

Scope of Work  
&  
Terms of reference  
For



**Environmental Impact Assessment (EIA), Environmental Management Plan (EMP), Social Impact Assessment (SIA) and Social Management Plan (SMP)cum Resettlement Action Plan (RAP)**  
for  
**Jal Marg Vikas Project**  
for the Capacity Augmentation of  
**National Waterway -1**

Activity Ref : IN-IWAI- 67912-CS-QCBS  
Date of Release - 08<sup>th</sup> August '2018

for

**"Capacity Augmentation of National Waterway-1. Project"**

**Client: Inland Waterways Authority of India, Ministry of Shipping,  
Government of India**  
**Country: INDIA**

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## 1. 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-Hooghly 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. EIA & EMP for Ghazipur and Kalughat Terminals have been completed.

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

- Provision for bank protection / slope protection
- River training works including bend correction for critical locations.
- Two vessel repair and maintenance facilities at Sahibganj and Patna.
- SIA and SMP cum RAP for Ghazipur and Kalughat IWT terminals. 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.
- 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.

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 SMP/cum RAP 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, including socially and economically disadvantaged communities such as women, scheduled caste, scheduled tribe, other backward and poor in accordance with the Laws and 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 and 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. Under JMVP, 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 pollution.

**Social Impacts:** This may cause temporary disturbance or permanent adverse impacts to the local population, including women. The intervention may have impact on any cultural function that may be carried out including disruption of local ferries, or activities at ghats. There may be impacts 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 and cultural purposes. Impacts due to labour influx and compliance with labour laws are to be considered.

A scoping and screening will be required and followed up with detailed EIA, EMP, SIA and SMP cum RAP is required to be prepared (as per the list).

### **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, e t c. All these environmental components will be affected due to development and operation of the jetties and a detailed Environmental Impact Assessment

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Social Impacts: Further, the impacts on land, assets, common property resources, communities, women, vulnerable people and others due to project facilities location or nature of activities to be performed during its development and operation phase; impacts due to labour influx on local community thus, both these aspects need to be looked into while carrying screening and scoping and undertaking the SIA and preparing SMP, RAP, etc. Indirect impacts on livelihoods in general and in particular on vulnerable needs to be assessed.

### **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 Impacts:** 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 system is 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 Impacts:** 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. There may be impact on the communities dependent on the river, if any, at the location of these facilities. Particularly women who use the water for daily needs. Furthermore, effluent discharge will have many social implications on neighbouring habitations and particularly the fishermen population inhabiting the bank- affecting their livelihoods, 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 the 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 at Varanasi 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. 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 SIA and SMP /cum RAP in the lines with the RPF and the RAP disclosed for the project.

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

The SIA and SMP cum RAP will include a standalone chapter on gender and management of labour compliance and impact due to labour influx.

## 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 including Labor Laws 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,

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occupation, income and asset levels, education, access to health services, social organization, cultural distinctions, etc.). data will be collected on real time basis using the application that is geo-referenced. 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

Chapter	Content	Description/ details needed
Executive Summary		
Chapter 1- Project Identification	1.1 Project Background 1.1.1 Land Acquisition and Social Impact Assessment 1.2 Project Description 1.3 Project Proponent 1.4 Need for the Social Impact Study 1.4.1 The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 1.5 Layout of the Report	
Chapter 2- Approach and Methodology for the Social Impact Assessment Study	2.1 IWAI and PIU and SIA Unit 2.2 Profile if SIA Unit 2.3 Objective and Scope of Work 2.4 Approach of the Study 2.5 Study Methodology 2.5.1 Review of Relevant Documents 2.5.2 Site Visits 2.5.4 Stakeholder Consultations 2.5.5 Socio-Economic Survey and Focused Group Discussions 2.6 Study Definitions 2.7 Sampling Design for the Survey	
Chapter 3- Public Purpose of the Project	Define Public Purpose	

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Chapter	Content	Description/ details needed
Chapter 4- Analysis of Alternatives and Bare Minimum Land	4.1 Selection Criteria for Alternative 4.2 Examination of Alternatives 4.3 Best Alternative 4.4 Bare Minimum Land	
Chapter 5 Land Assessment	5.1 Introduction 5.2 Land Use 5.3 Scope of Land Acquisition 5.4 Collection of land Rates	
Chapter 6 The Social Baseline : Socio-economic Profile of PAFs	6.1 Socio-Economic Profile of the Study Region 6.2 Demographic Profile 6.3 Status of Women 6.4 Village Infrastructure 6.5 Socio-Economic Profile of Titleholders PAFs 6.5.1 Demographic Profile of PAFs 6.5.2 Caste Composition 6.5.3 Levels of Education 6.5.3 Occupation and Income of PAFs 6.6 Socio-Economic Profile of Tenant Households  6.7 Socio-Economic Profile of Non Titleholders PAFs 6.7.1 Category of NTH 6.7.2 Caste Composition 6.7.3 Levels of Education 6.7.3 Occupation and Income of PAFs 6.7.4 Extent of Impact  6.7.5 Details of CPRs 6.7.6 Type of CPR 6.7.7 Number and Extent of loss	Non titleholders analysis should be provided in SIA report
Chapter 7 The Social Impact of Land Acquisition	7.1 Introduction 7.2 Impact on Tenant Households 7.2.1 Loss of Shelter 7.2.3 Loss of Cultivated Area and Farm Income 7.2.3 Loss of Non-Farm Income 7.2.4 Especially Vulnerable Tenant Households 7.3. Impact on Owner Farmers 7.3.1. Loss of Land Holdings and Farm Income 7.3.2. Loss of Immoveable Assets 7.3.3. Loss of Self-Owned Enterprises 7.3.4. Especially Vulnerable Owner Farmer Households	
Chapter 8-Sakeholders Consultations	8.1 Stakeholders Consultation 8.2 Type of Consultations 8.3 Focused Group Discussions 8.4 Public Hearing and Social Impact	

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Chapter	Content	Description/ details needed
	<p>Management Plan</p> <p>8.5 Summary of Public Consultation Meetings – Issues discussed and Suggested Mitigation Measures (provide date, no. of participants, stakeholders category, and photo of FGD)</p>	
Chapter 9- Analysis of Cost and Benefit and Recommendations of Acquisition	<p>9.1 Requirement of Bare Minimum Land</p> <p>9.2 Serves the Public Purpose</p> <p>9.3 Social Benefits of the Project</p> <p>9.4. Social Costs of the Project</p> <p>9.4.1 Impact on Project Affected Families</p> <p>9.5. Conditions and Recommendations for the Acquisition of Land</p> <p>9.5.1 Compensation for Land</p> <p>9.5.3 Settlement of Dispute</p> <p>9.5.4 Resettlement and Rehabilitation of Project Affected Tenant Households</p> <p>9.5.5 Valuation and Compensation for Immovable Assets</p> <p>9.5.6 Restoration of Livelihood of Affected Tenant Households and Owner Farmers</p> <p>9.5.7 Special Assistance for Especially Vulnerable Project Affected Families</p>	
Chapter 10 - Resettlement Policies and Legal Framework	<p>10.1 Relevant Laws and Policies</p> <p>10.2 World Bank Safeguard Policies</p> <p>10.3 Comparative Analysis of the Right to Fair Compensation in Land Acquisition, Rehabilitation and Resettlement Act (RFCTLARR-2013), and World Bank OP 4.12 on Involuntary Resettlement</p> <p>10.4 Process of Land Acquisition and Other Immovable Assets</p>	
Chapter 11 – Resettlement Policy Framework	<p>11.1 Entitlement Matrix</p> <p>11.2 Project specific RPF</p> <p>11.2.1 Process flow for R&amp;R as per the RFCTLAR&amp;R Act 2013</p> <p>11.3 Appointment of “administrator” for R&amp;R</p> <p>11.4 Notification, Declaration and Preparation of Award</p> <p>11.5 Method of Valuation of Project Affected Assets</p>	<p>R&amp;R Scheme as per the RFCTLAR&amp;R Act includes the following, which can be incorporated in the RPF:</p> <ul style="list-style-type: none"> <li>• R &amp; R entitlements of each land owner</li> <li>• List of land owners who are dependent on the lands being acquired</li> <li>• List of public utilities and Govt. buildings which are to be provided in the Resettlement area</li> <li>• Details of the public amenities and</li> </ul>



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Chapter	Content	Description/ details needed
		<p>infrastructural facilities which are to be provided in the Resettlement area</p> <ul style="list-style-type: none"> <li>• Details of CPRs</li> </ul> <p>R&amp;R Awards as per the RFCTLAR&amp;R Act include the following:</p> <ul style="list-style-type: none"> <li>• R&amp;R amount payable to the affected family</li> <li>• Bank account numbers to which R&amp;R amount to be transferred</li> <li>• Particulars of allotted house and site (in case of displaced families)</li> <li>• Particulars of land allotted (in case of displaced families)</li> <li>• Particulars of one time subsistence and transportation allowances (in case of displaced families)</li> <li>• Particulars of payment of cattle shed and petty shops</li> <li>• Particulars of one time amount to artisans and small traders</li> <li>• Details of mandatory employment</li> <li>• Particulars of any fishing rights</li> <li>• Particulars of annuity and other entitlements</li> </ul> <p>Details of special provisions for the SC/ST</p>
Chapter 12- Livelihood Restoration and Income Generation Plan	12.1 Estimation of livelihoods / income affected 12.2 Needs assessment 12.3 Livelihood / Income Restoration and Enhancement Plan	<ul style="list-style-type: none"> <li>• Include timelines and budget</li> </ul>
Chapter 13 Social Impact Management Plan	13.1 Anticipated Impacts/Risks and Mitigation Strategy	<ul style="list-style-type: none"> <li>• Approach to mitigation.</li> <li>• Measures to avoid, mitigate and compensate impact.</li> <li>• Measures included in the terms of Rehabilitation and Resettlement and compensation as outlined in the Act.</li> </ul>

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Chapter	Content	Description/ details needed
		<ul style="list-style-type: none"> <li>Measures that the Requiring Body has stated it will introduce.</li> <li>Additional measures that the Requiring Body has stated it will undertake in response to the findings of the Social Impact Assessment process and public hearings.</li> <li></li> </ul>
Chapter 14 - Gender Development Plan	14.1 Gender Profile along the Project 14.2 Profile of Women Headed Households 14.3 Identification of Gender and Health Issues / Risks within the Project 14.4 Mitigation Measures and Action Plan	Include timelines and budget
Chapter 15 - Labour Standards Plan	15.1 Overview of applicable Labour Laws and Policies 15.2 Institutional matrix for labour law compliance 15.3 Labour Law Compliance Plan 15.4 Labour Influx Screening 15.5 Labour Influx Assessment and Management Plan	Social Impact of Labour Influx - Screening and assessment of the type and significance of potential social impacts that may be generated by labor influx
Chapter 16- Institutional and Implementation Arrangement	16.1 Headquarter Level- Social Development Specialist, and Land Acquisition and Resettlement Officer 15.1 PIU level- Social Officer 15.2 RAP implementation team/ NGO support for RAP implementation 15.3 Contractor 15.4 Technical Supervision Consultant (Social Officer)	
Chapter 17- Grievance Redressal Mechanism	17.1 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 17.2 Establishment of Grievance Redressal Committee 17.3 Lodging of Complaint 17.4 Processing the Complaint 17.5 Nodal Officer for Grievance Redressal 17.6 In case of non-resolution of complaints 17.7 Timelines Reporting requirements	
Chapter 18- Citizens Engagement Plan	18.1 Feedback Mechanisms	

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Chapter	Content	Description/ details needed
	18.2 Plan for Consultations and Information Disclosure	
Chapter 19- Training and Capacity Building Plan	19.1 Training Modules 19.2 Areas of Capacity Building	
Chapter 20- Monitoring and Evaluation	Internal Monitoring 20.2 External Periodic Evaluation and Concurrent Monitoring	Develop monitoring indicators for R&R Implementation
Chapter 21- Budget Allocation	21.1 Cost Estimate for Citizen Engagement, GRM, Training & Capacity Building, Income Restoration Measures, M&E and hiring of NGO for RAP implementation and other Social Staff. 21.2 Methods of Calculation of Value of Land 21.3 Cost of structures 20.3 Cost of R&R Assistance	
Annexures	<ol style="list-style-type: none"> <li>1. Form 1- Request for Land Acquisition with supporting documents</li> <li>2. Document evidencing publicity of public hearing for SIA</li> <li>3. List of likely to be displaced families; List of infrastructure in the affected area; List of land holdings in the affected area; List of businesses in the affected area; List of landless people in the affected area; List of disadvantage groups like Scheduled Castes or Scheduled Tribes, differently abled people in the affected area; List of landless agricultural labours in the affected area; List of prospective youth for employment in the affected area; and Socio-economic and cultural profile of the affected area and the affected families.</li> <li>4. Notice by Collector</li> <li>5. Preliminary Enquiry Report of the Committee constituted by the District Collector</li> <li>6. List of Notifications and Declarations               <ul style="list-style-type: none"> <li>- Notification issued under Section 4 (2) RFCTLARR</li> <li>Declaration for Prior Consent Gram Sabha Resolution if PPP</li> </ul> </li> </ol>	

#### 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

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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], in case the sub-project is PPP 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 impacts, 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) Gender. The consultant will identify relevant gaps between women and men, boys and girls in the analysis particularly; aim to address these gaps through specific actions supported by the project, and link them to indicators in the results framework. It is intended to prompt discussion at the project design stage on opportunities to narrow gaps between males and females in human endowments, more and better jobs, ownership and control of assets, and voice and agency. The consultant must identify operations that are critical to closing key gender gaps to address gender inequalities and achieve tangible outcomes and include a gender action plan.
- (xii) Citizen Engagement. – Assess use of citizen engagement to improve results in operations. Suggest measures to include citizen engagement in design of operations and implementation mechanism of citizen engagement in operations and include a citizen engagement plan. Also, indicators for Results Framework.
- (xiii) **Cultural Heritage.** Identify the physical and non-physical cultural heritage in the project-affected area having archaeological, paleontological, historical, cultural, artistic

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and religious values. It shall include cultural knowledge and traditional lifestyles. Proof of consultations with the government and communities about the cultural heritage should be included. The section also should describe the meaning and use of the cultural heritage, and conditions for removal.

- (xiv) Conduct labor influx risk assessment of pre-identified terminals. This shall include key social risks related to labor influx include, risk of social conflict, increased risk of communicable diseases, labor condition, camp-related issue, gender-based violence and misconduct, illicit behavior and crime affecting the local population and child labor issues. This study shall also assessment human trafficking issues and the risk assessment of labor impacts of institutional restructuring. The Consultant prepare labor influx mitigation plan and the employee code of conduct, which will be part of the Social Management Plan cum RAP
- (xv) **All other relevant potential social impacts.** The consultant should list the social impacts that do not fall under the above categories.
- (xvi) Prepare a SMP cum RAP in lines with the existing Resettlement Policy Framework and RFCTLAR&R Act. 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.
- (xvii) Organize workshop for other stakeholders like NGOs, District Administration, Ministry, etc., and finalize the RAP
- (xviii) Indicate a public consultation/ communication strategy with action plan for continuous public consultation during implementation.
- (xix) Prepare necessary plans to address HIV/AIDS and other health & safety issues as required by World Bank policies;
- (xx) 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 but not necessarily limited to: (i) the construction of Terminals (including storage infrastructure and transportation linkages), RO-RO terminals, Jetties, and Dredging sites and all associated issues of land clearance, creation or closure of accesses, pollution from construction activities, resource depletion during construction, and other related issues. ii) Operation related issues such as pollution, accidental spills, occupational safety and health issues, creation of third-party hazards, restriction of access to traditional sources of resources, exposure and establishment of exotics, periodic issues arising out of maintenance dredging, (iii) potential for unplanned development that could result in unintended pollution, resource depletion, safety or any other impacts on the communities and quality of environment around the sites of project interventions. Impacts as described above could be direct, indirect and cumulative – and should be described as such.
- To site and design the project interventions in such ways that most of the potential impacts are (a) avoided; and minimized when cannot be absolutely avoided; (b) for the impacts those cannot be avoided, plan for appropriate mitigation measures. These avoidance and minimization of impacts should be examined through an adequate and appropriate analysis of alternatives – which may include alternative sites, alternative design options, alternative technology or alternative work processes during operation stage. [Note that as the major

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portion of the project is already planned and under implementation, there will not be any planning alternative at the level of these specific project components. Similarly, a “no-project” alternative is basically reduced to an analysis of alternative sites.]

- To support public consultations on the possible and feasible alternatives (siting, design, technology, operational processes) and the residual impacts. Based on the public consultations and feedback, finalize the best possible and feasible alternative (for site, design, technology and operational processes for each individual project intervention).
- For the selected alternative, reexamining all possible ways of minimizing impacts; and prepare mitigation/management action for the residual impacts.
- To prepare an Environmental Management Plan, for each of the project interventions, satisfying the following:
  - Describe in detail, each anticipated impact, and the corresponding appropriate but wholesome mitigation measures
    - during pre-construction
    - during construction
    - during operation phase including environmental health and safety management plan, oil-spill contingency management plan, and similar other plans to address the potential risks
  - Identify and describe in detail all positive environmental enhancement measures as per overall environmental management plan of the “Rashtriya Jal Marg Project”, the actions needed for the following:
    - Measures to reduce use of water during construction
    - Measures to reduce use of water during operation (including installation of water-efficient plumbing, equipment, sprays, hoses)
    - Measures to reduce use of energy during construction
    - Measures to reduce use of energy during operation (including maximizing natural ventilation and daylighting) and generation of renewable energy during operation
  - All measures required to ensure zero discharge of liquid and solid wastes during construction (including preventing any accidental spills on to the river), and during operation (and at least ensuring that no liquid and solid wastes is disposed in the river or river bank or flood plains during operation)
  - All measures required to facilitate zero discharge of liquid and solid wastes from barges and vessels plying on the waterways during operation including at the minimum, requisite (modular if required) facilities to be installed to collect entire volume of solid and liquid wastes from the barges/vessels and final safe disposal of the same).
  - Other such activities to enhance positive environmental contributions.
  - Describe, for each of the above mitigation and enhancement measures, the timeframe, the responsibilities, and the modalities for implementation, monitoring, reporting and evaluation.
  - For the part of the above mitigation and enhancement measures to be implemented by the DBO contracts, describe the following:
    - Performance standards to be included in the contract for DBOs
    - Exact responsibilities for design, approval of design, including qualified third-party designs and audits required for ensuring best appropriate water-efficient, energy-efficient and carbon (GHG)-efficient designs and operations.
  - Wherever, it is important to specify technical design standards, or specifications, to achieve the goals of the EMP;
  - A generic cost estimate of the EMP measures (including an analysis of incremental cost to ensure energy and water efficiency over both construction and operation stage of the project, given that it is normally expected that water-efficient and energy-efficient design,

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construction and operation is expected to be cost-efficient also).

- Separately, and as may be required, recommend specific measures, to be implemented by IWAI as well as for other future projects, for addressing the environmental impacts over and above the mitigation and/or management measures described in above.
- 
- The EIA studies and reporting requirements to be undertaken under these ToR must also conform to the Government of India (GoI) as well as State-level legislations, regulations, rules, and notifications, and the Safeguards Policies including Environmental Health and Safety Guidelines of the World Bank...

#### **4.1 Details to be covered in Stand-alone EIA/EMP Reports**

A. **Project Description:** This section should cover broad details of the basic activities, such as:

- Relevance of the project in light of the existing development plans of the region, and specifically for “Rashtriya Jal Marg Vikas Project”
- Project coverage, master plan, phasing and scope
- Type, size and scale of the project- capacity augmentation of navigation facilities in the waterways, expansion, modernization, cargo-handling equipment, ancillary operations, housing, vessel parking details, etc. The layout plan should include details of channel, breakwaters, bunds or similar other structures, dredging, disposal and reclamation. Include details of bathymetry study.
- Technologies involved in design, construction, equipment and operation
- Location, layout and implementation schedule of the project
- Use of existing public infrastructure road, railway and airport networks, water supply, electrical power, etc.
- Description of project site, geology, topography, transport and connectivity, demographic aspects, socio-cultural and economic aspects, villages and settlements
- Estimated water balance for the proposed project during construction / operational stages.
- 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
- Resources, manpower and time frame required for project implementation
- Essential Maps to be provided with the Project Description

- A. A map specifying locations of the state, district and project
- B. A map of project and the area within 10 km from the Centre line 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
- C. A map covering aerial distance of 10 km on the landward side from the proposed project boundary, delineating environmentally sensitive areas
- D. 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
- E. Natural drainage contour map of the project area within 2 km of the proposed project area

#### **B. Methods, protocols and tools applied in the EIA**

- (1) The objective is to understand the site specific environmental sensitivities associated with the project site, and recommend specific mitigation measures (and not generic statements).

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- (2) The final recommendations (to be presented as part of EMP, should be discrete actions, with specified arrangements for implementation.
- (3) 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 2km radius (twice a week at each location for one season/ three months);
  - Ground Water Quality - at project site and other locations in 2km radius (one time at each location);
  - Surface Water Quality - near project site and other locations including any discharge point, confluence point of other stream and dredging locations (one time at each location);
  - Soil Quality - at project site and other locations in 2km 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 (15km upstream and downstream), undertake secondary and primary surveys as may be required for RET (rare, endangered and threatened) species known in that area and eco-sensitive zones within 10km radius of the site;
  - Terrestrial Ecology - in project area and 2km radius area in detail and general overview in 10km radius. Mention RET species and eco-sensitive zones within 10km radius of the site.
- (4) Quantification of impacts should be carried out by using quantitative models and specific calculations (based on established models) for estimating air emissions, GHG emission, maximum ground level concentrations for pollutants due to transportation, noise level, sewage generation, muck generation and disposal, underwater and ambient noise, etc., as applicable.
- (5) Methodology and objective of the public consultation, stakeholders consulted, proof of communication and conducting consultations (attendance sheet, invitation letters/ leaflets/ newspaper invitation/ public communication, proceedings & photographs of consultation and summary outcome of consultation with their redressal.

### C. Environmental baseline and relevance for the project interventions

- (1) 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. This will include carrying out site visits and investigations of all the environmentally sensitive locations and document them on the base maps to identify conflict points with design of the project.
- (2) 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.
- (3) **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 2km from the bank of the river. Secondary data should be collected for area within 10km aerial distance from the bank of the river. These should be depicted on specific and appropriate maps.
- (4) Land Environment:
  - 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;



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- 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;
- **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;
- **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;
- **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;
- **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:
  - a) Wind speed and direction,
  - b) Rainfall,
  - c) Relative humidity,
  - d) Temperature,
  - e) Barometric pressures, and,
  - f) History of cyclones.

(5) Water Environment

- Examine and submit details of the water bodies (including the seasonal ones) within the area of impacts along with their status, volumetric capacity and quality likely impacts on them due to the project. This should be accompanied by (a) a copy of the contour plan with slopes, drainage pattern of the site and surrounding area; (b) details of terrain, level with respect to MSL, filling required, source of filling materials and transportation details, etc.
- Examine the details of water requirement, impact on competitive user, treatment details, use of treated waste water. Prepare and present a water balance chart.
- **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.
- **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.
- **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.)

(6) Biological Environment

- River 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.
- 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.

(7) 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, and cargo and vessel movement in the waterway should be monitored, and results presented.
- This data should be collected in an area extending at least 2km from the high bank of the river by observation at a sufficient number of locations. Specific importance should be attached to sensitive receptors (schools, community aggregation areas, markets, hospitals, and the like) close to the project, say, up to 1km. 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.
- Potential air pollution and impact on sensitive receptors. Note: The air quality monitoring should be carried out according to the notification issued by GoI.

(8) 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.

(9) 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.

(10) 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 health infrastructure facilities within 500 m on both sides from the bank of the river and boundary of the waterway shall be studied.

(11) 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.
- 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

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study should be made for existing and projected passenger and cargo traffic (based on traffic analysis prepared by the Engineering consultants).

**D. Policy, Regulations, Rules Applicable**

- (1) GOI policies, laws, rules and regulations and their application in the project. Specify all prior permits or licenses required, and when to apply and receive the licenses along with responsibilities specified to obtain the licenses. Specify the reporting requirements to comply with the usual conditions of permits/licenses.
- (2) State laws, rules and regulations and their application in the project. Specify all permits or licenses required, and when to apply and receive the licenses along with responsibilities specified to obtain the licenses. Specify the reporting requirements to comply with the usual conditions of permits/licenses
- (3) (As and when required under the CRZ Notification, 2011). 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
- (4) Operational policies of the World Bank, and their relevant application to the project, including application of the World Bank's Environmental Health and Safety Guidelines (EHSB).

**E. Analysis of Alternatives:**

- (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) Description of various alternatives like locations or layouts or technologies studied
- (3) Description of each alternative
- (4) Summary of adverse impacts of each alternative
- (5) Selection of the best alternative
- (6) 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.

**F. Stakeholders Consultation:**

- (1) Stakeholder consultations, which will include community consultations at the state, district, village and riverside community levels, to improve siting and design of the project components with regard to proper environmental and social management
- (2) 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. Describe the process of public consultation, actual consultation sessions, and how exactly the feedback from these consultation sessions are/will be incorporated in the design, construction and operation of the project (with specific references to the EMP).

**G. Environmental impact analysis and impact prediction (direct, indirect and cumulative) and Description of Mitigation Actions**

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,

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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, as follows:

- (1) Land Environment: (a) suitable plan and design to reduce overall requirement of land, (b) suitable plan and design to reduce unplanned change in land use in the surrounding; (c) soil improvement techniques if adverse effect on surrounding soil is predicted; (d) measures to prevent increased traffic and truck parking in the approach roads.
- (2) Topography, Geology and Soil: Impacts, such as floods, inundation, restriction of natural drainage, land settlement, subsidence and slides, stress on vegetation and tree cover, and stress on any other ecological sensitive elements due to filling up of low-lying areas including through dredged spoil should be assessed. Mitigation measures to reduce adverse effects including alternative sites, soil stabilization, alternative borrow and quarry areas, use of alternative construction materials such as fly ash, storm water management, green and vegetative covers, etc., should be described in detail.
- (3) Groundwater: Discharge of effluent and sewage as a consequence of the construction and operation of the facilities should be studied. Impact of project construction/operation, navigation in the waterways on the groundwater due to leachates, run off from material and cargo storages, and toxic or harmful substances, percolation, river water intrusion should also be assessed. Based on the total water budget of the project, the use of groundwater should to be reviewed and alternatives should be recommended to be included in the DBO contracts. Mitigation measures to reduce adverse effects include cargo storage areas, treatment of effluent, recycling/reuse and disposal should be described in detail.
- (4) 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 to protect surface water resources from construction and operational activities and choice of alternative resources should be described in detail. Proper collection and disposal of liquid and solid waste from the terminal facilities, from any associated facilities and processes, and from operation of barges should be described in detail. Plans, guidelines for designing and standards for collection, treatment and disposal of solid and liquid wastes conforming to standards notified under the EP Act 1986 should be submitted as part of the EMP.
- (5) River ecology: Impacts of the construction and operation of the facilities on the river ecology (including on the river banks, and in the flow zones of the river should be assessed by using suitable empirical/model studies, and avoidance/reduction/mitigation measures should be described in detail.
- (6) Air Environment: Impacts on the ambient air quality, such as from (i) dust and particulates during construction including management of construction wastes, and cargo handling, (ii) emission of gases from equipment deployed for construction and cargo handling, (iii) vessel emissions around the facility, including when the vessels are berthing, (iv) emissions from access roads and railways, (iii) emissions from transshipment and/or transfer and handling of break-bulk and bulk commodities should be assessed. Detailed description of mitigation measures, including all measures to reduce emission, suppression of emissions – particularly dust and coal dust; and all measures to reduce and manage emissions during operation period should be provided.
- (7) Greenhouse emission reduction and quantification (using methods similar to or same as

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methods approved as per UNFCCC): The consultant shall prepare a detailed estimate of GHG emissions from construction and operation of (each of the) facilities. The EIA report should provide clear and detailed (step-by-step) guidance for the DBO contractors as to how to reduce the GHG emissions from each element of construction as well as each of the operational processes.

- (8) Noise Pollution: Noise and vibration from construction/operation of the facilities, the equipment used in the facilities for cargo handling, as well as the linkages with barge movement and operation in the waterway and road/rail traffic should be assessed. Mitigation measures to reduce adverse effects, especially for sensitive receptors (such as hospitals, schools around the sphere of noise and vibration influence) should be described.
- (9) Solid Waste Management: All generation and collection (from vessels that ply on the waterways) of non-hazardous and hazardous solid waste during construction and operational stages should be quantified; options for minimizing generation of solid wastes should be specified. For the anticipated quantum of hazardous and non-hazardous solid wastes, plans and designs should be prepared and specified (in a manner that these could be incorporated in the DBO contract) up to final treatment and disposal of such waste, both during construction and in operation periods.

#### **H. Environment Management Plan (EMP)**

The EMP should describe, for each of the above mitigation and enhancement measures, the timeframe, the responsibilities, and the modalities for implementation, monitoring, reporting and evaluation. For the part of the above mitigation and enhancement measures to be implemented by the DBO contracts, the EMP should include the following: (a) performance standards to be included in the contract for DBOs, (b) exact specifications and bills of quantities for design, approval of design, including qualified third-party designs and audits required for ensuring best appropriate water-efficient, energy-efficient and carbon (GHG)-efficient designs and operations.

Separately, and as may be required, recommend specific measures, to be implemented by IWAI as well as for other future projects, for addressing the environmental impacts over and above the mitigation and/or management measures described in above.

The EMP actions and reporting requirements must also conform to the Government of India (GoI) as well as State-level legislations, regulations, rules, and notifications, and the Safeguards Policies including Environmental Health and Safety Guidelines of the World Bank.

The EMP should include the following:

- (1) Construction Debris Management Plan
- (2) Borrow Area Management Plan
- (3) Measures for soil erosion protection and muck management, and soil quality management plan
- (4) Water management plan, including, but not limited to, the following:
  - (a) Water quality management plan including details of rainwater harvesting and utilization of rain water.
  - (b) Measures to reduce use of water during construction
  - (c) Measures to reduce use of water during operation (including installation of water-efficient plumbing, equipment, sprays, hoses).
- (5) Air Emission Management Plan
- (6) Noise Management Plan

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- (7) Bio-diversity (RET species) Conservation & Management Plan
- (8) Measures for management, closure and rehabilitation of sites of labor camps and plant site (batching plants, workshops and material storage sites)
- (9) Details of recommended safe handling storage, transport along with spillage control, dust preventive measures with respect to each major cargo expected. In case of coal, mineral cargo, details of storage and closed conveyance, dust suppression and prevention filters should be included.
- (10) Plantation plan including compensatory afforestation. 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.
- (11) Fisheries Impact Management Plan along with 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.
- (12) Effluent/Sewage and Waste Management Plan for non-hazardous and hazardous liquid and solid waste; and monitoring mechanism for prevention of disposal of waste generated at site and vessels in the waterway. This should include, but not limited to, the following:
  - (a) All measures required to ensure zero discharge of liquid and solid wastes during construction (including preventing any accidental spills on to the river), and during operation (and at least ensuring that no liquid and solid wastes is disposed in the river or river bank or flood plains during operation)
  - (b) All measures required to facilitate zero discharge of liquid and solid wastes from barges and vessels plying on the waterways during operation including at the minimum, requisite (modular if required) facilities to be installed to collect entire volume of solid and liquid wastes from the barges/vessels and final safe disposal of the same).
- (13) Details of energy efficient construction and operation of the whole facility (including buildings which will need to be GRIHA/LEED certified) and zero- discharge infrastructure for the whole facility/site. This should include, but not limited to, the following:
  - (a) Measures to reduce use of energy during construction for the entire facility (buildings included)
  - (b) Measures to reduce use of energy during operation (including maximizing natural ventilation and daylighting), and,
  - (c) Generation of renewable energy during operation
- (14) Comprehensive Risk Assessment and Disaster Management Plan including emergency evacuation during natural and man-made disasters. Describe the alternatives considered and selected. This will also include details of oil spill contingency plan.
- (15) All other elements as per environmental impacts assessed and predicted, and all other such activities to enhance positive environmental contributions.
- (16) Cost estimates of the EMP measures (including an analysis of incremental cost to ensure energy and water efficiency over both construction and operation stage of the project, given that it is normally expected that water-efficient and energy-efficient design, construction and operation is expected to be cost-efficient also). Gross cost estimates are also required for all items of EMP intended/recommended to be included in the DBO contracts.

### **B.3 Environmental Impacts and Mitigation Measures**

This section should describe likely impact of the project on each of the environmental

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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, as follows:

#### **B.3.1 Land Environment**

**(a) Land Environment:** (a) suitable plan and design to reduce overall requirement of land, (b) suitable plan and design to reduce unplanned change in land use in the surrounding; (c) soil improvement techniques if adverse effect on surrounding soil is predicted; (d) measures to prevent increased traffic and truck parking in the approach roads.

#### **(b) Topography, Geology and Soil**

**(b)** Impacts, such as floods, inundation, restriction of natural drainage, land settlement, subsidence and slides, stress on vegetation and tree cover, and stress on any other ecological sensitive elements due to filling up of low-lying areas including through dredged spoil should be assessed. Mitigation measures to reduce adverse effects including alternative sites, soil stabilization, alternative borrow and quarry areas, use of alternative construction materials such as fly ash, storm water management, green and vegetative covers, etc., should be described in detail.

### **B.4 Water Environment**

#### **B.4.1 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.4.2 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 conforming to standards notified under the EP Act 1986 should be submitted.

### **B.5 Aquatic Environment**

#### **B.5.1 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:**

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

#### **B.5.2 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.6 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.7 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.8 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.9 Solid Waste Management**

All generation and collection (from vessels that ply on the waterways) of non-hazardous and hazardous solid waste during construction and operational stages should be quantified; options for minimizing generation of solid wastes should be specified. For the anticipated quantum of hazardous and non-hazardous solid wastes, plans and designs should be prepared and specified (in a manner that these could be incorporated in the DBO contract) up to final treatment and disposal of such waste, both during construction and operation periods.

### **B.10 Carbon Reduction and Assessment as per UNFCCC agreement due to the JMVP**



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 navigation on National Waterway -1 (JMVP)

The consultant shall prepare a detailed estimate of GHG emissions from construction and operation of (each of the) facilities. The EIA report should provide clear and detailed (step-by-step) guidance for the DBO contractors as to how to reduce the GHG emissions from each element of construction as well as each of the operational processes.

## 6. Consultant's Input

S. No.	Expert Position	Numbers	Experience in Years	Education
1.	Team Leader/Sr. Environmental Specialist	01	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	1	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	1	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.	1	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
5.	Noise and Vibration expert	1	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.

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 navigation on National Waterway -1 (JMVP)

S. No.	Expert Position	Numbers	Experience in Years	Education
6.	Ecology and Bio-diversity Experts	1	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	01	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	01	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	01	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	01	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	01	5 yrs experience in mapping on GIS platform , land use surveys	MSc in Remote Sensing and GIS, engineer / environment management / geography/ geology.
11.	Hydrologist	1	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	1	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	01	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

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

## 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)

## Annex B

### 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 Environmental Health and Safety Guidelines; 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.

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 navigation on National Waterway -1 (JMVP)

**Annex C**

JOINT INSPECTION (IWAI, FBP, HOWE)						
LIST OF LOCATIONS SELECTED FOR BANK PROTECTION WORKS						
S.NO.			SIDE	GEOGRAPHICAL COORDINATES		REMARKS
	CHAINA GE IN KM	LENGT H IN KM		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

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	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 BRIDGE
	532.89			594194.598	2725037.58	
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	
	<b>Sub-total</b>	<b>9.438</b>				<b>Feeder Canal</b>
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	RAGHUNATHGA NJ
	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 Selected)
	480.65			618441.69	2694301.7	
38	477.35	0	R-SIDE	621595.31	2693093.02	CHAR KABILPUR (Not Selected)
	476.85			622022.27	2692994.43	
39	476.3	0.2	R-SIDE	622624.96	2692900.7	KABILPUR
	476.1			622796.884	2692861.254	

Terms of Reference for Environmental Impact Assessment (EIA), Environmental Management Plan (EMP),  
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navigation on National Waterway -1 (JMVP)

40	474.20	0.25	L-SIDE	624242.86	2691836.97	LALITAKURI
	473.95				624352.149	
41	453.45	1	R-SIDE	626298.73	2682750.49	BARANAGAR
	452.45				626305.07	
42	449.8	2	L-SIDE	628529.84	2680291.49	AZADHINDBAG H
	447.8				628228.34	
43	444.75	2.5	R-SIDE	628303.88	2675844.33	HAZARDUARI
	442.25				628741.21	
44	421.90	0	L-SIDE	624306.61	2654850.30	MAULA (Not Selected)
	421.80				624163.54	
45	420.90	0	L-SIDE	623991.05	2653643.11	HATNAGAR (Not Selected)
	420.70				623836.87	
46	418.90	0	R-SIDE	621546.85	2653960.22	KATALIA (Not Selected)
	418.65				621438.85	
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	
49	406.600	0.95	L-SIDE	623504.70	2646123.00	MIRZAPUR (Modified)
	405.650				623204.98	
50	404.600	0.25	R-SIDE	621998.60	2645161.21	KAZIPARA
	404.350				621965.07	
51	402.800	0.25	R-SIDE	622278.25	2643578.20	ALIKPUR
	402.550				622349.45	
52	395.10	0.8	R-SIDE	622485.95	2638095.14	TAUSHADPUR
	394.30				622832.18	
53	393.20	0	L-SIDE	623965.73	2636992.23	MAGANPARA (Not selected)
	392.70				625035.31	
54	381.40	0.8	L-SIDE	623991.55	2627468.47	MANIKDIGHI (Modified)
	380.60				622970.47	
55	377.10	0.5	R-SIDE	621400.10	2627784.50	NATUNGRAM
	376.60				621480.23	
56	373.450	0.4	L-SIDE	620815.84	2624797.25	Raghupur (Modified)
	373.050				620592.25	
57	372.50	0.225	R-SIDE	619986.81	2624731.47	KALYANPUR
	372.275				619881.44	
58	370.40	1.1	L-SIDE	619804.57	2622425.05	FULBAGAN
	369.300				618739.63	
59	368.62	1	R-SIDE	617722.92	2622072.64	SITAHATI (Modified)
	367.62				616838.14	
60	361.90	0.2	R-SIDE	615869.05	2616062.12	GOALPARA GHAT
	361.700				615979.71	
61	360.10	0.57	L-SIDE	617554.28	2615309.25	
	359.530				618063.14	



Terms of Reference for Environmental Impact Assessment (EIA), Environmental Management Plan (EMP),  
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navigation on National Waterway -1 (JMVP)

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	VDAICHANDRA PUR (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	RANCHARDRAPU R 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	

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	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					
86	269.6	0.9	L-SIDE	637186.19	2574454.15	KALINAGAR
	268.70					
87	268.2	0	R-SIDE	636020.05	2573632.19	PURNIR GHAT (Not Selected)
	267.7					
	Sub-total	27.43				
	Total	36.868				

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