Contour plan covering an area upto an elevation of MWL + 5m	1:2500 H Contou interval 0.5 m	leveling grid interval of 50m.
3.	Dam and Dyke	Topographic plan of the site with contours, covering the area upto 4 H on upstream and downstream of the axis or a minimum of 250m on the upstream and 500m on the downstream of the axis, and extending upto MWL+ 5m where H is the height of dam (tail channel area shall be adequately	1:2500 H Contou interval 0.5 m	leveling grid interval of 10m.
4.	Barrage/Weir	Topographic plan with contours of the site covering an area upto 1 km on either side of the firm bank and 500 m from the upstream/downstream tip of the guide bunds, parallel to the flow (tail channel area shall be adequately covered)	1:2500 H Contou interval 0.5 m	leveling grid interval of 50m or less depending on the slope of the land.
7.	Power House & associated facilities.	Contour plan of the site to cover full area of the component(s) and alternative layouts. Area to include 100m on all sides of the component(s)	1:2500 H Contou interval 0.5 m	- do -
8.	Plant and Colony	Contour plan of required area	1:2500 H Contour interval 0.5 m	- do -

9.	Water conveyance system including tunnel audit & Penstock.	i) Contour plan of the area covering the length of the tunnel and 500m (150 m for penstock) on either side of the centre line of the tunnel/adit including approach, portal and dump areas.	1:2500 H Contour interval 0.5 m	- do -
		ii) L-Section	1:2500 H 1:100 V	
12	Archaeological surveys	Shall be performed in the reservoir area and en-route the canal system in order to identify and report presence of any sites of archaeological, historical and cultural importance.		
13	Mineral surveys	Shall be performed in the reservoir area and en-route the canal system in order to identify and report presence of any sites. The nature of such minerals, quantum and location in the reservoir area and its vicinity shall be indicated.		
14	Right of way surveys	These shall cover surveys for right of way of approach roads.		
15	Communication Surveys	This shall cover surveys for assessing the present status and future requirements of roads, railways transmission lines, telephone lines etc. in the reservoir .		
16	Drainage Surveys	This shall cover surveys for existing status and future requirements of drainage system (surface and sub-surface as necessary).		
17	Cadastral & Legal Surveys	This shall cover surveys for gathering cadastral details including ascertaining the ownership of land such as Govt. , Pvt. And community holdings, etc. for land acquisition.		

3.0 REPORTING

The outlined activities above shall be reported as separate reports and drawings in specified scale. The detailed site plans, L-sections and X- sections shall have bench marks, coordinate, and all the physiographic features and shall have adequate overlap for continuity purpose.

Both the L-Section and X-sections shall have the following details:

- i) Date of survey of the particular reach and water level on that day
- ii) Deep pools and rapids including their bed levels, rock outcrops, etc. iii)

Maximum Historical observed HFL.

For each item, brief details of the performed surveys shall be furnished.

Annex-2.2

GUIDELINES FOR GEOLOGICAL INVESTIGATIONS

1.0 GENERAL

Detailed geological surveys shall be carried out as part of the field investigation campaign for preparation of Detailed Project Report (DPR). The following sections enumerate the minimum requirements for undertaking the geological surveys. These details shall form inputs to perform site assessments of various facilities and further engineering design and execution.

2.0 METHODOLOGY

2.1 Regional Geological Assessment

Regional geological setting of the project area shall be compiled from the available published literature and maps. However, for areas or segments where geological maps are not available such data shall be collected on 1:50,000 scale maps by undertaking traverses. These regional traverses shall be undertaken with standard practices of geological mapping with respect to the topographical maps. In the regional scale, the geomorphology and general geological features of the region shall be studied through digital remote sensing data products. Suitable ground traverses shall be made for ground truth verification.

Airborne surveys shall be carried out for the project site. These digital data collection shall provide a quick insight of the regional setting with a 3-D visualization and analysis model. Based on the results obtained there of, segments or areas of engineering geological concerns shall be identified for further on-land geological and geophysical investigations.

2.2 Detailed Geological and Geophysical Assessment

Detailed engineering geological mapping shall be carried out for identified segments of concerns. This shall be followed by on-site geophysical investigations through both seismic and electrical resistivity surveys.

These detailed investigations shall provide both surface and sub-surface geology so as to establish suitability of the site for the intended purpose such as dams, tunnels, and penstock etc. In addition to the standard practices followed for engineering geological assessment coupled with on- site geotechnical investigations, the following details shall be addressed.

- Brief description of the over burden shall be provided classifying clay, silt, sand, gravel, water table etc.
- The rock type at the site shall be described supported by thin section studies and geo-chemical analysis.
- Rock weathering lateritisation with its type, intensity & extent and effect on excavation shall be addressed.
- Demarcation of the zones of rock falls and landslides shall be done on plan.
- Magnitude of landslide and the volume of the material involved in the slide shall be estimated.

- Structurally weak zones such as faults, shear zones, joint planes and fracture zones shall be demarcated on plan. Thereby, the anticipated causes of instability and proposed remedial measures shall be outlined. The geological setting of the area of submergence due to reservoir site shall be studied in detail for delineation of such structurally weak zones, which could be possible avenues of leakage of reservoir water. Such cases shall be discussed with anticipated and permitted extent of loss of water.
- Anticipated undesirable rock stresses along with their likely extent and magnitude for underground works such as cavities, tunnels etc. shall be defined on the basis of the on site field test results.
- Possible zones of squeezing ground shall also be demarcated and design remedial measures shall be outlined. Physical, experimental data and field evidences gathered from geological mapping, geophysical and geotechnical investigations shall be provided along with the cause and reasons of such neo-tectonic activities.
- For under ground works, anticipated high temperature anomaly zones with magnitude and likely extents shall be estimated and mapped.
- Similarly, anticipated presence of undesirable gases either at surface or in underground excavations shall also be provided along with the details of occurrence and geologic associations.
- Other adverse features such as heavy siltation, ground water problem etc. shall also be discussed based on the geological investigations.

2.3 Seismicity

In addition to the outlined geological investigations, seismicity of the region shall be assessed in detail as follows:

- History of earthquakes in the project site with epicenter (s) date(s) of occurrence etc. and details of seismological data collected from theseismological observatory(s) and other available sources and evaluation of seismic status of faults, thrusts and other weak features etc.
- Availability of seismological observatory(s) instrument(s) near the project site or need for establishing a seismological observatory at and around the project site with proposed locations.
- Based on the available information and assessment of local and regional seismicity, the seismic design criteria of structures shall be calculated.

3.0 REPORTING

The outlined activities above shall be reported as individual reports, geological maps and drawings in specified scale.

The detailed site plans, L-sections and X-sections shall have bench marks, coordinate, and all the delineated geological features and shall have adequate overlap for continuity purpose.

Details of local geology of the foundations and evaluation of physical parameters, depth and nature of overburden, fresh sound rock, summary of the field work, results of investigations and recommendations shall be furnished.

Detailed report on Regional Geological Assessment, Local Geological Assessment and Seismicity shall form an Annex to the Detailed Project Report.

Annex-2.3

GUIDELINES FOR GEOTECHNICAL INVESTIGATIONS

1.0 GENERAL

Subsequent to the geological surveys, geotechnical investigations shall be carried out as part of the field investigation campaign for preparation of Detailed Project Report (DPR) . The following sections enumerate the minimum requirements for undertaking the geotechnical investigations. These details shall further form inputs to perform site assessments of various facilities and further engineering design and execution.

2.0 METHODOLOGY

2.1 Earth and rock fill dam/barrage/weir etc.

- Details the location of the auger/drill holes, pits and drifts excavated and in-situ tests conducted for the foundation investigations alongwith axis, abutments and other locations.
- Logging of the auger/drill holes, pits and drifts, description of sub strata, including weak and vulnerable zones.
- Details of the disturbed and undisturbed soil samples collected for classification of the foundation material and result of the laboratory tests thereof.
- Details and results of the in-situ tests(density, shear, permeability, bearing capacity, penetration etc.) conducted at different depths in selected boreholes and other location..
- Description of the foundation rocks, detail of samples collected and its properties including core recovery, permeability etc.
- Summary of the field observations, investigations and in-situ and laboratory tests data, evaluation of the design parameters and treatment proposed.
- In case of earth and rock-fill dams, type of cut off chosen viz. Conventional open trench/diaphragm/sheet pile etc. and its depth as well as nature such as positive or partial with or without a grout curtain may be furnished.
- Details regarding testing for determination of dynamic properties of soil or liquefaction susceptibility
- Details regarding testing for determination of dynamic properties of rock foundation strata.

2.2 Masonry/concrete dam/weirs etc

- Details and location of the drill holes, along the dam axis and abutment, along toe line of the dam (river bed and spillway) and along a line upstream of the dam axis at a distance equal to the distance between the dam axis and toe line (river bed and spillway or at locations decided in consultation with the geologist) and in-situ tests conducted for function investigation including other locations.
- Details and location of pits/drills excavated in the abutments
- Logging of the drill holes and drifts and description of sub-strata including weak and vulnerable areas.

- Details of the rock samples collected and results of the laboratory test.
- Details and results of the in-situ permeability tests conducted in different rock strata at various depths in selected boreholes to check the water tightness of the foundation.
- Details and results of the in-situ rock mechanic tests carried out in the foundation/drifts/other locations.
- Summary of the field investigations/observations, in-situ and laboratory tests data, evaluation of the design parameters and treatment proposed.

2.4 **Power house tunnels, de-silting chamber, surge tanks, transformer cavern etc.**

- Details and location of drill holes/pits/drifts excavated and in-situ tests conducted.
- Logging of the drill holes/pits/drifts and description of the material at the site of in-situ tests etc.
- Details of the samples collected for classification of materials and results of in-situ and laboratory tests.
- Summary of the field observations/investigation works and in-situ and laboratory tests, evaluation of properties of the foundation materials and suggested locations of the various components.

Annex-2.4

GUIDELINES FOR CONSTRUCTION MATERIAL SURVEYS

1.0 GENERAL

As part of the field investigation campaign for preparation of Detailed Project Report (DPR) , comprehensive surveys shall be carried out for construction materials. This shall establish source, reach, quality and quantity of construction materials available for the project. The following sections enumerate the minimum requirements for undertaking the surveys and investigation for assessment of suitability of the material and adequate availability of the same for the intended purpose. These details shall further form inputs to engineering design and execution philosophy.

2.0 METHODOLOGY

2.1 Construction Materials

Soils and rock-fill	Location(s) of different types of soils in the borrow area, quantities, properties, lead etc.
Sand	Location(s) of sand quarry/other source (brushed sand) quantity available, properties, lead etc.

Rock & Aggregates	Location(s) of the quarries for different types of rocks available and their properties, quantity available, lead etc.
Bricks & Tiles	Location(s) of the soils suitable for manufacture of bricks & tiles, quantum available, properties of the soil & bricks including lead etc.
Pozzolana	Location of the natural pozzolonic material fly ash or soil suitable for manufacture of surkhi, available quantity, properties, lead, etc.
Cement & lime stone	Location of the lime stone quarry, quantity available for manufacture of cement & lime, properties, lead etc.
Cement and steel	Location of the rail head & stockyard and lead from the site of work(s).
Scarce Materials	Source, quantities required and procedures for procurement etc
Investigation of material that is available from compulsory excavation like underground power house, foundation for overflow and non-overflow structures etc.	
Any other material	

2.2 Testing Procedures

The sample for testing shall be collected by qualified persons from the testing laboratory. Alternatively, sufficient quantity of samples shall be collected as per procedure prescribed in IS and in consultation with the laboratory.

•Soils

Pits/auger holes(diameter 150mm to 300mm) **113** be taken in the proposed borrow area on 30 to 50 meter grid and representative samples shall be collected and tested for different types of strata/soil to determine their properties and delineate the soil zones.

The depth of the pits & auger holes shall depend upon the availability of the soils and economic exploitation.

The borrow area shall be located as near the dam site as possible but at least at a distance 5-10 times the head(H) of water away from the toe or heel of the dam (for small and medium dams the distance shall not be less than 10H and for high dams not less than 5 H)

The plan and section showing the stratification of the borrow area shall be provided along with the lead for different types of soils from the site(s) of work for different borrow areas.

• Aggregate and rocks

Samples from the different approved rock quarry(s) for different type of rocks shall be collected for laboratory tests. Lead from the site(s) of work of different quarry(s) shall be indicated. For assessment of quantities drill holes shall be taken in consultation with geologist, if required.

- **Natural/crushed sand**

Samples from the approved quarry/source shall be collected for Laboratory tests. The type i.e., natural/crushed sand shall be indicated clearly. The lead from the sources to the site(s) of work and quantity available shall be indicated.

- **Bricks & Tiles**

Samples shall be collected from the proposed areas demarcated for preparation of bricks/tiles for laboratory tests to prove the suitability of the soil. For preparation of Surkhi to be used for pozzolanic material representative samples of bricks shall be collected and tested in the laboratory to prove the suitability. The average lead from the site(s) of work shall be indicated.

- **Natural Pozzolona**

Samples shall be collected from the quarry for laboratory test to prove its suitability. The lead and quantity available shall be indicated.

- **Lime Stone**

Samples shall be collected for laboratory tests to prove its suitability for manufacture of cement/lime. The lead to the proposed site(s) of manufacture of cement/lime and quantity available shall be indicated.

- **Cement**

The source of cement and the distance from ¹¹⁴ the nearest railhead to the site(s) of work shall be indicated.

- **Steel**

The sources/stockyard etc. and its distance from the work site(s) shall be indicated.

- **Scarce material**

The source of the scarce material shall be indicated.

- **Any other material**

Required details as indicated in the earlier items shall be indicated.

3.0 **REPORTING**

The outlined activities above shall be reported as individual reports, geological maps and drawings in specified scale i.e. Plan & Sections 1:

2000 H & 1: 100 V.

Detailed report on the investigation of the following materials and more, if any, as relevant to the project shall form an Annex to the Detailed Project Report. The report shall discuss the details of the field work undertaken logging of the bore/auger holes/pits, profile of the soils along the grids, samples collected, tests results and evaluation of the design parameters as relevant to each material.

Summary of the investigations shall form this chapter of the Detailed Project Report discussing the quantitative and aspects and bringing out clearly the conclusions based on the field observations/investigations/laboratory tests.

Annex-2.5

GUIDELINES FOR HYDROLOGICAL INVESTIGATIONS

GENERAL

Hydrological data requirement for the envisaged project shall be as per the outlined requirements under data collection for various aspects such as water resources assessment and as per the listed sections of Hydrology volume of the Detail Project Report. However, the extent of these investigations shall be determined by the nature and purpose of development i.e. the use to which these data would be put to availability of hydrological and meteorological data in the general region from existing networks/sites.

2.0 METHODOLOGY

Guidelines, regarding the desirable length and frequency of hydrological observations are indicated in the table below. However, in situations where long term data of any hydrological phenomenon which is likely to be co-related with the relevant phenomenon are not available in the vicinity, longer data would be required.

Type of information	Desirable length of record	Frequency
1. River Gauge data	30 years	Daily at 0800 hrs. during low flows seasons Thrice daily at 0800, 1300 and 1800 hrs during high flow season Continuous with an automatic water level recorder with backup arrangements, for hourly, quarter
2. River Flows Discharge	30 years	Daily during low flow season, Daily during high flow season
3. Sediment flow and	3 years	- do – alongwith discharge observations
4. Water Quality	3 years	About once a month with more frequent observation
5. Water Salinity	3 years	Same as above but additional observations in tidal reach of the river twice a month and at
6. River profiles cross sections showing flow levels	-	The surveys may have to be repeated occasionally for moveable bed rivers. Information to cover all
7. Pan evaporation etc.	3 years	Daily concurrent with ordinary rain gauge and observations measuring temperature (max.
8. Rainfall	30 yrs.	Ordinary rain gauge as necessary for strengthening existing network Concurrent with flow observations for rainfall – runoff co-relation
9. Self Recording Rain Gauge	30 yrs	Continous to be tabulated as hourly / quarter hourly concurrent with flow observation

The observed data would not be available for desired locations or for desired length of period and therefore the inputs shall have to be prepared using data transfer and data extension techniques.

In case of non availability of sufficient / representative data, on-site observations shall be carried out so as to collect in-situ information for sufficient period for validation and extrapolation as the case may be, and subsequent use.

All locations of sites and observations shall be as per IS/IMD Standards. Where these are not available the location/methodology adopted shall be described.

Discharge measurement shall be done by area velocity method using current meter or floats based on the flow conditions.

Hydraulic structures across the rivers can also be used for flow measurement provided the structures have been properly calibrated preferably by model tests.

In case of storage reservoirs, lake levels, reasonably accurate area capacity tables and withdrawal and lake evaporation data would be required for indirect computation of flow volumes.

Rainfall, Pan evaporation and other meteorological data measurement stations shall be set up at major storage reservoir sties and keeping in view the availability of such stations.

While deciding the location of additional hydrological and meteorological stations, future requirements for operational stage of the project shall be kept in view. The data collection shall be continued at these locations.

3.0 REPORTING

The report shall be prepared as per the laid out guideline in the Annex 3.2. However, specific site activities and investigations performed, as part of data collection campaign shall be annexed as a separate report to the main DPR. This shall also have the entire data set both in tabulated manner and pictorial representation along with the analysis.

Annex-2.6

GUIDELINES FOR MODEL STUDIES & ASSESSMENTS

1.0 GENERAL

Numerical Simulation studies and assessments shall be carried out for various aspects of the project so as to create a “real like” or “as implemented” situation for subsequent analysis of the possible consequences and also on the future conditions. This shall provide necessary insight into the envisaged development and shall perform as a Decision Support System. All the software licenses purchased and used for the model studies shall be in the name of CNNL.

Following are the minimum requirements for the numerical model studies and assessments envisaged for the project.

2.0 METHODOLOGY

In order to perform hydrological, hydraulic analysis & design the following aspects shall be carried out.

- data screening – to complete missing data
- data generation – to generate data by combining several sets of data
- frequency analysis – to undertake classification according to frequency analysis & excellence level.
- The data set shall be maintained with a Database Management System. The input data file shall have provision for customization or editing. The output file shall be a “delimited file” that can be imparted into a spreadsheet for further analysis.

2.1 Rain fall and Run off Modelling

Based on available daily, monthly, annual records of rainfall and runoff, a suitable rainfall–runoff model shall be developed. Justification for adopting the developed model shall be given based on goodness of fit criteria. The water use corresponding to hydrologic data shall be properly accounted for, while developing the model.

The details of model calibration and validation shall be given separately. The acceptability of data for developing the model shall be explained. The modeling procedure shall also be explained.

2.2 Water Balance Modelling

The hydrological consequences of surface water developments of the river link shall be evaluated through simulation. Thereby, the hydrological reliability of the development configurations in terms of meeting performance target levels shall be assessed.

This shall included information on water availability, concurrent usage, etc. and the conditions shall be evaluated corresponding to present condition and future conditions upto next 50 years.

In order to perform the numerical model the following minimum inputs shall be used.

- Flow inputs: representing locations where water enters the river system
- Reservoir input: representing either a storage reservoir or a storage with associated hydroelectric plant.
- Municipal & industrial water supply.
- Diversion and Routing inputs: representing man-made diversion structures
- Hydrograph inputs: representing flow parameters at locations where minimum guaranteed flow is to be maintained.
- Confluence inputs: representing the location details of confluence of water systems
- Ground water input: representing the aquifer system
- Flow control inputs
- Terminal inputs: representing locations of end points and boundary.

2.3 Hydrodynamic Modeling System

Numerical simulation studies shall be carried out for obtaining information concerning water levels, discharges and velocities at different point in the channel and over specified period of time. This shall be used for

- Estimation of Transport capacity of the Water Transport System. (Needs to be studied under different reservoir operation policies to meet the hydrological conditions of upstream as well as downstream)
- Operation of water regulation & control structures in reservoir
- Selection of spillway parameters for the design flood conditions
- Location and alignment of hydraulic structures
- Understanding effects of integrated reservoir operation including power generation, irrigation, flood control, frequency & duration of different reservoir levels and discharges through turbines and spillway.
- Computation of height of river banks down stream of the dam
- Evaluation of impacts of the project on downstream flood control

2.4 Assessments of Morphological Processes in Open channels

In order to study the morphological processes of river systems and the impacts of engineering involving aggradations & degradation of the alluvial river system, the assessments shall be carried out. The following impacts shall be considered:

- Impact of short-cuts of river channels.
- Impact of closure of secondary branches.
- Impact of water abstraction
- Impact of water level regulation
- Impact of canals connecting river systems.
- And degradation processes downstream of dams.

2.5 Assessments of water Quality

Water quality studies of the entire network shall be carried out in order to assess the impact of the project. This shall have, as a minimum, spreading of pollution in river and network of canals under diversified flow and pollutant discharge conditions as existing.

As a minimum the following shall be studied

- Spreading of conservative & non-conservative contaminants such as bacteria, organic matter, chemicals, and heavy metals originating from pollutant discharges.
- Salt and silt intrusions.
- Oxygen balance in channel and river system
- Seasonal variations in water quality in ecologically sensitive zones.
- Estimation of Water quality downstream
- Effect of water quality on the construction of the reservoir
- Estimation of quantity of water to be released from reservoir in order to improve the water quality downstream to acceptable standards for industrial, agricultural & domestic use and to maintain acceptance ecological links. This shall be used to fine tune the reservoir regulation and flow diversion operation.

2.6 Risk Analysis, Probabilistic Design

The risk analysis shall commence with an inventory of the hazards & mechanism. Then the consequences of failure shall be evaluated, along with characterisation of damage, structural damage and duration of load shall be estimated.

The risk shall be weighed against the cost of construction. Disaster Management Plan shall be prepared for probable risks.

2.7 Database Management System

A central 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, CAD packages, word processors, statistical software and simulation models.

The numerical models shall be able to import data directly from the database including GIS maps and return data into the database for presentation and further analysis. The system shall be capable of handling data sets of, as a minimum, following types

- Constant time step
- Variable time step
- Instantaneous values
- Average values
- Cumulative values
- Extreme values
- Set points

The DBMS shall have facilities

- for punching data either manually or automatically
- for updation & retrieval in uniform manner
- for generation of datasets of various types.
- forre-assessmentandre-visiting.

Annex-2.7

GUIDELINES FOR ENVIRONMENTAL AND ECOLOGICAL ASPECTS

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

- Assessment of alternate sites
- Legal status of the proposed project site with respect to various applicable Environmental Legislations (Forest act, CRZ regulations etc.)
- Baseline Environmental Data
- Environmental Impact Assessment
- Environmental Management Plan

The study area for the project can be considered as:

- 1 km either side of the river link canal
- 10 km radius around the project area from the periphery of the project site
- Submergence and catchment area for the dams/reservoir in the down stream of the reservoir 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.

However, detailed delineation of project site for the purpose of study shall be based on the requirement of each individual link project.

1.0 ASSESSMENT OF ALTERNATE SITES

Major environmental and ecological components that need to be kept in view during site selection include:

- Legal aspects of the potential sites with respect to environmental legislation (e.g. Forest act etc.)
- Impact on flora and fauna in the vicinity
- Impact on national parks and sanctuaries
- Impact on wild life (including birds) breeding area/feeding area/migration route
- Impact on sensitive sites like monuments of historical, cultural and religious significance
- Impact on forests, agriculture, fishery and recreation etc.
- Evaluation of alternatives with respect to forest, ecology, sensitive sites etc.
- Evaluation of ecological viability of alternate sites based on the aforesaid issues.
- No project scenario On selection of the proposed sites specific issues, which shall be addressed for environmental impact assessments, are discussed in the following sections.

2.0 LEGAL STATUS OF THE PROJECT SITE

The legal aspects of the project with respect to various environmental legislation/guidelines shall be discussed. This will include the status of the project with respect to various environmental acts like Forest Act, 1980, National Forest Policy, 1988, Environment (Protection) Act, 1986, Wildlife Protection Act etc.

The legal aspects of diversions of designated land-use categories to other like National Park or loss of endangered species should be covered. Consideration should also be given to the requirement of prior approval of the Central Government under the Forest (Conservation) Act, 1980 and the Supreme Court in the designated areas.

3.0 BASELINE ENVIRONMENTAL DATA

Baseline Environmental Status of the project shall be established based on the baseline survey carried out (either fresh or based on available literature/authenticated documents) in accordance to the MoEF 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, barren 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
- Sources of water pollution (present as well as future)
- Dependence on water system
- Tourism
- Public Health

Socioeconomic status of the area shall be addressed in the Socioeconomic Environment Impact Assessment study and R & R study.

4.0 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.

Special attention is to be made to do full justice to maintain the balance of both community structures and ecosystem functions of the region in the natural manner.

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
- Impact on Green House Gases and Climate Change
- 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

III. **Land Environment**

- Impact on land use/land cover and change in designated land-use
- 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 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.

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 submergence of wild life and breeding places.

V. Socioeconomic Environment

- Impact on public health due to vector borne diseases
- Impact on sensitive locations like archeological sites etc.
- Impact on change in occupational pattern especially for those who are dependent on the water resources
- Impact on tourism
- Impact on human settlement
- Biodiversity aspects require due consideration

5.0 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
- Siltation Erosion Management
- 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
- Forest management including action plan for improvement of quality (like density, naturalness), and quantity (extent) of forest in low forest cover districts/areas which are served by interlinking program
- Plan for green belt (other than catchment area).
- Comments/observations/recommendations of Chief Wildlife Warden in- case Wildlife habitat/migratory path exists within 7 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.
- Index map of catchment areas with target (physical & financial).
- 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

**Methodology for environmental data collection is given here under in
Tables 1 to 7.**

**MEHODOLOGY FOR ENVRIONMENTAL DATA COLLECTION AS PER OF EIA
GUIDELINE**

Table 1: Guidance for assessment of representativeness and reliability of baseline environmental attributes
(Refer CPCB Guidelines on Methods of Monitoring & Analysis)

Attributes	Sampling		Measurement Method	Remarks
A. Air Environment	Network	Frequency		
Meteorological <ul style="list-style-type: none"> • Wind speed • Wind direction • Dry bulb temperature • Wet bulb temperature • Relative humidity • Rainfall • Solar radiation • Cloud cover • Environmental 	Minimum 1 site in the project impact area	1 hourly continuous	Mechanical/automatic weather station Rain gauge As per IMD specifications As per IMD specifications Mini Sonde /SODAR	IS 5182 Part 1-20 Site specific primary data is essential Secondary data from IMD, New Delhi
Pollutants SPM RPM SO ₂ NO _x CO H ₂ S* NH ₃ * HC* Fluoride* Pb*	10 to 15 locations in the project impact area	24 hourly twice a week (Please refer National Ambient Air Quality Standards, CPCB Notification dated 11 th April, 1994) 8 hourly twice a week 24 hourly twice a	Gravimetric (High-Volume) Gravimetric (High-Volume with Cyclone) EPA Modified West & Gaeke method Arsenite modified Jacob & Hochheiser NDIR technique	Monitoring Network Minimum 2 locations in upwind side, more sites in downwind side / impact zone All the sensitive receptors need to be covered Measurement Methods As per CPCB standards for NAQM, 1994

***Project Specific**

Table 2 : Guidance for assessment of representativeness and reliability of baseline environmental attributes

Attributes	Sampling		Measurement Method	Remarks
B. Noise	Network	Frequency		
Hourly equivalent noise levels	Identified study area	Once in each season	Instrument: Noise level meter	IS:4954-1968 as adopted by CPCB
Hourly equivalent noise levels	Inplant (1.5 metre from machinery)	Once	Instrument: Noise level meter	CPCB/OSHA
Hourly equivalent noise levels	Highways	Once in each season	Instrument: Noise level meter	CPCB/IS:4954-1968
Peak particle velocity	150-200m from blast site	Once	PPV meter	
C. Water				
Parameters for water quality pH, temp, turbidity, magnesium hardness, total alkalinity, chloride, sulphate, nitrate, fluoride, sodium, potassium, salinity total nitrogen, total phosphorus, DO, BOD, COD, Phenol, Heavy metals Total coliforms, faecal coliforms Phyto plankton Zoo plankton	Set of grab samples during pre and post-monsoon for ground and surface water for 10 km distance	Diurnal and Season wise	Samples for water quality should be collected and analysed as per : IS : 2488 (Part 1-5) methods for sampling and testing of Industrial effluents Standard methods for examination of water and wastewater analysis published by American Public Health Association.	

Table 3 : Guidance for assessment of representativeness and reliability of baseline environmental attributes

Attributes	Sampling		Measurement Method	Remarks
	Network	Frequency		
<p>For River Bodies</p> <ul style="list-style-type: none"> • Total Carbon • pH • Dissolved Oxygen • Biological Oxygen Demand • Free NH₄ • Boron • Sodium Absorption Ratio • Electrical Conductivity 	<p>Standard methodology for collection of surface water (BIS standards)</p> <p>At least one grab sample per location per season</p>	<p>Yield of water sources to be measured during critical season River Stretch within project area be divided in grids (say 1 km length and 1/3 width) and samples should be from each grid at a time when the wastewater discharged by other sources of pollution is expected to be maximum</p>	<p>Samples for water quality should be collected and analysed as per : IS : 2488 (Part 1-5) methods for sampling and testing of Industrial effluents Standard methods for examination of water and wastewater analysis published by American Public Health Association.</p>	<p>Data should be collected from relevant offices such as central water commission, state and central ground water board, Irrigation dept.</p>

Table 4 : Guidance for assessment of representativeness and reliability of baseline environmental attributes

Attributes	Sampling		Measurement Method	Remarks
	Network	Frequency		
D. Land Environment				
Soil <ul style="list-style-type: none"> • Particle size distribution • Texture • pH • Electrical conductivity • Cation exchange capacity • Alkali metals • Sodium Absorption Ratio (SAR) • Permeability • Water holding capacity • Porosity 	One surface sample from each village, (soil samples be collected as per BIS specifications)	Season-wise	Collected and analysed as per soil analysis reference book, M.I.Jackson and soil analysis reference book by C.A. Black	
Land use/Landscape <ul style="list-style-type: none"> • Location code • Total project area • Topography • Drainage (natural) • Cultivated, forest, plantations, water bodies, roads and settlements 	At least 20 points along the boundary		Global positioning system Topo sheets Satellite Imageries* (1:25,000) Satellite Imageries* (1:25,000) *Project specific	

Table 5 : Guidance for assessment of representativeness and reliability of baseline environmental attributes

Attributes	Sampling		Measurement Method	Remarks
	Network	Frequency		
Solid Waste				
Domestic Waste <ul style="list-style-type: none"> • Per capita contribution • Collection, transport and disposal system • Process waste • Quality (oily, chemical, biological) 	Grab and composite samples	Season-wise	Guidelines IS 9569 : 1980 IS 10447 : 1983 IS 12625 : 1989 IS 12647 : 1989 IS 12662 (PTI) 1989	
Quality <ul style="list-style-type: none"> • Loss on heating • pH • EC • Calorific value, metals etc. 	Grab and composite samples	Season-wise	Analysis IS 9334 : 1979 IS 9235 : 1979 IS 10158 : 1982	
azardous Waste <ul style="list-style-type: none"> • Permeability and porosity • Moisture pH • Electrical conductivity • Loss on ignition • Phosphorous • Total nitrogen • Cation exchange capacity • Particle size distribution • Heavy metal • Arsenic • Fluoride 	Grab and composite samples		Analysis IS 9334 : 1979 IS 9235 : 1979 IS 10158 : 1982	

Table 6 : Guidance for assessment of representativeness and reliability of baseline environmental attributes

Attributes	Sampling		Measurement Method	Remarks
	Network	Frequency		
<p>E : Biological Environment</p> <p>Aquatic</p> <ul style="list-style-type: none"> • Primary productivity • Aquatic weeds • Enumeration of phyto plankton, plankton and benthos • Fisheries • Diversity indices • Tropic levels • Rare and endangered species • Marine Parks/Sanctuaries/ closed areas /coastal regulation zone (CRZ) <p>Terrestrial</p> <ul style="list-style-type: none"> • Vegetation- species list, economic importance, forest produce, medicinal value • Importance value index (IVI) of trees • Fauna 	<p>Considering probable impact, sampling points and number of samples to be decided on personal judgment within 10/25 km radius from the proposed site</p> <p>Samples to collect from upstream and downstream of discharge point, nearby tributaries at down stream, and also from dug wells close to activity site</p>	<p>Season wise</p>	<p>Standard techniques (APHA et. al. 1995, Rau and Wooten 1980) to be followed for sampling and measurement</p>	<p>Seasonal sampling for aquatic biota</p> <p>One season for terrestrial biota, in addition to vegetation studies during monsoon season</p> <p>Preliminary assessment</p> <p>Microscopic analysis of plankton and me bents, studies of macro fauna, aquatic vegetation and application of indices, viz. Shannon, similarity, dominance IVI etc.</p> <p>Point quarter plot less method for terrestrial vegetation survey</p>

Table 7: Guidance For assessment of representativeness and reliability of baseline environmental attributes

Attributes	Sampling		Measurement Method	Remarks
	Network	Frequency		
<ul style="list-style-type: none"> • Avi fauna • Rare and endangered species • Sanctuaries / National park / Biosphere reserve • Migratory routes 	For forest studies, direction of wind should be considered while selecting forests			Secondary data to collect from Government offices, NGOs, published literature Plankton net Sediment dredge Depth sampler Microscope Field binocular
F. Socio-economic				
<ul style="list-style-type: none"> • Demographic structure • Infrastructure resource base • Economic resource base • Health status: Morbidity pattern • Cultural and aesthetic attributes • Education 	Socio-economic survey is based on proportionate, stratified and random sampling method	Minimum for two phases of the project	Primary data collection through questionnaire	Secondary data from census records, statistical hand books, Topo sheets, health records and relevant official records available with Govt. agencies

ANNEX- 2.8

GUIDELINES FOR FINANCIAL ANALYSIS

1.0 INTRODUCTION

Financial analysis should cover estimation of annual costs and annual benefits of the project in monetised terms. The benefits should be estimated by compiling the tangible benefits to be accrued from the project on various accounts (explained later).

In addition, the intangible benefits like creation of employment, improvement of the standard of living, health and environment, etc should also be assessed (as accurately as possible in monetised terms) and duly considered for economic analysis. Based on above analysis, prioritisation of implementation of the various components of the project could be prepared.

Planned large investment on any infrastructure project need to be evaluated on the basis of detailed feasibility analysis. Financial Analysis (FA) will provide three very useful quantitative project evaluation measures- Cost Benefit Ratio, Economic Internal Rate of Return (EIRR)² and Financial Internal Rate of Return (FIRR). The EIRR is the evaluation of the projects from the viewpoint of the national economy. The FIRR takes into account only the financial inflows, exclusive of economic benefits, and shows the financial/ commercial viability of the project, which is often a condition for long run sustainability of the project (these terms are explained in the next sub-section).

2.0 CASH FLOW ANALYSIS

Cash Flow Analysis will consist of two countervailing parts- the outflows (basically, the proposed costs) and expected inflows (returns) over the years.

A) Outflows: First, we enlist the cost items relevant for 'financial' analysis, where we take the *market* prices for consideration.

(1) Costs during pre-construction phase: These are the early requirements.

Most of the funds need to be collected from budget allotment or loan from co-operative banks, etc (as recently resorted to in Sardar Sarovar Project). Private equity participation in this initial phase will not be large, as they are more concerned with immediate return. The pre-construction costs are-

a) Expenditure on geological, economic, engineering, etc feasibility studies, excluding the govt. officials of the project implementation departments.

Using the terminology of Asian Development Bank (ADB)

(2) Costs during Construction phase: These costs could be financed in part by domestic internal borrowing, aided by external assistance and loans. The precise estimation costs on capital assets (inclusive of a provision for inflation) is very crucial since any cost overrun could lead to delay the construction activity, which will, in turn, delay the realisation of returns.

Capital Assets: They include the expenses on basic structure and equipment mentioned in the technical specification of the project (i.e. head works on main dam, canals, barrages, reservoir, embankments, etc including the provisions for distributaries, electricity generation and distribution, drinking water supply works).

The unit cost of digging, leveling, clearing and reclamation should be estimated for one representative hectare of each terrain type and then extrapolated for the whole project area.

Capital costs are irreversible and confined to the construction phase (post-construction expenditure on renovations will need to be provided- see below).

Wages: In ILR project, labour (both unskilled and expert supervision) cost will be a major outflow of funds given the 'labour intensive' nature of irrigation projects. In view of the typical rigidity of wage rates in India in the face of abundant unemployed workers, this cost component will be fairly stable. This heading must include the expenses on temporary dwellings, schools and hospitals for migrant labourers.

Annual Loan Repayment: For its calculation, the conditions regarding the year of first repayment installment, year by which loan has to be repaid and the interest rebate will need to be finalised by the time of CF analysis. Logically, repayment will start from the end of the first year of project implementation when the water charges will be collected (these details should be obtained from the recommended financing plan).

(3) Costs during Operational Phase: For full realisation of benefits, the long run financial viability of the project is very crucial. So a Maintenance & Operation Manual has to be prepared showing-

(a) Working Capital Funds: Since water charges and maintenance cess are often collected once in a year, sufficient funds should be available with the maintenance units for operation, small repairs; administrative cost of determination, collection and audit of water-charges, including electricity, fuels, rents for vehicles hired, etc.

For the project component like power plants also, working capital will be need to meet operating costs as the billing cycles involves unavoidable time lag.

(b) Renovations: Funds should be available for renewals of worn-out portions of canal, plants and equipment and also for unforeseen major contingencies. For initial years these needs do not arise. They could be considered as constant recurrent costs after a gap of 4/ 5 years.

B) **Inflows:** The inflows appearing in the cash flow tables that are relevant from commercial viewpoint are as follows-

1) Revenue from water charges (on the farmers and industrial users): Depending on the development of the project measured in hectare), the number of beneficiaries will rise gradually. Hence the actual number of beneficiaries and the charges per hectare of irrigated land should be

estimated (even at the feasibility analysis level) to get the series of revenue over different future years. The rate adopted for the recovery should be explained through a note on the methodology, addressing the issues of affordability and acceptability of water charges.

Since the project will take a few years to complete the entire construction, revenue collection may be started as soon as a portion is completed. They would accrue from the end of the first year of the supply of irrigated water.

The industrial users can be charged higher than the farmers. In addition a 'betterment fee' could be levied on those people benefiting by presence of water in their place of living (i.e. watering of cattle by dairy farms, enhanced productivity of fruit gardens, rise in ground water level (if any) around canal areas, etc

- 2) Maintenance cess: Once this flat rate (per hectare) is decided, the total expected revenue collection from the cess would be arrived at (the methodology adopted for fixing the rate should be explained).
- 3) Revenues from hydro-electricity units and drinking water supply, if any.
- 4) International assistance/ loan and domestic donations (if any): The latter may come in parts and might be converted to domestic currency.
- 5) Miscellaneous: Auction of ferry services, lease of lands for shops in colony area, etc
- 6) Increased land revenues on irrigated land, minus the revenue lost on the lands submerged by canals and dam, etc.
- 7) Receipts and recoveries on capital account.
- 8) Residual value and working capital funds: This amount will be available in the last year of economic operation of the scheme.
- 9) Appropriate apportionment of benefits among various stake holders

2.1 Calculation of Internal Rate of Return

By subtracting total outflows for a year from that year's total inflow, we get the net cash flow at current prices for that particular year. The series over all the relevant years will have both positive (if returns exceeds the costs) and negative entities. The rate of discount that will make the sum of their PVs equal to zero is the IRR of the project (i.e. IRR makes the present values of costs equal to the present values of benefits). Comparing it with the alternative investment option (like, minor irrigation) or the market rate of interest (or a reference level like 10 to 12 per cent followed by ADB / World Bank), we can decide whether the project is worth implementing or not.

The same table can be used for 'Economic Cost-Benefit Ratio Analysis' and calculation of EIRR, which shows the total outflows required and various tangible and intangible benefits emerging from the project. The changes that need to be made are as follows-

- (1) On the costs side, for economic IRR we take constant prices (i.e. with reference to a base year prices) instead of current prices so as to reflect the real cost and real benefits free of inflation.

(2) We use 'shadow prices' for inputs used, lands submerged; shadow wage rates to show the opportunity cost of the labour and shadow exchange rate. The shadow prices reflect the true value of the resources to the national economy by removing the distortionary margin (subsidy/ taxes) from the market prices.

On the benefits side, in place of revenues from water charges, etc we put benefits from:

- i. Additional³ crop production
- ii. Additional livestock production
- iii. Flood control (in terms of crops and property worth saved).
The estimate of Cost Benefit ratio for flood control aspect alone could also be calculated.
- iv. Drinking water supply and reduction of water-borne diseases.
- v. Employment generation in 'mandays per hectare' or in terms of
'Wage bill paid out': (a) During the construction activities (b) Out
of

³ 'Additional' implies the difference between the output of the 'with' the project scenario and 'without' the project scenario.

Multiple cropping (c) Increased farm-labourers, if any (possibility of reduction in employment through mechanisation should not be overlooked as irrigation is observed to be accompanied in many areas by adaptation of mechanised farming practices).

- vi. Pisciculture, if any.
- vii. Indirect benefits from expansion of ancillary industries.
- viii. Indirect benefit due to over all development of area such as increase in taxes, stamp duty etc.

2.2 Exhaustive list of estimates required for Cash Flow analysis

1. A pre-determined Discount Rate: The need for discount rate arises in calculating the Cost Benefit Ratio and calculation of shadow prices. The costs and returns will occur in streams over different years. To make them comparable they need to be discounted to present values (PV). Different options are available for the discount rate- the interest rate prevailing in the country, the open market rate on borrowing for public investment, or a combination of spot and forward interest rates. Market rates are often distorted by the imperfections of financial market. The choice will depend on the real opportunity cost of capital to the society (society has a lower rate of discount or time preference) or the rate of return on capital to the economy (i.e. creation of GDP).

2. Year wise expected realisation of revenues/ returns from water charges: Since commend area development may be spread over many years, the ratio of irrigated land to total cropped land will gradually rise. Only these fractions of realisation and the target area should be forecasted to get the year wise probable additional revenue series.

3. Lifetime of the project: The year up to which the scheme is expected to operate viably (both technically and economically) needs to be specified at the outset. After 30 or 40 years the present values of returns become very small.

2.3 Survey Requirement

A survey is necessary for determination of the time required by farmers to opt for new crops and adapt to multiple cropping practices under irrigated water and their plan for substitution of labour for mechanised and chemical inputs. Once water security is provided the use of modern inputs rises. So the survey should also gauge the fertiliser and hi-breed seeds requirement and the need for agricultural advisory services, along with the ability and willingness to pay the water charges. This survey will be covered under the socio-economic survey.

2.4 Sensitivity Analysis

All economic forecasting involves uncertainty. So the designer of the project must make every effort to minimise the uncertainty and make every possible allowance for risks. There are two types of risks:

Natural risks arise from the hazards of the weather that may cause fluctuation in water supply and crop yields. Probability calculations in hydrological surveys show that drought could occur in one or two or even three consecutive years. In calculations of average yields, it must be borne in mind that in about one year out of ten no more than 70% of the normal yield may be expected, but a total crop failure is unlikely. With the help of statistical methods (Arithmetic Mean) it is possible to calculate reasonable average yields on the basis of the known climate of the area and the actual yields achieved by the farms. Also using the past record the probability of risks through unforeseen factors need to be calculated.

Economic risks regarding prices could be estimated. Concurrent technological progress (both productivity raising and input cost reducing) may lead to steady decline in prices as supply exceeds demand. Also the maintenance costs may rise due to high inflation.

Since it is very difficult to forecast the scale of probable fluctuations in yields and prices with any accuracy, the only solution is *to test the sensitivity of calculations to these fluctuations*. This may be done by using other parameters than those considered probable in the initial calculation and by finding out what parameter(s) have the strongest effects on the profitability of the projects for a given percentage variation (i.e. increase in investment costs, increase in operation costs, decrease in average yields, price decline and extension of construction and farmers' adaptation periods). So, it is desirable to calculate the upper and lower limit of IRR and Cost-Benefit Ratio.

There are some contingent cost items like the cost of complementary afforestation if substantial forest land has been submerged, health safeguards to be incorporated during the construction so as to reduce the incidence of health hazards in the operational phase, preventive measures like spraying of mosquito repellent to prevent water-borne diseases, environmental replenishment measures, etc. The negative impact of them on financial returns will be analysed in the sensitivity analysis as, by nature, they are contingent. The impact of delays in construction due to inter-state disputes over sharing of water, reduction in the project life due to higher than the expected siltation, etc. will be similarly incorporated.

Also the items like the loss of medicinal plants, deltas, disappearance of ports and consequent rise in transportation cost (if any), the opportunity cost of fuels lost in cases of water-lifting, etc will be considered in the sensitivity analysis for the *economic* cost-benefit analysis.

2.5 Financial Compartmentalisation

The objective should be to identify the different project components in such detail as will enable the most accurate possible estimation of the financial outflows and financial inflows (as distinct from overall economic benefits). For purpose of the outflows, the parts forming the project proper, as listed in section 10 will each form a separate item. In addition, cash outflow will also cover cost estimates on pre-construction preparatory works and Operation and Maintenance needed during the Construction Phase.

Forecasts should be made on the liabilities arising after the project is commissioned. While grouped under the head of 'Operation and Maintenance', detailed estimation should be made for each project component figuring in the O&M Plan referred in respective section. The following are the main items of expenditure that will figure in this estimation:

- a) Total salary bill of Maintenance staff
- b) Fuel, electricity, rents
- c) Repairs and renovations, preventive maintenance works
- d) Administrative costs and accounts (regarding revenue collection and audit, etc)
- e) Financing costs – interest payments, loan repayments.

On the 'inflow' side, the Water Charges (for irrigated water) and Maintenance Cess are the standard sources directly accruing from the canal link. In addition, expected inflows from power generation, drinking water supply use should be separately assessed for the full life of the project. On power generation, the total operating expenses and the expected revenues from bulk sale of electricity should be estimated separately, and the 'net' inflow worked out so as to provide the expected bidders with a FIRR of power plant alone. Similarly the water supply aspect can be entrusted to some agency with own budget for upgrading and distributing the drinking water and own revenue target under BOT or similar arrangement.

2.6 Participatory Involvement

Implementation of the Project can be facilitated and opposition to it mitigated by involving the affected population and local resources in the project execution. The factors that plays crucial role as inducements for participation are-

- (1) Satisfactory Rehabilitation packages: If apart from resettlement in newplaces, the dislocated people are also provided with employment by opening up collective dairy farm, brick-yard, etc according to their preferences and provision of medical facilities, it will reduce the opposition.
- (2) Complementary Institutional arrangements: Collection and maintenance can be entrusted to agricultural co-operatives, panchayat, Gram Sabhas, etc which will increase the direct involvement in protecting the scheme and reduction of cost of maintenance. The possibility of limited financial participation by local institutions should also be considered (this would impart financial decentralisation to the scheme).
- (3) Incentives: Assurance of subsidised inputs along with advisory services on new technique of cultivation (through existing govt. agencies in these fields or NGOs) for farmers will

encourage the use of irrigated water throughout the year. After the project is commissioned, the socio-economic benefits from it can be increased by encouraging the farmers to adopt multiple cropping and providing them information and access to the needed inputs.

(4) Formal interaction: If advance 'consent contracts' are signed between the expected beneficiaries (without involving any payment of cash) then a fair idea of demand for water will be achieved along with commitment.

(5) Decentralisation of Decision process: If the concerned people are involved in the determination of water charges, it will impart a sense of ownership to the scheme.

2.7 Timeline

Financial Analysis require inputs from all aspects such as technical and socio-economic. Financial analysis should be done after the completion of technical and socio-economic studies and in last four months before final writing of the DPR.

Annex-3.1

GUIDELINES FOR GIS and SPATIAL PORTAL

1.0 GENERAL

The following methodology shall be adopted for performing analysis of Satellite Remote Sensing Data, Development of a Decision Support System using GIS as a front end tool and a RDBMS as the back hand tool and also development of a Spatial Portal.

2.0 METHODOLOGY

The software / information system shall have facilities for user interface design and inter operability. It shall be developed with standard software such as Visual Basic for application, SQL SERVER and ORACLE for database management system and a G.I.S. tool such as Arc GIS or similar for display and analysis of thematic layers of information.

All the licensed purchased or used for this job shall be in the name of the Owner and all the source code of the developed application software shall be provided to the owner.

The data model shall be designed so as to have compatibility with any of the GIS package and similarly compatibility of the propriety software with other software shall be ensured.

The information system shall provide a collaborative environment for multi user editing, updating, analysis, visualization and decision-making. To be operated through stand-alone desktop PC, the devised system shall have the minimum features as mentioned here under:

- Data Access
- Mapping, Customisation
- Hot link, Query Run and Decision Support System
- Editing, Data Conversion
- Geo-processing, High-quality Cartography
- Internet-enabled
- On-the-fly projection
- Geo-coding
- Wizard-driven tools
- Support for metadata standards using XML
- COM-based customization Extensible architecture
- Direct read of more than 40 data formats

The data inputs for the system shall be digital remote sensing data such as FCC, Aerial Photography, and Airborne Laser Terrain Mapping survey results. In addition to these inputs the system shall be designed to have facilities for punching real time on site investigation results such as geological, geomorphological, geophysical, geotechnical and hydrological parameters developed through Auto CAD or similar platforms. The system shall also have features to amalgamate numerical model study results for geo-processing.

The system shall have add on features for carrying out the following:

- Spatial Modeling and Analysis of both raster and vector data in order to create buffers, generate density maps, create surfaces and derive contour, slope, aspect maps, perform Boolean queries and algebraic calculation, perform grid classification etc. It should also be able to do the following:

- Create, query, map, and analyze cell-based raster data. Perform integrated raster/vector analysis.
- Derive new information from existing data.
- Query information across multiple data layers.
- Fully integrate cell-based raster data with traditional vector data sources.

The system should be able to perform spatial analytical tasks such as

- Surface analysis
- Terrain analysis
- Map algebra

Three Dimensional Visualization for Topographic Analysis i.e. perform inter active perspective viewing. It should also be able to perform certain topographic analysis like View shed analysis. The solution should enable users to effectively visualize and analyse surface data. Using the system one should view a surface from multiple viewpoints, query a surface, determine what is visible from a chosen location on a surface, and create a realistic perspective image draping raster and vector data over a surface.

The perspective viewing shall have features such pan, zoom, rotate, and tilt, fly- through simulation, for both presentation and analysis. The three dimensional viewing shall have facilities for generation of sub- surface models for engineering purpose and hydro geological analysis such as ground water/ aquifer modelling. Ground water and surface creation. This shall also have features to calculate surface area, volume, slope, and aspect and perform engineering analysis.

Concurrent to the project development, in order to host an web enabled spatial portal, the system shall have the features of a common platform for exchange and sharing of the entire gamut of both spatial and non spatial information through a collaborative environment. In order to facilitate web related display requirements vis-à-vis transmission through bandwidth, all the data shall be developed in digital format. The spatial portal shall be designed with Arc IMS or similar GIS tool as front-end display, which shall be coupled with the developed information system and shall have restricted access for designated and authorized user. The proposed web solution should have following features:

- Ability to combine data from multiple sources
- Secure access to map services
- Wide range of GIS capabilities
- Highly scalable architecture
- Standards-based communication
- Support for a wide range of clients

Annex-3.2

TEMPLATES FOR DETAIL PROJECT REPORT

The Detailed Project Report shall be prepared as per the laid out guidelines and shall be presented in the following sections:

Section-1 Check list (Will be as per CWC/MOWR Guidelines) Section-2 Salient Features (Will be as per CWC/MOWR Guidelines) Section-3 Report (shall contain the Volumes of DPR as given below)

Volume No.	Description
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Executive Summary

Vol. I Introduction

Vol. II Surveys & Investigation

Vol. III Hydrology & Water Assessment

Vol. IV Design Aspects

Vol. V Reservoir & Power

Vol. VI Construction Program, Manpower Deployment & Plant Planning

Vol. VII Environment Impact Assessment & Environment Management Plan

Vol. VIII Cost Estimate, Financial Aspects

Vol. IX Project Operation Philosophy

Vol.X Other Aspects

Section -4 List of Drawings (Will be as per CWC/MOWR Guidelines) Section-5 List of Appendices

Note: All the activities shall be carried out as per the latest applicable & relevant codes and established practices such as MOWR guidelines for preparation of DPR.

EXECUTIVE SUMMARY

Executive Summary of the DPR shall contain the following in brief:

No.	Description
1.0	Index Map
2.0	Salient Features
3.0	Aims & Objective of the Project and Description of works
4.0	Methodology adopted
5.0	Climate
6.0	Topography & Physiography
7.0	Population
8.0	Geology, Geophysical, Geotechnical & Seismic study
9.0	Hydrology and Water Assessment
10.0	Flood Control & Drainage
11.0	Reservoir & Power
12.0	Design Features
13.0	Construction Materials
14.0	Accessibility & Infrastructure
15.0	Construction & Equipment Planning
16.0	Environmental and Ecological aspects of the Project
17.0	Cost Estimate
18.0	Economic & Financial evaluation
19.0	Clearances Required
20.0	Database

Volume I
INTRODUCTION

- 1.1 Out line of the Project
- 1.2 Justification & Objective of the Project
- 1.3 Lessons Learned from Previous Projects
- 1.4 National Perspective on Water Resources
- 1.5 Selection of proposed Schemes
- 1.6 Project Planning and Optimisation of Benefits
- 1.7 Methodology Adopted.
 - 1.7.1 Data collection
 - 1.7.2 Planning and layouts
 - 1.7.3 Surveys and investigations
 - 1.7.4 Engineering assessments and Front end engineering
 - 1.7.5 Ecological, Socio-economic and Financial Aspects
- 1.8 Clearances Required

##: Covering Govt. Policies, incentives, technical profiles of the projects etc.

Volume II

SURVEY AND INVESTIGATION

- 2.1 Topographical surveys
 - 2.1.1 River
 - 2.1.2 Reservoir
 - 2.1.3 Headworks (Dams including dykes, barrages, weirs etc.)
 - 2.1.4 Plant and colony, layout
 - 2.1.5 Powerhouse, switchyards, surge-shaft, tailrace, etc.
 - 2.1.6 Tunnel, Adits and Penstocks
 - 2.1.7 Any other
- 2.2 Other Allied surveys
 - 2.2.1 Archaeological surveys in the reservoir area
 - 2.2.2 Mineral, (useful and harmful) surveys in the catchment reservoir areas.
 - 2.2.3 Right of way surveys for the reservoir
 - 2.2.4 Communication surveys
 - 2.2.5 Drainage surveys
 - 2.2.6 Soil surveys
- 2.3 Geology, Geophysical & Seismic Investigations
 - 2.3.1 Geology
 - 2.3.2 Seismicity
- 2.4 Foundation Investigations
 - 2.4.1 Earth and rock fill dam/barrage/weir etc.

- 2.4.2 Masonry/concrete dam/weirs etc.
- 2.4.3 Power house tunnels, and canal structures

- 2.5 Construction Material Investigations
 - 2.5.1 Soils-
 - 2.5.2 Sand-
 - 2.5.3 Rock and aggregates-
 - 2.5.4 Bricks tiles-
 - 2.5.5 Pozzolana-
 - 2.5.6 Cement/lime stone-
 - 2.5.7 Cement and steel-
 - 2.5.8 Scarce Materials-
 - 2.5.9 Any other material
- 2.6 Hydrological and Meteorological Investigations
 - 2.6.1 Rainfall and runoff
 - 2.6.2 Sunshine, cloud cover and visibility
 - 2.6.3 Wind and cyclones
 - 2.6.4 Humidity
 - 2.6.5 Temperature
 - 2.6.6 Discharge
 - 2.6.7 Sedimentation
 - 2.6.8 Water quality
 - 2.6.9 Evaporation.

HYDROLOGY & WATER ASSESMENT

3 General climate and Hydrology

3.1 General information about regions

3.1.1 Specific information

3.1.1.1 Drainage basin

3.1.1.2 Floods and drainage

3.1.1.3 River Geometry

3.1.1.4 Ground water recharge

3.1.1.5 Reservoir area

3.1.1.6 Other water usage

3.1.2 Data availability

3.1.2.1 Rainfall and snowfall

3.1.2.2 Pan evaporation

3.1.2.3 Climatological parameters like temperature, humidity, wind etc.

3.1.2.4 River, gauge and discharge

3.1.2.5 Sediment (suspended & bed load) inflow and grain size composition

3.1.2.6 Water quality

3.2 Hydrological data requirements

3.2.1 Alternatives and classifications

3.2.2 Inputs

3.2.2.1 Type of inputs

3.2.2.2 Time unit for simulation studies

3.2.2.3 Hydrological inputs

3.2.3 Requirement of the inputs for the Project

3.3 Compilation and processing of basic hydrological data

3.3.1 Hydrological investigation

3.3.2 Data from other sources

3.3.3 Processing of data

3.3.3.1 Quality of data.

3.3.3.2 Filling up of short data gaps

3.3.4 Adjustment of records

3.3.5 Consistency of data

3.3.5.1 Internal

3.3.5.2 External

3.3.6 Presentation of data

3.3.7 Data for studies other than simulation

3.4 Presentation of Hydrologic inputs for simulation

3.4.1 Water inflows

3.4.1.1 Storage projects

3.4.1 Extension of Data

3.4.2 Data generation

3.4.2.1 Diversion and small pondages

3.4.3 Extension of data

3.4.4 Lake evaporation

3.4.5 Sedimentation studies

3.4.5.1 Revised area capacity curves

3.4.5.2 Rate of sedimentation

3.4.6 Potential evapo-transpiration and rainfall

3.4.7 Flood inputs

3.4.8 Inputs for water quality

- 3.4.9 Low flow inputs
- 3.4.10 Surface to groundwater recharge
- 3.5 **Preparation of hydrological inputs for studies other than simulation**
- 3.5.1 Design floods for safety of structures
 - 3.5.1.1 Criteria for selection of design flood for each structures taking into account the importance of each structures
 - 3.5.1.2 Overall approach adopted
- 3.5.2 Hydro meteorological approach
- 3.5.3 Frequency approach
 - 3.5.3.1 Comparison of design flood estimate.
- 3.5.4 Design flood for determination of flood storage & flood control works
 - 3.5.4.1 Flood problems
 - 3.5.4.2 Degree of protection
 - 3.5.4.3 Design flood for fixing flood storage & design of structures downstream
 - 3.5.5 Studies for design of drainage
 - 3.5.5.1 The problem
 - 3.5.5.2 Surface drainage
 - 3.5.6 Design flood for diversion arrangements
 - 3.5.7 Studies for determination of levels for locating structures on outlets
 - 3.5.7.1 Location of structures
 - 3.5.7.2 Location of outlets
 - 3.5.8 Tail water rating curves.
- 3.6 **Simulation studies**
 - 3.6.1 Model Studies
 - 3.6.2 Project performance
 - 3.6.3 Minimum flow for environmental considerations
- 3.7 **Effect of project on hydrologic regime**
 - 3.7.1 Effect on low flows
 - 3.7.2 Effect on peak flood
 - 3.7.3 Effect on total runoff
 - 3.7.4 Effect on sediment flows
- 3.8 Water allocation & Interstate Aspects.

DESIGN ASPECTS

4.1 Engineering Assessment

4.1.1 General – Brief

4.1.2 Geology, seismicity and foundation – Brief

4.1.3 Alternative studies carried out for selection of site and type of structures.

4.1.4 Choice of final layout of all major components of the project and reason details

4.1.5 Design flood and sediment studies – details

4.1.6 Free board

4.1.7 River diversion arrangements – choice of design flood with hydrographs.

4.1.8 Construction materials – Brief

4.1.9 Details of the model studies for important structures'

4.2 Dam

4.2.1 Earth and/or Rock fill Dam – Design criteria and stability analysis

4.2.2 Concrete/Masonry dam/weirs, Non-overflow section – design criteria, stability analysis, Spillway section – design criteria.

4.2.3 Opening through dams

4.3 Barrages/Weirs and Head regulator

4.3.1 Sediment data

4.3.2 Assumed retrogression at maximum and minimum discharges.

4.3.3 Looseness factor

4.3.4 Scour depth

4.3.5 Intensity of discharge under design/super flood condition.

4.3.6 Co-efficient of discharge

4.3.7 Exit gradient value

4.3.8 Stress allowed

4.3.9 Type (concrete/Masonry) /profile cut off, upstream and down stream aprons, uplift pressure Relief arrangements etc.

4.3.10 Various conditions of MWL, TWL, Drainage earthquake etc, considered for stability analysis of different components of barrages (Spillway, under- sluice, divide wall, canal way, fish ladder, bridge et) and values of factor safety.

4.3.11 Gates, types of gates and hoist bridge and stop logs

4.3.12 Detail of spillway bridge guide and afflux bunds, sheet piles, abutments, divide wall, wings wall, flare out walls, upstream/downstream protection wall.

4.6 **Power House-**

4.6.1 Intake

4.6.2 Power channel

4.6.3 Tunnels/Pressure shafts

4.6.4 Balancing reservoir

4.6.5 Fore bay

4.6.6 Penstocks and surge shaft

4.6.7 Main Power house

4.6.8 Instrumentation

4.6.9 Powerhouse at canal falls and estimates thereof.

4.7 **Infrastructure Studies**

4.8 Industrial and urban use

4.9 Instrumentation

4.11 Operation and Maintenance

4.12 Other Studies.

RESERVOIR & POWER

5.1 Fixation of Storage and Reservoir Levels Approach- Criteria

5.1.1 Dead storage level

5.1.2 Low water level

5.1.3 Full reservoir level

5.1.4 Maximum water level

5.1.5 Maximum backwater at full reservoir level and maximum water levels and its effect points to which backwater effect is felt. Maximum distance of such points from the axis of the structure

5.1.6 Fetch

5.1.7 Direction of wind-Velocity of wind-wave height –Free board-Top of dam

5.2 Sedimentation data and studies

5.2.1 Rate of sedimentation with basis

5.2.2 Sedimentation fraction

5.2.3 Quantity of sediment

5.2.4 Types and shape of Reservoir

5.2.5 Sediment studies

5.2.6 Sedimentation in the reservoir after 50 and 100 years

5.3 Life of Reservoir in years with basis

5.4 Capacity

5.4.1 Capacities

5.4.2 Storage in mcm

5.4.3 Water tightness of the reservoir

5.4.4 Annual losses (mcm) and basis

5.4.5 Flood absorption (mcm)

- 5.5 **Effects on sub soil water table in the adjoining areas particularly downstream of the dam.**
- 5.6 **Reservoir rim stability**
- 5.7 **Area of submergence**
 - 5.7.1 Maximum water level
 - 5.7.2 Full reservoir level
 - 5.7.3 Submergence Ratio submerged (Cultivated) area/CCA
- 5.8 **Land Acquisition –Property submerged-rehabilitation**
 - 5.8.1 Land acquisition (ha)
 - 5.8.2 Detail of property submerged
 - 5.8.3 Rehabilitation of oustee’s
- 5.9 **Recreation facilities**
- 5.10 **Pisciculture**
- 5.11 **Need and recommendation for soil conservation measure in the catchment**
- 5.12 **Any other relevant information**
- 5.13 **Power**
 - 5.13.1 Present status of power development in the state/region
 - 5.13.1.1 Available generating capacity in the state/region from different sources with location and category wise
 - 5.13.1.2 Present status of utilisation of power produced
 - 5.13.1.3 Energy availability (KWH) peaking capability month wise on a dependable year basis (90%)
 - 5.13.1.4 Shortages/Surpluses and import/export of power form the neighboring states/regions
 - 5.13.1.5 Transmission system-layout of transmission network and operation voltages

- 5.13.2 Power requirement
- 5.13.3 Existing
 - 5.13.3.1 Anticipated requirements of energy and peak load with daily, monthly and annual variations up to the likely year of completion of project report say 10-15 years
 - 5.13.3.2 Future plans of power developments in the state/regions
 - 5.13.3.3 Schemes under construction/expansions with locality
 - 5.13.3.4 New schemes under constructions/expansions with locality
 - 5.13.3.5 New schemes sanctioned brief
 - 5.13.3.6 Month wise energy and capacity contribution from the schemes existing under construction/expansion and new for design year including the power generation if any from canal falls
 - 5.13.3.7 Integrated operations studies of the regional power system-short fall/surplus, if any and proposals, to meet the shortfall/disposal of surplus energy
 - 5.13.3.8 Status of the present proposal in overall planning based on the study of alternative mode of generation viz. Thermal, Atomic, and Tidal etc.
 - 5.13.4 Assessment of the power benefits of the proposed projects
 - 5.13.4.1 Nature of multipurpose project in runoff of the river, storage, based with and without carryover brief
 - 5.13.4.2 Hydrology, sedimentation studies and criteria for fixing up full reservoir level and minimum draw down level brief
 - 5.13.4.3 Mode of operation of reservoir depending upon the requirement of the irrigation power flood control, water supply, riparian rights etc.
 - 5.13.4.4 Water power studies depending upon the nature of project. The period of simulation studies.
 - 5.13.4.5 Month wise availability of firm and seasonal power
 - 5.13.5 Installed capacity
 - 5.13.5.1 Anticipated load factor of operation of the power house
 - 5.13.5.2 Total installed capacities to be provided base on the power benefits and anticipated load factor of operations
 - 5.13.5.3 Size and type of generating units, their designed and rated head with justification for the selection of the type and size of units
 - 5.13.5.4 Number of generating units including stand by units to be installed
 - 5.13.5.5 Layout of the power generating units including auxiliary equipment's and switchyards, choice of step-up voltage transformer
 - 5.13.6 Annual Energy generated (Firm seasonal and total) in dependable/lean year.
 - 5.13.7 Proposal for transmission of power form the power station to the existing canal grid
 - 5.13.8 Allocated cost of head works
 - 5.13.9 Comparison of the total cost of the hydroelectric components of the project with any other viable category viz. Thermal, Atomic, and Tidal etc.

VOLUME VI

CONSTRUCTION PROGRAM AND MANPOWER AND PLANT PLANNING

7.1 Construction program and manpower and plant planning

7.1.1 Details of year wise construction program for each of the major components of the work. The program shall be supported by critical path methods highlighting the critical activities.

7.1.2 Bar charts showing the construction program quantity-wise item-wise and year wise target of construction

7.2 Key material planning

7.2.1 Special material and their year-wise requirements

7.2.2 Suggested source of supply for each key item and availability, Irrigation proposed mode of transportation and constraints and limitations

7.3 Plant/Equipment planning

7.3.1 Quantities of excavation involved

7.3.2 Dewatering

7.3.3 Dredging

7.3.4 Drilling and grouting

7.3.5 Earthworks and rock-fill

7.3.6 Concreting/masonry

7.3.7 List of requisite plants & equipments along with cost based on current prices

7.3.8 Workshop and store facilities

7.4 Manpower planning

7.4.1 Year-wise requirements and source

7.4.2 Facilities and amenities proposed to be provided.

Volume VII

ENVIRONMENTAL IMPACT ASSESSMENT

8.1 The proposed project

Project background
Project justification
Project description

8.2 Site selection

Alternate site
No Project option

8.3 Legal status of the project

8.4 Baseline Environmental Data

8.5 Environmental Impact Assessment

8.6 Environmental Management and Monitoring Plan.

VOLUME VIII

COST ESTIMATE, BENEFIT COST (BC) RATIO AND FINANCIAL BENEFITS

10.1 Classification of units

The project shall be grouped into following units

10.1.1 Unit 1 — Head works including main dam and auxiliary dam, dykes, spillway, outlet works, energy dissipation devices, barrages, weir, regulator including intake structures and diversion works.

10.1.2 Unit III- Hydroelectric installation

10.1.3 Unit V – Water supply works

10.2 Classification of minor heads/ sub-heads

10.2.1 Direct charges

10.2.2 Indirect charges

10.2.3 The provisions under the minor head-I – works shall be further sub-divided into A to Y sub-heads.

- A. Preliminary
- B. Land (Resettlement & Rehabilitation)
- C. Works
- D. Regulators and measuring devices
- E. Falls (for canals only)
- F. Bridges (for canals only)
- G. Escapes (For canals only)
- H. Power plant appurtenances (civil works)
- I Buildings
- J. Plantations
- K. Tanks and Reservoirs
- L Miscellaneous
- M. Maintenance
- N Special tool and plants
- O Communications
- P. Power plant and electrical-mechanical system
- Q. Water supply works
- R Distributaries, minors and sub minors
- S Water courses
- T Drainage
- V. Environment and ecology
- W. Losses on stock and unforeseen

10.3 Establishment

10.4 T&P

10.5 Suspense

10.6 Receipts and recoveries on capital account

10.7 Indirect charges

The provisions for these shall be made for two items as under:

10.7.1 Audit and account charges

10.7.2 Abatement of land revenue

10.8 Revenues

10.8.1 Yearly program of development w.r.t date of starting of construction of the project

10.8.2 Sources of Revenue

10.8.2.3 Power rate

10.8.2.4 Other sources (Pisciculture, tourism, etc)

10.8.3 Concession in cargo and passenger rates, etc.

10.8.4 Administrative charges for supply of water and collection of revenues etc.

10.8.5 If the area to be irrigated is prone to scarcity, the expenditure normally incurred to redress the scarcity

10.8.6 Year in which the revenue would start accruing from various sources counting from the first year of construction

10.8.7 Total income from various sources indicated in 11.9.2.

10.8.8 Details of staff proposed for collection of revenues and its basis

10.8.9 Net revenue expected from different components of project

10.8.10 Productivity of project in terms of percentage financial returns.

10.8.11 Justification for sponsoring unproductive project components.