Terms of Reference

for

Environmental Impact Assessment (EIA), Environmental Management Plan (EMP), Social Impact Assessment (SIA) and Resettlement Action Plan (RAP)

for

Capacity Augmentation of National Waterway -1 (Jal Marg Vikas Project)

Ref:- IN-IWAI-29587-CS-QCBS

November-2017

Project Management Unit
Capacity Augmentation of the National Waterway – 1 (Jal Marg Vikas Project)
INLAND WATERWAYS AUTHORITY OF INDIA
(Ministry of Shipping, Government of India)

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

Phone: 0120-2424544 ; website: www.iwai.nic.in ; email: vc.iwai@nic.in

1.0 Introduction

The Inland Waterways Authority of India (IWAI), Ministry of Shipping, Government of India is implementing the Jal Marg Vikas Project (JMVP) for Capacity Augmentation of the National Waterway -1 (Varanasi to Haldia stretch) on the Ganga-Bhagirathi-Hoogly River System. The capacity augmentation includes development of infrastructural facilities i.e. river terminals with appropriate cargo handling capacity and equipment for facilitating integration with other modes of transportation; one navigational lock, provision of navigation aids; river information system; RO-RO jetties; bank protection / slope protection; river training works; tow barges; inland vessels; survey vessels including rescue boats and survey equipment and maintenance dredging facilities.

Specific interventions that are planned under the JMVP and for which EIA and SIA has been completed are as follows:

A. Interventions for which the EIA and SIA has been completed :

- Maintenance dredging to provide Least Available Depth (LAD) in waterway/channel and the terminal facility.
- Improved Navigation Infrastructure & Navigation Aids
  - Construction of 3 terminals: Site identification and planning for three terminals at Sahibganj, Varanasi and Haldia is completed. Construction of one Navigation Lock at Farakka, West Bengal.

B. Interventions for which EIA and SIA are yet to be done

- Provision for bank protection / slope protection and river training works including bend correction for critical locations.
  - Two barge maintenance and operation facilities. Locations under finalization.
  - Two more potential sites for development of terminals are identified at Ghazipur (Navapura) and Kalu Ghat (Parmanandpur). These two sites are still under consideration for finalization and planning of design at initial stage only. One more terminal site along NW-1 is being identified.
  - 10 RO – RO terminals (5 pairs)
  - Road connectivity and Road Over Bridge for terminal at Sahibganj and construction of additional facilities at the Varanasi terminal for construction of road.

C. Other project interventions

- Development of efficient River Information System with all hardware & software.
- Development of navigation aids along NW-1 for facilitation of day & night time navigation.
- The project will support detailed design preparation of passenger terminals at 18 locations in 6 cities (Varanasi, Patna, Munger, Bhagalpur, Haldia, Kolkata) for which the locations are yet to be identified.

- Provision for tow barges, inland vessels, survey vessels including rescue boats and survey equipment. Development of low draught cargos.

The project also envisages creation and improvement of integration opportunities with other surface transport modes such as roads and railways, so as to improve the overall efficiency of the logistics chain by linking the waterways through various well equipped terminals and jetties.

An EIA and EMP, SIA and RAP/SMP and a Resettlement Policy Framework has been prepared for the four sub-projects identified earlier. For the remaining sub-projects for which locations were finalized at a later stage, IWAI is commissioning this study for additional interventions (listed below in section 2.0) to identify environmental and social issues and stakeholders and communities, including socially and economically disadvantaged communities in accordance with the Rules framed by Central /State governments and the World Bank operational policies.

2.0 Interventions, impacts to be covered within the scope of the Additional facilities

Following additional works are planned under the JMVP and form the scope of this study are detailed in 2.1-2.4 below:

2.1 River Training, Bank Protection and Bend Correction works

Erosion of banks is a natural phenomenon in alluvial rivers. However, the problem of erosion aggravates further due to construction of structures like bridges, terminals and jetty on the river and also due to ripple action of the waves due to barge movement in narrow stretches of the waterway. UnderJMVP, river training works of the following nature will be taken up:

- Bank protection works – for 9.438 kms. (Feeder Canal) total 42.5 kms at different locations
- Bend correction – upstream of Farakka

Environmental and Social Impacts are anticipated due to River training and Bank protection.

Environmental Impact: Bend correction: Bends are navigational hazard which may require straightening to minimize the navigational hazard. Under JMVP, the only bend correction intervention proposed so far is upstream of the Farakka navigation lock.

Additionally, the project is planning to undertake slope correction/ bank protection. The list of locations for river bank protection works is annexed at **Annex C**. It is envisaged that there may be some construction induced impact including the impacts due to movement of construction material to and from the bank protection sites/ river training works, or due to placing of materials and stocks at the location during construction. This could have some impact in terms of noise and air

Social Impacts: This may cause temporary disturbance to the local population

including disruption of local ferries, or activities at ghats. There may be impact related to access to services for those relying on local ferries Moreover, placing of geo bags or other materials results in temporary reduction in river water quality due to sediment mobilization, affecting the usage of water for household purposes.

A detailed EIA, EMP, SIA and SMP cum RAP is required to be prepared to screen the location specific impacts (as per the list) and mitigation measures.

2.2 RO- RO crossings, Jetties

Under JMVP, five pairs of RO-RO crossings at NW-1 are proposed to be developed in UP, Bihar, Jharkhand and West Bengal. In addition to RO-RO jetties, passenger ferry jetties will also be developed for movement of passenger ferries and promoting passenger movement and tourism in the waterway. A list of locations for RO-RO crossings is provided at **Annex A**.

Environmental and Social Impacts Anticipated Due to RO-RO Jetties and Passenger Ferry Jetties.

Environmental Impacts: Development and operation of jetties will have implications on various physical and biological components of the environment, i.e. water quality, aquatic and terrestrial flora & fauna, air quality, noise levels, etc. All these environmental components will be affected due to development and operation of the jetties and a detailed Environmental Impact Assessment should be carried to assess the potential impacts of the project.

Social Impacts: Further the impacts of development can be due to its location or nature of activities to be performed during its development and operation phase; thus, both these aspects need to be looked into while carrying out the SIA study.

2.3 Barge Repair and Maintenance Facilities

The project proposes to construct and operate two barge repair and maintenance facilities. The proposed facilities will have the following components, tentatively:

1. **Slipway:** It is a ramp, which helps in moving the barge/ship to and fro from water to land. Slipway will be provided in deeper water conditions so that design vessels can be taken in docking conditions.
2. **Winch House:** It would be provided in straight-line to main slipway. It is generally a single room like structure and with adequate space for winch and electrical equipment.
3. **Repair bay for large & small vessels:** Repair bay for vessels should be inclined so that the vessels can slide towards the river on its own after repair under control of winch.
4. **Transfer bays:** To transfer small vessels between slipway and repair bay.
5. **Winches and trolleys:** Winches would be provided at winch house and at transfer bay. Trolleys would be provided to receive the vessels on main slipway.
6. Workshops and buildings with all basic utilities like water, electricity, storm water management system and waste management system.

Environmental and Social Impacts anticipated due to development and operation of barge repair & maintenance facility.

Environmental Impact: Maintenance and repair facilities for barges involve handling, storage and management of various hazardous chemicals and wastes. Also there are occupational health and safety risks involved at these facilities due to nature of works and machinery involved. High VOC emission and odour are also expected from such sites due to storage of paints & other chemicals and painting facility. Large quantity of wash water will be generated from these sites for which an efficient effluent treatment systemis required. Overall development of maintenance facility will have interface with various physical, social and biological components of the environment, i.e. soil quality, water quality, aquatic and terrestrial flora & fauna, air quality, noise levels, land use, waste management facilities etc. All these environmental components will get affected due to development and operation of the maintenance facilities and a detailed ESIA would need to be carried out to assess the potential impacts of the project.

Social Impact: This activity would include impacts associated with temporary influx of labours; taking health and safety measures and compliance of labour laws at the construction site. Furthermore, effluent discharge will have many social implications on neighbouring habitations and particularly the fishermen population inhabiting the bank-affecting their livelihood, health, etc. Further, the impacts of development can be due to its location or the nature of activities to be performed during its development and operation phase. Thus, both these aspects need to be looked into while carrying out SIA study.

2.4 Inland Waterways Terminal Facility

IWAI has requisitioned land at the following sites for terminal, with required land and associated facilities:

Sl.	Site and Intervention	Required land
1.	Intermodal terminal at Ghazipur (with road connectivity)	8.971ha
2.	Intermodal terminal at Kalughat (with road connectivity)	5.159 ha
3.	Multimodal terminal at Sahibganj – (Road connectivity, ROB)	23.15 ha
4.	Land for additional terminal and road connectivity with NH-7	29.169 ha

2.4.1 Specific scope of SIA of terminal facilities

1. The land for the intermodal terminal at Ghazipur is being purchased as per G.O of UP dated 19.03.2015. The SMP /RAP will detail any particular mitigation measures apart from the ones stated in the RPF/RAP document as per the findings of social screening and consultations with locals. A final list of land owners as per the details of final payment of compensation must be attached to the report.
2. The land for the intermodal terminal at Kalughat will be acquired as per the RFCTLARR Act 2013, with the State Government as appropriate government for acquisition. The consultants will work in tandem with the District Administration, Saran and prepare the final RAP in the lines with the RPF and the RAP disclosed for the project disclosed for

the entire project. Documentation of any consultations Final list of land owners must be attached to the report.

3. The land for road connectivity and RoB at Sahibganj will be acquired as per Jharkhand Rules on RFCTLARR Act 2013. The consultants will work in tandem with District Administration, Sahibganj and prepare the final RAP in the lines with the RPF and the RAP disclosed for the project.

   Each intervention will have a separate RAP document made on the lines of the already disclosed RAP.

3.0 Scope of Work for SIA and Methodology

The broad scope of work shall be, but not limited to, the following:

A.1 Scoping for the Social Impact Assessment and preparation of Resettlement Action Plan

The Consultants must carry out scoping for the detailed Social Impact Assessment. The scoping process will determine the influence area/ define boundaries of the project, identify affected communities, identify the priority or most significant impacts and their mitigation measures to be covered in the assessment process and related methodology.

Confirmation on the applicable World Bank Social safeguard policies and Government of India and State Government's legal and policy other national standards and regulations which apply to the Project;

The consultants will conduct the SIA as per the requirements in A2 , A3 and A4.

A.2 Detailed Social Impact Assessment

List of socio-economic and cultural parameters to be covered by the SIA, as per the requirements of the RFCTLARR Act 2013. This information should describe the socio-economic conditions of the PAHs (gender, no. of single headed households, family size, occupation, income and asset levels, education, access to health services, social organization, cultural distinctions, etc.). Detail of process and methodology provided in section A.3 and A.4.

Identifying Key Impact Areas- This essentially involves identification and prioritization of the range of likely social impacts on PAHs through review of secondary data and primary data collection processes including public surveys and public participation techniques. This would also include assessing impact of the project at different stages of the project cycle.

Mitigation Strategy- This involves preparing a Resettlement Action Plan and Social Impact Management Plan, in order of preference to avoid, minimise and compensate for adverse impacts. If the predicted impact is minimal and can be managed, mitigation measures must be put in place. These could be in the form of modification of the specific event in the project, operation and redesign of the project or policy or compensation

for the impact by providing substitute facilities, resources and opportunities. The Social Impact Management Plan also includes a gender action plan, labour standards plan, citizen engagement plan and grievance redressal mechanism.

Monitoring Plan- This involves developing a monitoring plan with key monitoring indicators to identify deviations from the proposed action and any important unanticipated impacts. This should track project development and compare real impacts with projected ones.

A.3 Information matrix for SIA

S no.	Chapter	Contents
1.	Executive Summary - Describe with the help of the maps, information from land inventories and primary sources	- Project and public purpose - Location - Size and attributes of land acquisition - Alternatives considered – Social Impacts - Mitigation measures
2.	Detailed Project Description	- Background of the project, including developers background and governance/management structure. - Rationale for project including how the project fits the public purpose criteria listed in the RFCTLARR Act 2013 (and Jharkhand Rules in the case of Sahibgunj) - No. of affected families, displaced families and common properties - Details of project size, location, capacity, outputs, production targets, cost benefit analysis, risks - Examination of alternative (to be done in consultation with the technical team) - Phases of project construction - Core design features and size and type of facilities - Need for ancillary infrastructural facilities - Work force requirements (temporary and permanent) - Details of SIA if already conducted and any technical feasibility reports - Applicable legislations and policies
3.	Team composition, approach, methodology and schedule of the SIA	- List of all team members with qualifications - Description and rationale for the methodology and tools used to collect information for the SIA - Sampling methodology used - Overview of information/data sources used. Detailed reference must be included separately in the annexures - Schedule of consultations with key stakeholders and brief description of public hearings conducted. -Details of the public hearings and the specific feedback incorporated into the Report must be included in the annexures.
4.	Land Assessment	- Describe with the help of the maps, information from land inventories and primary sources.

		- Entire area of impact under the influence of the project (not limited to land area for acquisition) - Total land requirement for the project - Present use of any public, unutilised land in the vicinity of the project area. - Land (if any) already purchased, alienated, leased or acquired, and the intended use for each plot of land required for the project - Quantity and location of land proposed to be acquired for the project. - Nature, present use and classification of land and if agricultural land, irrigation coverage and cropping patterns - Size of holdings, ownership patterns, land distribution, and number of residential houses - Land prices and recent changes in ownership, transfer and use of lands over the last 3 years
5.	Estimation and enumeration (where required) of affected families and assets	- Estimation of the following types of families that are- a) Directly affected (own land that is proposed to be acquired) are: - Tenants/occupy the land proposed to be acquired - The Scheduled Tribes and other traditional forest dwellers who have lost any of their forest rights - Depend on common property resources which will be affected due to acquisition of land for their livelihood - Have been assigned land by the State Government or the Central Government under any of its schemes and such land is under acquisition; - Have been residing on any land in the urban areas for preceding three years or more prior to the acquisition of the land - Have depended on the land being acquired as a primary source of livelihood for three years prior to the acquisition b) Indirectly impacted by the project (not affected directly by the acquisition of own lands) c) Inventory of productive assets and significant lands
6.	Socio-economic and cultural profile (affected area and resettlement site)	Demographic details of the population in the project area- - Age, sex, caste, religion, literacy, health and nutritional status. - Income and poverty levels - Vulnerable groups- women, children, elderly persons, women-headed households, differently abled and ST/SC/OBC - Land use and livelihood patterns- Livestock assets, Local economic activities and factors that contribute to local livelihoods - Kinship patterns and social and cultural organisation - Administrative organisation - Political organisation - Community-based and civil society organisations - Regional dynamics and historical change processes - Quality of the living environment- houses, community and civic spaces and sites of religious and cultural meaning, patterns of crime
7.	Social impacts	Framework and approach to identifying impacts: - Indicative list of impacts areas includes impacts on land, livelihoods and income, access and control of physical resources, impact on private assets,

		public services and utilities, health due to in migration and due to project activities, culture and social cohesion - Description of impacts at various stages of the project cycle such as impacts during- • Pre-construction phase- Interruption in delivery of services, drop in productive services, land speculation, displacement and relocation, influx of migrant construction workforce, non-compliance of labour laws, etc. • Operation phase- Socio-economic impact of the project, benefits of new infrastructure, new patterns of social organisation • De-commissioning phase- loss of economic opportunities, impact on livelihood due to environmental degradation, direct (experienced by PAHs) and indirect impact (experienced by those living in the project area but are not affected by land acquisition) - Differential impact on different categories of the affected families- Impact on women, children, the elderly and the differently abled, Impacts identified through tools such as Gender Impact Assessment Checklists, and Vulnerability and Resilience Mapping Cumulative impacts, measurable and potential impacts of other projects in the area along with the identified impacts for the project in question and impact on those not directly in the project area but based locally or even regionally.
8.	Resettlement Action Plan	- Process of Land Acquisition and Other Immovable Assets - Entitlement Matrix - Process flow for R&R as per the RFCTLARR Act 2013 a. Appointment of "administrator" for R&R b. Notification, Declaration and Preparation of Award - Method of Valuation of Project Affected Assets * R&R Scheme as per the RFCTLARR Act includes the following, which can be incorporated in the RPF: - R & R entitlements of each land owner - List of land owners who are dependent on the lands being acquired - List of public utilities and Govt. buildings which are to be provided in the Resettlement area - Details of the public amenities and infrastructural facilities which are to be provided in the Resettlement area - Details of CPRs
9.	Livelihood Restoration and Income Generation Plan	- Estimation of livelihoods / income affected needs to be ascertained. - Accordingly, a needs assessment should be carried out in the project area. - Livelihood / Income Restoration and Enhancement Plan will be prepared based on the needs assessment.
10.	Social Impact Management Plan	Approach to mitigation - Measures to avoid, mitigate and compensate impact - Measures that have is included in the terms of R&R and compensation as outlined in the RFCTLARR Act 2013 - Alterations to project design and additional measures that may be required to address the full extent and intensity of impacts across various groups as identified and expressed during the SIA process

		- Detailed mitigation plan must include: detailed activities to be carried out for each mitigation strategy, timelines for each mitigation strategy and the key responsible authorities for each mitigation measure. - The SIMP must clearly indicate which measures the Requiring Body has committed to and those that have been proposed, but not committed to.
11.	Gender Development Plan	The Plan will consist of - Gender Profile along the Project - Profile of Women Headed Households The plan will identify gender and health issues /risks within the project area and include mitigation measures and action plan
12.	Labour Standards Plan & Labour Influx Assessment and Management Plan	The labour Standard Plan will provide an overview of applicable labour laws and policies, institutional matrix for labour law compliance, labour law compliance plan and labour influx screening. Labour Influx Assessment and Management Plan will be prepared based on the screening and assessment of the type and significance of potential social impacts that may be generated by labour influx.
13.	SIMP/RAP Institutional Framework	Description of institutional structures and key person responsible for each mitigation measure - Field level staff including RAP implementation team - Specify role of NGOs/CBOs, if involved - Indicate capacities required and capacity building plan, including technical assistance if any - Timelines for each activity
14.	Grievance Redressal Mechanism	Process flow for grievance redressal through traditional approach/ online/toll free no. (a) related to compensation, Resettlement and Rehabilitation & (b) related to Construction Induced Impact - Establishment of Grievance Redressal Committee - Lodging of Complaint - Processing the Complaint - Nodal Officer for Grievance Redressal - In case of non-resolution of complaints - Timelines - Reporting requirements
15.	Citizen Engagement Plan	A feedback mechanism will be developed along with a plan for consultations and information disclosure
16.	SIMP/RAP Budget and financing of mitigation plan	- Costs of all resettlement and rehabilitation costs - Costs for Citizen Engagement, GRM, M&E and hiring of Social Staff. - Annual budget and plan of action - Funding sources with break up
17.	SIMP/RAP Monitoring and evaluation	- Key M&E indicators - Monitoring processes

A.4. Methodology, tools and protocols

(i) Carry out a census and socio-economic baseline to capture the data above, skill base assessment including a detailed inventory of affected assets for all project affected persons to establish the cut-off date, loss of fixed assets or access to resources as

a result of project implementation on the influence area. **The consultant must use the updated land records (if not available, then request the District Administration to update the list) to prepare the final list of affected families.** If the District Administration is already in process of preparing the SIA, then the report must be prepared in consultation and coordination with them.

(ii) The baseline socio-economic data of the project area including the demography, occupational profile and livelihood pattern of the communities including fishing community all along the waterway, profile of the human settlements, health status of the communities, existing infrastructure facilities within 500 m on both sides from the bank of the river boundary of the waterway shall be studied. Assess in detail all the adverse impacts and categorize each type of losses specific to the project area.

(iii) Photograph the affected/ displaced family with the affected asset and number each asset including fisher folk whose livelihood may suffer due to loss of access. Prepare a fact sheet and attach the photograph of each project-affected person/family for Social Impact Assessment. Geo tag/ photograph with time stamp each affected asset and submit as annex to the report.

(iv) Undertake cadastral survey for land assessment, census survey and adequate consultations with the affected people. Finalize the list of PAPs and PAHs in close coordination with state Government. Notifications and Declaration for public consultations with affected households for Prior Consent [as per Section 2(2) of RFCTLARR], with representatives of local bodies [Section 4(2) proviso 1 RFCTLARR] and Public Hearing [Section 5 RFCTLARR] should be submitted as annex to the report.

(v) Conduct focus group discussions on designs options. Ensure separate consultations with vulnerable communities including fisher folk on the preliminary design options for their consent. Propose ways of mitigating impact on the vulnerable communities.

(vi) Assess local tenures, property rights arrangements and access rights, which may include usufruct or customary rights to the land or other resources taken for the project including common property resources and develop realistic land acquisition plan and mitigation plan for other rights that may be affected on the basis of the revenue records as per Government rule and RFCTLARR 2013, including the World Bank Policies.

(vii) Develop measures and technical options to minimize land acquisition and resettlement impact , indicate and document alternate design options considered by DPR consultants.

(viii) The study shall follow inclusive approach including all social, gender and occupational groups. Identify any particular community issues that have to be addressed.

(ix) Carry out skill assessment as a part of census and focus group consultation with different social groups including women to examine the existing skills of PAHs and their future skills requirements and accordingly suggest feasible income generations schemes and skill up-gradation plans.

(x) Modify and update database of project affected persons and use KAPI to ensure the date and time stamp . Locations of affected family must be mapped in the area map.

(xi) Prepare a RAP in lines with the existing Resettlement Policy Framework. The above analysis will be used for the preparation of RAP including entitlement matrix. RAP will ensure compensation for assets acquired at replacement cost, assistance to facilitate shifting or structures out of the corridor, and include mitigation measures for loss of livelihood or reduction in incomes for PAPs. RAP is intended to be an action oriented and time bound document.

(xii) Organize workshop for other stakeholders like NGOs, District Administration, Ministry, etc., and finalize the RAP

(xiii) Indicate a public consultation/ communication strategy with action plan for continuous public consultation during implementation.

(xiv) Prepare necessary plans to address HIV/AIDS and other health & safety issues as required by World Bank policies;

(xv) Develop detailed budget for implementation of RAP based on the outcomes of the study.

4.0 General Scope of Work for EIA

EIA is to be conducted with the following objectives:

- To examine and understand the aggregate impacts from: (i) the construction related issues such as Terminals (including storage infrastructure and transportation linkages) RO-RO terminals, Jetties Dredging sites and other related issues. ii) Operation related issues such as Pollution, Accidental spills, Occupational safety, Health, Exotics and Dredging of all the current and proposed project development on NW-1, and, (iii) Potential scenarios for development that could affect the environmental and social dimensions impacted by the proposed projects.
- To examine and understand the share of impacts, among the aggregate impacts of development, directly attributable to the project. Particularly important will be to understand the nature and magnitude of impacts by undertaking the activities such as navigation facilities on waterway and construction of barrages on NW1 from over and above the impacts of the projects already in place.
- To recommend specific measures, to be implemented by IWAI as well as for other future projects, for addressing the Environmental impacts and issues over and above the mitigation and/or management measures for project-specific impacts.
- Carry out initial public consultations on the outcomes of the EIA, and to record the views of the local communities and other stakeholders. These would, at the least be consistent with the environmental and social safeguard policies of the GOI and World Bank.
- The EIA studies and reporting requirements to be undertaken under these ToR must also conform to the Government of India (GoI) and World Bank guidelines and regulations, which include, inter-alia, the EIA amendments and updated guidelines.

4.1 Details to be covered in the Report

1. Reasons for selecting the site with details of alternate sites examined/rejected/selected on merit with comparative statement and reason/basis for selection. The examination should justify site suitability in terms of environmental angle, resources sustainability associated with selected site as compared to rejected sites. The analysis should include parameters considered along with weightage criteria for short-listing selected site.
2. Details of the land use break-up for the proposed project. Details of land use around 10 km radius of the project site. Examine and submit detail of land use around 10 km radius of the project site and map of the project area and 10 km area from boundary of the proposed/existing project area, delineating project areas notified under the Wild Life (Protection) Act, 1972/Critically polluted areas as identified by the Central Pollution Control Board (CPCB) from time to time/notified eco-sensitive areas/interstate boundaries and international boundaries. Analysis should be made based on latest satellite imagery for land use with raw images.
3. Submit the present land use and details related to permissions required for any conversion such as forest, agriculture etc. land acquisition status, rehabilitation of communities/ villages and present status of such activities.
4. Examine and submit details of the water bodies (including the seasonal ones) within the corridor of impacts along with their status, volumetric capacity and quality likely impacts on them due to the project.
5. Submit a copy of the contour plan with slopes, drainage pattern of the site and surrounding area
6. Submit the details of terrain, level with respect to MSL, filling required, source of filling materials and transportation details etc.
7. Examine road/rail connectivity to the project site and impact on the existing traffic network due to the proposed project/activities. A detailed traffic and transportation study should be made for existing and projected passenger and cargo traffic (based on traffic analysis prepared by the Engineering consultants).
8. Submit details regarding R&R involved in the project
9. Submit a copy of layout superimposed on the HTL/LTL (High Tide Line/ Low Tide Line) map demarcated by an authorized agency on 1:4000 scale along with the recommendation of the SCZMA.
10. Details of the layout plan including details of channel, breakwaters, dredging, disposal and reclamation.
11. Details of handling of each cargo, storage, transport along with spillage control, dust preventive measures. In case of coal, mineral cargo, details of storage and closed conveyance , dust suppression and prevention filters.

12. Submit the details of fishing activity and likely impacts on the fishing activity due to the project. Specific study on effects of construction activity and pile driving on aquatic life. (NOTE: this will be a summary of assessments of fishing scenario completed separately by consultants/agencies engaged by IWAI).
13. Details of oil spill contingency plan.
14. Details of bathymetry study.
15. Examine the details of water requirement, impact on competitive user, treatment details, use of treated waste water. Prepare a water balance chart.
16. Details of rainwater harvesting and utilization of rain water.
17. Examine details of solid waste generation treatment and its disposal.
18. Details of energy efficient terminal building (GRIHA certified) and zero-discharge infrastructure.
19. Examine baseline environmental quality along with projected incremental load due to the proposed project/activities.
20. The air quality monitoring should be carried out according to the notification issued by GoI.
21. Examine separately the details for construction and operation phases both for Environmental Management Plan and Environmental Monitoring Plan with cost and parameters.
22. Submit details of a Comprehensive Risk Assessment and Disaster Management Plan including emergency evacuation during natural and man-made disasters
23. Submit details of the trees to be cut including their species and whether it also involves any protected or endangered species. Measures taken to reduce the number of the trees to be removed should be explained in detail. Submit the details of compensatory plantation. Explore the possibilities of relocating the existing trees.
24. Examine the details of afforestation measures indicating land and financial outlay. Landscape plan, green belts and open spaces may be described. A thick green belt should be planned all around the nearest settlement to mitigate noise and vibrations. The identification of species/ plants should be made based on the botanical studies.
25. The Public consultation should be conducted for the project in accordance with provisions of the World Bank guidelines and the issues raised by the public should be addressed in the Environmental Management Plan.
26. The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.
27. A detailed draft EIA/EMP report should be prepared in accordance with the World Bank guidelines..
28. Socio-economic and environmental benefits due to the project.
29. Examine the existing policy framework and need of wildlife, forest, environmental etc. clearances and provide technical assistance and coordination for the obtaining such clearances.

A.0 Project Description

This section should cover broad details of the basic activities, such as:

I. Location, layout and implementation schedule of the project
II. Type of the project- capacity augmentation of navigation facilities in the waterways, expansion, modernization, cargo-handling facility, etc.
III. Relevance of the project in light of the existing development plans of the region
IV. Project coverage, master plan, phasing and scope
V. Description of project site, geology, topography, transport and connectivity, demographic aspects, socio-cultural and economic aspects, villages and settlements
VI. Capacity of the waterway, types of cargo proposed for handling, navigation facilities, cargo-handling equipment, ancillary operations, housing, vessel parking details, etc.
VII. Technologies involved in design, construction, equipment and operation
VIII. Use of existing public infrastructure road, railway and airport networks, water supply, electrical power, etc.
IX. Estimated water balance for the proposed project during construction/operational stages
X. Estimated cost of development of the project, environmental cost, funding agencies, and whether the project is being implemented through government/international funding or on the basis of BOT
XI. Resources, manpower and time frame required for project implementation

A.1 Essential Maps to be provided with the Project Description

I. A map specifying locations of the state, district and project
II. A map of project and the area within 10 km from the centreline of the waterway delineating (i) Protected areas notified under the Wildlife (Protection) Act, 1972, (ii) Critically polluted areas as notified by the CPCB from time to time, (iii) Notified eco-sensitive areas, and (iv) Inter-state and international boundaries
III. A map covering aerial distance of 10 km on the landward side from the proposed project boundary, delineating environmentally sensitive areas
IV. Land-use map of the study area on a 1:25,000 scale based on latest satellite imagery of the project and the area within 10 km of the proposed project boundary, delineating the cropping pattern, wastelands, forest area and built-up areas, water bodies, human habitation and other surface features such as railway tracks, waterways, airports, roads, national highways and major industries
V. Natural drainage contour map of the project area within 2 km of the proposed project area

B.0 Report contents and methodology

This shall include the following:

i. Detailed description of the project as mentioned above (information collected from the engineering and design section of the project and from the technical feasibility report), along with required maps/designs/documents

ii. Discussion of the policy, legal and administrative framework within which the project is set, major stakeholder departments of the state and central government with their specific roles, applicable laws and clearance requirements at various levels and their current status

B.1 Analysis of Alternatives (Technology & Sites)

This chapter shall include:

i. Description of various alternatives like locations or layouts or technologies studied

ii. Description of each alternative

iii. Summary of adverse impacts of each alternative

iv. Selection of the best alternative

This chapter should include, for each of the project intervention and all of interventions, together: a comparison of the alternatives including a "no-project" alternative; and selection of the best alternative.

B.2 Public Consultations: Stakeholder consultations, which will include community consultations at the state, district, village and roadside community levels, to improve project components with regard to proper environmental and social management

B.3 Description of the Environment

Baseline surveys for description of the environment will include:

a) Collection of information from secondary sources that are necessary for understanding the baseline pertaining to physical, biological and socio-economic environments in the project and influence area

b) Carrying out site visits and investigations of all the environmentally sensitive locations and document them on the base maps to identify conflict points with preliminary design

c) Preparing detailed specific maps showing details of sites for environmental enhancements. The surveys are to be carried out as per the standards prescribed by Government of India, which if not available, shall conform to international practice

It is recommended that environmental surveys be coordinated with social and engineering surveys and done simultaneously, as far as possible.

B.3.1 Study Area

As a primary requirement of EIA process, the Consultant should collect primary baseline data for environmental parameters in the project area as well as in the area within 2 km from the bank of the river. Secondary data should be collected for area within 10 km aerial distance from the bank of the river. This should be depicted on a map.

Following components of the environment shall be studied.

B.3.2 Land Environment

(a) Land

Data on the land availability is to be ascertained from local authorities, revenue records, etc. Justification for proposed quantum of the area is to be given.

(b) Topography

Baseline data needs to be provided on existing situation of the land at the proposed project area including description of river bank slopes and inland topography, river bank features, terrain features, slope and elevation. Study of land use pattern, habitation, cropping pattern, forest cover, environmentally sensitive places, etc. should be made by using remote-sensing techniques and also from secondary data sources.

(c) Geology

Baseline data should be provided on rock types, regional tectonic setting (reported fractures/faulting, folding, warping), and history of any volcanic activity, seismicity and associated hazards all along the waterway route. Information on quarries along the waterways, strength of rock, restrictions for quarrying if any, environmental controls, statutory permissions, etc. should be provided.

(d) Soil

Soil data, including type, classification, characteristics, and soil properties are important engineering considerations for design of structures, loading capacities of cargo stockpiles, green belt development, etc. Changes in parameters of soil may also affect plantation and vegetative growth, which in turn may endanger the health of local habitat. Baseline data of the soil and results of investigations carried out are to be provided for the project area.

(e) Meteorological Data

Meteorological data covering the following should be incorporated in the EIA report.

Data for at least 10 years period should be collected from the nearest meteorological station. The history of cyclones and tidal surges for the area shall be mentioned. The data pertaining to the following parameters shall be included:

- Wind speed and direction
- Rainfall
- Relative humidity
- Temperature
- Barometric pressures
- History of cyclones

B.3.3 Water Environment

(a) Groundwater

Baseline data on groundwater including data on pH, dissolved solids, suspended solids, BOD, DO, coliform bacteria, oil and heavy metals is to be collected at least for one season. Usage purpose of the groundwater, if any, is to be indicated.

(b) Bed sediment contamination

Baseline data on bottom sediments and the associated bottom biota and other physical habitat at the proposed project area and the neighborhood areas should be collected and analyzed.

(c) Waterway water quality

Baseline data shall be collected on chemical parameters in the river and in the proposed activity area for understanding hydro-chemical characteristics in the waterway environment (such as river water temperature, BOD, DO, pH, TSS, salinity, heavy metals, etc.)

B.3.4 Biological Environment

(a) River Water ecology

Baseline (primary and secondary) data on aquatic flora and fauna, mangroves, marshes and other aquatic vegetation, is to be ascertained through proper surveys. Data on river bank stability, seismic characteristics, history of any endangered species, bank erosion, shoreline changes, if any, is also necessary.

(b) Terrestrial ecology

Details on primary and secondary data on the existing flora and fauna in the study area shall be collected and shall be included in the list of flora and fauna along with the classification as per the schedule given in the Wildlife Protection Act, 1972 (for fauna) and in the Red Book Data (for flora). Also, a statement clearly specifying whether the study area forms a part of an ecologically sensitive area or migratory corridor of any endangered fauna should be provided.

B.3.5 Air Environment

Baseline data of ambient air quality parameters, such as PM10 and PM2.5, nitrogen dioxide, sulphur dioxide, carbon monoxide, heavy metals and other harmful air pollutants, depending upon the type of the activity proposed & cargo and vessel movement in the waterway should be monitored.

This data should be collected in an area extending at least 2 km from the high bank of the river by observation at a number of locations. Specific importance should be attached to areas in close proximity to the project, up to 1 km. Data for one season (three months), other than monsoon, should be monitored as per the CPCB norms. The monitoring location should be in the up-wind area.

B.3.6 Noise

Baseline data on noise pollution in the project area and the neighborhood up to a specified distance or nearest residential areas is to be monitored as per the CPCB norms.

B.3.7 Existing Solid Waste Disposal facilities

Details of municipal solid waste facilities, biomedical treatment facilities and hazardous waste disposal facilities in the area should be inventoried.

B.3.8 Socio-economic and Occupational Health Environments

Baseline socio-economic data of the project area shall include the demography, livelihood pattern of the communities including fishing community all along the waterway, profile of the human settlements, health status of the communities, existing infrastructure facilities within 500 m on both sides from the bank of the river and boundary of the waterway shall be studied. Wherever the land is required to be acquired, the detailed socio-economic study shall be conducted for the entire 100% of

Project Affected Persons (PAP) and Project Affected Families (PAF) and a Rehabilitation and Resettlement (R&R) plan shall be prepared along with the compensation and entailment matrix as per the latest acts and regulations. A separate chapter on Social Impact Assessment, Institutional Framework and on R & R shall be prepared. Present employment and livelihood of these populations and awareness of the population about the proposed activity shall also be included.

B.3.9 Public Utilities

Baseline data of existing public utility infrastructure shall be ascertained and reported to assess the impacts of the project on these public utilities in order to incorporate desired methods in the EMP and the same shall be monitored during the construction as well as operational phases of the waterways.

B.4 Environmental Impacts and Mitigation Measures

This section should describe likely impact of the project on each of the environmental parameters and the methods adopted for assessing the impact such as model studies, empirical methods, reference to existing similar situations, reference to previous studies, details of mitigation methods proposed to reduce adverse effects of the project, best environmental practices and conservation of natural resources. The identification of specific impacts followed with mitigation measures should be done for construction and operation of the proposed interventions.

B.4.1 Land Environment

Impact of project construction/operation on the land requirement/land-use pattern should be assessed. Effect of future growth by augmentation of navigation facilities in the waterway and/or the ancillaries should be carefully assessed. Prediction of impacts should include impacts on the existing infrastructure such as groundwater/surface water, loss of productive soil and impact on natural drainage pattern.

Mitigation Measures:

Mitigation measures to reduce adverse effects include adopting soil improvement techniques and suitable design methods to reduce overall requirement of land. Strengthening of road and rail network infrastructure to handle the increase in traffic and truck parking arrangements and integration of waterways development by improvement of navigation facilities with the local land-use plan should be planned.

B.4.2 Topography, Geology and Soil

Impact of improvement of navigation facilities on the topography due to filling of low lying area with dredged spoil, damage to existing vegetation/green belt and plantation, changes in land-use patterns, disturbance to existing protected areas like mangroves, forests and environmentally sensitive areas/zones should be assessed. Flooding due to filling up of low-lying areas should also be assessed. Impacts on the surrounding land-use pattern, housing, groundwater, etc. should be assessed.

Impact of the improvement of navigation facilities in the waterways on the geology and vice-versa should be studied in detail. Impact of such facilities on construction/operation on the soil parameters, probability of settlement, subsidence, slides, surface drainage, leachates, etc. are to be estimated.

Mitigation Measures:

Mitigation measures to reduce adverse effects include study of alternative sites, improving green belt, obtaining construction materials from other sources, usage of alternative construction materials like fly ash, where possible, and storm water management. Other measures include adopting soil improvement techniques, suitable design methods and ground covering.

B.5 Water Environment

B.5.1 Groundwater

Discharge of trade effluent and sewage and its impact should be studied. Impact of project construction/operation, navigation in the waterways on the groundwater on account of leachates, run off from material and cargo storages, and toxic or harmful substances, percolation, river water intrusion should also be assessed.

Mitigation measures:

Mitigation measures to reduce adverse effects include cargo storage areas. Treatment of effluent, recycling/reuse and disposal should be planned. Groundwater study on leachates should be carried out periodically and should be correlated with baseline data. Remedial measures should be taken in case of any deviation. Based on the total water budget of the project, the use of groundwater should to be reviewed and alternatives should be presented.

B.5.2 Surface Water

Impact of waterways operations on surface water sources, contamination due to cargo operations, impact on utility of surface water resources by the neighboring colonies, impact on surface water flow (e.g., flooding) due to anticipated obstructions, etc. should be assessed.

Mitigation measures:

Measures should be taken to protect surface water resources and to prevent adverse impacts in their quality due to construction and operational activities and choice of alternative resources. Proposals to treat effluents confirming to standards notified under the EP Act 1986 should be submitted.

B.6 Aquatic Environment

B.6.1 Bed Sediment Contamination

Impact of the project on the bed sediment contamination on account of construction/operations of navigation facilities in the waterway and other proposed activity in JMVP is to be assessed by using suitable empirical/model studies.

Mitigation measures:

A survey of the impact of bottom sediments on water quality, aquatic life should be undertaken.

B.6.2 River Water Quality

Impact of the improvement of navigation facilities in the waterway on the river water quality is to be assessed by using suitable empirical/model studies.

Mitigation measures:

Proper collection and disposal of liquid and solid waste from shore establishment and ships should be planned.

B.7 Biological Environment

Impacts of the project, navigation facilities in the waterway on the river water ecology should be assessed by using suitable empirical/model studies.

Mitigation measures:

Mitigation measures to reduce adverse effects should be provided.

B.8 Air Environment

Impact of improvement of navigation facilities in the waterway on the ambient air quality on account of emissions of dust during construction and cargo handling, as well as emission of gases from equipment deployed for construction of navigation facilities and cargo handling should be assessed.

Prediction of emissions by vessel operation, cargo handling due to traffic, emission inventory for critical pollutants with and without mitigation measures should be done. Further, prediction of impacts due to existing activity on the proposed project and prediction of impacts due to sanctioned/on-going projects in the surrounding area on the proposed project and the ambient environment shall be carried out.

Mitigation measures:

Mitigation measures proposed during the construction stage, operational stage should be given. Other mitigation measures proposed for lowering the emissions from the vessels and green belt development should also be given.

B.9 Noise Pollution

Impact of construction/operation for improving navigation facilities in the waterway including noise and vibration on account of construction equipment, vessel movement, cargo handling equipment and road traffic should be assessed.

Mitigation measures:

Mitigation measures to reduce adverse effects should be provided.

B.10 Solid Waste Management

Impact due to non-hazardous and hazardous solid waste generated during the construction and operational stages should be assessed.

Mitigation measures:

Mitigation measures to comply with the norms should be planned. Options for minimization of solid waste and environmentally compatible disposal/recycling of waste to conserve natural resources should be planned. Plans should be made for management and disposal of temporary structures made during the construction phase.

B.11 Socio-Economic and Occupational Health Environment

The impact of the proposed activity on the fishermen communities should be assessed. Details of public and private land in the proposed project area and immediate surroundings and the socio-economic status of affected owners of the private land shall be provided. Present status of health, housing, public utilities, commercial structures and transportation should be collected.

Impact of the project on socio-cultural aspects should be assessed. Mitigation measures:

Mitigation measures to reduce adverse effects including satisfactory R&R methods should be planned.

B.12 Carbon Reduction and Assessment as per UNFCCC agreement due to the JMVP

An assessment of carbon reduction benefits in terms of vessel movement through inland waterways vis-a-vis other modes of transportation such as rail and road shall be assessed and the possibility of carbon reduction benefits shall be studied and the Project Design Document (PDD) shall be prepared by the consultant.

Protocols referred at Annex B maybe referred during the assessment and report consolidation.

Methodology Protocol and tools

Environmental Impact Assessment Study should broadly cover the following but should not be limited to this

- To carry out visits to understand the site specific environmental and social sensitivities associated with the project site
- To develop an understanding of the project, activities involved in all the stages and their interface with the environment referring to the DPR, available literature and studies of similar projects.
- To carry out environmental screening to define the impacted environment due to the project development and operation.
- To define project influence area on basis of screening exercise and considering the potential impacts of the project derived during the above exercise.
- To collect the primary and secondary data of the likely to be affected environments as identified during screening exercise to obtain their existing condition. Baseline monitoring should be conducted for one season (three months) for the following parameters.
- Air Quality-At project site and other locations in 2 kms radius (twice a week at each location for one season/ three months).
- Ground Water Quality-At project site and other locations in 2 kms radius (One time at each location)
- Surface Water Quality-Near project site and other locations including any discharge point, confluence point of other stream & dredging locations (One time at each location)
- Soil Quality-At project site and other locations in 2 kms radius (One time at each location)
- River Bed Sampling- Near project site and dredging locations (One time at each location)
- Aquatic Ecology-In river stretch (15 kms u/s & d/s), mention RET (rare, endangered and threatened) species available in that area and eco-sensitive zones within 10 kms radius of the site

- Terrestrial Ecology-In project area and 2 kms radius area in detail and general overview in 10 kms radius. Mention RET species and eco-sensitive zones within 10 kms radius of the site.
- Socio-economy- Analysis of all the habitations and sensitive habitats located within 2 kms radius of the project site, availability of nearest fire- fighting facility to the site, connectivity of the site to the highway.
- To prepare the maps on GIS platforms of the project site, study area, drainage pattern of the site, land use, contour and socio-economy using satellite imagery, google imageries and toposheets as available and required
- To examine and understand the aggregate effects from the development of the
- Maintenance facility/ RO-RO terminals/ River training and bank protection works that could affect the environmental and social dimensions of the study area w.r.t its location, nature of developments and interface with different environments.
- To recommend specific measures, to be implemented by IWAI, as well as for other future projects, for addressing the environmental impacts and issues over and above the mitigation and/or management measures for project- specific impacts.
- To identify the stakeholders to be affected by the project at any stage of development (in consultation with the client). To draft a checklist/questionnaire of the issues to be discussed during consultations. To define the consultation methodology and mode of communication to the stakeholder about the consultation date and venue. Carrying out public consultations to obtain the view of the stakeholders on the project development, impacts on their life and environment due to project development and mitigation measures to be taken.
- The EIA studies and reporting requirements to be undertaken under this ToR must also conform to the GoI and World Bank guidelines and regulations, which include, inter-alia, the amendments in EIA notifications and updated guidelines. A detailed environment legislative framework should be developed for the project which should define the applicability of environmental legislations on the project at different stages of project development, clearances to be obtained and concerned authorities for the same.
- EIA Study should consist of the Environmental Management and Monitoring Plan (EMMP) for pre-construction, construction and operation stage of the project. EMMP should essentially include the institutional mechanism for implementation of the EMMP, grievance redressal mechanism, EHS policy, management system and team and environmental budget for the project.

EIA Report should essentially contain the following components:

- Project general background, need of the project and sub-component, overview of the project & sub-components, Objective of the EIA study, Extent and limitation of EIA study, Contents of the EIA report, Methodology followed to carry out the EIA study, Data Sources for the EIA study and References.

- Overview of Indian environmental legislation & administrative framework, applicable environmental legislation, international best practices & guidelines including operational policies of world bank; EHC guidelines of IFC for General industry & Ports, terminals & harbours; IMO conventions and other related Conventions, Environmental standards & guidelines [national & international including Permanent International Association of Navigation Congresses (PIANC)]
- Setting and location of the project site, connectivity of the site, existing facilities at the site & its surroundings, project components including size & type of project; salient features of project; master planning layout; off-shore & on-shore components, construction phase activities including onshore & off-shore, operational phase activities including material handling & maintenance activities, construction material sourcing, utilities requirement & management, environmental provisions including drainage system, sewerage system, dust suppression system, green belt development, fire protection & emergency measures & flood protection measures, implementation schedule of project

Analysis of alternatives

- Environment and social features of project within study area, environmental settings & features of project, site connectivity, existing sources of pollution, monitoring plan & quality assurance procedures, description of physical environment including topography; drainage pattern; land use pattern; cropping pattern; river morphology; riverbank features slope & elevation; habitations along the project site; archaeological protected areas; wastewater & waste management facilities in the area; geology; rock types; regional tectonic settings; history of volcanic activity; seismicity; information on quarries along the waterway; soil quality; meteorology [wind speed & direction, relative humidity, temperature, rainfall, calm periods, cloud cover, barometric pressure, history of cyclones & tidal surges, history of floods & HFL (High Flood Level)]; water resources & quality; river bed sediments; air quality; noise levels, description of biological environment including terrestrial ecology (flora & fauna); avifauna; aquatic ecology (planktons, benthos, mangroves, marshes, fisheries); forest cover, migratory routes & eco-sensitive zones in study area; RET species in waterway (dolphins, turtles, otters, ghariyal, Gangetic sharks) with their habitat & status, description of social environment including demography; occupation/livelihood pattern; health facilities; infrastructure (transportation, industries, educational institutes); public utilities in the area (sewerage system of area, all type of solid waste disposal sites in area); cultural heritage and archaeological sites; festivals; tourism; spiritual & other practices of the locals associated with the waterway. Maps on GIS platform should be prepared to show the study area & project site, environmental settings of project site, drainage pattern, contours, land use, connectivity and monitoring network. Primary & secondary baseline monitoring data should be presented in the reports.
- Impact identification matrix for each project activity & development stage on the

above defined baseline components during the pre-construction, construction & operational stage of the project along with the impact mitigation & avoidance measures and a matrix detailing the residual impact of the project after implementation of the mitigation measures.

- Quantification of impacts should be carried out by using modelings and calculation methods for estimating air emissions, GHG emission, maximum GLC (ground level concentrations) due to transportation, noise level, sewage generation, muck generation and disposal, underground noise, etc, as applicable.
- Methodology and objective of the public consultation, stakeholders consulted, proof of communication and conducting consultations (attendance sheet, invitation letter/leaflets/newspaper invitation/public communication, proceedings & photographs of consultation and summary outcome of consultation with their redressal.
- Environment Management Plan (EMP) for each of the identified project activity and affected environmental component, institutional arrangement to ensure EMP implementation, structure of EMP with roles and responsibility of each member, environmental standards for operation and maintenance of barge repair & maintenance facility, environmental monitoring plan, reporting requirement, grievance redressal mechanism and environmental budget. EMP should cover the following components

  - Measures for soil erosion protection and muck management
  - Measures for management, closure and rehabilitation of sites of labour camps and plant site (batching plants, workshops and material storage sites)
  - Green Belt Development Plan
  - Construction Debris Management Plan
  - Borrow Area Management Plan
  - Oil Spill Management Plan
  - Occupational Health & Safety Management Plan
  - Bio-diversity (RET species) Conservation & Management Plan
  - Air emission Management Plan
  - Noise Level Management Plan
  - Water Resources and Quality Management Plan
  - Accident and Risk Management
  - Soil Quality Management Plan
  - Effluent/Sewage and Waste Management Plan for Non- hazardous and
  - Hazardous liquid & solid waste
  - Monitoring mechanism for prevention of disposal of waste generated at site and vessels in the waterway
- Summary of findings should be provided in the EIA report alongwith concluding remarks and recommendations.

B.13 Preparation of standalone EMPs and RAPs for each intervention

The consultants will prepare stand-alone EMPs and RAPs including all the studies and analyses mentioned above. These should be in a form that appropriate parts of these are readily incorporated in the respective contract documents.

6. Consultant's Input

S. No.	Expert Position	Experience in Years	Education
1.	Team Leader/Sr. Environmental Specialist	20 yrs in field of environment and 15 yrs specific in EIA studies	M. Tech Environmental Engineering/MSc. Environmental Science and allied sciences Experience in the field of EIA study of linear and area development projects including highways, railways, ports, container depots. Experience in the field of waterways is desirable.
2.	Air pollution , meteorology and air quality monitoring expert (2)	10 Yrs of Experience in air quality monitoring with experience in field of EIA study of linear and area development projects including highways, railways, ports, container depots. Experience in the field of waterways is desirable	M. Tech. Environmental Engineering/MSc. Environmental Science and allied sciences.
3.	Water pollution expert (2)	10 yrs of experience in Water Quality monitoring with Experience in the field of EIA study of linear and area development projects including highways, railways, ports, container depots. Experience in the field of waterways is desirable.	M Tech. Environmental Engineering/MSc. Environmental Science and allied sciences.
4.	Risk and Hazard assessment expert. (2)	15 Yrs of Experience in Risk assessment, Hazard identification for Port/ Terminals.	M Tech. Environmental Engineering/MSc. Environmental Science and allied sciences with qualification in the field of Occupational Health & Safety is desirable. Experience in preparation of EHS/SHE plans for linear and area development projects. Experience in the field of waterways is desirable
	Noise and Vibration expert (2)	10 years in monitoring of noise / vibration , processing and analysis of data, and impact assessment on fauna in the river.	M. Tech. Engineering / M.Sc Sciences with experience in modelling underwater, sound vibrations.

6.	Ecology and Bio-diversity Experts (2)	10 yrs of experience in carrying out Ecology and Biodiversity studies Experience in riverine ecology and bio-diversity	M.Sc. (Life Sciences/ Ecology); Ph.D. (Life Science / Ecology)
7.	Fisheries Expert	10 yrs of experience in carrying out river water fisheries study. Experience on Dolphins/ Turtles is desirable	M.Sc. (Ecology/Fisheries); Ph.D. (Fisheries)/ Environment Science / Life Sciences
8.	Socio- economics expert	10 years of experience in carrying out socio-economic studies and census survey for land acquisition and resettlement	M.A (Sociology/ Social Science) / Master of Social Work; Ph.D. (Sociology/ Social Science) Experience of conducting SIA studies and preparation of RAP.
9.	Social Science assistant / junior sociologist	5 years of experience in carrying out land surveys , socio economic surveys	M.A in Social Sciences / Social Work / Political Sciences Anthropology / Regional Planning, MBA (rural development).
	Land Acquisition Expert	10 years of experience in facilitating/carrying out the land acquisition process	M.A (Law/ Sociology/ Social Science) / Master of Social Work; Ph.D. (Sociology/ Social Science)
10.	Land use and GIS Expert	5 yrs experience in mapping on GIS platform , land use surveys	MSc in Remote Sensing and GIS, engineer / environment management / geography/ geology.
11.	Hydrologist (2)	10 years of experience in EIA carrying out Hydrological Studies as part of the EIA studies	B. Tech (Civil) and M. Tech (Hydrology) / Mechanical / Msc. Geology / Hydrology / Water Resources Management / Geophysics is desirable
12.	Solid Waste Management Specialist (2)	10 years in managing Industrious , Municipal and Hazardous solid waste of urban area	B.E. / B. Tech (Civil); M.Sc. (Environment) / P. G Diploma in Waste Management)
13.	Soil conservation expert	10 years of experience in EIA/ EMP , Sampling , Analysis of soil, Impact Assessment and Management Plan	MTech Engineering – Agricultural / civil MSc. Agricultural science/ Soil science / Earth Sciences/ Forestry / Natural Resource Management

7. Timeline

Study should be completed within 6 months of the award of the work. The work will only be considered as complete when all the primary data, geo tagged photographs and lists, are submitted along with the reports.

Deliverables and Payment Schedule

Sno.	Deliverables	Timelines	Payment of contract value
1.	Mobilisation advance	Within 15 days of award of contract	5%
2a.	Draft SIA/SIMP/RAP of Ghazipur IMT , Kalughat IMT	Within 1 month of award of work	7%
2b.	Final SIA/ SIMP/RAP for Ghazipur IMT, Kalughat, IMT		3%
3a.	Draft SIA/SIMP /RAP of RO-RO terminals, Road, ROB for Sahibganj connectivity and Road connectivity and terminal extension at Varanasi	Within 2 months of award of work	7%
3b.	Final SIA/SIMP / RAP of RO-RO terminals, Road, ROB for Sahibganj connectivity and Road connectivity and terminal extension at Varanasi		3%
4a	Draft SIA/SIMP / RAP for Bank Protection and bend correction, 2 Vessel Repair maintenance facilities.	Within 4 months of award of work	7%
4b	Final SIA/SIMP / RAP of RO-RO terminals, Road, ROB for Sahibganj connectivity and Road connectivity and terminal extension at Varanasi		3%
	EIA		
5a.	Draft EIA –EMP for IMT Kalughat and IMT Ghazipur	Within 4 months of award of work	7%
5b.	Final EIA –EMP for Kalughat and Ghazipur IMT		3%
6a.	Draft EIA- EMP for RO- RO terminals , Road connectivity and ROB for Sahibganj and terminal extension at Varanasi.	Within 4 months of award of work	10%
6b.	Final EIA- EMP for RO- RO terminals , Road connectivity and ROB for Sahibganj and terminal extension at Varanasi.		5%
7a.	Draft EIA- EMP for Bank protection , bend correction, 2 vessel repair maintenance facilities.	Within 5 months of award of work	10%
7b.	Final EIA- EMP for Bank protection , bend correction, 2 vessel repair maintenance facilities.		5%
8a.	Draft standalone consolidated EIA – EMP and SIA/SIMP cum RAP for all interventions	Within 6 months of award of work	15%
8b.	Final standalone consolidated EIA – EMP and SIA/SIMP cum RAP for all interventions		10%

ANNEX A

List of locations for RO-RO terminals : Approximate land required 20 Ha.

1	Rajmahal – Manikchak
2	Samdaghat (Sahibganj) - Manihari
3	Bakhtiyarpur – Mahnar (Hasanpur)
4	Kahalgaon – Tintanga
5	Buxar (Mishrawalia Village) – Sarai Kota (Pump House Location)

Standards for carrying out EIA and SIA

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.

As part of the above, special references are to be made to the World Bank Safeguard Policies; and the relevant laws, regulations and rules of the Government of India, and the specific rules and regulations applicable for the states of Uttar Pradesh, Bihar, Jharkhand and West Bengal.

This shall also include guidance notes and recommendations as published by Environmental Committee of PIANC (Permanent International Association of Navigation Congresses), a non-profit international organization responsible for: dealing with both broad and very specific navigation sustainability and environmental risk-related issues; and Developing and providing environmental guidance for sustainable waterborne transport infrastructure.

Specifically, the Consultant shall ensure the services are conducted, were relevant for Inland Water Transportation, in accordance with the general principals as established in the following documents:

- Initial Assessment of Environmental Effects of Navigation and Infrastructure Projects (WG 143 -2014)
- Sustainable Waterways within the context of Navigation and Flood Management (WG 107 -2009)
- Climate Change and Navigation (TG3 -2008)
- Dredging Management Practices for the Environment (WG 100 -2009)
- Dredging Material as a Resource (WG 104 – 2009)
- Environmental Impact Assessments of Dredging and Disposal Operations (WG 10 – 2006)
- Biological Assessment Guidance for Dredged Material (WG 8 – 2006)
- Ecological and Engineering Guidelines for Wetland Restoration in relation to the Development, Operation and Maintenance of Navigational Infrastructure (WG 7 – 2003);
- Management of Aquatic Disposal of Dredged Material (WG 1 – 1998); and
- Dredged Material Management Guide 1997.

JOINT INSPECTION (IWAI, FBP, HOWE)						
LIST OF LOCATIONS SELECTED FOR BANK PROTECTION WORKS						
S.NO.				GEOGRAPHICAL COORDINATES		REMARKS
	CHAINAGE IN KM	LENGTH IN KM	SIDE	EASTING	NORTHING	
1	549	0.4	R-SIDE	591616.07	2740874.37	JINDAL ITP JETTY
	548.6			591647.79	2740515.69	
2	547.7	0.15	R-SIDE	591732.64	2739657.07	BHARIGURAMPUR
	547.55			591744.155	2739511.216	
3	547.93	0.33	L-SIDE	591940.98	2739664.1	SAHANAGAR (Modified)
	547.6			591954.47	2739379.84	
4	546.6	0.2	L-SIDE	592028.61	2738609.75	Faterpur
	546.4			592045.42	2738382.27	
5	545.5	1.27	L-SIDE	592109.34	2737629.95	BAIKUNTHAPUR
	544.23			592231.24	2736363.93	
6	543.55	0.05	R-SIDE	592140.42	2735413.81	ALAIPUR
7	543.3	0.37	R-SIDE	592136.6	2735308.65	Anuppur Bridge (Modified)
	542.93			592162.79	2735040.55	
8	542.9	0.1	L-SIDE	592377.57	2734873.92	Anuppur Bridge
9	542.15	0	R-SIDE	592265.27	2734155.61	Pachula Gram (Not Selected)
	542.2					
10	541.85	0.05	L-SIDE	592482.67	2733837.67	BHABANIPUR GHAT
11	540.7	0.61	L-SIDE	592605.97	2732717.31	Jigri Kulgachhi
	540.09			592602.19	2732715.14	
12	539.4	0.05	R-SIDE	592499.32	2731384.42	Mamrejpur
13	538.6	1	L-SIDE	592898.87	2730438.79	Mahadeb Nagar (Modified)
	537.6			593060.36	2729712.42	
14	537.67	0.933	L-SIDE	593103.75	2729543.34	BHAGMARI SYPHONE (Modified)
	536.737			593270.5	2728808.36	
15	537.61	0.51	R-SIDE	592977.98	2729226.31	BHAGMARI SYPHONE (Modified)
	537.1					
16	537	0.4	L-SIDE	593068.825	2728921.055	Phulandar (Modified)
	536.6			593229.426	2728188.452	
17	535.9	0.29	L-SIDE	593483.41	2728009.95	BHAGMARI SYPHONE
	535.61			593548.55	2727721.71	
18	535.4	0.42	R-SIDE	593392.1	2727489.75	Jafrabad

	534.98			593477.39	2727071.42	
19	533.6	0.2	R-SIDE	593807.929	2725741.024	Antar Dwipa
	533.4			593853.592	2725546.307	
20	533.1	0.21	L-SIDE	594130.318	2725320.367	Dhulian Pakur
	532.89			594194.598	2725037.58	BRIDGE
21	532.4	0.29	R-SIDE	594131.54	2724565.38	Bhasaipaikar
	532.11			594264.824	2724303.724	
22	532	0.05	R-SIDE	594323.36	2724179.71	
23	531.85	0.03	R-SIDE	594434.53	2723978.69	
24	531.35	0.03	R-SIDE	594775.09	2723545.64	
25	530.95	0.275	R-SIDE	595035.85	2723288.15	BaliaGhati
	530.675			595240.18	2723095.09	
26	529	0.22	L-SIDE	596555.4	2722150.8	
	528.78			596707.02	2722005.96	
27	528.5	0.05	R-SIDE	596798.17	2721662.1	Bhagalpur
28	527.5	0.1	R-SIDE	597496.12	2720989.12	BaliaGhati
	527.4			597589.156	2720932.084	
29	526	0.05	L-SIDE	598744.68	2720089.44	
30	525.7	0.05	R-SIDE	598786.05	2719771.61	Lokaipur
31	523.1	0.5	R-SIDE	600696.64	2718005.88	Hazipur
	522.6			601064.43	2717653.3	
32	521.5	0.25	L-SIDE	602031.38	2717023.44	Bamuha
	521.25			602217.76	2716847.99	
	Sub-total	**9.438**				**Feeder Canal**
33	512.7	1.3	R-SIDE	605958.965	2710669.285	KANUPUR
	511.4			606091.269	2709687.518	
34	507.3	0.5	R-SIDE	608138.962	2706156.168	RAGHUNATHGANJ
	506.8			608269.059	2705654.934	
35	499.3	0.4	L-SIDE	614528.02	2702167.29	KASIADANGA
	498.9			614484.41	2702052.57	
36	484.2	0.4	R-SIDE	615990.73	2696922.41	GADDE
	483.8			616154.3	2696648.64	
37	481.2	0	R-SIDE	618037.14	2694663.66	BALIA (Not
	480.65			618441.69	2694301.7	Selected)
38	477.35	0	R-SIDE	621595.31	2693093.02	CHAR KABILPUR
	476.85			622022.27	2692994.43	(Not Selected)
39	476.3	0.2	R-SIDE	622624.96	2692900.7	KABILPUR
	476.1			622796.884	2692861.254	

40	474.20	0.25	L-SIDE	624242.86	2691836.97	LALITAKURI
	473.95			624352.149	2691607.382	
41	453.45	1	R-SIDE	626298.73	2682750.49	BARANAGAR
	452.45			626305.07	2682932.22	
42	449.8	2	L-SIDE	628529.84	2680291.49	AZADHINDBAGH
	447.8			628228.34	2678292.88	
43	444.75	2.5	R-SIDE	628303.88	2675844.33	HAZARDUARI
	442.25			628741.21	2672321	
44	421.90	0	L-SIDE	624306.61	2654850.30	MAULA (Not Selected)
	421.80			624163.54	2653972.95	
45	420.90	0	L-SIDE	623991.05	2653643.11	HATNAGAR (Not Selected)
	420.70			623836.87	2653521.91	
46	418.90	0	R-SIDE	621546.85	2653960.22	KATALIA (Not Selected)
	418.65			621438.85	2653877.40	
47	416.300	0.8	L-SIDE	623177.06	2652706.62	Radhaballabhpur (Modified)
	415.500		L-SIDE	623083.59	2651828.99	
48	413.000	0.3	R-SIDE	620681.20	2651625.85	CHAURIGACHA
	412.700			620979.03	2650781.33	
49	406.600	0.95	L-SIDE	623504.70	2646123.00	MIRZAPUR (Modified)
	405.650			623204.98	2645637.94	
50	404.600	0.25	R-SIDE	621998.60	2645161.21	KAZIPARA
	404.350			621965.07	2644792.70	
51	402.800	0.25	R-SIDE	622278.25	2643578.20	ALIKPUR
	402.550			622349.45	2643338.33	
52	395.10	0.8	R-SIDE	622485.95	2638095.14	TAUSHADPUR
	394.30			622832.18	2637225.49	
53	393.20	0	L-SIDE	623965.73	2636992.23	MAGANPARA (Not Selected)
	392.70			625035.31	2636736.08	
54	381.40	0.8	L-SIDE	623991.55	2627468.47	MANIKDIGHI (Modified)
	380.60			622970.47	2628222.10	
55	377.10	0.5	R-SIDE	621400.10	2627784.50	NATUNGRAM
	376.60			621480.23	2627531.32	
56	373.450	0.4	L-SIDE	620815.84	2624797.25	Raghupur (Modified)
	373.050			620592.25	2624791.33	
57	372.50	0.225	R-SIDE	619986.81	2624731.47	KALYANPUR
	372.275			619881.44	2624502.21	
58	370.40	1.1	L-SIDE	619804.57	2622425.05	FULBAGAN
	369.300			618739.63	2621749.73	
59	368.62	1	R-SIDE	617722.92	2622072.64	SITAHATI (Modified)
	367.62			616838.14	2620929.33	
60	361.90	0.2	R-SIDE	615869.05	2616062.12	GOALPARA GHAT
	361.700			615979.71	2615943.59	
61	360.10	0.57	L-SIDE	617554.28	2615309.25	
	359.530			618063.14	2615048.95	

62	356.70	0.5	L-SIDE	620450.91	2613614.28	MATIARI
	356.200			620730.73	2613285.07	
63	355.70	0.475	R-SIDE	620841.79	2612607.38	Shatghar
	355.225			621303.12	2612456.96	
64	355.70	0	L-SIDE	620824.97	2613230.03	MATIARI GHAT (Not Selected)
	355.250			621163.84	2612933.94	
65	345.500	1	L-SIDE	628628.92	2610659.39	AGRADUIP
	344.500			627829.02	2610201.34	
66	339.90	0.8	R-SIDE	628468.14	2606467.03	MOHAJANPATTI
	339.10			629224.95	2606260.68	
67	336.60	1	L-SIDE	630678.30	2607507.35	BABLADANGA (Modified)
	335.60			632402.42	2607411.89	
68	334.50	0	L-SIDE	632991.94	2606304.80	VDAICHANDRAPUR (Not Selected)
	332.50			631595.13	2605084.54	
69	332.00	0.150	L-SIDE	630554.33	2605172.61	CHASKINIPARA
	331.85			630366.04	2605204.06	
70	331.00	2	R-SIDE	629495.45	2605567.62	POTULI DAMPAL GHAT
	329.00			629144.44	2605247.19	
71	328.80	0	R-SIDE	628747.47	2603535.35	POTULI FERRY GHAT (Not Selected)
	328.65			628915.45	2603238.89	
72	328.30	0	R-SIDE	629021.71	2603112.28	Tegachhi (Not Selected)
	327.20			630301.25	2602522.23	
73	320.70	0.2	R-SIDE	635579.24	2604077.24	TANAGHATI
	320.50			635832.86	2604033.14	
74	319.80	0.6	R-SIDE	636578.90	2604088.19	TANAGHAT
	319.20			637013.45	2604229.77	
75	316.30	0.2	L-SIDE	639076.09	2604210.85	KERKARIA
	316.10			639191.45	2603973.67	
76	315.10	0	L-SIDE	639744.50	2603194.63	VEBODAGA (Not Selected)
	315.00			639944.05	2602946.43	
77	308.40	0	L-SIDE	638629.98	2597192.70	DEBNAGAR (Not Selected)
	307.70			638043.30	2597603.85	
78	305.80	0.6	R-SIDE	637998.75	2596732.20	KUTURIA
	305.20			638332.78	2596454.21	
79	304.80	0	R-SIDE	638968.64	2595327.71	KASHTHASALI (Not Selected)
	304.70			639025.37	2595245.36	
80	301.40	0.36	L-SIDE	640551.72	2593570.19	RANCHARDRAPUR FERRY GHAT
	301.04			640483.26	2593206.33	
81	299.80	0.2	R-SIDE	639718.02	2592101.73	PACHIN MAYAPUR
	299.60			639915.25	2591699.36	
82	296.10	0.35	L-SIDE	640961.12	2589350.01	SWARUP GANJ GHAT (Modified)
	295.75			640905.37	2589117.89	
83	291.10	0	R-SIDE	638858.98	2585913.72	

	291.00			638790.34	2585791.15	Mohisura (Not Selected)
84	279.25	0.5		635616.03	2582905.14	SIDDAPARA
	278.75					
85	273.30	0.9	L-SIDE	638737.23	2578035.44	TENGRIDAYA
	272.4			638240.34	2576655.59	
86	269.6	0.9	L-SIDE	637186.19	2574454.15	KALINAGAR
	268.70			636546.04	2573690.46	
87	268.2	0	R-SIDE	636020.05	2573632.19	PURNIR GHAT (Not Selected)
	267.7			636186.30	2573117.69	
	Sub-total	27.43				
	Total	36.868				

****