**West Bengal Major Irrigation and Flood Management Project**

# Terms of Reference for Environmental and Social Impact Assessment

## Background

1. The Government of West Bengal (GOWB) has applied for USD 290 million financing from the International Bank for Reconstruction and Development (IBRD) and from the Asian Infrastructure Investment Bank (AIIB) towards the cost of the WBMIFMP and intends to apply part of the proceeds for Consulting Services.

2. WBMIFMP aims to improve the existing irrigation network, optimizing conjunctive and sustainable use of ground and surface water across in the project area and throughout the year, and to reduce flooding.

3. An Environmental and Social Impact Assessment (ESIA) is a decision-making tool to ensure that the project design and implementation are environmentally and socially sound and sustainable. During the preparation phase, the objectives of the ESIA is to (i) identify potential environmental and social risks arising out of the project; (ii) recommend ways in which such risks could be mitigated or managed by the project, including recommendations to carry out projects specific environment and social management plans (ESMP); and (iii) provide inputs into the feasibility study and also the preliminary and detailed design of the project. During the implementation phase, environmental and social management plans (developed as a part of the ESIA during the preparation phase) serve as a framework for executing the mitigation, enhancement and monitoring measures.

4. In the preparation phase, the ESIA shall achieve the following objectives:

- Establish the environmental and social baseline in the study area, and to identify any significant environmental and social issues;
- Assess the impacts of the proposed technical solutions to address the challenges that the project area is facing, and provide for measures to address the adverse impacts by the provision of the requisite avoidance, mitigation and compensation measures;
- Integrate the environmental and social issues in the project planning and design;
- Develop appropriate management plans for implementing, monitoring and reporting of the environmental and social mitigation and enhancement measures suggested.

5. The environmental and social assessment studies and reporting requirements to be undertaken under the ToR must conform to the Government of India (GoI) and the World Bank guidelines and regulations.

6. The ESIA comprises the following stages – environmental and social screening, preparation of Environmental and Social Management Framework, project ESIA, and preparation of Environmental and Social Management Plans (ESMPs); Pest Management Plan (PMP); Resettlement Action Plan (RAP) and Indigenous Peoples Plan (IPP). The following sections give the detailed scope of work in each of these stages.

## Project Description

7. The proposed project is located in the Damodar Valley Command Area (DVCA) and the Lower Damodar Sub-basin, and includes areas located in Purba & Paschim Burdwan, Bankura, Hooghly and Howrah Districts of West Bengal. Water to the DVCA is provided by five dams that are located in the upstream parts of the Damodar River in Jharkhand State. Improved management of these dams can play an important role in reducing floods and increasing the amount of water available for irrigation. However, these dams cannot be operated as originally intended due to lack of adequate land acquisition and subsequent encroachment of population within the upper portions of the designated storage zones. This applies to Maithon and Panchet dams in particular. Thus, although these dams were constructed with large potential storage capacities, it has never been possible to utilize more than half of the design volume.

8. The DVCA canals currently irrigate around 332,000 ha in the Kharif season (out of a design area of 393,800 hectares), 20,000 ha in the Rabi season on the basis of an earmarked allocation, and an average of 28,000 ha in the summer (Boro) season, depending on the amount of water remaining in upstream reservoirs and after meeting the priority needs. The total area irrigated (including all sources of water) is approximately 100,000 hectares in Rabi and Boro season each. The main sources of water of those parts that are not covered by canal water are ground water, and household and village ponds.

9. The DVCA was developed more than six decades ago and is now degraded. Numerous regulating structures including cross and tail regulators, outlet gates, distributaries and minors have been severely damaged. Cross drainage structures, including aqueducts are damaged and are leaking, resulting in a loss of irrigation water. Tail end farmers are not getting the required amount of water at the time of need as per the irrigation schedule, and are using groundwater, especially during Rabi and Boro seasons.

10. Flooding of extensive areas of the Lower Damodar is a frequent phenomenon within parts of Howrah and Hooghly districts causing significant economic damage and social distress. The situation occurs because these areas are on low-lying alluvial plains of the lower reaches of the river, a naturally accreting zone where tidal backwater restricts outflow of extensive floodwaters from the upland headwaters of the basin. Development of "Boro bunds" to store water in the summer season aggravates the situation.

*Irrigation Management*

11. In order to maximize production in the DVCA, farmers and scheme managers are "pushing" as much water as possible towards the Boro season to expand the Boro irrigation area. With the amount of water stored in the five upstream reservoirs given at the end of the monsoon, and with the Rabi acreage fairly fixed at 20,000 hectares, saving water during Rabi and Boro seasons will help extend the cultivated area during Boro season.

12. There are a number of ways in which water losses during Rabi and Boro seasons can be reduced:

- Reducing losses from canals through "plumbing" – canal repairs to reduce leakage;
- Improved canal management to reduce operational losses at all levels;
- Growing crops during Rabi and Boro seasons that consume less water than paddy.
- Using groundwater in a more sustainable manner: Consequent upon degradation of the irrigation network, the areas irrigated during Rabi and Boro seasons are located in close proximity to the main canals. Those areas that can no longer be served by the canals are using groundwater but as a result of over-abstraction and reduced recharge from canal water, groundwater levels have fallen[1] and groundwater irrigation during Boro season is becoming unsustainable. Recharging groundwater throughout the DVCA by spreading the canal water more equitably across the command area could return groundwater use to sustainable levels.

13. A more equitable water allocation across the project area could be established by going beyond mere rehabilitation of canal infrastructure and by introducing more comprehensive measures to reduce wastage and save water.

*Flood Management*

14. The Lower Damodar Sub-basin area is historically flood prone. On average, about 33,500 hectare of cropped area and 460,000 people are affected every year. The major reasons of floods, waterlogging and drainage congestion in the project area include inadequate utilization of flood storage in upstream reservoirs, progressive rising of bed of the Mundeswari River due to siltation, resulting in reduction of carrying capacity, tidal effect at the outfall of the channels and rivers, and inadequate conveyance capacities of drainage channels and outfall structures.

[1] 17 out of the 40 blocks located in the project area have now become critical or semi-critical. Semi-critical and critical blocks are defined in relation to the decline of the groundwater level and the level of groundwater development.

*Modernization of Hydraulic Assets*

15. The proposed project aims to address the degradation of hydraulic assets. However, the conditions that determined the original design of the irrigation and flood management infrastructure are no longer in place and the current needs and conditions have to be considered in a coherent manner. For instance, the use of ground water for irrigation during the Rabi and Boro seasons has increased significantly in the command area in response to the degraded canal system. In addition, siltation has reduced the effective storage capacity of upstream reservoirs in Jharkhand, and encroachment of the reservoir areas has reduced the capacity of the reservoirs to store floods. The project would therefore seek to modernize and upgrade the physical, management and information systems, rather than simply rehabilitate infrastructure. This would include:

- *Investing* in reducing flooding and saving water for Boro. This would include investments in infrastructure, improved planning and scheduling of irrigation to ensure a more equitable distribution of irrigation water and reduced flooding across the project area, optimizing the sustainable use of both surface and groundwater, reducing wastage and improving the efficiency of water use, e.g. by promoting crops that use less water;
- Reforming *institutions* to improve the quality of water service delivery by establishing Water Users' Associations, outsourcing performance based O&M, contractualizing public service delivery, and introducing asset management;
- Improving *information* by strengthening monitoring capacities, modernizing the monitoring, and information system of IWD.

16. A feasibility study is currently under preparation that will help identify the modernization options. Based on a preliminary assessment of the modernization options, the proposed project components are:

*Component 1: Irrigation Modernization*

17. This component would aim to reduce operational water losses across the system. This would be done by improving water allocation and by increasing storage (ground water, ponds, etc.), but also by strengthening the institutions that are responsible for irrigation management, including strengthening of monitoring and measuring of key operational data, introducing performance based irrigation management, and introducing more rational management and maintenance procedures.

18. The project would promote a more equitable and more strategic distribution of surface water across the project area that will help groundwater recharge and will improve the sustainability of water distribution. During project preparation, a pre- and post-project water balance will be prepared to confirm the sustainability of ground water recharge and withdrawal under the project.

19. During project preparation, the following activities would be considered:

- Improve water allocation and planning, rehabilitate hydraulic infrastructure, and prioritize canal water supply to those blocks in the command area that have been recognized as semi-critical for ground water use. Doing so would give the groundwater in these blocks more time to recharge and return to non-critical status;
- Refine scheduling procedures to more closely match irrigation supply to demand and introduce on a pilot basis performance based irrigation management at distributary canal level. This may require regular feedback from chaks on their water demands and scheduling down to the distributary level, with branch canals running continuously throughout the irrigation season;
- Improve monitoring and evaluation (M&E), conduct a water audit and develop a decision support system;
- Improve Operation and Maintenance (O&M) by introducing asset management to more systematically identify, prioritize and evaluate maintenance requirements of the hydraulic assets in the project area.

*Component 2: Water Resources Management*

20. This component would aim to reduce flooding in the Lower Damodar Sub-basin area through structural and non-structural measures. In close collaboration with the Bank-funded Dam Rehabilitation

and Improvement Project (DRIP, P089985), this would include strengthening forecasting and analysis capacities, addressing flooding hotspots through desiltation and embankment reconstruction (for instance at the Mundeshwari intake), and increase the use of storage during the monsoon season.

21. During project preparation, the following activities will be considered:
    - Treatment of flooding hotspots through removal of some sediment and construction and heightening of embankments. This will help allow controlled flood releases during major floods and increase channel conveyance capacities in the flood-prone area;
    - Support DVC in the management of its reservoirs to increase the amount of water in the reservoirs at the end of the monsoon available for irrigation and reduce flooding.
    - Support efforts by the GOWB to strengthen data collection, analysis, risk assessment, flood forecasting and modelling to improve the management of the five reservoirs in Jharkhand, including for instance development of a Decision Support System and Flood Warning System;

*Component 3: Command Area Development*

22. This component would aim to improve water allocation and reduce water losses below outlet level. The project would invest in command area development, including investments in infrastructure, capacity strengthening and institutional reforms. This component would be implemented in close collaboration with WRIDD. The component would also help farmers take advantage of existing subsidies for command area development that are available at State and Union level.

23. During project preparation, the following activities could be considered:
    - Construct in-field channels to allow water to be distributed to tail-end plots in the chak and thus allow more diversified cropping and farming practices within the chak (e.g. System of Rice Intensification, SRI, or Alternate Wetting and Drying, AWD, for rice cultivation). Modernize the turnout structures along the minor canal to better control supplies and reduce losses;
    - Establish WUAs to manage the distribution of water along the minor and within the chak, and to represent the interests of the farmers to scheme management. The establishment of the WUAs would also be part of measures to strengthen the communication of information on water delivery schedules between the IWD and the water users;
    - Promote solar pumping, for instance by installing solar panels over village and household ponds to reduce evaporation losses from these ponds and reduce the costs of ground water pumping. Support would be provided to WUAs that agree to establish ground water monitoring and management committees.

*Component 4: Crop Diversification*

24. This component would aim to reduce water demand by diversifying agricultural production towards crops that have a lower water requirement and provide higher income, in particular during Boro season. Indicators would include the proportion of the project area under crops that require less water. Measures under this component would complement those taken by Agri-Marketing Department under GOWB that is making efforts to develop storage facilities at Block Levels by construction of Kishan Mandis (places for selling produces by the farmers at fair price). During project preparation, and in close consultation with IWD, the team will define the exact scope of the Crop Diversification component, and will decide whether the focus will be on capacity strengthening and incentives for crop diversification only, or additional measures should be incorporated into the project. This component will be implemented in close collaboration with the Agriculture Department.

25. During project preparation, the following activities could be considered:
    - Train farmers in crop husbandry measures of non-paddy crops, and conduct farmer field schools to promote crop diversification;
    - Demonstrate crop husbandry methods that reduce water use, including SRI;
    - Educate farmers on optimal use and safe handling of pesticides and fertilizers.
    - Introduce water caps/restrictions to chaks based on seasonal water availability, and work with WUAs to develop seasonal crop plans that maximize water productivity within these caps.

*Component 5: Project Management, including Monitoring and Evaluation*

Project Management

26. This component will support strengthening the IWD's and the PMU's capacity for project management, monitoring and evaluation (M&E) (including, inter alia, the areas of procurement and financial management) through the provision of goods, consultant services, training, and financing of incremental operating costs. This component will (i) develop a comprehensive management information and data collection and reporting system on key performance outputs and impact indicators through baseline surveys, participatory assessments, mid-term reviews and final evaluations.

27. Staffing of the PMU will include a number of technical, financial management, M&E and safeguards (social and environmental) experts. Detailed implementation arrangements will be spelled out in the Project Operational Manual. (POM). Regular training of PMU staff will be organized to strengthen their capacities to implement the project.

Monitoring and Evaluation

28. Improved scheduling and planning of canal water supplies across the project area, and adjusting the supplies to better match demand requires high quality monitoring of key performance indicators. The project would strengthen the existing monitoring and evaluation (M&E) system, including the GIS to map the system in different layers (land use, river, canal and drainage network, cropping, ground water levels and status, crop production and crop yields, etc.). The base unit for this GIS would be the administrative Blocks, as various departments currently collect much data on this basis. The project would also consider developing smart apps to promote more transparent and accountable irrigation management at scheme level.

29. A key component of an improved M&E system for IWD will be the development of a web-based management information system. Such systems have been developed and introduced as part of World Bank funded irrigation rehabilitation and modernization projects in Madhya Pradesh and Tamil Nadu. IWD has recently drawn together data from various sources and prepared the Statistical Handbook. The web-based MIS would similarly act as a portal for the majority of the data collection, processing, analysis and reporting for the Department, both for irrigation and water resources and flood management. The M&E system will also be used to develop Android and iOS apps to promote citizen engagement in irrigation management.

30. The use of remote sensing to measure key performance indicators such as crop type, area and location and flooding will also be promoted. The feasibility of further developing such systems to measures actual evapo-transpiration, biomass production and crop yields will also be investigated, with the results being incorporated into the GIS mentioned above.

31. At the system level there will be a need for a control room and computer systems to collect, process and analyze the data collected through the proposed SCADA system on the main canals. The details will need to be provided by the feasibility study, but it is anticipated that the computer displays will show the water levels and discharges at the relevant control points and allow simulation of the impacts of adjustments to the gates on the flow conditions.

32. The GOWB has the intention to transform the River Research Institute (RRI) into a center of excellence affiliated with Jadavpur University. RRI would award MSc and PhD degrees in River Engineering, and Hydrology and Hydro-informatics. A consultant has been recruited by the GOWB to define the transformation of RRI. Associated investments in the upgrading of RRI's infrastructure will be identified by the study. It was agreed that once the final report has been completed the project would consider financing some of these investments.

## Project Area

33. The project area considering both irrigation and flood management aspects is as follows:

***For irrigation***

a) Northern Boundary: River Ajoy at Parulia, Block Katwa-I, District Burdwan (Latitude 23°38′51″ N).
b) Southern Boundary: Outfall of Nabinbabur Khal at Block Amta-I, District Howrah (Latitude 22°35′47″ N).
c) Western Boundary: Durgapur Barrage on river Damodar at Block Barjora, District Bankura (Longitude 87°18′13″ E).
d) Eastern Boundary: Howrah Burdwan Main Line of Eastern Railway at Nityanandapur, Block Balagarh, District Hooghly (Longitude 88°25′17″ E)

***For flood management***

a) Northern Boundary: Bifurcation point of river Damodar into Mundeswari River and Amta Channel at Beguahana, Block Jamalpur, District Burdwan (Latitude 23°08′8.34″ N).
b) Southern Boundary: Outfall of Amta Channel in river Hooghly, Block Shyampur-I, District Howrah (Latitude 22°20′59.76″ N).
c) Western Boundary: Ichhapur at Block Khanakul-I, District Hooghly (Longitude 87°45′0.43″ E).
d) Eastern Boundary: River Saraswati at Eklakhi, Block Chanditala-II, District Hooghly (Longitude 88°16′33.89″ E).

The schematic drawing, brief project outlay, location and other particulars are available on the website *www.wbiwd.gov.in* in the link **"**WBMIFMP**"**.

## Scope of Work

34. Consultancy for feasibility level studies to develop alternative options for modernizing and improving Irrigation Management, Flood Management, Command Area Development & Crop Diversification is being awarded. Selection of the preferred option will be done by the Feasibility Study Consultancy, keeping in view, inter alia, potential environment and social impacts of each of the options. Once the preferred option has been selected, the Feasibility Study Consultant will prepare detailed designs of the proposed investments. The ESIA Consultant will be responsible for Environmental and Social Screening and Scoping, formulation of Environmental and Social Management Framework, undertaking detailed assessment of potential Environmental and Social Impacts, based on the preferred option selected by the Feasibility Study Consultant and finally formulation of Environmental and Social Management Plans.

***Part A: Inception***

35. The consultant shall use the inception period to familiarize with the project details, and shall recognize that other aspects of the project, such as engineering, are being studied in parallel, and it is important for these aspects to be incorporated. The consultant should also recognize that due care and diligence planned during the inception stage helps in improving the timing and quality of the ESIA reports.

36. During the inception period the Consultant shall (a) study the project information to appreciate the context within which the ESIA should be carried-out, (b) study the baseline information provided by Feasibility Study Consultant (refer Annex 1 for the baseline data to be provided by Feasibility Consultant) (c)identify gaps in the baseline information provided by Feasibility Study Consultant and sources of primary information for the same (d) identify the sources of secondary information on the project and on the project area, and (e) undertake preliminary consultations with stakeholders.

37. The consultant shall interact with the Feasibility Study Consultant to determine how the ESIA work fits into the overall project preparation/ project cycle; how overlapping areas are to be jointly addressed; and to appropriately plan the timing of the deliverables of the ESIA process. These shall be succinctly documented in the ***Inception Report***. The report will be revised in consideration of the comments of IWD and the World Bank.

***Part B: Environmental and Social Screening and Scoping***

38. *General:* Environment and social screening is done in the early stages of the project preparation to make a preliminary assessment/review of the environment and social issues that are relevant to the proposed project, and to make the project environmentally and socially sound and sustainable. It determines the appropriate extent and type of project ESIA to undertake, provides information/inputs that are required for assessing technical, economic and financial feasibility of the project, and recommends possible modifications in the preliminary project design options. The Consultants shall carry out environmental, social screening and scoping as per the work plan, and methods described in the Inception Report and in consideration of the comments of IWD and the Bank on the same. The consultant shall keep in mind the particular requirements of the project, especially the needs of the overall feasibility studies in carrying out the screening. The assessment shall be co-ordinated with the surveys being undertaken by Feasibility Study Consultant, as far as practical.

39. *Screening and Scoping:* The consultant shall collect information relevant to the environmental and social screening through rapid assessment, from the information provided by Feasibility Study consultant, and supplement with additional information in case any gaps are identified. The consultant shall develop a Screening Checklist to undertake rapid assessment of at least 10% of the project area to assess potential environmental and social impacts of the project interventions. The Screening Checklist shall be vetted by IWD and the World Bank. Screening and scoping shall include, but not limited to, hydro-geological information, flood warning & emergency response systems, agro-chemical use practices and identification of all macro-level environmental issues within the project's influence area.

40. The consultants shall also collect and review prevailing GOI, state and World Bank policies, regulations and other provisions, to assess their applicability to the project. These shall include, but not limited to, laws and regulations related to environment, social, water, forest and Environment-Health-and-Safety (ESHS), land acquisition, resettlement and rehabilitation of project affected people and other social issues especially tribal population.

41. The safeguard policies that possibly will get triggered based on assessment at concept stage of the project are:

a) Environmental Assessment (OP 4.01)
b) National Habitat (OP 4.04)
c) Pest Management (OP 4.09)
d) Physical Cultural Resources (OP 4.11)
e) Dam Safety (OP 4.37)
f) International Waterways (OP 7.50)
g) Indigenous People (OP4.10)
h) Involuntary Resettlement (OP4.12)

42. The consultants shall survey the environmentally sensitive locations on and along the project area/river/canal/command area. All regionally or nationally recognized environmental resources and features within the project's influence area shall be clearly identified, and studies undertaken by IWD (refer Annex 3) in relation to the proposed scope of the project. Typically, these will include wetlands, protected areas; RAMSAR sites and forests; eco-sensitive areas in Mundeswari river (in and around sections for desilting) and canals; and major physical cultural properties. The consultant shall, apart from community consultations, also carry out a rapid survey of the potentially affected households on a sample basis (10% of the total potentially affected households) in the project area to (i) assess the both positive

and adverse impacts (ii) socio-economic profile of the project area; and (iii) issues of vulnerable communities and gender. All these may be depicted using a line diagram or a strip map.

43. *Stakeholder Assessment & Consultation:* The consultants shall carry out consultations with communities that are likely to be affected, NGOs, selected government agencies and other stakeholders to (a) collect any missing baseline information, (b) obtain a better understanding of the potential impacts and (c) appreciate the perspectives/concerns of the stakeholders. Consultations shall be preceded by a systematic stakeholder analysis, which would (a) identify the individual or stakeholder groups relevant to the project and to environmental and social issues and their stake in the project, (b) identifying key formal and informal institutions operating in the project area and assessing their role in community decision making processes; (c) expert opinion and inputs, (d) determine the nature and scope of consultation with each type of stakeholders, (e) determine the tools to be used in contacting and consulting each type of the relevant stakeholders; and (f) assess local capacities in terms of participation in planning, implementation, supervision and monitoring. Consultation with the stakeholders shall not be treated as a session to disseminate project information, but be used to improve the plan and design of the project.

44. The consultants shall prepare an ***Environmental and Social Screening Report***. The report will be revised in *consideration of the comments of IWD and the World Bank.*

***Part C: Environmental and Social Management Framework***

45. *General:* Environmental and Social Management Framework sets out the principles, rules, guidelines and procedures to assess the environmental and social impacts. It contains measures and plans to reduce, mitigate and/or offset adverse impacts and enhance positive impacts, provisions for estimating and budgeting the costs of such measures, and information on the agency or agencies responsible for addressing project impacts.

46. *Preliminary Analysis of Impacts and Management Measures:* Based on the information collected during screening and scoping, the consultants shall conduct a preliminary analysis of the nature, scale and magnitude of the impacts that the individual preliminary design alternative are likely to cause, and classify the same using established methods. For the negative impacts identified, alternative mitigation/management options shall be examined, and the most appropriate ones suggested. For the positive measures identified, alternative and preferred enhancement measures shall be proposed.

47. The consultant shall also undertake analysis for, but not limited to, quantitative analysis of use of water for irrigation, ground water and pesticide use; factors affecting use of canal for irrigation and recharging of ground water; the impact of investments on the river flow system and at the downstream end; and environmental and health impacts due to flood management.

48. *Inputs to feasibility study & preliminary project design:* The ESIA consultants shall make location-specific and substantiated design recommendations, wherever possible or required, related to canal works, flood management and irrigation works, and mitigation and enhancement measures. The ESIA consultants shall consult with the Feasibility Study Consultants and familiarize themselves with the project's overall preliminary design models/options including preliminary environmental and social impacts assessed by the Feasibility Study Consultants of each of the options, so that the ESIA inputs are in conformity with the needs of the overall feasibility study and selection of the preferred option be made, inter alia, with adequate justification from social and environment viewpoints.

49. In the cases of very significant environmental and/or social losses or benefits, the consultants shall prepare indicative economic/financial costs of environment and/or social damage and the economic/financial benefits the preliminary design options are likely to cause. In case the impacts or benefits are not too significant, qualitative methods could be used. In addition, wherever economic and financial costs of the environmental and/or social impacts cannot be satisfactorily estimated, or in the cases of significant irreversible environmental and/or social impacts, the consultants shall make recommendations to avoid generating such impacts.

50. Based on the environmental and social analysis, the consultant shall formulate an Environmental and Social Management Framework (ESMF). The ESMF will include (i) environmental management framework; Pest Management Plan; Resettlement Policy Framework; Indigenous Peoples Framework; Gender Action Framework and Consultation framework. The ESMF will also include generic Environmental and Social Management Plans (ESMPs) covering mitigation measure for each category of loss identified and guidelines for undertaking detailed ESIA for the finalized design option. The frameworks will be revised in consideration of the comments of IWD and the World Bank.

***Part D: Environmental and Social Impact Assessment***

51. *General:* Project ESIA is the stage when the detailed assessments are done. This includes carrying out the detailed ESIA considering the preferred option finally selected and preparing various reports that include the detailed ESIA report and environment and social management plans. The work plans and methods employed shall be as per those described in the Screening Report and as agreed in ESMF. It is recommended that the environmental and social assessments be co-ordinated with the Feasibility Study surveys, as far as practical.

52. *Baseline Assessment:* The consultants will (a) collect information from secondary sources that are relevant to understanding the baseline, as well as the design of mitigation and enhancement measures, as pertaining to physical, biological and socio-cultural environments; (b) carry out site visits and investigations of all the environmentally sensitive locations (based on the inventory of valued eco-system components) and document them to identify conflict points with preliminary designs (including verification of these from authentic sources of information, such as from the revenue and forest records); (c) prepare detailed specific maps showing details of candidate sites for environmental enhancements; (d) establish criteria that will assist in the formulation of strategies; to the extent possible maximize project benefits to the local population and minimize adverse impacts of the project interventions on the affected communities; and (e ) establish role of community and local self-government in management of irrigation water and potential role in formation of WUA

53. All assessments shall be carried out in compliance with the GoI standards/guidelines/norms. Wherever such guidelines/norms are not available, the techniques, tools and samples employed for the assessments shall conform to international practice. Whenever directly relevant secondary data is available, these should be used, while indirectly relevant data should be verified through primary survey. Additional sample data for sensitive environmental/ecological receptors, if any, shall be collected such as to analyse and predict the possible impacts to a degree and precision of acceptable professional standards. Further, additional specialized surveys, such as, but not limited to, biodiversity assessment, and hydro-geological assessments shall be conducted, if and when recommended by environmental scoping described earlier.

54. *Stakeholder Consultation:* The consultants shall undertake community consultation sessions as per the consultation plan prepared during the screening stage. Consultations should be carried out with all relevant stakeholders identified through stakeholder analysis. The objective of the consultation sessions shall be to improve the project's interventions with regard to environmental and social management. As part of consultation, consultants shall inform, consult and carry out dialogues with the project stakeholders on matters relating to the project design, objectives, and implementation and provide specific recommendations to avoid/ minimize high environmental and social risks (e.g. activities where it is advisable not to proceed), the proceedings of consultation with stakeholders shall be properly documented. Two rounds of consultations shall be carried out – the first to seek views from the stakeholders on the environmental and social issues and the ways these could be resolved, and the second to provide feedback to the stakeholders that their views have been taken considered the project (when the environmental and social management plans are nearly complete). Further, the residual feedbacks received shall be analysed, and the consultants shall determine how these can be addressed in the final management plans and in the project designs. The consultants shall co-ordinate the entire consultation

program with the engineering consultants. Consultants shall develop a consultation framework for participatory planning and implementation of proposed mitigation plan.

55. *Environmental and Social Analysis of Alternatives:* As the overall design options are final at this stage, the environmental and social analysis of alternatives shall focus on comparisons in relation to siting, design, technology selection, construction techniques and phasing, and operating and maintenance procedures.

56. *Impact Assessment& Management:* The consultants shall determine the potential impacts due to the project through identification, analysis and evaluation on sensitive areas (natural habitats; sites of historic, cultural and conservation importance), urban settlements and villages/agricultural areas. To distinguish between significant positive and negative impacts, direct and indirect impacts, immediate and long-term impacts, and unavoidable or irreversible impacts. The survey and analysis will cover likely impacts of the project, in terms of, but not limited to, impacts on natural habitats including wetlands, protected areas, RAMSAR sites and forests; eco-sensitive areas and environmental flows in Mundeswari river (in and around sections for desilting) and canals; induced impacts of increased fertilizer and pesticide use due to improved irrigation; major physical cultural properties; water resource availability; emergency flood response; land acquisition (loss of lands, houses, livelihood, etc.), and resultant involuntary resettlement extent and undertake the census of potential project affected people; impact on their livelihood; likely loss of community assets including the religious structures and common property resources; social development issues in the project area and its vicinity and design the social services that may be provided by the project in order to improve the quality of life and achieve the projects economic and social goals; and impact of labour influx on the host community.

57. For each impact predicted as above, feasible and cost effective mitigation measures shall be identified to avoid or to minimize potentially significant adverse environmental and social impacts to acceptable levels. The capital and recurrent costs of the measures, and institutional, training and monitoring requirements to effectively implement these measures shall be determined. The consultants shall explore and recommend different environmental enhancements, like health benefits, etc., as necessary.

58. *Institutional Arrangement to Manage Environmental and Social Impacts Effectively:* The consultants shall identify institutional/organizational needs to implement the recommendations of the project ESIA and to propose steps to strengthen or expand, if required. Consultant shall assess the capacity of institutions and mechanisms for implementing the mitigation measures and recommend capacity-building measures as required. This may extend to inter-sectoral arrangements, management procedures and training, staffing, operation and maintenance, training and budgeting. Consultants shall also develop monitoring and evaluation mechanism to assess social development outcomes.

59. The consultants shall discuss and co-ordinate with the Feasibility Study consultants, the findings and recommendations of the project ESIA in a continuous manner. The consultants shall prepare an Environmental and Social Assessment Report. The report will be revised after consideration of the comments of IWD and the World Bank.

***Part E: Environmental and Social Management Plans***

60. Based on the environmental and social impacts predicted, Environmental and Social Management Plans (ESMPs), generic for various types of the contract packages, shall be prepared in such a manner that these are amenable to incorporation in the bidding/contract documents. The ESMP shall be prepared to fulfil all requirements of the GoI, and at the minimum meet the requirements of World Bank OP 4.01-Annex C. The ESMP shall, among others, include a list of design modifications recommended by the project ESIA. The report will be revised after consideration of the comments of IWD and the World Bank.

61. *Environmental Mitigation & Enhancement Measures:* Feasible and cost-effective measures to prevent or reduce significant negative impacts to acceptable levels shall be recommended. Apart from

mitigation of the potential adverse impacts on the environmental components, the ESMPs shall identify opportunities that exist for the enhancement of the environmental quality for each contract package. This shall include, but not limited to, construction activities, ground water management (quality and quantity) and pesticide use for irrigation, water harvesting to meet irrigation needs, flood management. Residual impacts from the environmental measures shall also be clearly identified. The ESMPs shall include specific or generic plans, such as for management and redevelopment of quarries, borrow areas and construction camps. The ESMPs shall include detailed specification, bill of quantities, estimated costs, and enhancement measures suggested, separate for pre-construction, construction and operation periods to be done on generic basis for various broad based types of contract packages e.g. Irrigation Canal improvement work, construction of regulating structure, embankment improvement work, re-excavation of drainage channel etc so as to incorporate those subsequently in the bidding/contract documents with necessary modification. In addition, the ESMPs shall include a guide to good practice related to various components of the project. Responsibilities for execution and supervision of each of the mitigation and enhancement measures shall be specified in the ESMPs. A plan for continued consultation, as required, to be conducted during implementation stage of the project, shall also be appended. Additionally, the ESMPs shall include as separate attachments, if applicable, Natural Habitat Plan and/or Cultural Properties Plan to satisfy the requirements of the World Bank safeguard policies.

62. *Pest Management Plan:* A standalone PMP shall be prepared giving details of process and action steps to improve pesticide use (procurement, handling, storage, use and disposal) and to promote Integrated Pest and Nutrient Management (IPNM) for reducing the use of pesticides and other agro-chemicals.

63. *Resettlement Action Plan:* The scope and level of detail of the resettlement plan vary with the magnitude and complexity of resettlement. The plan shall be prepared based on social assessment survey and should cover the impacts on the community and other adversely affected groups and mitigation measures. Specifically, the resettlement plan shall cover (i) Description of the project and survey methodology; (ii) baseline information and Socio-economic details of affected people including income/asset survey of affected persons; (iii) review of applicable legal framework and its relevance to project; (iv) impact identification: Identification of impacts and its quantification. This chapter will include all those who will lose their assets; needs to be relocated; loss of common property; physical cultural resources and vulnerability; (iv) issues related to gender and labour and it's management measures; (v) mitigation measures for each impact category; (vi) institutional arrangement for implementation of RAP; (vii) time schedule for implementation of RAP; (viii) grievance redressal mechanism; (ix) monitoring and evaluation indicators and mechanism; and (x) tentative budget.

64. *Indigenous Peoples Plan:* On the basis of the social assessment and in consultation with the affected Indigenous Peoples' communities, consultant shall prepare an Indigenous Peoples Plan (IPP) that sets out the measures through which the project will ensure that (a) Indigenous Peoples affected by the project receive culturally appropriate social and economic benefits; and (b) when potential adverse effects on Indigenous Peoples are identified, those adverse effects are avoided, minimized, mitigated, or compensated for. The IPP shall include (i) a summary of the social assessment; (ii) a summary of results of the free, prior, and informed consultation with the affected Indigenous Peoples' communities; (iii) a framework for ensuring free, prior, and informed consultation with the affected Indigenous Peoples' communities during project implementation (iv) an action plan of measures to ensure that the Indigenous Peoples receive social and economic benefits that are culturally appropriate; (v) an appropriate action plan of measures to avoid, minimizes, mitigate, or compensate for these adverse effects; (vi) the cost estimates and financing plan for the IPP; (vii) accessible procedures appropriate to the project to address grievances by the affected Indigenous Peoples' communities; (viii) mechanisms and benchmarks appropriate to the project for monitoring, evaluating, and reporting on the implementation of the IPP.

65. *Environmental, Social, Health & Safety (ESHS):* The consultant shall be responsible for preparing ESHS policy for IWD, which would include the relevant Indian rules and regulations and Bank's EHS policies. Environmental, Social, Health and Safety Management Strategies and Implementation Plans

(ESHS-MSIP) shall also be developed by the ESIA consultant detailing the roles and responsibilities of IWD and the prospective contractors for mitigation, enhancement and supervision & monitoring of ESHS measures. The ESHS-MSIP shall be prepared for individual contracts. ESHS-MSIP shall be included in the bid documents.

66. *Supervision & Monitoring:* The ESMPs and ESHS shall specify the supervision, monitoring and auditing requirements. The monitoring programme shall specify parameters, reference standards, monitoring methods, frequency, duration, location, reporting responsibilities, and what other inputs (e.g., training) are necessary. In addition, the program will specify what action should be taken and by whom in the event that the proposed mitigation measures fail, either partially or totally, to achieve the level of environmental protection expected.

67. The ESMPs and ESHS shall list all mandatory government clearance conditions, and the status of procuring clearances.

68. *Institutional Capacity Building & Training:* The management plans shall describe the implementation arrangement needed for the project, especially the institutional capacity-building proposals, including the staffing of the environmental and social units (as and when recommended) adequate to implement the environmental and social mitigation and enhancement measures. For each staff position recommended, detailed job responsibilities shall be defined. Equipment and resources required for the environmental and social units shall be specified, and bill of quantities prepared. A training plan and schedule shall be prepared specifying the target groups for individual training program, the content and mode of training. Training plans shall normally be made for IWD (including the environmental and social units), the supervision consultants and the contractors.

***Public Disclosure***

69. The consultants are to provide support and assistance to IWD in meeting the disclosure requirements, which at the minimum shall meet the World Bank's policy on public disclosure. The consultants will prepare a plan for in-country disclosure, specifying the timing and locations; translate the key documents, such as the ESIA Summary in local language; draft the newspaper announcements for disclosure; and help the client to place all the ESIA reports in the client's website.

70. The consultants shall prepare a non-technical **ESIA Summary Report both in English and local language** for public disclosure.

***Co-ordination***

71. The ESIA consultants shall at the direction of IWD ensure absolute coordination and shall include but not limited to the following as part of the scope of work:

a) Provide assistance to IWD as appropriate in preparation of the project;
b) Shall establish a strong co-ordination mechanism with the other project-preparation /management consultants stationed in the department and in the respective implementing agencies;
c) Support IWD to furnish any relevant information required for obtaining clearance from various state and central government agencies.
d) Shall detail out in the Inception Report, how the required inputs would be provided to the other consultants in a timely manner;
e) Assist the IWD in disclosure and consultation process of the EIAs in compliance with the safeguard policies of the World Bank;
f) Work under the overall supervision of IWD who will facilitate the consultancy in contacting relevant officials, departments and agencies;

72. IWD will provide the following services to the consultants:

a) All relevant documents related to the project area; and any other background documentation and studies, available with IWD.

b) Making all necessary arrangements for supporting the work of the consultant, for e.g. facilitating access to government authorities and other project stakeholders and infrastructure facilities;
c) Disclosure of draft documents, sending out of invitations for workshops, organization of venues for workshops, and participation at all public hearings/consultations during the assessment.
d) Ensure the timely flow/exchange of information and documents between consultants engaged in project preparation.

## Deliverables and Timeline

73. The duration of total assignment shall be 6 months

| SI.No. | Activity | Timeline (from the date of award of contract) |
|---|---|---|
| 1. | Submission of draft Inception Report including work plan, timelines, field survey methodology, and table of content for various frameworks, ESIA and management plans | Within 2 weeks |
| 2. | Presentation to IWD on Proposed Work Plan | Within 3 weeks |
| 3. | Submission of Final Inception report incorporating the suggestions /recommendations from IWD and the World Bank, to be communicated within one week of presentation | Within 5 weeks |
| 4. | Submission of draft Screening Report and draft ESMF, R&R Entitlement Framework with respective Executive Summaries | Within 2 months |
| 5. | Submission of final Screening Report and ESMF, R&R Entitlement Framework with respective Executive Summaries | Within 2.5 months |
| 6. | Submission of draft ESIA and draft ESMPs (all management plans)with Executive Summary | Within 5 months |
| 7. | Submission of final ESIA and final ESMPs (all management plans)with Executive Summary (in English and regional language) | Within 5.5 months |
| 8. | Disclosure of documents | Within 6 months |

The deliverable as listed above shall be submitted by the Consultant in electronic / soft copy and ten (10) hard copies.

74. **Key Expert and other specialists**

The total estimated level of input for key experts is 22.0 person-months. Suggested key experts and their minimum qualification and experience (to be evaluated for arriving at the Technical Score of the Proposals) are listed below:

| Sl. No. | Position | Minimum Qualification | Experience |
|---|---|---|---|
| K1 | Team Leader – Environmental Expert | Graduation in Civil Engineering and Post-graduation in Environment | 15 years of demonstrated experience in the preparation of Environmental and Social |

| | | | |
|---|---|---|---|
| | | Engineering / Environment Science. | Management Framework in developed countries, and carrying out EIAs for managing and monitoring environmental impacts on natural habitats, conservation/degradation of natural habitats in forests, protected wetlands areas, ecosystem of drainage channels, rivers and also including social impacts during and after implementation of large-scale infrastructure project. The specialist should also be fully conversant with formulation of Resettlement people's Framework/ Action Plan, Indigenous People's Framework/ Action Plan in accordance with the safeguard policies of the World Bank. |
| K2 | Deputy Team Leader – Social Impact Assessment Expert | Post-graduation in Sociology / other relevant field. | 15 years of demonstrated experience in designing and implementing social assessment programs in large-scale infra-structure projects. The specialist should have working experience on issues pertaining to vulnerable community; religion and gender. Should also have wide experience of handling consultations with multiple stakeholders and large-scale database of individual households. The specialist should also be fully conversant with the national law and regulations related to land acquisition and resettlement and safeguard policies of the World Bank. |
| K3 | Public Consultation / Participation Specialist | Post-graduation in Social Science / other relevant field. | 15 years, with extensive experience in preparation of social impact assessments and mitigation/ management strategies and the planning and implementation of community consultation programs, and in Rapid Rural appraisal (RRA). |
| K4 | Agricultural Expert / Agronomist | Post-graduation in Agriculture / Agronomy. | At least 10 years professional experience in Agriculture sec-tor and expertise in study of impacts of fertilizers & pesticides and formulating Integrated Pest Management |

| | | | |
|---|---|---|---|
| | | | Plan etc. |
| K5 | Hydraulic Structural Engineer | Post-graduation in Civil / Structural Engineering. | At least 10 years professional experience in design of major irrigation projects involving dams and barrages. |

75. Other specialists, who will not be evaluated for arriving at the Technical Score, are listed below. However, the Consultant shall submit CVs of the proposed staff for each of these positions for the Client's review:

- Irrigation Expert
- Water Resources Expert
- GIS Expert
- Data Collector
- Data Entry Operator

***Client's Input and Counterpart Personnel:***

Study Reports/Documents as listed in Annexure 2 will be handed over to the Consultants by the Client. Workshop Report to be prepared by the Feasibility Study Consultant, showing various alternative options will also be shared with the Consultant undertaking the present assignment. The Client may also assign counterpart personnel to the consultant's team. The Client will also facilitate the Consultant to collect various pertinent data, from other Govt. Departments / Civil Administration / Organisations by issuing letters for introduction and otherwise.

## Annex 1 – Baseline Information to be Collected by Feasibility Study Consultant

### A. Environmental Information

#### 1. Construction activities

a) Estimated volume of silt to be dredged.

b) Authorized silt disposal sites.

c) Authorized silt-testing labs.

d) Authorized borrow sites.

#### 2. Natural habitats

a) Wetlands, protected areas, etc. in project area / command area.

b) Forests within 10 km of river / canal.

c) Natural habitats between 5 dams (Maithon, Panchet, Ramchandrapur, Maliarajore and Puinala) and project area, either along / within the waterway or just adjacent to the river flowing downstream of the dams (may be reported from secondary data, without field verification).

d) Eco-sensitive areas in Mundeswari River (in and around sections for desilting) and drainage channels proposed to be re-excavated.

#### 3. Water quality

a) Surface water quality at the Left Bank Main Canal (LBMC) and Right Bank Main Canal (RBMC), the main offtaking canals from Durgapur Barrage and at each point where drainage water returns to the Damodar River.

b) Groundwater quality at representative places in the command area.

#### 4. Groundwater – integrated information on the following:

a) Water quality affected Blocks in project area.

b) Groundwater development status of Blocks in project areas (with classification).

c) Trend of groundwater table depletion.

d) Wells in shallow aquifer (average depth range).

e) Wells in deep / confined aquifers with depth of wells.

#### 5. Pesticides / agro-chemical use

a) List of agro-chemicals in use.

b) Quantity of agro-chemicals in use per crop per ha.

#### 6. Agriculture and Irrigation data (for water requirement assessment)

a) Types of crops.

b) Area under cultivation per crop.

c) Water requirement per crop.

d) Pre / post project water balance.

7. **Flood warning / alert systems – current practices**

8. **Emergency response systems – current practices**

9. **Disease burden associated with flood affected areas (to assess the positive outcomes of project interventions)**

    a) Prevalent gastro-enteritis diseases – to be collected from sub-centers (Accredited Social Health Activists (ASHA) workers submit household level information to Auxiliary Nurse Midwife (ANMs).

    b) Prevalent vector borne diseases – to be collected from sub-centers (ASHA workers submit household level information to ANMs).

    c) Activities undertaken by various departments' pre and post floods along with incurred expenditure.

**B. Social Information**

**1. Identification**

a) Blocks and villages of the Project.

b) Socio-economic baseline of the project area in terms of demographic, cultural, social and economic (based on secondary sources of information).

c) General skill set with the community in the project area (needs to be covered under economic characteristics of the area) (based on secondary sources of information).

d) Data should be gender segregated.

**2. Land**

a) Estimated extent of private land to be acquired.

b) Estimated extent of government land to be transferred.

**3. Resettlement**

a) Will land acquisition / transfer lead to any

    i) Estimated number of displaced people (provide number).

    ii) Estimated number of people with loss of livelihood (provide number).

    iii) Sources of livelihood of people with loss of livelihoods (explanatory note).

    iv) Estimated number of people with loss of access to common property resources or loss of common property resources (explanatory note).

**4. Labour influx**

a) Estimated number of labour to be used during the project.

b) Number of migrant labour and number of labour camps project may set up (estimate).

## Annex 2 – List of Studies Undertaken for the Project Area by IWD

(i) Historically observed gauge level and discharge data of Damodar River System at identified locations.

(ii) Detailed Project Report to alleviate flood waterlogging and erosion problem for Lower Damodar region "CES LTD., May 2015".

(iii) Dam Safety Review Panel (DSRP) Reports on DVC for its four reservoirs, i.e. Konar, Tilaiya, Maithon and Panchet and plan of implementation of the recommendations of the DSRP by DVC.

(iv) Probable Maximum Flood (PMF) and flood routing for these four reservoirs.

(v) Dam Break Analysis and Emergency Action Plan for these four reservoirs.

(vi) Flood Warning System of the DVC.

(vii) Similar documents / reports stated under Sl. (iii), (iv) & (v) for Tenughat reservoir, owned and maintained by the Government of Jharkhand, subject to availability.