



INLAND WATERWAYS AUTHORITY OF INDIA

(Ministry of Shipping, Government of India)

Head Office: A-13, Sector – 1, Noida – 201301

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EOI (Expression of Interest) for deployment of reputed & experienced consultant for undertaking detailed feasibility and engineering studies for preparation of DPR for development of NW-5 in Odisha India.

1. Inland Waterways Authority of India (IWAI), Ministry of Shipping, Government of India propose to develop Inland Navigation on National Waterway no. 5 in Odisha & West Bengal as a World Bank assisted Project and intends to utilize part of the fund towards the consulting services required for implementing the above Project.

2. Brief introduction on consultancy services:-

2.1 The consultancy services (“the Services”) include “**Study and Preparation of Detailed Project Report for Development of National Waterway no. 5.**”

The main objective of the assignment is to undertake all the relevant studies such as pre-feasibility studies (PFS), detailed feasibility studies (DFS) & detailed engineering studies (DES) which are essential for developing systematically a commercially viable & vibrant inland navigation system for the entire waterway consisting of both river & canal sections. It is proposed to undertake the above mentioned studies as considered essential in two parts i.e. **Part-A and Part-B**, as the draft scope of studies & ToR (Terms of Reference) attached at **Annex – I**.

2.2 Under “**Part- A**” – only **Detailed Engineering Studies (DES)** for the river stretch between **Talcher to Dhamra and Paradip** and under “**Part-B**”- for the canal stretch between Dhamra – Charbatia – Geonkhali (Matai River & East Cost Canal) shall be taken up for both **Detailed Feasibility Studies (DFS)** and **Detailed Engineering Studies (DES)**, for preparation & submission of the DPR (Detailed Project) for undertaking the development work on EPC mode.

It is emphasized that the above mentioned studies for both river & canal system need to be conducted simultaneously for harnessing potential of NW-5 having connectivity and integration with “**Eastern National Waterways Grid**”.

2.3 For both the Sections and stretches, the capacity assessment of the waterway system for transportation of the projected cargo is essential for developing fairway, terminals & other infrastructure. The engineering details of the various components of the fairway development in both the stretches including control structures i.e. barrages with navigation locks shall be prepared for facilitating the safe and smooth movement of both self-propelled and tug barge flotilla of optimum size and capacity.

- 2.4 The **Detailed Feasibility Study** for **Part-B** will include but not limited to technical feasibility study, environmental and social impact assessment and management, resettlement appraisal policy framework, procurement assessment, operation and management, monitoring & evaluation framework, financial management and institutional analysis. The Consultant shall study the river hydrological, hydro morphological, geological and soil condition etc. and also option analysis to arrive at the best option available for maintaining 3.0 meters Least Available Depth in the river & canal stretch between Dhamra and Geonkhali throughout the year.
- 2.5 **DES for both the Part-A & Part-B**, shall include the master plan and detailed engineering design, drawings, specification, cost estimates and time frame for all works including the ancillary ones to be carried out along with goods procurement plan. The studies shall recommend appropriate designs and construction standards which are safe, economical, relevant to traffic projections, local site condition, environmental requirement, social need and have considerable design life and high economic rate of return.
3. Accordingly IWAI, invites expression of interest from the reputed, experienced & resourceful consultancy firms ("Consultants") to provide Consultancy services for **"Study and Preparation of Detailed Project Report for Development of National Waterway no. 5"**. Consultants interested in providing the services should provide information demonstrating that they have the required qualification and relevant experience to perform the Services complying to the following eligibility criteria as in the draft ToR/scope of work attached. The eligibility criteria for short listing the consultant are:-
- a) Consultant should be engaged in conducting similar activities for the past 10 years – copy of Certificate of Incorporation to be submitted along with the EOI.
 - b) Consultant should have a minimum financial turnover of INR 30 crore during any of the last 5 years – Declaration for last 5 years to be submitted along with the EOI.
 - c) Consultant should have completed 5 such studies of similar / related work during the last 5 years – List of scope of work, date of commencement, date of completion, client's details to be submitted.
 - d) Consultant should be having a minimum of 200 employees on their payroll – declaration to be submitted.
 - e) Consultant may form Joint Venture to enhance their qualification or have a sub consultancy agreement for short listing. The nature of association of consultants, whether JV or sub consultant shall be mentioned in the EOI.
4. Expression of interest must be delivered in a written form (in person, or by post or by e-mail) to:-

Chief Engineer,(Project & Marine),
Inland Waterways Authority of India,
A-13, Sector- 1,
Noida – 201301, U.P.
E-mail: cepm@iwai.gov.in
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By 20th November 2015 by 17:00 hours (IST) and it shall be clearly marked “Expression of interest for Consultancy services for **"Study and Preparation of Detailed Project Report for Development of National Waterway no. 5"**”.

5. The proposed consultancy services shall be undertaken as the procedure, terms and condition of World Bank for deployment of consultant. Hence, interested consultants may refer the paragraph 1.9 of the World Bank *Guidelines: Selection and Employment of Consultants under IBRD Loans and IDA Credits & Grants by World Bank Borrowers* dated January, 2011 (“Consultant Guidelines”), setting forth the World Bank’s policy on conflict of interest.
6. A Firm or an individual debarred by the World Bank in accordance with the anticorruption guidelines shall be ineligible for this Assignment in any form or way. A list of debarred firms and individuals is available at the Banks external website: www.worldbank.org/debarr.
7. A Consultant will be selected in accordance with the Quality and Cost Based Selection method set out in the Consultant Guidelines.
8. Further information can be obtained at the address mentioned above during office hours.
- 9. Instructions for submission of Expression of Interest:**
 1. Accomplished Expression of Interest Application & proposal must be submitted together with a Letter of Intent not later than 17:00 hours (IST) on 20th November 2015. Documents in support of all qualification information shall be submitted with application. Proposal of EOI with qualification information shall be furnished on/before the due date of submission at the address mentioned above.
 2. The Application shall be basis of drawing up a shortlist of eligible Consultants who will be invited to submit proposal for services required.
 3. All Applications shall be submitted in English.
 4. Joint Venture (JV) shall not have more than 3 members. One of the members should be a Lead Member. Accordingly, the joint venture agreement as the procedure is to be submitted.
 5. A Consultant shall submit only one proposal, either individually or as a joint venture partner in another proposal. If a Consultant, including a joint venture partner, submits or participates in more than one proposal, all such proposals shall be disqualified. This does not, however, preclude a consulting firm to participate as a sub-consultant, or an individual to participate as a team member, in more than one proposal when circumstances justify and if permitted by the Request for Proposals (RFP).

6. The Application and all related correspondence and documents should be written in English language. Supporting documents and printed literature furnished by Applicant with the Application may be in any other language provided that they are accompanied with translations in English language. Supporting materials, which are not translated into English, may not be considered. For the purpose of interpretation and evaluation of the Application, English language translation shall prevail.
7. IWAI reserves the right to reject any Application, without assigning any reasons thereto.
8. The Applicant shall provide all the information sought under this Qualification Document. Applications that are received in the required format and complete in all respects shall only be evaluated. Incomplete and/or conditional Applications shall be liable to rejection.

10. Guidelines for preparation of Expression of Interest

Following information shall be submitted:

1. Complete name of firm, date of establishment and type of organization whether individual, proprietorship, partnership, private limited company, public limited company etc.
2. Exact and complete corporate/registered/home office address, business address, telephone numbers, fax numbers, E-mail and cable address. For Consultant of foreign registry, indicate if there is any branch office(s) established in India with details in aforesaid manner.
3. If present firm is the successor to or outgrowth of one or more predecessor firms, fresh name(s) of former entity (ties) and year(s) of their original establishment with details in aforesaid manner.
4. Present a brief narrative description of the firms.
5. List of not more than two (2) principals who may be contacted by this Office.
6. Listed principals must be empowered to speak for him or for the firm on policy and contractual matters.
7. Indicate financial figures from consultancy business for past 5 (five) financial years.
8. Organizational strength of Consultant and its constituents in case of a JV shall be given.
9. The above information is required to be submitted in the application by sole applicant or members of JV individually.

S. Dandapat
Chief Engineer
(P & M)
Mob:- +919717622733

Terms of Reference for study and preparation of Detailed Project Report (DPR) for development of National Waterway-5

1.0 Introduction.

1.1 Inland Waterways Authority of India (IWAI), a statutory body under Ministry of Shipping, Government of India has been set up during 1986 for regulation and development of National Waterways for the purposes of shipping and navigation for promoting Inland Water Transport in the country. National Waterway -5 declared during November 2008 for development for a total length of 588 km consists of river system of Brahmani, Kharsuan, Mahanadi delta river, Matai River along with East Coast Canal (ECC) with details as below:-

S.No.	Stretch	Length in Km
1.	Talcher to Jokadia	131
2.	Jokadia to Mangalgadi	106
3.	Mangalgadi to Dhamra	28
4.	Mangalgadi to Paradip	67
5.	Dhamra to Charbatia	39
6.	Charbatia to Geonkhali	217
	Total	588

A map of the NW-5 is attached as **Annex-1** for ready reference.

1.2 NW-5 provides good hinterland connectivity to Paradip Port Trust (PPT) & Dhamra Port Company Limited (DPCL), the major ports of Odisha with the mineral belt in and around Talcher, Daitary, Keonjhar & the upcoming industrial hubs at Talcher, Kalinganagar and Vyasnagar. The projected cargo for transportation through IWT mode on NW-5 are mainly the domestic coal produced by Mahanadi Coal Field, Iron Ore & chromite, imported coal for various industries such as steel plants, thermal power stations, fertilizers and finished products from the industries.

1.3 NW-5 also provides connectivity to National Waterway-1 and NW-2 through Indo-Bangladesh Protocol route as well as proposed NW-6 forming the “**Eastern National Waterway Grid**” for a total length of above 4800 km to serve more than 11 States of India and Bangladesh. This waterway also provides connectivity to a number of minor & major ports under planning & development stage along East Coast in Odisha and West Bengal. A map of National Waterways Grid is attached as **Annex-2**.

2.0 Activities in progress for development.

- 2.1 A study and preparation of DPR was carried out through WAPCOS for developing the fairway with LAD of 2.0m to facilitate the movement of cargo vessels of 500 tonne capacity. The report in this regard was submitted during 2010 with the estimated development cost of Rs. 4210 Cr. (2009 price index) with the suggestion for construction & maintenance of a series of barrages creating reservoir for navigation in the upper reaches of the stretch between Talcher to Jokadia. In the canal portion, it was proposed to develop the fair way only for 300T capacity vessels. EIA & EMP studies for the entire waterway has also been carried and report received during June'2012. However, the statutory clearances from the concerned authorities have not been obtained.
- 2.2 On acceptance of DPR, it was decided initially to develop the commercially viable stretches between Talcher to Dhamra & Paradip for providing the connectivity to both the ports with mining & industrial area through PPP mode. Accordingly, a study was conducted through M/s Grant Thornton for developing the PPP model and engagement of concessioner. However, the project was not found to be feasible with lower capacity cargo vessels.
- 2.3 Effort was made to develop the above viable stretch through Gross Budgetary Support (GBS) by entering into a MoU among IWAI, Odisha Govt, Paradip Port Trust(PPT) & Dhamra Port Company Limited(DPCL) in two phases for providing a fairway of 3.0m LAD to facilitate movement of cargo vessels of above 1500 tonne capacity. M/s WAPCOS was re-engaged to study and suggest the strategy for developing the stretch under phase-I between Pankopal to Paradip & Dhamra. The report in this regard has been submitted during November 2014 with the suggestion for further construction of control structures in this stretch as well besides the reconstruction of existing weir at Jokadia and Sujanpur with navigation locks.
- 2.4 Hence, the development under phase-I has been limited between Erada to Dhamra & Paradip port. The development activities in this stretch for commencement of commercial cargo services are being under taken accordingly. The dredging operation in the non-tidal stretch from Erada to Padanipal is scheduled to commence from November 2015. A temporary terminal facility at Erada is being developed for

commencement of cargo services from Dhamra & Paradip port from the terminal facilities to be developed by both the ports.

- 2.5 On the recommendation of WAPCOS, a one dimensional mathematical model study for the River Brahmani & delta system is being conducted for obtaining the information & characteristic of the river for planning the development strategy of the fairway particularly with respect to the proposed new and existing control structures as recommended by WAPCOS.
- 2.6 In the meanwhile, with the objective of finding once again the feasibility of developing the entire stretch with fairway of higher LAD through PPP mode, M/s FEEDBACK Infrastructure India Ltd., has been engaged as the PDC consultant during May '2015 and the report is expected by Dec '2015.
- 2.7 Tendering action has been initiated for fresh EIA-EMP studies of the tidal stretches of the Mahanadi & Brahmani delta including the terminal facilities proposed to be developed at Paradip, Dhamra & Pankopal for obtaining the required statutory clearances before commencement of developmental activities as envisaged.
- 2.8 Detailed hydrographic survey of the above stretches have been completed during 2013 to assess the latest morphological conditions. Since April 2015, regular monthly Thalweg survey are being conducted in the stretch Jokadia-Dhamra - Paradip to have a data base for proposed navigational activities including dredging where ever required.
- 2.9 A reconnaissance survey of the East Coast Canal was conducted by IWAI from 07th. June 2014 to 15th June 2014. The Report indicates the latest status of the ECC with respect to the existing Locks and weirs, bridges. The ECC canal (known as Hijli tidal canal in West Bengal & Odisha Coast Canal in Odisha) traverses parallel to Bay of Bengal and crosses no. of rivers in both West Bengal and Odisha.

3.0 Objective of the Assignment

- 3.1 The main objective of the assignment is to undertake all the relevant studies such as pre-feasibility studies (PFS), detailed feasibility studies (DFS) & detailed engineering studies (DES) which are essential for developing systematically and smoothly a commercially viable & vibrant inland navigation system for the entire waterway consisting of both river & canal sections. However, due to the inherent characteristics of river & canal section being different from each other,

it is proposed to undertake the above mentioned studies as considered essential for each sector in two parts. Accordingly, under “**Part- A**” - the relevant studies for the stretch between Talcher to Dhamra and Paradip, under “**Part-B**”- the studies for the stretch between Dhamra – Charbatia – Geonkhali (Matai River & East Cost Canal) shall be taken up. It is emphasized that the above mentioned studies for both river & canal system need to be conducted simultaneously for harnessing potential of NW-5 having connectivity and integration with “**Eastern National Waterways Grid**”.

- 3.2 For both the Sections and stretches the capacity assessment of the waterway system for transportation of the projected cargo is essential for developing fairway, terminals & other infrastructure. The engineering details of the various components of the fairway development in both the stretches including control structures i.e. barrages with navigation locks shall be prepared for facilitating the safe and smooth movement of both self-propelled and tug barge flotilla of optimum size and capacity.
- 3.3 The availability of the navigation clearances (horizontal & vertical) across the existing cross structures on the waterways particularly the rail & road bridges, electrical high-tension line and other structures need to be examined for ensuring safe movement of the vessels and accordingly the suggestions/measures for improvement.

4.0 PART – A : The river section from Talcher – Dhamra & Paradip:-

Considering the availability of adequate input and information for establishing the potential of the waterways and feasibility for developing the stretch on account of a number of studies as already conducted after declaration of NW-5 during 2008, it is proposed to carry out directly the detailed engineering study (DES) followed by preparation of DPR for this stretch to execute the development activities for providing a fairway with LAD of 3 mt for facilitating cargo vessels of approx. 2000 tonne capacity along with multi-modal terminal facilities proposed at Talcher, Pankopal, Paradip, Dhamra and other locations as found necessary based on the OD survey of the cargo projected.

The proposed Detailed Engineering Study may be conducted utilizing the data and information available from the DPR prepared by WAPCOS in 2010 and subsequently revised partially for the stretch Pankopal/Jokadia- Dhamra and Paradip during 2015 as well as on the outcome of the ongoing mathematical model studies being conducted by IIT Guwahati for the river stretch. The findings of the studies being carried out by PDC consultant M/s Feedback Infrastructure India Pvt. Ltd. may also be useful.

4.1. Detailed Scope of Work & Terms of Reference (ToR)

4.1.1 The detailed engineering for developing the fairway for 3.0 m LAD, terminal facilities and navigational aids and any further studies if considered necessary shall be carried out for the following:

- i) Demolition of the existing weirs at Sujapur & Jokadia by replacing with suitable barrages & navigation locks having state of art technology.
- ii) Demolition of existing Anicut at Jenapur by replacing with a suitable structure for arresting the diversion of the water.
- iii) Design and Construction of five nos. of new barrages with navigation locks proposed in the stretch Talcher – Jokadia for LAD of 3 m may be reviewed with detailed mathematical/physical model & river engineering studies along with EIA EMP assessment.
- iv) Control structures i.e. check dams proposed by WAPCOS in their revised DPR in the modified route from Sujapur to Padanipal via Kani/Tantighai river may be further studied with mathematical/physical models to decide the minimum requirement for 3.0 m LAD keeping in view the environmental and social impact aspects. River re-direction or river resistive or bank-protection works if any as per the requirement will have to be studied.
- v) Multi-modal terminal facilities at Pankapal, Talcher, Paradip & Dhamra and at other locations based on the OD survey and cargo projections to be examined and developed.
- vi) Requirement of River Conservancy Work including dredging, widening/river diversion and bank protection.
- vii) Improvement of navigation clearances for the existing cross structures i.e. bridges, HT lines etc.

Accordingly, the detailed scope of the work & ToR shall be as follows:

4.1.1 Technical, Economic and Financial Requirements:

The Study including a technical analysis (together with Front-end Engineering and Design works), an Economic and Financial Analysis for preparation of detailed engineering to execute the above work on EPC mode shall be carried out as the following:

1. To revalidate the technical studies after carrying out detailed assessment of navigability, requirement of barrages, their locations, state of the art navigation locks, requirement of multiple navigation channels/lanes as per the capacity assessment of the fairway, potential docking, anchoring areas etc.
2. To revalidate the requirement of terminal facilities with respect to type, size and capacity etc. as per the previous studies on traffic

projection and further re-assessment if essential for developing the detailed engineering.

3. To develop viable outline options to improve or construct common-user facilities at various locations, taking into account short to long term traffic demand, intermodal linkages (to road and/or rail). In developing viable outline options, the Consultant shall include a detailed SWOT (Strength Weakness Opportunity and Threat) analysis on all design alternatives.
4. In consultation with IWAI, make recommendations for preferred options. These shall be prioritized taking into account the existing and future traffic demand, time for project preparation, time for construction and other needs.

In selecting the preferred option, the consultant shall further make: (a) recommendations on the quantity and type of cargo handling equipment or other facilities that should be provided at each common-user terminal; and (b) make recommendations on off-take infrastructure improvement needed to link to the existing road or rail networks.

5. To provide all Front-end Engineering and Design (FEED), cost estimates, drawings and specification for the selected options.

All FEED works shall be divided into separate packages covering different portions of the project and used as the design basis for future construction works. It will reflect IWAI specific requirements and be done in a way that avoids any significant changes during future execution,

6. To recommend a program of development to handle current and forecast traffic volumes most efficiently and effectively and undertake a thorough financial and economic analysis taking into account whole life costs.
7. To indicate a comparison of Scenario of “with project” and “without Project” analysis for the EIRR Studies.

4.1.2. Detailed Engineering Document

The Detailed Engineering Study for drafting the DPR and bid documents for execution on EPC mode shall be undertaken after the revalidation and modification of the earlier recommendation of WAPCOS as and when found necessary by the Consultant. The DPR shall recommend appropriate designs and construction standards which are safe, economical, relevant to traffic projection, local site condition, environmental requirement, social need and have considerable design life and high economic rate of return. The DPR shall include the following but not limited to:

1. Suggest requirement of construction of new barrages & modification of existing old barrages/weirs with the provision of navigational locks for an assured LAD of 3 m.
2. Preparation of master plan/detailed layout plan of entire complex and its surroundings including access to terminal along with design, drawings, specification and cost estimate for gates, boundary wall, internal roads, security, drainage, water supply, sewage disposal, electric supply, emergency and backup power supply. Layout developed should permit expansion of terminals to cater to projected traffic beyond the assessed value for the projected time frame. Adequate space should be allocated for construction of roads to various berths for safe transportation & movement in the terminal area.
3. Prepare detailed multimodal terminal layout plan, shore side infrastructure plan, bank protection work, land development plan along with design and structural drawings, specifications, cost estimates for all structures like berthing jetty, approach jetty, cargo handling equipment including conveyor system covered and open storages along with all allied structures/buildings/facilities like administrative buildings, residential accommodation, security office, customs enclosure, bonded warehouse if required, bunkering of fuel, water supply, electricity supply, fire fighting including lighting, requirement of power, water supply, emergency and standby power supply, communication system, drainage & sewerage system, boundary wall, fencing etc complete.
4. Prepare detailed design, drawings, estimated costs and technical specification, bill of quantities and cost estimates for the works/processes required to develop navigational infrastructure by examining differential global positioning system (DGPS) stations, day and night navigational facilities, vessel traffic management system (VTMS), river infrastructure system (RIS), channel marking methods etc.
5. Every estimate shall be duly supported with rate analyses and on the basis of rates adopted by CPWD/State PWD rates/lowest offers etc.
6. Proof checking of design through reputed academic institutes like IITs (Indian Institute of Technologies) or any independent agencies of repute approved by IWAI before submission to IWAI. The proof checking authority shall endorse on the drawings itself the basic assumptions adopted in the design process.
7. Preparation of realistic construction schedule for the ancillary structures indicating the sequence of activities duly considering the river characteristics in different seasons and priority and phasing of work along with phasing of expenditure.
8. Preparation of specifications, bill of quantities, estimates and tender documents containing General condition of contract, special condition of contract, technical specification and NIT etc. to facilitate implementation of works after the finalization of Detailed Project Report.

9. Preparation of Bid document for works to include all ancillary works and facilities for Capacity Augmentation
10. Preparation of Bid document for goods procurement for navigation aids, cargo handling equipment, dredging, river information system etc and their procurement plan.
11. Preparation of EIA Study Report and Environment Management Plan
12. Preparation of Resettlement Action Plan
13. Work out cost benefit analysis, Financial Internal Rate of Return (FIRR) and Economic Internal Rate of Return (EIRR) of the project based on current Indian/International norms including SWOT analysis with detailed back up calculation, basis, assumption, justification etc along with their source of information.
14. Suggest suitable method of implementing the project including phasing, time frame and source of funds for implementation of project, specifically as to whether the project components can be implemented under EPC mode and if yes, give all necessary details for implementing the project in EPC mode including evaluation of EPC bids, checking of selected EPC contractor's design and drawings etc.
15. Suggest composition of Project Management Consultants (PMC) who would act on behalf of IWAI to implement the project shall carry out necessary checks on all aspects of contract of construction and submit fortnightly reports. The PMC shall also check the quality of work done and certify the correctness of bill progressed by the contractor for payment by IWAI.
16. Conduct stakeholder progress meetings monthly or as required by IWAI at Bhubaneswar/Haldia/Noida/Delhi for giving progress report. Also seek views of stakeholders & incorporate the same for suitable modifications.
17. Submit all the above details in the form of Detailed Project Report (DPR) along with complete tender document to undertake the construction work and thereafter give PowerPoint presentation of Detailed Project Report to IWAI at its HQ in Noida and provide details required by IWAI/clarification, if any.

4.1.3 Detailed Engineering for Ancillary works and Processes

4.1.3.1 The detailed engineering study shall carry out the option analysis and recommend the ancillary works and major civil works to ensure the least available depth (LAD) of water as 3.0 m.

4.1.3.2 The details of ancillary works and processes shall provide all Front-end Engineering and Design (FEED), cost estimates, drawings and specification. The jobs are listed below:

- (1) Terminal complex of appropriate cargo handling capacity and equipment for facilitating integration with other modes including provision to prevent spillage including spills of oil and other hazardous material contaminants for terminals proposed at Talcher, Pankopal, Paradip, Dhamra & other identified locations including but not limited to berthing jetties, approach jetties, mooring bollards, fenders etc. covered and open storage along with all allied structures/buildings/facilities like administrative buildings,

residential buildings, security offices, customs enclosure, bunkering of fuel etc., water supply system, lighting, electricity supply system, emergency and stand by power supply system, communication system, area drainage, sewerage system, treatment plants, boundary wall, fencing, gates, internal roads connecting to highways/rail, pavements, including plan for expansion of berths and roads to cater to projected traffic beyond assessed value for the projected time frame and including revetment/bank protection /slope protection etc. as required

- (2) Provision of all types of navigational aids for day and night navigation.
- (3) Provision of Ro-Ro jetties if any to be recommended.
- (4) Provision of revetment/bank protection/slope protection to be ascertained and detailed engineering developed.
- (5) Provision of river training works/conservancy works for critical locations to be ascertained and detailed engineering developed.
- (6) Provision of dredging for critical locations and assessment of dredging quantity to be recommended.
- (7) Need for provision of integrated repair and maintenance complexes for vessels at suitable locations to be examined.
- (8) Design of River information system including all hardware and software.
- (9) Type and capacity of tug barge flotilla, cargo (self-propelled) vessels along with technical specification for economical operation.
- (10) Specification of the ancillary crafts i.e. survey vessels, tugs, workboats and petrol, rescue, firefighting & pollution control vessels required for the waterways systems.
- (11) Specifications of computer system and software required for information data base & monitoring.

4.2 Economic and Financial Analysis

1 Economic Analysis

The Consultant shall evaluate the benefits of the proposed improvement programme to the economy of India in general in accordance with the principles of the Economic Aspects of Inland Waterways published by the International Navigation Association (Report of Working Group 21 of the Inland Navigation Commission). This shall include a comparison of whole life costs and benefits of the proposed river/canal improvement program. The economic analysis shall also consider the implication of other options including:

- i. Costs of diverting traffic to roads/rail when inland water transport is no longer possible because of limiting navigation conditions
- ii. Costs of having to use smaller shallow draft vessels under the existing navigation arrangements(with limiting draft restriction); and

- iii. Costs to the economy of no longer transporting the inland water traffic because no alternative transport is available.
- iv. The EIRR Studies should specifically indicate a comparison of Scenario of “**With Project**” and “**Without Project**” analysis.

2 Financial Analysis

The increase in IWAI financial revenues resulting from the river/canal improvement programme should be compared with improvement costs and a Financial Internal Rate of Return calculated. While this will almost certainly be negative, against this background, the Consultant will consider measures via which users might be required to pay more - for example, by introducing (i) a levy on fuel for inland vessels, (ii) a port charge per tonne of cargo handled or (iii) a toll on inland water transport –which toll may include various user levies such as navigation dues, river and other dues.

4.3 Deliverables:

All the studies shall be carried out after submission of method statement followed by a bar chart/timeline on activity wise for completion within the agreed time period. Initially, an inception report may be submitted and based on the approval of IWAI, detailed studies are to be carried out and the relevant information & data, engineering details, drawings & plans as considered necessary are to be submitted in a codified & well documented manner.

However, the main deliverables shall include:-

- (i) Method statement and bar chart/action plan.
- (ii) Inception report.
- (iii) Detailed design & drawings of the barrages/weir, navigation locks and check dams proposed for construction at various locations.
- (iv) Cost estimate of each structure along with detail analysis.
- (v) Layout of the proposed terminal facilities with detailed design & construction drawings of the various structures.
- (vi) List of the cargo handling equipment proposed for the terminal facilities & other amenities.
- (vii) Details of the river conservancy work which may include dredging, river training work and bank protection/river diversion work with design and construction drawings.
- (viii) Details of the navigational aids and engineering details.
- (ix) Cargo projection, alongwith types, capacity & size of fleet.
- (x) The various cost benefit analysis such as EIRR, FIRR etc.
- (xi) Tender document for various component of the work including NIT and BOQ.
- (xii) Detailed project report.
- (xiii) Any other deliverables as considered necessary depending on ToR of the studies also to be included.

4.4 Period of Consultancy:

The total period of consultancy for part – A shall be 15 months from the date of signing of the contract.

5.0 **PART – B: Dhamra – Charbatia – Geonkhali (Matai River & ECC)**

The Study for this stretch shall include basically in two phases for finding feasibility and subsequently detail engineering for developing the stretch with LAD of 3 mt for providing a connectivity to the river stretch of NW-5 and subsequently Eastern National Waterways Grid. The studies under two phases are:-

Phase – I: Techno-Economic Feasibility Study including environment and social impact assessment for improving the navigability for economical size of vessels.

Phase – II: On the basis of outcome of Phase – I Study, Detailed Engineering to be conducted for developing the desired fairway, terminal facilities and navigational aids

5.1 The Technical component of the Feasibility Study **under phase-I** shall cover but not limited to the following:

I. Collection and reviewing the data/ reports as available from the various agencies to be conducted. The same shall include:

- All data relating to tidal, topographic, bathymetric, flow and discharge condition, water level variation, soil (suspended sediment, bed and bank) condition, geological, geomorphologic and all other condition;
- Collection of data and information from the **organisations/departments** as mentioned below wherever feasible to be carried out:
Central Water Commission (CWC); CWPRS Pune, WRD & Irrigation & Flood Control Dept. of the State Govt. of Odisha, other concerned Departments of State Govt; National Remote Sensing Agency; Survey of India; National Water Development Authority; Central Ground Water Board; National Disaster Management Authority, ; Central/State Pollution control boards; MoEF & other State/Central agencies for wildlife & forest etc.
- All related documents and studies done by state Govt, CWC with respect to sedimentation distribution pattern discharge pattern etc connected with the stretch.

- All data on road, rail and other modes of transport serving the hinterland from concerned Authorities.
 - All existing cross structures like temporary wooden bridges, steel and RCC bridges including railway bridges shall be studied for vertical clearance with reference to HFL and horizontal clearance available for navigational hindrances. The Study shall recommend the reconstruction /demolition of the cross structures with in-adequate horizontal and vertical clearance for safe navigation.
- II. Review and analyse digital terrain models based on Toposheet of Survey of India/Satellite Imagery and available resources.
- III. Study, map and analyse the following:
- a. All existing man-made structures on the river & canal system (barrages, locks, bridges, river re-direction or river resistive or bank-protection works).
 - b. Historic and existing water and river reference levels, low and flood levels; flow characteristics, discharge velocity and other hydrological conditions;
 - c. Bathymetric conditions;
 - d. Cadastral conditions on river, canal banks and in flood areas
- IV. Undertake surveys to ensure adequacy and completeness of data and record details after physical verification, wherever necessary. This shall include digital terrain modelling using SOI maps available & Satellite Imagery of the entire river & canal system as applicable;
- a. The effects astronomical conditions have on the river system, including tidal reach, height and stream conditions;
 - b. Changes of river courses (based on satellite images for the past 10 years)
 - c. Availability of Road and rail connectivity for possible intermodal connectivity;
 - d. Prepare a spatial distribution of the proposed IWT terminals with destinations/origins (OD pairs) with minimum overland transport.
- V. Undertake physical condition surveys of land at existing navigation locks to be rebuilt with suitable navigational locks and associated works.

- VI. Conduct a comprehensive geomorphic study, review and analysis of sedimentation processes and other requirement for developing desired fairway which shall include:
- VI(a) The sedimentation study shall be aimed at developing an improved understanding of the significant sedimentation processes within the entire river basin. The major emphasis of this work shall be on analysing major channel morphology and sedimentation phenomenon during last 10 year period based on available data. As a minimum, sedimentation study shall comprise the following:
- a) Document the variations in sediment transport (size and quantity);
 - b) identify and quantify all major sources of sediments (bed and banks, tributaries, etc.); and
 - c) Locate degrading, aggrading, and stable reaches, and
 - d) Establish the range of flows transporting the majority of sediments.
- VI(b) Correlate the results of the sedimentation study with historical changes in the basin (channel improvements, land use, barrage and reservoir construction, etc.) enabling the development of a firm understanding of past and present sedimentation processes. This information shall be used by the consultant to qualitatively analyse the effects of anticipated project features. This information shall be used to determine what may or may not work when designing navigation improvement. It shall include a determination of those reaches that are stable in depth and width and thus provide the basis for all subsequent FEED work. Included in the analysis, shall be a study of the curvature of the bends of the river/canal while meandering to determine the siltation and erosion process in the same and the minimum radius of curvature required for navigation of the reference vessels.
- VI(c) Undertake various types of model studies like mathematical and physical depending on requirement to verify and / or enhance all design parameters. As a minimum, this shall include a mathematical model to produce detailed pictures of flow in the river and canal system under current and future conditions. The proposed mathematical model will include the stretch particularly in the intersection of rivers crossing ECC so as to investigate the hydrological effects of the proposed new barrages with navigation locks if considered necessary. The existing barrages/weirs if any are to be demolished or rebuilt with

navigation locks for augmenting the flow in the canal section with respect to navigational requirement.

- VI(d) Identify stretches State wise along with specific issues of each stakeholder so that interaction/consultation with various stakeholders and State Govt. on relevant issues can be made.
- VI(e) Carry out detailed assessment of navigability including bridges, barrages, navigation locks, terminals and potential docking, anchoring, waiting areas/landing points etc for multiple navigation channels if any provided.
- VI(f) Identify requirement of land acquisition, where ever necessary. Details regarding ownership and khasra no. be provided after collecting details from Revenue officials of local administration,
- VI(g) A study/review to be made for Integrating inland navigation with coastal shipping,

Based on the findings of Items VI(a-g) above, the Consultant shall develop viable outline options of short term and long term navigation improvement works. The options should include:

- VII. As a minimum, the option analysis shall include, but not be limited to the following (including combinations thereof);
 - a) Dredging works for maintaining a least available depth (LAD) of 3.0 m all-round the year; and,
 - b) Re-directive Works (channelization, and other flow directive works)
 - c) Resistive Works (bank protection and other erosion control works)
 - d) Construction of level reaches through barrages, weirs and or similar structures to maintain the proposed LAD of 3.0 m.

In developing viable outline options, the Consultant shall include a detailed SWOT (Strength Weakness Opportunity and Threat) analysis on all design alternatives that takes into account the results of the sedimentation study, model and other studies.

This shall include:

- a) The impact, if any, of these measures on the existing structures
- b) Impacts on the environment, agriculture, habitation and other socio economic activity in the region.
- c) Specific analysis, as below, for options of augmentation of water flow. Consultants will examine and analyze (based on secondary data, and modeling as required) for the following:

- d) Understanding and presentation of baseline flow at different segments (preferably of each 50 km length) of the canal (including effect of planned future abstraction)
- e) Understanding and presentation of the baseline flow at the different tributaries (in segments if possible), including effect of planned future abstractions. Understanding and presentation of lean season flow (average of 10 consecutive days and 30 days of least flows) or any other number of consecutive days as acceptable for “round the year navigation” at different segments, including effect of planned future abstraction,
- f) Understanding and presentation of where the lean season flow is adequate for 3.0 m depth (this volume of water flow that is required to enable the intended operation of the waterway will be termed as the “the needed flow”)

VIII. In consultation with IWAI, make recommendation for preferred options. These shall be prioritized taking into account, existing and future traffic demand, time for project preparation, time for construction and other needs.

In considering the same, Consultant shall take into account what works may be done to immediately improve navigability in the short to medium term without construction of barrages, locks or other major river engineering works. Where such improvements shall include dredging, the Consultant shall give detail recommendations with regard to capital and maintenance dredging, type of equipment to be deployed, where and how to dispose of the dredged spoil from dredging operations and assess of the rate of maintenance dredging to be applied as a result of shoaling, boundary and bank changes.

IX. Provide preliminary Engineering and Design, cost estimates, drawings and specifications for both: the preferred navigability improvement works (barrages/check dams, locks, re-directive, resistive or dredging works); and, common-user multi modal freight and passenger terminal works.

X. All works shall be divided into separate packages covering different portions of the project and used as the design basis for future construction works on EPC mode. It will reflect IWAI specific requirement and be done in a way that avoids any significant changes during future execution on EPC mode. No other interpretation, scope, terminology, understanding, meaning etc. will be accepted.

5.2 Economic and Financial Analysis

1 Economic Analysis

The Consultant shall evaluate the benefits of the proposed improvement programme to the economy of India in general in accordance with the principles of the Economic Aspects of Inland Waterways published by the International Navigation Association (Report of Working Group 21 of the Inland Navigation Commission). This shall include a comparison of whole life costs and benefits of the proposed river/canal improvement program. The economic analysis shall also consider the implication of other options including:

- v. Costs of diverting traffic to roads/rail when inland water transport is no longer possible because of limiting navigation conditions
- vi. Costs of having to use smaller shallow draft vessels under the existing navigation arrangements (with limiting draft restriction); and
- vii. Costs to the economy of no longer transporting the inland water traffic because no alternative transport is available.
- viii. The EIRR Studies should specifically indicate a comparison of Scenario of **“With Project”** and **“Without Project”** analysis.

2 Financial Analysis

The increase in IWAI financial revenues resulting from the river/canal improvement programme should be compared with improvement costs and a Financial Internal Rate of Return calculated. While this will almost certainly be negative, against this background, the Consultant will consider measures via which users might be required to pay more - for example, by introducing (i) a levy on fuel for inland vessels, (ii) port charge per tonne of cargo handled or (iii) a toll on inland water transport –which toll may include various user levies such as navigation dues, river and other dues.

5.3 Preliminary Engineering for providing terminals facilities and navigational aids

The Study including a technical analysis (together with Preliminary design), an Economic and Financial Analysis shall be undertaken for preparation of detailed engineering to execute the work on EPC mode in future.

5.3.1 Technical, Economic and Financial Requirements

The Technical component of the feasibility Study shall cover but not limited to the following:

1. Review historical river freight and passenger transport data if any (for river section);

2. Review all historical road and rail transport data;
3. Review the main drivers for transport growth;
4. Analyze the distribution pattern of transport (by cargo grouping and/or commodity types) and its linkages to related patterns of activity in the river basin.
5. Study and map the location of all existing passenger and cargo handling facilities if any (including private and public or common-user terminals) on the entire river reach. This shall include a description of the facility, its capacity (for vessels and passenger or cargo handling).
6. Carryout a detailed condition survey of the existing public terminals or common user facilities if any. The condition surveys determine each terminal's physical condition, its layout if any, size, and current utilization.
7. Develop viable outline options to improve or construct common-user facilities at various locations, taking into account short to long term traffic demand, intermodal linkages (to road and/or rail). In developing viable outline options, the Consultant shall include a detailed SWOT (Strength Weakness Opportunity and Threat) analysis on all design alternatives;
8. In consultation with IWAI, make recommendations for preferred options. These shall be prioritized taking into account, existing and future traffic demand, time for project preparation, time for construction and other needs.

In selecting the preferred option, the Consultant shall furthermore:

- a) make recommendations on the quantify and type of cargo handling equipment or other facilities that should be provided at each common-user terminal; and
 - b) make recommendations on off-take infrastructure improvements needed to link to the existing road or rail networks.
9. Provide all preliminary Engineering and Design, cost estimates, drawings and specifications for the selected options.

All works shall be divided into separate packages covering different portions of the project and used as the design basis for future construction works. It will reflect IWAI specific requirement and be done in a way that avoids any significant changes during future execution,

10. Recommend a program of development to most efficiently and effectively handle current and forecast traffic volumes and undertake a thorough financial and economic analysis taking into account whole life costs.

5.4 Study under phase- II : Detailed Engineering

The detailed engineering study shall be conducted on acceptance by IWAI to the recommendation of techno-economic feasibility study under phase-I including market development. The study shall be conducted for preparation of the DPR and bid documents for execution on EPC mode shall be undertaken. The DPR shall recommend appropriate designs with construction standards and drawings which are safe, economical, relevant to traffic projections, local site conditions, environmental requirements, social needs and have considerable design life and high economic rate of return. The DPR shall include the following but not limited to:

1. River Conservancy work including dredging, widening, channel diversion and bank/side protection of the canal system.
2. Design & construction of new barrages with the provision of navigational locks for an assured LAD of 3 m or as found feasible during phase-I study.
3. Improvement of navigation clearances for the existing cross structures i.e. road/rail bridges, HT lines etc.
4. Preparation of master plan/detailed layout plan of entire complex and its surroundings including access to terminal along with design, drawings, specification and cost estimate for Gates, boundary wall, internal roads, security, area drawings, drainage, water supply, sewage disposal, electric supply, emergency and backup power supply. Layout developed should permit expansion of terminals to cater to projected traffic beyond the assessed value for the projected time frame. Space should be kept for roads to various berths.
5. Prepare detailed multimodal terminal layout plan, shore side infrastructure plan, Bank protection work, land development plan along with design and structural drawings, specifications, cost estimates for all structures like berthing jetty, approach jetty, cargo handling equipment including conveyor system covered and open storage along with all allied structures/buildings/facilities like Administrative Buildings, Residential Accommodation, security office, customs enclosure, bunkering of fuel, water supply, electricity supply, fire fighting including lighting, requirement of power, water supply, emergency and standby power supply, communication system, Drainage & Sewerage system, boundary wall, fencing etc. complete
6. Prepare detailed design, drawings, estimated costs and technical specification, bill of quantities and cost estimates for the works/process required to develop navigational infrastructure by examining Differential Global Positioning System (DGPS) stations, day and night navigational facilities, Vessel Traffic Management system (VTMS), River Infrastructure system (RIS), channel marking methods etc.

7. Every estimate shall be duly supported by the justification of rates adopted/basis of rates adopted like CPWD/State PWD rates/ market rates/lowest offers etc.
8. Proof checking of design through IITs/ independent agencies of repute approved by IWAI before submission to IWAI. The proof checking authority shall endorse on the drawings itself the basic assumptions adopted in the design process.
9. Preparation of realistic construction schedule for the ancillary structures indicating the sequence of activities duly considering the river characteristics in different seasons and priority and phasing of work along with phasing of expenditure.
10. Preparation of specifications, bill of quantities, estimates and tender documents containing General conditions of contract, Special conditions of contract, technical specification and NIT etc. to facilitate implementation of works after the finalization of Detailed Project Report.
11. Preparation of Bid document for works to include all ancillary works and facilities for Capacity Augmentation
12. Preparation of Bid document for goods procurement for navigation aids, cargo handling, dredging, river information system etc. and procurement plan
13. Preparation of Environment Management Plan
14. Preparation of Resettlement Action Plan
15. Work out cost benefit analysis, Financial Internal Rate of Return (FIRR) and Economic Internal Rate of Return (EIRR) of the project based on current Indian/International norms including SWOT analysis with detailed back up calculations, basis, assumption, justification etc. along with their source of information.
16. Suggest suitable method of implementing the project including phasing, time frame and source of funds for implementation of project, specifically as to whether the project components can be implemented under EPC mode and if yes, give all necessary details for implementing the project in EPC mode including evaluation of EPC bids, checking of selected EPC contractor's design and drawings etc.
17. Suggest composition of Project Management Consultants (PMC), who would act on behalf of IWAI to implement the project, shall carry out necessary checks on all aspects of contract of construction and submit fortnightly reports. The PMC shall also check the quality of work done and certify the correctness of bill progressed by the contractor for payment by IWAI.
18. Conduct stakeholder progress meetings monthly or as required by IWAI at Bhubaneswar/Haldia/Noida/Delhi, give progress report whenever asked by IWAI, seek views of stakeholders, incorporate views of stakeholders and make suitable modifications.
19. Submit all the above details in the form of Detailed Project Report (DPR) along with complete tender document to undertake the construction work and give PowerPoint presentation of Detailed

Project Report to Project Management Unit (PMU) of IWAI at its HQ in Noida.

20. Subsequent to Detailed Project Report, Provide details required by IWAI/clarification, if any.

5.4.1 Detailed Engineering for Ancillary works and Processes

- i. The detailed feasibility study shall carry out the option analysis and recommend the ancillary works and major Civil works to ensure least available depth (LAD) of water as 3.0 m.
- ii. As the details of ancillary works and processes shall be only available after the detailed feasibility study, the financial bid of the detailed engineering for ancillary works and processes shall be quoted. The details of ancillary works and processes shall provide all Front-end Engineering and Design (FEED), cost estimates, drawings and specifications. The jobs are listed below:

- (1) Terminal complex of appropriate cargo handling capacity and equipment for facilitating integration with other modes including provision to prevent spillage including spills of oil and other hazardous material contaminants for terminals proposed at Talcher, Pankopal & other identified locations including but not limited to berthing jetties, approach jetties, mooring bollards, fenders etc. covered and open storage along with all allied structures/buildings/facilities like administrative buildings, residential buildings, security offices, customs enclosure, bunkering of fuel etc., water supply system, lighting, electricity supply system, emergency and stand by power supply system, communication system, area drainage, sewerage system, treatment plants, boundary wall, fencing, gates, internal roads connecting to highways/rail, pavements, including plan for expansion of berths and roads to cater to projected traffic beyond assessed value for the projected time frame and including revetment/bank protection /slope protection etc. as required
- (2) Provision of all types of navigational aids for day and night navigation.
- (3) Provision of Ro Ro jetties if any –To be recommended by the Consultant.
- (4) Provision of revetment/bank protection/slope protection – To be ascertained by the Consultant.
- (5) Provision of River training works/conservancy works for critical locations - To be ascertained by the Consultant.
- (6) Provision of dredging for critical locations – To be recommended by the Consultant.
- (7) Provision of integrated repair and maintenance complexes for vessels at two locations. (Locations shall be recommended by consultants)

- (8) Design of River information system including all hardware and software
- (9) Specification of Tug barge flotilla, inland cargo (self-propelled) vessels.
- (10) Specification of the ancillary crafts i.e. survey vessels, tugs, workboats and petrol, rescue, firefighting & pollution control vessels.
- (11) Specifications of computer system and software

5.5 Economic and Financial Analysis

1 Economic Analysis

The Consultant shall evaluate the benefits of the proposed improvement programme to the economy of India in general in accordance with the principles of the Economic Aspects of Inland Waterways published by the International Navigation Association (Report of Working Group 21 of the Inland Navigation Commission). This shall include a comparison of whole life costs and benefits of the proposed river/canal improvement program. The economic analysis shall also consider the implication of other options including:

- i. Costs of diverting traffic to roads/rail when inland water transport is no longer possible because of limiting navigation conditions
- ii. Costs of having to use smaller shallow draft vessels under the existing navigation arrangements (with limiting draft restriction); and
- iii. Costs to the economy of no longer transporting the inland water traffic because no alternative transport is available.
- iv. The EIRR Studies should specifically indicate a comparison of Scenario of “**With Project**” and “**Without Project**” analysis.

2 Financial Analysis

The increase in IWAI financial revenues resulting from the river/canal improvement programme should be compared with improvement costs and a Financial Internal Rate of Return calculated. While this will almost certainly be negative, against this background, the Consultant will consider measures via which users might be required to pay more - for example, by introducing (i) a levy on fuel for inland vessels, (ii) port charge per tonne of cargo handled or (iii) a toll on inland water transport –which toll may include various user levies such as navigation dues, river and other dues.

5.6. Deliverables:

All the studies in both phases shall be carried out after submission of method statement followed by a bar chart/timeline on activity wise for completion within the agreed time period. Initially, an inception report may be submitted and based on the approval of IWAI, detailed studies

are to be carried out and all the relevant information & data, engineering details, drawings & plans as considered necessary are to be submitted in a codified & well documented manner.

However, the main deliverables for the study shall include:-

Phase – I

- (i) Method statement and bar chart/action plan.
- (ii) Inception report.
- (iii) Conceptual layout of the barrages/weir, navigation locks and check dams proposed for construction at various locations.
- (iv) Preliminary Layout of the proposed terminal facilities.
- (v) Requirement of the river conservancy work which may include dredging, river training work and bank protection/canal diversion work.
- (vi) Requirement of the navigational aids.
- (vii) Preliminary Environment, socio-economic study report.
- (viii) Cargo projection & traffic details with suggested types/capacity of the cargo fleet.
- (ix) The various cost benefit analysis included EIRR, FIRR etc.
- (x) Project Feasibility report.
- (xi) Any other deliverables as considered necessary depending on ToR of the studies also to be included.

Phase – II

The main deliverables for this study shall include:-

- (i) Method statement and bar chart/action plan.
- (ii) Inception report.
- (iii) Detailed design & drawings of the barrages/weir, navigation locks and check dams proposed for construction at various locations.
- (iv) Cost estimate of each structure along with detail analysis.
- (v) Layout of the proposed terminal facilities with detailed design & construction drawings of the various structures.
- (vi) List of the cargo handling equipment proposed for the terminal facilities & other amenities.
- (vii) Details of the river conservancy work which may include dredging, river training work and bank protection/river diversion work with design and construction drawings.
- (viii) Details of the navigational aids and engineering details.
- (ix) Cargo projection details and types/capacity & dimension of vessels.
- (x) The various cost benefit analysis included EIRR, FIRR etc.
- (xi) Tender document for various component of the work including NIT and BOQ.
- (xii) Detailed project report.
- (xiii) Any other deliverables as considered necessary depending of ToR of the studies may also be included.

5.7. Period of Consultancy:

The total period of consultancy shall be 20 months from the date of the signing of the contract with Consultant. The phase – I study i.e. techno economic feasible study is to be completed within a period of 8 months. On acceptance of the report of the feasibility study, the phase – II study is to be completed within a period of 12 months.

6.0 Institutional Strengthening & Capacities for studies under both parts.

The Consultant shall advise on the following activities for institutional strengthening & Capacity building:

1. Prepare the detailed guidance & procedure for the subsequent operation & maintenance of the waterway system.
2. Based on the above, suggest the manpower requirement with a organisational structure, their duties & responsibilities.
3. Based on cargo projection assess the number of vessels, their type and size required for transportation
4. Review and suggest the roles of State Government and Central Government with regards to rules and regulations pertaining to development of waterways, safety during navigation, environment management, registration and safe operations of vessels.
5. Review and recommend Human Resource Development for complete Inland waterways Transport Sector
6. Review and recommend development/enhancement of Training Institutes for IWT sector
7. River Information system and vessel traffic management service for the sector
8. Advise on search, rescue and emergency arrangements for the sector.

7.0. Minimum Qualification and Experience of Key Experts required for the studies under both parts:

S.No.	Key Expert	Minimum Qualification	Experience
1	Team Leader	B.E. / B. Tech (Civil), M. Tech (Civil) with Specialization in structures	25 Years including 5 years as CE / Head
2.	Irrigation & Flood Control Engineer	B.E. / B. Tech (Civil), M. Tech (Civil) with Specialization in design & construction of Dams, Barrages, weirs, Locks	25 Years including 5 years as CE in the WRD/ Irrigation & Flood Control Deptt. of any State Govt.
3	Hydrographer	BE(Civil) or equivalent	20 years including 5 years in the river
4	Structural Engineer	B.E. / B. Tech (Civil), M. Tech (Civil) with Specialization in structures	20 years including 5 years in marine / river structures
5	Docks and	B.E. / B. Tech (Civil), M. Tech	20 years

	Harbour Engineer	(Civil) with Specialization in Docks and Harbour	
6	Navigation Expert	Master Unlimited / Master Mariner	20 years, including 1 year in Inland Waterways or equivalent experience
7	Hydrologist	B.E. / B. Tech (Civil), M. Tech (Civil) with Specialization in Hydrology	15 years
8	Contract Specialist	B.E.(Civil)	25 years
9	Geotechnical Engineer	B.E.(Civil), M. Tech (Geotechnical Engineering)	10 years of experience in related field
10	Survey Engineer	B.E. (Civil), M. Tech (Survey)	10 Years of experience in related field
11	Transport Economist	M.A. (Economics)	10 Years including 5 years in transport sector
12	I T Specialist	B. Tech (Computer Science) or equivalent	10 Years including 5 years in river information system
13	Inland vessel design specialist	B.Tech(Naval Architecture)	15 Years including five years on inland vessels.
14	EIA Coordinator	Must be a i) QCI/NABET Accredited EIA Coordinator for Ports & Harbour Projects, Category 'A' ii) Masters in Environment Management from recognized university with minimum 10 years of Environmental studies of various infrastructure projects.	25 Years including 5 years as Head.

Consultants will provide a team of additional experts and support team to complete the assignment with high quality.

8. Cooperation with Other Consultants, Methodology and Standards applicable to both PART A & B.

8.1 The proposed study may be conducted with reference to the studies already completed and studies in progress including the proposal for identification of specific stretches through PPP mode and the corresponding project proposal.

8.2 The entire river section and majority of the canal section of NW 5 fall within the State of Odisha where the river network is controlled by Water Resources Department of Govt. of Odisha. In addition to this, the Govt. Port at Paradip and the private Port at Dhamra are the major stake holders in the development of NW 5. The Consultant shall make all relevant studies and data collection and analysis with a close interaction with the co-operation of the WRD of Odisha Govt and the

above two Port Authorities. The proposed construction of new barrages with navigation locks and replacement of existing old Weirs/Barrages without navigation locks by new Barrages with navigation locks without affecting the requirement of irrigation and flood control is a challenging job that has to be done with the total assistance and co-operation of the State WRD and local Irrigation Divisions of the Govt. of Odisha and partly with the assistance of the Irrigation & Waterways Directorate of the Govt. of West Bengal for last stretch of the canal section falling within West Bengal.

- 8.3 The Consultant shall be responsible for evolving an appropriate methodology in accordance with relevant industry standards shall undertake all fieldwork and ensure that all data is quality assured and corrected wherever appropriate. The Consultant shall keep a record of all information collected and present in a manner that allows statistical comparisons to be made. Qualitative or Quantitative assessment must be backed up by case studies and relevant industry examples.
- 8.4 The methodology shall ensure any selective, focused or short-term interventions aligned with the broader large-scale, integrated and long-term vision of IWAI, taking into account linkages to other sectors. In particular, the methodology shall take into account the medium to long-term need to reduce maintenance dredging and other works.
- 8.5 The Consultant shall, for the purposes of this study, take into account all recognized standards, guidance notes and codes of practice as required in accordance with Indian Law and as recognized internationally.
- 8.6 The proposed studies shall also refer to guidance notes and recommendations as published by PIANC, European Commission on River Rhine Navigation, US Army Corps of Engineering and other non-profit international organization responsible for dealing with both broad and very specific navigation sustainability and environmental risk-related issues;

9. Assumptions and Conditions

- 9.1 No assumptions shall be made by Consultants regarding the support and services from IWAI. All consultancy works which are included in the scope of work shall be carried out by the selected Consultant and the Consultant cannot transfer any responsibility for completion of work to IWAI.
- 9.2 The proposals submitted by Consultant shall not have any conditions. Conditional proposals shall not be technically evaluated and will be summarily rejected.
- 9.3 IWAI will provide only necessary assistance to the Consultant to obtain the data and clearances from various government agencies.

- 9.4 IWAI will only provide extra cost for carrying out the Geo-technical investigations required for structures after due approval of IWAI and ascertaining the necessity of work and reasonability of cost. All other costs including that of detailed hydrographic & traffic surveys, data collection and investigations should be accounted for in the financial proposal of the Consultant.

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NATIONAL WATERWAY - 5

East Coast Canal integrated with Brahmani and Mahanadi delta river system



Eastern Inland Waterways Grid

