ENVIRONMENT AND SOCIALDUE DILIGENCE REPORT (ESDD)

सत्यमेव जयते

IRRIGATION & WATERWAYS DEPARTMENT, GOVERNMENT OF WESTBENGAL

DAM REHABILITATION AND IMPROVEMENT PROJECT (DRIP-II)

(Under World Bank Fund)

ESDD REPORT

For

SILABATI BARRAGE

Prepared by

ISO 9001:2015

WAPCOS LIMITED

(A Government of India Undertaking)

Ministry of Jal Shakti

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ABBREVIATIONS AND ACRONYMS

AIDS	:	Acquired Immunodeficiency Syndrome
BDO	:	Block Development Officer
CGWB	:	Central Ground Water Board
COVID	:	Corona virus Disease
CPMU	:	Central Project Management Unit
CSS	:	Centrally Sponsored Scheme
CWC	:	Central Water Commission
DI	:	Within Dam Area
D/PMC	:	Design/Project Management Consultant
DRIP	:	Dam Rehabilitation and Improvement
Project		
DSRP	:	Dam Safety Review Panel
DVC	:	Damodor Valley Corporation
E&S	:	Environment & Social
EAP	:	Emergency Action Plan
EMC	:	Engineering and Management Consultant
ESA	:	Environment & Social Assessment
ESCP	:	Environmental and Social Commitment Plan
ESDD	:	Environmental and Social Due Diligence
ESF	:	Environmental and Social Framework
ESIA	:	Environmental and Social Impact Assessment
ESMF	:	Environment and Social Management Framework
ESMP	:	Environment and Social Management Plan
ESS	:	Environmental and Social Standard
ESZ	:	Eco-Sensitive Zones
GBV	:	Gender Based Violence
GIS	:	Geographic Information System
GoI	:	Government of India
GP	:	Gram Panchayat
GRM	:	Grievance Redressal Mechanism
HIV	:	Human Immuno-deficiency Virus
IA	:	Implementation Agency
I & W	:	Irrigation and Waterways
IPF	:	Investment Project
Financing		
IWDP	:	Integrated Wastelands Development Project
JFM	:	Joint Forest Management
LB	:	Left Bank
LMP	:	Labour Management Procedure
MoH& FW	:	Ministry of Health & Family Welfare
NIDM	:	National Institute of Disaster Management
NREGS	:	National Rural Employment Generation Scheme
OHS	:	Occupational Hazard and Safety
PDO	:	Project Development Objective
PE	:	Physical Environment
PM	:	Particulate Matter
PMC	:	Project Management Consultancy
PPE	:	Personal Protective Equipment
PPEQMP	:	Pollution Prevention and Environment Quality Management Plan

PST	:	Project Screening Template
QPR	:	Quarterly Progress Report
RCP	:	Resource Conservation Plan
RET	:	Rare Endangered and Threatened
RL	:	Reduced Level
SC	:	Scheduled Castes
SDO	:	Sub Divisional Officer
SEA	:	Sexual Exploitation and Abuse
SEAH	:	Sexual Exploitation Abuse and Harassment
SEF	:	Stakeholder Engagement Framework
SEP	:	Stakeholder Engagement Plan
SF	:	Screening Format
SH	:	Sexual Harassment
SH	:	State Highway
SPMU	:	State Project Management Unit
ST	:	Scheduled Tribes
TOR	:	Terms of Reference
WAPCOS	:	Water and Power Consultancy services
WB	:	World Bank

A. EXECUTIVE SUMMARY

Rehabilitation and restoration of Silabati Barrage and its appurtenant structures, has proposed to undertake rehabilitation measures (structural, non- structural, instrumentation and basic facility enhancement) under the proposed Dam Rehabilitation and Improvement Project (DRIP II) with a view to increase the safety and to strengthen dam/barrage safety management.

The Environment and Social Due Diligence has been conducted for decision-making on the sub-project with a view to identify, evaluate and manage the environment and social risks and impacts in a manner consistent with the World Bank ESF. ESDD has been carried out by studying the sub- project information and proposed interventions, assessing the magnitude of E&S risk and impacts with respect to key baseline data in immediate vicinity area; and conducting preliminary stakeholder consultations.

In the current circumstances due to COVID19, only 15 persons, external to dam authority were contacted ensuring social distancing and their views recorded while preparing ESDD. Two sets of questionnaires were prepared, one for each category of stakeholders – direct workers and community stakeholders. Direct workers included Engineers/staff working at barrage (present or working from home) – full time or contracted and community stakeholders included local people from vicinity villages. The consultation mainly brought out the data regarding profile of the neighbouring villages, impact of the barrage on public, connection of the public and the dam authority.

Activity wise environment and social screening has been carried out to identify risks and impacts to classify the sub-project based on risk level (low, moderate or substantial and high) and recommend commensurate plans/measures to meet identified risks and impacts.

As per the ESDD exercise, risk/impacts that have been identified relate to Water Quality, Fisheries, Physical Environment, labour and SEAH/GBV. Environment risks of air, water, noise, and resource use as well as social risks of labour, civil work within the dam/ barrage body and road work are Moderate along with environment and social risk of labour camp and disposal of debris. Risk of all other activities has been identified as low Hence the overall risk of this sub-project Dam/ Barrage is categorized as Moderate. OHS is a substantial risk activity and is being treated separately through OHS plan in accordance with WB ESHS guidelines.

Since risks and impacts are low to moderate category, a standard ESMP customised to sub-project will be prepared in accordance with the ESMF. The customised ESMP will address the following:

- Gender Based Violence or SEA/SH related actions(ESS1)
- Labour Management Procedure(ESS2)
- Resource Efficiency and Pollution Prevention(ESS3)
- Community Health and Safety(ESS4)
- Stakeholders Engagement Plan(ESS10)

Overall, the proposed activities within this barrage sub-project have low to moderate risks resulting in the overall sub-project to be categorized as Moderate risk category. These risks and impacts can be effectively mitigated with effective implementation of mitigation plans by

SPMU/IA, Contractors and monitoring by EMC, SPMU and CWC.

Chapter I

B. INTRODUCTION

B.1. Project Overview

The proposed Dam/Barrage Rehabilitation and Improvement Project (DRIP II) would complement the suite of ongoing and pipeline operations supporting India's dam / barrage safety program.
The DRIP project activities will focus not only on the rehabilitation and improvement of dam / barrage structures, but will also address shortcomings in instrumentation, maintenance and provide for improvements in operation of the dams and barrages.
The project would finance towards (i) physical and technical dam / barrage rehabilitation and improvement; and (ii) managerial upgrading of barrage operation and maintenance, with accompanying institutional reforms and strengthening of regulatory measures pertaining to safe and financially-sustainable dam / barrage operations.
It aims at assuring the full reservoir capacity of project barrages, achieving effective utilization of the stored water, and managing and monitoring the long-term performance of the dams /barrages. The project development objective (PDO) is to improve the safety and operational performance of selected existing barrages in the territory of the participating states. Project comprises three Components namely (i) Rehabilitation and Improvement of Barrage and Associated Appurtenances; (ii) Barrage Safety Institutional Strengthening and (iii) Project management.

Component 1: Rehabilitation of Barrages and Appurtenant Structures: This component supports improving the safety of barrages through structural and non-structural interventions. Structural measures include measures for seepage reduction, hydrological and structural safety measures (e.g., renovation and strengthening of existing structure, cementations grouting, shaping of embankment, improvement of draining arrangement, removal of vegetation and weeds etc.), enhancing the reliability of operational facilities (e.g., spillway gates, head regulator gates with hoisting system), and improving basic barrage facilities (e.g., access roads, downstream inspection roads). Non-structural measures could include standardized barrage safety instrumentation, monitoring, assessment and reporting protocols for barrage health.

Component 2: Barrage Safety Institutional Strengthening: This component supports further strengthening of Barrage safety management through institutional modernization. A major focus of activities under this component will be increasing the oversight of dam safety by developing dam safety guidelines and by strengthening the capacity of various dam safety actors to carry out the regulatory functions defined in the proposed Dam Safety Bill, which has been passed by the Lok Sabha.

Component 3: Risk-informed Asset Management and Innovative Financing for Sustainable Operation and Maintenance of Dams: This component aims to increase the financing available for periodic dam safety needs and regular O&M by improving asset management and dam risk assessment. Currently, expenditures needed for dam rehabilitation are based on seasonal (pre and post monsoon) inspections, rather than a longer-term needs-based approach grounded in asset management and risk assessment. This component will put in place systems to improve the identification of financing needs for dam safety and develop more sustainable sources of funding for dam safety. An asset management system and risk assessment will identify long-term funding needs for the sector and trade-offs related to investment decisions.

Component 4: Project Management: This component ensures effective implementation of project activities and monitoring and evaluating project implementation progress, outputs and outcomes. The component will support: (i) establishment and operations of State level Project Management Units (SPMUs) within State implementing agencies, which can hire experts in various fields as and when needed on a contractual basis; (ii) setting up of a monitoring and evaluation system; and (iii) establishment of a Quality Assurance and Quality Control system. This component will also finance consultancies, as well as related material, office equipment and incremental operating costs. The project will provide investment and technical support for the establishment of a Management Information System and Information and Communication Technology systems.

Component 5: Contingent Emergency Response Component: The Contingent Emergency Response Component (CERC) allows provision of immediate response to an Eligible Crisis or Emergency, as needed. For example, following an adverse natural event that causes a major natural disaster, the government may request the World Bank to re-allocate project funds to support response and reconstruction. This component will draw resources from the unallocated expenditure category and/or allow the government to request the World Bank to re-categorize and reallocate financing from other project components to partially cover emergency response and recovery costs. This component could also be used to channel additional funds should they become available as a result of the emergency.

The primary beneficiaries of the project are the communities that live in barrage breach flood inundation areas and the communities that depend on water, irrigation and power services provided by the barrage that could be compromised by poor barrage performance or failure. In addition to saving lives, improved barrage safety will avoid potential flood damage to houses, farm areas, infrastructure (roads, bridges, others public and private infrastructure) and industrial and commercial facilities. Improved barrage safety will also reduce the likelihood of service interruptions due to barrage failure as well as potentially improving barrage service provision, overall efficiency and storage capacity, including during drought periods.

The approximate estimated cost of the works mentioned under Component 1,2 & 3 will be around **Rs. 16.90 Cr .**

B.2. Sub-Project Description – Silabati Barrage

Silabati barrage is an integral part of the Kangsabati project. It was completed in the year 1975. Malfunctioning of the Barrage is likely to affect the effectiveness of a large part of Kangsabati project and as such the present rehabilitation and repair works are proposed to be taken up.

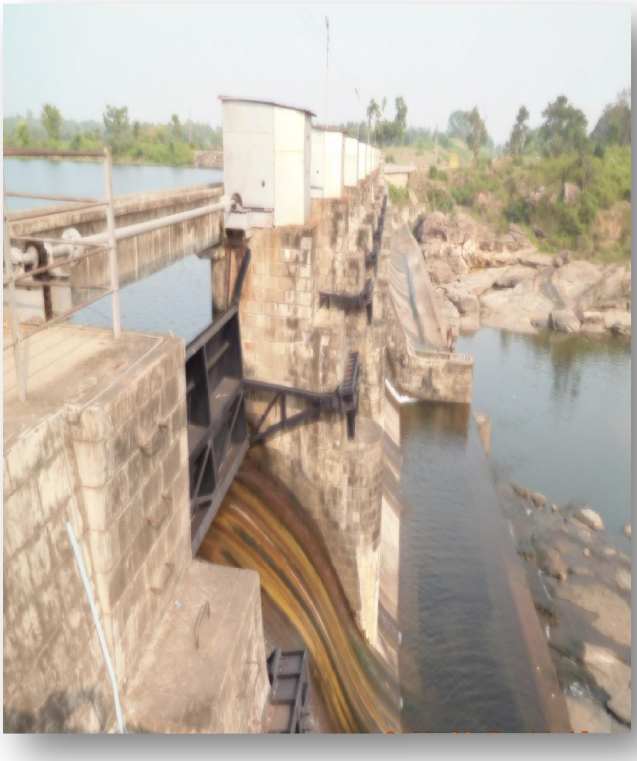
Table 1 : Salient Feature

Project	**Silabati Barrage**
River	Silabati
Lat/Long	22°45'54.30" N, 86°49'29.82" E, Kadamdeuli,Indpur, Bankura
Length of Barrage	62.48 M
Nos. of Bays / Gates	5 Nos.
Length of Each Bay	9.144 M.
Design Discharge	1273.488 Cumec

Pond Level / Maximum Water Level	117.378 M
Nos. of Regulators	1 No. Tail Regulator and 1 No. Head Regulator
No. of Bays in Tail Regulator	6 (Six) (SMC)
Canal Discharge	70.45 Cumec
No. of Bays in Head Regulator	5 Nos. (IMC)
Canal Discharge	67.92 Cumec
Length of Main Canals	16 Km
Length of Distribution System	82.83 Km
Total No. of Structures In Main Canal and Distribution System Except Head Regulator of Main Canal	283 Nos

Recent Photographs of Silabati Barrage

Downstream view of the SilabatiBarrage



Leakage from the 2nd pier from the left bank abutment wall

In Annexure V, more photographs of infrastructure proposed for rehabilitation works are given.

B.2.a. Proposed Interventions/ Activities and intended Outcomes

The Dam Safety Review Panel (DSRP) constituted by Irrigation and Waterways Department of Government of West Bengal has inspected and reviewed the Silabati Barrage. They recommended measures in January, 2020 on the repairs and rehabilitation works to improve the safety and performance of barrage and associated appurtenances in a sustainable manner.

The objectives of the project are to be achieved through investments for physical and technological improvement activities, managerial upgrading of barrage operations, management and maintenance, with accompanying institutional reforms. The project will improve the safety and operational performance of barrage and mitigate risks to ensure safety of downstream population and property. The following rehabilitation works are proposed based on the DSRP recommendations and these proposals form the basis for preparation of present ESDD report.

Structural Rehabilitation Works

I. Silabati Barrage Proper and Reservoir Pond

(i) Repairing of the pier and abutments of the Spillway structure by Guniting and polymer concrete for Deck slab of Bridge over the Spillway. The profuse leakage from the piers will be counteracted with Chemical Grouting.

(ii) Making of Up stream Spill way protection and Down stream Bed protection for Spill way with taking up new RCC Friction blocks for maintaining Hydraulic properties of flow.
(iii) Construction of a new Regulator Gate cum Bridge at Tail Regulator (Supur main canal) replacing the existing dilapidated one.
(iv) Replacement of Wearing course of Spillway Glacis.
(v) Repairing Spillway structure especially at cracks in the abutment of spillway/retaining structure after spillway proper.

II. Resuscitation of Barrage pond

(i) Removal of Silts of Silabati pond above crest level of Spill way.
(ii) RCC Jacketing on existing boulder protection around the Pond and new boulder protection at down stream of pond as down stream level is abruptly at low levels..
(iii) Protection of Foot paths for local villagers at Barrage pond side road with fencing arrangements.

III. Restoration of Indpur Head Regulator Structure with Gates

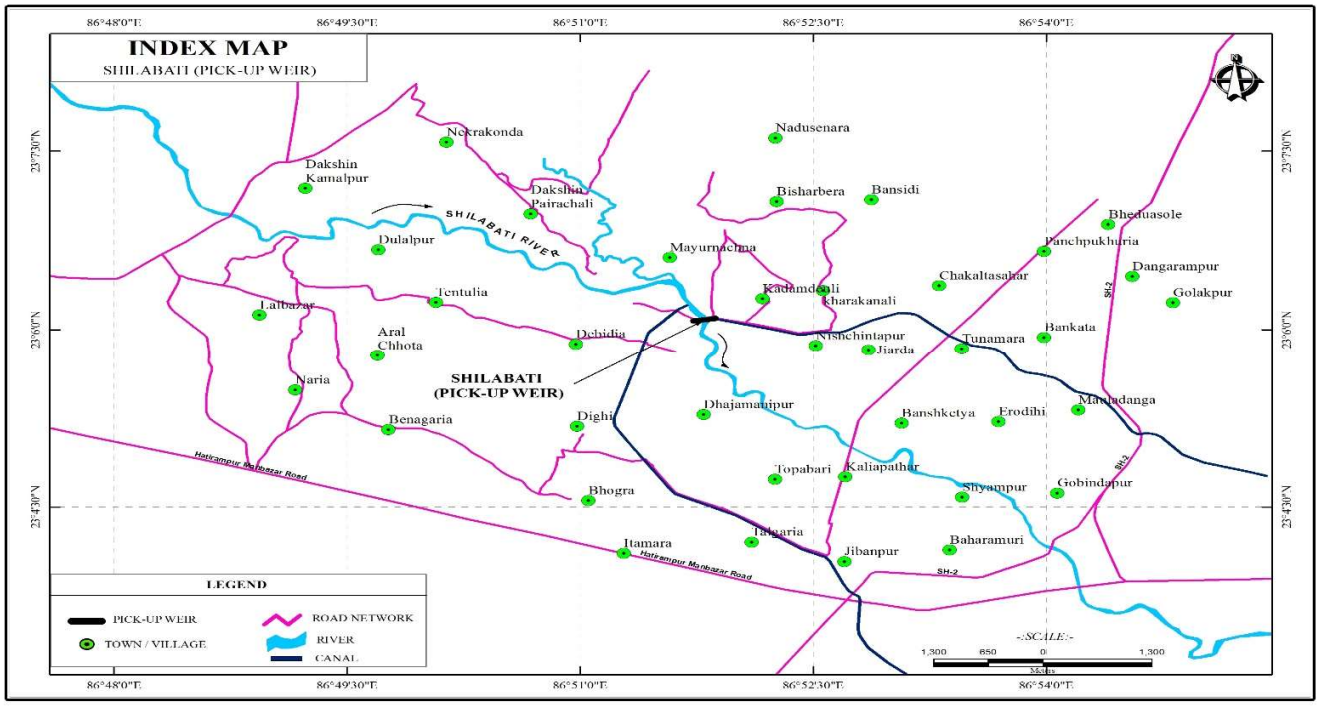
(i) Up stream protection works of head regulator and Down stream Bed protection for Spill way with new RCC Friction blocks for maintaining Hydraulic properties of flow
(ii) Replacement of Wearing course of head regulator.
(iii) Strengthening of the stilling basin
(iv) Repair of Deck slab of Bridge with polymer concrete over the Head Regulator. Leakages from the structure are to be counteracted with Chemical Grouting
(v) New Cement concrete Lining for the protection of distressed canal bank and canal bed at downstream of head Regulator

IV. Repairing of Staff Quarter & Development of Office Colony

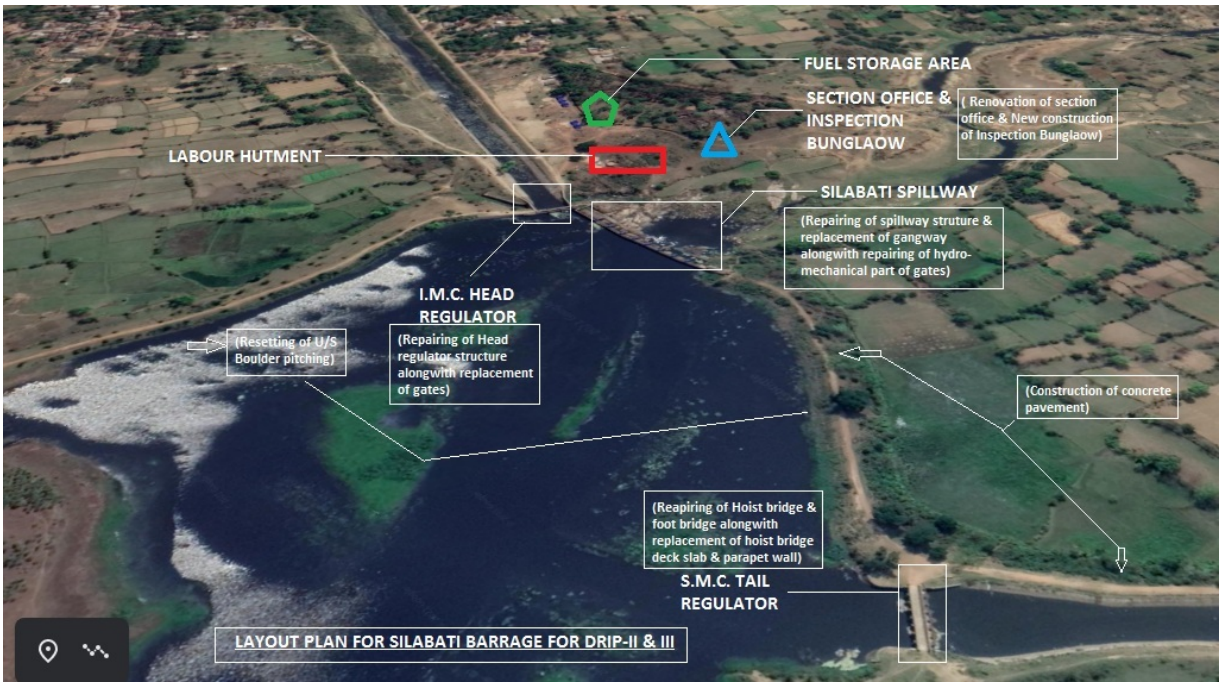
V. Instrumentation for operation and monitoring.

VI. Preparations of as-built drawings & conducting bathometric survey & other testing.

Index Map


INDEX MAP
SHILABATI (PICK-UP WEIR)
86°48'0"E
86°49'30"E
86°51'0"E
86°52'30"E
86°54'0"E
23°7'30"N
23°6'0"N
23°4'30"N
Nokrakonda
Nadusenara
Dakshin Kamalpur
Dakshin Pairachali
Bisharbera
Bansidi
Bheduasole
Panchpukhuria
Dangarampur
Golakpur
Dulalpur
SHILABATI RIVER
Mayurnachma
Chakaltasahar
Kadamdanali
Kharakanali
Tentulia
Lalbazar
Aral Chhota
Dchidia
Nischintapur
Jiarda
Tunamara
Bankata
Naria
SHILABATI (PICK-UP WEIR)
Dighi
Dhajamanipur
Banshketya
Erodihi
Mandadanga
Benagaria
Hatirampur Balbazar Road
Topabari
Kaliapathar
Shyampur
Gobindapur
Bhogra
Talbaria
Itamara
Jibanpur
Baharamuri
Hatirampur Manbazar Road
SH-2
LEGEND
PICK-UP WEIR
TOWN / VILLAGE
ROAD NETWORK
RIVER
CANAL
-:SCALE:-
1,300
650
0
1,300


Select a location
kadamtala junior high school
কদমতলা জুনিয়র হাই স্কুল
Silabati Bridge
Hatiram Temple, Kadamtala, Paschim...
হাতিরাম টেম্পল, কদমতলা, পশ্চিম...
Shilabati River
Shitala Mandir
শীতলা মন্দির
Shilabati River
Sivmondir
শিবমন্দির
Shilabati River



Project Area showing major intervention locations

B.2.b. Implementation Arrangement And Schedule

As can be seen from the list of activities proposed under barrage rehabilitation project; these activities can be divided into civil work main package, Mechanical work and instrumentation to improve barrage safety.

Civil work and Mechanical work will be carried out by contractor(s) as these are labour intensive activities and would be completed over a period of 17 months. SPMU will hire contractor(s) based on national open competitive procurement using a Request for Bids (RFB) as specified in the World Bank's -Procurement Regulations for IPF Borrowers, July 2016, (Revised August 2018 Procurement Regulations), and is open to all Bidders as defined in the Procurement Regulations. Downstream work will be done when the water level is not increasing and the requirement of gate opening will not be envisaged for few months. This will be done typically during post monsoon season when water level in reservoir is continuously dropping. Following is the overall implementation schedule.

Overall phasing of project implementation:

a) Proposed starting of implementation: March 2022
   Proposed ending of implementation: July 2023
   Implementation duration: 17 months
b) Phasing of Project Implementation

Sl. No.	Description	From (Month/Year)	To (Month/Year)
1	Pre-construction	Mar. 2022	Jun. 2022
2	Structural work, road work, pitching work	Apr. 2022	Jul. 2023
3	Renovation, Repairing,	Apr. 2023	Jul. 2023

	Instrumentation		

** These are all tentative date collected from their proposed Work Plan

B.2.c. Purpose of ESDD

The overall project (DRIP II) was categorized as **High Risk** as per the internal Environment and Social Risk Classification of the Bank. The Environment and Social Due Diligence has been conducted to use it as a tool for decision-making on the sub-project with the following specific objectives:

i. To identify, evaluate and manage the environment and social risks and impacts of the sub-project in a manner consistent with the ESSs;
ii. To adopt a mitigation hierarchy approach to the project's E&S risks i.e. a) anticipate and avoid risks and impacts; b) minimize or reduce risks and impacts to acceptable levels, if not avoidable; c) once risks and impacts have been minimized or reduced, mitigate; and (d) where significant residual impacts remain, compensate for or offset them, where technically and financially feasible;
iii. To help identify differentiated impacts on the disadvantaged or vulnerable and to identify differentiated measures to mitigate such impacts, wherever applicable;
iv. To assess the relevance and applicability of environmental and social institutions, systems, laws, regulations and procedures in the assessment, development and implementation of projects, whenever appropriate; identify gaps, if any exist, and
v. To assess borrower's existing capacity, gaps therein, and identify areas for enhanced capacity towards management of E&S risks.
vi. Based on the categorization of Environment and Social risks and impacts of the Barrage sub-project, to determine whether ESIA is to be carried out using independent third- party agency or a generic ESMP customized to mitigate E&S risks and impacts will suffice.

B.2.d. Approach and Methodology of ESDD

The following approach has been adopted for ESDD:

i. Study sub-project information, proposed interventions, their magnitude and locations and carry out assessment of each proposed intervention to identify the magnitude of E&S risk and impacts;
ii. Review relevance and applicability of national and state legal requirements and Bank's ESF policy, standards and directives and preliminary assessment of applicability of legal requirement and ESS framework(2-8);
iii. Conduct site visit to understand baseline environment and social settings, proposed activities under the sub-project, their location and sensitivity, if any;
iv. Present key baseline data essential for impact assessment in immediate vicinity area of proposed interventions from secondary sources, such as land-use, protected areas in vicinity, ascertain presence of indigenous (schedule tribe)/vulnerable people etc.;
v. Undertake institutional assessment to identify existing capacities & relevant gaps to manage E&S risks and impacts;
vi. Conduct preliminary stakeholder consultations to help identify potential stakeholders; to provide information on the proposed interventions; to identify issues and concerns; and ascertain appropriate mechanisms for continued engagement;
vii. Carry out activity wise environment and social screening and identify risks and impacts. Classify the sub-project based on risk level (low, moderate or substantial and high) and recommend commensurate plans/measures to meet identified risks and impacts;

Chapter II

C. INSTITUTIONAL FRAMEWORK AND CAPACITY ASSESSMENT

C.1. Policy and Legal Framework

India has well defined environmental and social regulatory framework. The regulation applicability depends on nature of work and location of work. Broadly legislation can be divided into four categories viz environmental, forests, wildlife conservation and social. The applicability analysis of regulations pertaining to all the above four categories was carried out. The applicability of World Bank ESF comprising, 10 ESSs (ESS1 to ESS10) to the proposed rehabilitation proposals and standard specific requirements were analyzed. Further, a comparison of national environmental and social regulations versus World Bank's ESS was been carried out along with the gap analysis. Applicability of Indian regulations, World Bank's ESS along with comparison and gap analysis is discussed in ESMF.

Central Water Commission, Ministry of Jal Shakti, Government of India has prepared "Operational Procedures for Assessing and Managing Environmental Impacts in Existing Dam/ Barrage Projects" as a guiding document for the dam/barrage owners to systematically address in advance the environmental safeguard requirements and have discussed in detail all applicable legal requirement. Reference has been drawn from this document as well, while carrying out applicability analysis.

Indian environmental regulation requiring environment clearance is for new dam projects specifically for the purpose of hydropower generation and/or irrigation projects. It varies with generation capacity for hydropower projects and culturable command area served by irrigation projects. Forest related clearances become applicable, if new or any modification in any existing project requires diversion of forest land for non-forestry purposes. Wildlife Clearance process gets triggered if the project is in proximity to protected area or activities are proposed within protected or conservation areas.

Therefore, for the proposed barrage rehabilitation activities at Silabati Barrage, regulatory clearances will not be applicable as per Indian regulation. Other applicable regulatory requirement is discussed in ESMF and a summary is given below.

Policy and Institutional framework of the Govt. of India as well as relevant safeguard policies of the World Bank in regard to environmental and social management of development projects applied through the following Ministries/Statutory Bodies will be followed.

- The Ministry of Environment & Forest (MoEF)
- Central Pollution Control Board (CPCB)
- State Pollution Control Board (SPCB)
- Ministry/Department of Environment in the States

Applicable Environmental Regulations:

None of the components of this rehabilitation project falls under the ambit of the EIA notification, 2006 and therefore no EIA study or Environmental Clearance is required for this project. Beside EIA Notification, 2006 there are other acts, rules, policies and regulations currently force in India that deal with Environmental and Social issues that could be apply to rehabilitation work. The specific regulatory compliance requirements of the project are shown in the table below:

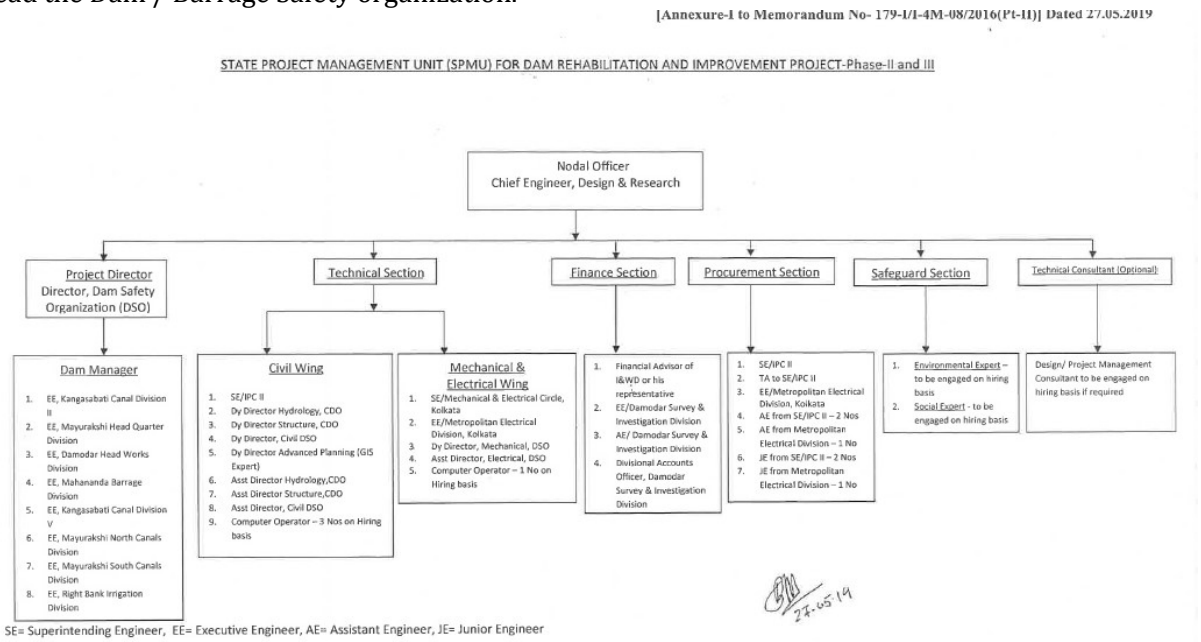
Law	Description	Requirements
Environment (Protection) Act, 1986 and Central Pollution Control Board Environmental Standards	Emissions and discharges from the facilities to be created or refurbished or augmented shall comply with the notified standards	Ambient air quality standard and Vehicular norms should be maintained as per CPCB standards.
Noise Pollution (Regulation and Control) Rules, 2000 amended upto 2010	Rule 3 of the Act specifies ambient air quality standards in respect of noise for different areas/zones.	Noise standard should be maintained as site as per CPCB norms
Air (Prevention and Control of Pollution) Act, 1981, amended 1987 and its Rules, 1982.	Applicable for equipment and machinery's potential to emit air pollution (including but not limited to diesel generators and vehicles); Consent to establish (CTE) and consent to operate (CTO) from West Bengal Pollution Control Board (WBPCB); Compliance to conditions and emissions standards stipulated in the consent to establish and consent to operate.	Applicable as per requirement. Emission should be within the standard. If any hot mix plant will be in use, then proper CTE and CTO needs to be obtained from Pollution Control Board.
Municipal Solid Municipal Solid Wastes Management Rules, 2016	Rules to manage municipal solid waste generated; provides rules for segregation, storage, collection, processing and disposal.	Solid waste generated at proposed facilities shall be managed and disposed in accordance with the MSWM Rules
Construction and Demolition Waste Management Rules, 2016	Rules to manage construction and to waste resulting from construction, remodeling, repair and demolition of any civil structure. Rules define C and D waste as waste comprising of building materials, debris resulting from construction, re-modeling, repair and demolition of any civil structure	Construction and demolition waste generated from the project construction shall be managed and disposed as per the rules
Labor Laws	The contractor shall not make employment decisions based upon personal characteristics unrelated to job requirements. The contractor shall base the employment relationship upon equal opportunity and fair treatment, and shall not discriminate with respect to aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment or retirement, and discipline. The contractor shall provide equal wages and benefits to men and women for work of equal value or type.	Applicable labour laws including amendments issued from time to time applicable to establishments engaged in construction of civil works.

Law	Description	Requirements
West Bengal Trees (Protection and Conservation in Non-Forest Areas) Act, 2006	This Act has put restriction on felling of trees in the State unless until permitted by the Tree Officer. Any person desiring to fell a tree shall apply in writing to the DFO for permission in that behalf. It further defines clauses for planting adequate number of trees, planting in place of fallen/destroyed trees, preservation of trees and adoption of trees.	Tree cutting may be required for construction work. In that case, prior permission should be obtained as per requirement

C.2. Description of Institutional Framework

The sub-project will be implemented by Irrigation & Waterways Department, Govt. of West Bengal. The department has seven distinct divisions and the present work will be under Kangsabati Canal Divn No. II.
The state is the lowermost riparian state of Ganga Basin and situated at the Foothills of several Himalayan rivers of Brahmaputra Basin. It is beset with extensive network of rivers, their tributaries, rivulets, jhoras, irrigation canals, wetlands, ponds, beels and low-lying pockets of water bodies.

The Irrigation & Waterways Department, West Bengal, will be responsible for implementing the project and Chief Engineer, Design & Research will lead as Nodal Officer and Director/ DSO will head the Dam / Barrage Safety organization.



The I& W department is entrusted with the following tasks:

- Providing irrigation facilities
- Offering reasonable protection against flood
- Alleviating drainage congestion
- Arresting erosion
- Maintaining internal navigation channels and
- Up-keeping the natural waterways in the state

Irrigation and Waterways department does not have in-house expertise to address E&S issues. Presently, Assistant Director at SPMU and Executive Engineer at dam level look after these aspects.
ESDD reports for sub-projects are prepared by the subject experts of WAPCOS. Environment and Social activities within the scheme will be dealt by individual experts procured by SPMU. Presently, Executive Engineer at barrage level looks after these aspects. SPMU shall establish and operationalize a grievance mechanism to receive and facilitate resolution of complaints and grievances, from the communities and other stakeholders including implementation partners. The committee will comprise Dam Manager at the dam site level, DDO and PD from SPMU and

will be headed by Secretary at state level. Presently GRM works within existing legal and cultural frameworks and shall comprise project level and respective State level redress mechanisms.

There is internal complaint committee as per Sexual Harassment Act at barrage site. The committee comprises Dam Manager, DDO, who is lady officer and headed by PD. Presently, no formal system is established for dealing with external complaint or a formal GRM. However, such complaints can be made to the Executive Engineer at dam level and Project Director at SPMU.

Chapter III

D. ASSESSMENT OF ENVIRONMENTAL AND SOCIAL CONDITIONS

Assessment of physical, ecological and socio-economic conditions of the district, at barrage site and immediate surrounding has been carried out based on secondary information and site observations. Detail is discussed below.

D.1. Physical Environment

D.1.a. Land Use/ Land Cover

The distribution of the particular types of land use in Bankura district depends largely on natural factors like the distribution of water and soil. It also depends on the traditional preferences and Government policies of zoning and land use planning decisions. Among food crops, paddy is the most widespread crop. The following table shows the land utilization statistics of the district for the last five years.

Table 2: Land Use Characteristics of Bankura District

	Land Use Class	Subclass	Subclass Total (acre)	Class Total (acre)
A.	**Built Up Area**			**177964.10**
	A1.	Urban Settlement	6539.23	
	A2.	Rural Settlement	165937.87	
	A3.	Commercial Area	34.07	
	A4.	Industrial Area	2782.48	
	A5.	Abandoned Airstrip	27.67	
	A6.	Ash Pond	586.69	
	A7.	Archaeological Site	23.53	
	A8.	Area Under Infrastructural Development	271.98	
	A9.	Brick Kiln	541.77	
	A10.	China Clay Quarry	94.15	
	A11.	Coal Mining Area Active/Disused)	132.03	
	A12.	Eco Tourism	11.38	
	A13.	Gravel/Stone Quarry	720.13	
	A14.	Pebble Querry	200.54	
	A15.	Stone Crushers	60.59	
B.	**Agricultural Land**			**1013534.81**
	B1.	Single Crop	603427.63	
	B2.	Single Crop (Boro)	140.60	
	B3.	Single Crop (Rabi)	739.03	
	B4.	More Than One Crop	403360.30	
	B5.	Vegetables	5867.24	
C.	**Forest**			**357869.85**
	C1	Notified Forest Area (As Per SOI Topo sheet 1970's)	305200.22	
	C2	Plantation	50590.64	

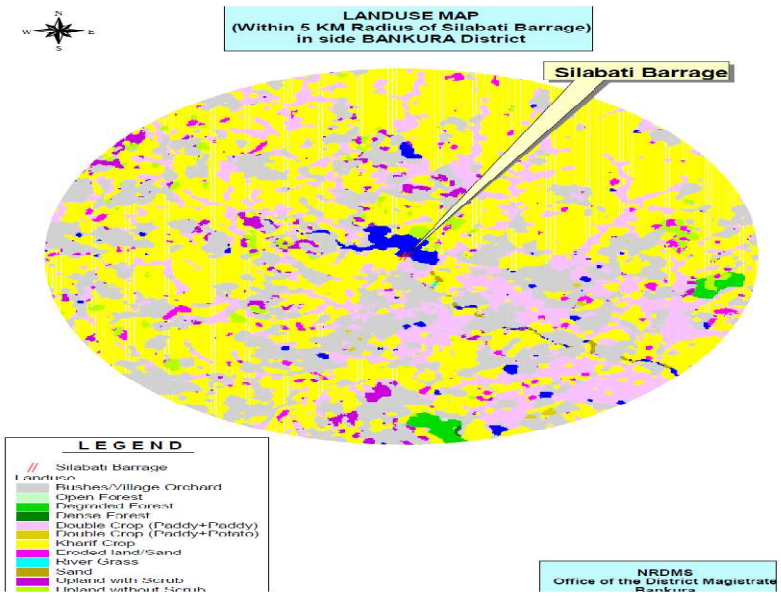
	Land Use Class	Subclass		Subclass Total (acre)	Class Total (acre)	
	C3	Plantation(Under Regeneration)		2078.98		
D.	**Waste Land**					**76454.5**
		D1	With Scrub		26228.20	
		D2	Without Scrub		41997.10	
		D3	Gullied		3214.88	
		D4	Sandy Area-Riverine		1096.41	
		D5	Stony Waste/Baren Rocky		3917.92	
E.		**Water bodies**				**92446.82**
		E1	**River**		**60767.96**	
	Land Use Class		**Subclass**	**Subclass Total** (acre)	**Class Total** (acre)	
		E2	**Canal**		**3656.71**	
		E3	**Reservoir/Lakes/Ponds/Tanks**		**28022.15**	
	GRAND TOTAL					**1718270.08**

Source: West Bengal Land Revenue Department

Land Use at Project site

The project surroundings land use and environmental sensitivity was analyzed using GIS techniques. Land use map has been provided by NRDMS, Office of the District Bankura Magistrate. Land use map within 5km radius of barrage is presented in the following figure. As can be seen from the map, present land use is mainly agricultural land of Kharif crop and patches of water bodies. Also from the figure, it is visible that there is habitation within the five kilometres radius of barrage premises. Proposed rehabilitation work will be confined to dam area and no structural interventions are proposed beyond existing barrage premises.

Figure 1 Land Use Map



D.1.b. Natural Hazards

Bankura though being a rain fed district, it is widely known as the drought prone district of West Bengal. There is no drainage problem in the district due to its undulating topography, yet the incidence of flood is not uncommon, due to siltation of rivers resulting in overflowing in case of heavy rain.

However, heavy rainfall in the district and in the upper catchment areas of Damodar River coupled with breaches of river embankments and release of excess water form Kangsabati and D.V.C Irrigation Project inundate Khariff Cropped areas in different parts of the district specially, in the Bishnupur Sub-division. That results loss of crops, damage of houses and other properties.

Flood or flood like situation has attributed a new dimension to soil erosion by formation of "Gully" due to tendency of the river (specially Shali at Sonamukhi and at Patrasayer block) to change its course of direction.

Due to occasional heavy rainfall in the district, sometimes flood water released from Kangshabati reservoir causing flood in several parts of the districts which result in loss of crops, house and other properties. Although the barrage location, i.e. Kadamdeuli is not a flood prone area as per District Disaster Management report.

D.1.c. Vulnerability to Earthquakes

As per the report published by National Institute of Disaster Management (NIDM) in 2013, West Bengal experiences earthquakes at a relatively lower frequency of the seismic hazard zonation map. As per the map of Bureau of Indian Standards West Bengal lies in seismic zones II-IV. Entire Bankura district and the project area falls in ZoneIII, which is classified as Moderate Damage Risk Zone in India and same was considered at the time of design and there is no need for seismic design review.

D.1.d. Rainfall

The rainy season sets during the month of June and lasts till September, but the climate is pleasant. The rainfall is maintained primarily by cyclonic storms, which originate from the Bay of Bengal, situated to the south-east. The winter sets in November and extends till February and the temperatures during the period are far more pleasant and enjoyable. The rainfall recorded at the various metrological stations, in and around Bankura district during the winter, summer and rainy seasons is **tabled below**:

Table 3: Rainfall

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Total
Normal	**18**	**29**	**27**	**35**	**94**	**258**	**336**	**319**	**197**	**88**	**18**	**4**	**1423**
2015	17.37	8.20	22.73	99.12	78.51	201.49	418.12	268.06	118.7	14.44	0	0	1246.74
2016	9.7	5.9	21.6	2.0	101.5	154.0	280.4	443.26	217.2	44.46	0	0	1280.02
2017	0.0	0.0	25.	33.4	136.	204.	570.	271.	191.	232.	15.	3.5	1684.

			31	1	78	23	9	2	6	46	13	5	57
2018	0.0	0.11	10.19	125.57	58.81	219.83	321.63	242.63	143.41	27.28	0	36.98	1186.44

Source: IMD (since weather station is at Indpur, district data is being considered)

D.2. Rivers and River Basin Systems of Bankura

- **The Damodar river** rises in the Palamu Hills of Chhotanagpur in Jharkhand at about 609 m above mean sea level. After flowing generally in a south-easterly direction for 540 km (240 km in Jharkhand and the rest in West Bengal), it joins the river Hoogly about 50 km below Kolkata. The river's principal tributary, the Barakar, joins it just upstream of the Jharkhand-West Bengal border. The Damodar has a number of tributaries and sub-tributaries, namely, Barakar, Konar, Bokaro, Haharo, Jamunia, Ghari, Guaia, Khadia and Bhera, with Barakar being the prime tributary.

- **The Sali River** is an important tributary of Damodar River that drains the northern part of Bankura district. It originates from a few miles west of Kora hill, halfway between Mejia and Bankura, and flows northwest to south-east and meets the Damodar at Samsar village in Indas Block. The total length of the Sali river is 81 km.

- **The Dwarakeshwar River** the largest river flowing through Bankura is the Dwarakeswar River. The river originates from Tilboni hills (445 m), in neighboring Purulia district, entering Bankura near Chhatna. The total length of the river within Bankura is 132 km, and its catchment area is 4430 km2.The Silai (or Shilabati) is the largest tributary of Dwarakeswar and it joins Dwareshwar near Ghatal (in Paschim Mednipur). The two together are known as Rupnarayan River, which flows through Hooghly. The other tributaries of Dwarakeswar River are the Gandheswari, the Kukhra, and the Berai.

- **Drainage and Drainage Basin of Gangajalghati block**. Within the block the important drainage channel is Sali River. Shape of Sali basin is elongated basin with elongation ratio less than 1.It originates at Gangajalghati Block at 87°13´37´´E longitude and 23°22´30´´N latitude. In Police Station Map, uppermost catchment area falls in Lachmanpur G.P, when the part of this G.P falls in Gandheswari sub basin flowing through Bankura district (Barjora, Sonamukho, Patrasayer, it joins Damodar river at Somsar village of Indus block in Bankura district.

- This block is crisscrossed by numerous small streams and gully erosion is quite prominent. It has the river **Joypanda** in the eastern part and **Silabati** along West South boundary. These apart, no significant river flows through this block.

D.3. Physiography

The Bankura district is described as the "connecting link between the plains of Bengal on the east and Chhota Nagpur plateau on the west." The areas to the east and north-east are low lying alluvial plains, similar to predominating rice lands of Bengal. To the west the surface gradually rises which gives way to undulating country, interspersed with rocky hillocks. Much of the district is covered with jungles. The regions of the district could be divided into broad three parts viz. 1) the hilly areas to the west, 2) the connecting undulating tract in the middle, and 3) the level alluvial plains to the east.

D.3.a. Topography and Geomorphology

The average elevation of the Bankura district from mean sea level is 448 metres. Topographically the district of Bankura is divided into 5 micro regions viz.:

(i) Main Bankura Upland: characterized by undulating terrain with many hills and ridges along the north-western boundary of the district and having a gradual descent from the Chhatonagpur plateau.

(ii) Bankura Upland: continuation from the main Bankura Upland over a small tract in the south-east corner.

(iii) Bankura–Bishnupur Radh Plain: the elevation rises gradually with undulating topography but abruptly in hilly tract towards the west extending between the western hilly tract and eastern alluvial plains. The hillocks ranges in the region from 90 m to 180 m.

(iv) Patrasayer Plain: a fertile plain with a gradual slope towards the south-west located in the north-east part.

(v) Silai Plain: a plain with few undulations in the west extending to the south-central part.

D.3.b. Hydro-geology and Ground Water Potential

The diverse geology of Bankura district controls the hydro-geological condition of the district. According to Central Ground Water Board (CGWB), in areas underlain by hard crystalline and Gondwana rocks, the groundwater occurs under:

(i) Unconfined condition in the weathered residuum down to the depth of about 15 meters below ground level (mbgl) with maximum to 25mbgl

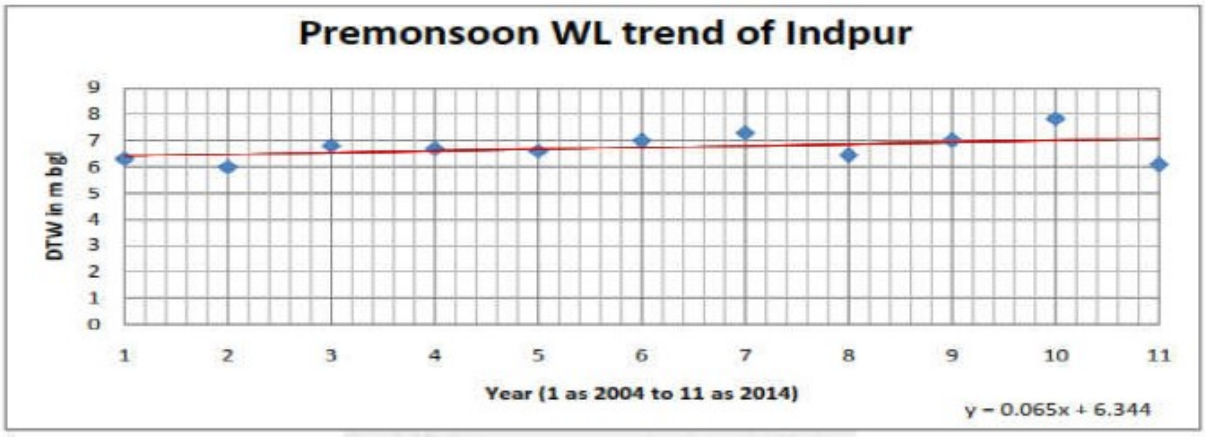
(ii) Semi-confined to confined condition in the fractured zones in the depth span of 30-60mbgl. Resistivity survey shows that in some places a deeper fracture zone is also expected to occur at a depth span of 80-100 mbgl.

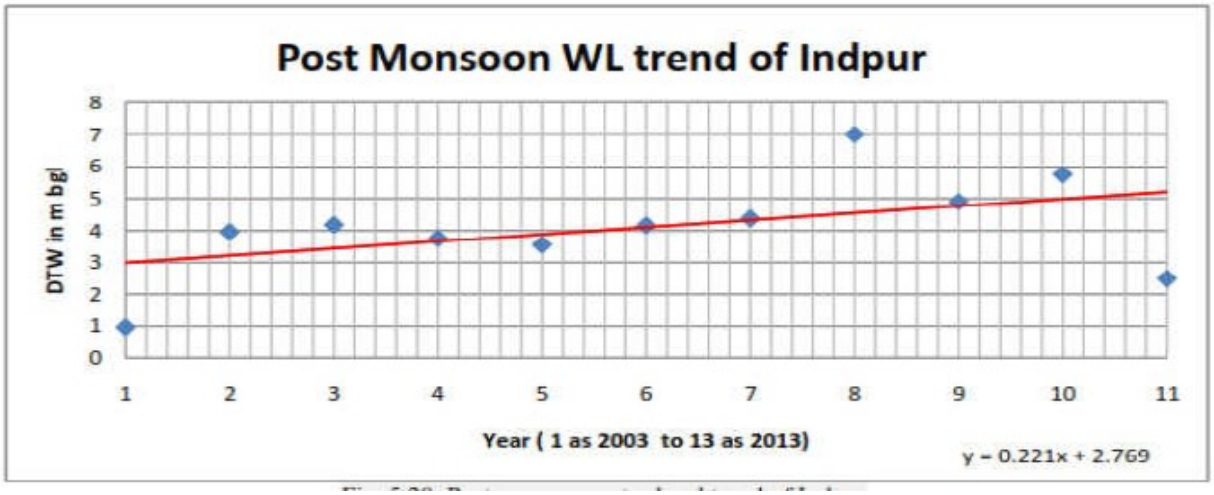
About two thirds of the district is covered by alluvium. Older alluvium and laterites occur in central–southern part of the district. Groundwater exploration carried out in the area indicates that the thickness of the alluvial sediments increases eastward from 36m in the marginal part to 150m in the eastern most part. Potential aquifers exist between 30 and 95 mbgl and the discharge of the wells tapping such aquifers varies from 20 to 124 m3/hr, with drawdown ranging from 6 to13 m. Depth to water level in the older alluvium varies from 6 to15 mbgl during pre-monsoon period.

Annual rate of water level fluctuation maximum in Chhatna, Ranibandh, Raipur, Bishnupur, Jaypur, Indus and Kotulpur (4m to 6m). Historic water level data of Central Ground Water for Indpur from CGWB website were noted and analysed to find out the long term water level trend, it was found that water level trend during pre-monsoon show a declining trend 6cm/yr, presented in below figure and during post monsoon period declining trend is 22 cm/yr. Hydrograph from the observed water levels were drawn in following figure 2:

Figure 2 Hydrograph of Indpur

Figure 3 WL Trend of Indpur





D.3.c. Groundwater Quality Status

According to CGWB the high concentrations of fluoride and iron in groundwater area is a serious problem in the district. Groundwater in 10 blocks namely Taldangra, Simlapal, Raipur, Indpur, Bankura II, Saltora, Barjora, Hirabundh, Chhatna and Gangajalghati is affected sporadically by high concentrations of fluoride in groundwater i.e. more than the permissible limit (>1.5 mg/L). This occurs in different hydro-geological formations namely:

(i) In fractured granite at depths of 40 m to 50 m.
(ii) In older alluvium sediments at depths of 40 m to 50 m.

In Bankura district, quite high concentrations of iron in groundwater have been found (up to 9.5 mg/L). Though iron content in drinking water may not affect the human system as a simple dietary overload, but in the long run prolonged accumulation of iron in the body may result in homo-chromatosis, a disease in which tissues are damaged. It is generally recognized that concentrations above 0.3mg/L in household water can lead to staining of clothes during washing and may therefore be unsuitable for use.

Table 4: Compiled Summary of Fluoride Contamination in Bankura, 2013-2017

Sl. No	Name of Blocks	Number of Samples Tested	Fluoride Concentration				Affected Habitation with Fluoride Concentration	
			> 1.5(mg/L)		1.0 - 1.5(mg/L)		>1.5 (mg/L)	1.0-1.5 (mg/L)
			No.	%	No.	%		
1	Bankura I	1854	2	0.11	29	1.56	2	18
2	Bankura II	2657	25	0.94	95	3.58	19	53
3	Barjora	2751	18	0.65	35	1.27	13	20
4	Bishnupur	2368	0	0.00	3	0.13	0	3
5	Chhatna	5250	67	1.28	198	3.77	47	137
6	Ganjagalghati	5007	26	0.52	259	5.17	20	107
7	Hirabandh	1684	10	0.59	53	3.15	10	41
8	Indpur	2651	7	0.26	36	1.36	7	27
9	Indus	2077	2	0.10	2	0.10	2	2
10	Jaypur	2054	0	0.00	0	0.00	0	0
11	Khatra	1842	6	0.33	4	0.22	5	4
12	Kotulpur	1737	0	0.00	2	0.12	0	2
13	Mejia	867	4	0.46	61	7.04	4	23
14	Onda	3378	1	0.03	1	0.03	1	1
15	Patrasayer	1704	0	0.00	0	0.00	0	0
16	Raipur	2462	11	0.45	29	1.18	5	22
17	Ranibundh	2104	0	0.00	6	0.29	0	5
18	Saltora	1969	43	2.18	131	6.65	31	59
19	Sarenga	1425	2	0.14	0	0.00	2	0
20	Simlipal	2149	167	7.77	68	3.16	95	57
21	Sonamukhi	1704	1	0.06	0	0.00	1	0
22	Taldangra	3140	21	0.67	33	1.05	12	19
Total		**52834**	**413**	**0.78**	**1046**	**1.98**	**276**	**600**

Source: IMIS data (from 2013-2017)

Summing up the last four years' data, as compiled, it has been observed that out of 52834 water samples tested across the 22 blocks, fluoride concentration above 1.5mg/L was observed in 413 samples (0.78%). Total 276 habitations are affected by high fluoride contamination. These samples were tested mainly from tube-wells. Also, an estimated 1046 (1.98%) samples showed fluoride concentration between 1.0 mg/L and 1.5 mg/L.

Based on the analysis, high fluoride concentrations are noted in 10 blocks, namely Bankura II, Barjora, Chhatna, Ganjagalghati, Hirabandh, Mejia, Raipur, Saltora, Simlipal and Taldangrawhichare considered as[1]severely affected. The blocks, which are moderately affected are Bankura-I, Indpur, Indus, Khatra, Onda, Sarenga and Sonamukhi. The 5 blocks which are unaffected with fluoride contamination are Bishnupur, Joypur, Kotulpur, Patrasayer and Ranibandh.

Apart from fluoride, about 68% of the groundwater samples show iron concentration above the permissible drinking water standard (0.3 mg/L). E-Coli and Coliform counts were also present above the permissible limit in samples tested. Details of other quality parameters based on IMIS data (from 2013-2017) is tabled below:

Table 5: Summary of Water Quality Parameters

Year	Samples Tested	Samples with			
		Coliform >[MPN/100ml]	**E-Coli >[MPN/100ml]**	**Fe > 0.3 (mg/L)**	**Hardness>200 (mg/L)**
2013-14	14536	6927	1739	6984	895
	Range	1 –60 MPN/100 ml	0.06 –90 MPN/100 ml	0.31 – 8.70mg/L	602 – 5001mg/L
2014-15	26807	6236	2010	20091	2451
	Range	0.6 –9.0 MPN/100 ml	0.2 –90 MPN/100 ml	0.31 – 9.64mg/L	604 – 4700mg/L
2015-16	9383	4876	962	7374	617
	Range	1.0 –9.0 MPN/100 ml	0.02 –110 MPN/100 ml	0.31 – 9.68mg/L	604 – 1844mg/L
2016-17	2114	722	4	1557	65
	Range	4 –1600 MPN/100 ml	2 –17 MPN/100 ml	0.31 – 8.65mg/L	68 – 12365mg/L
Total	**52840**	**18761**	**4715**	**36006**	**4028**
Percentage of Samples Tested Positive (%)		**35.5**	**8.92**	**68.1**	**7.6**

Source: IMIS data (from 2013-2017)

D.3.d. Air Quality

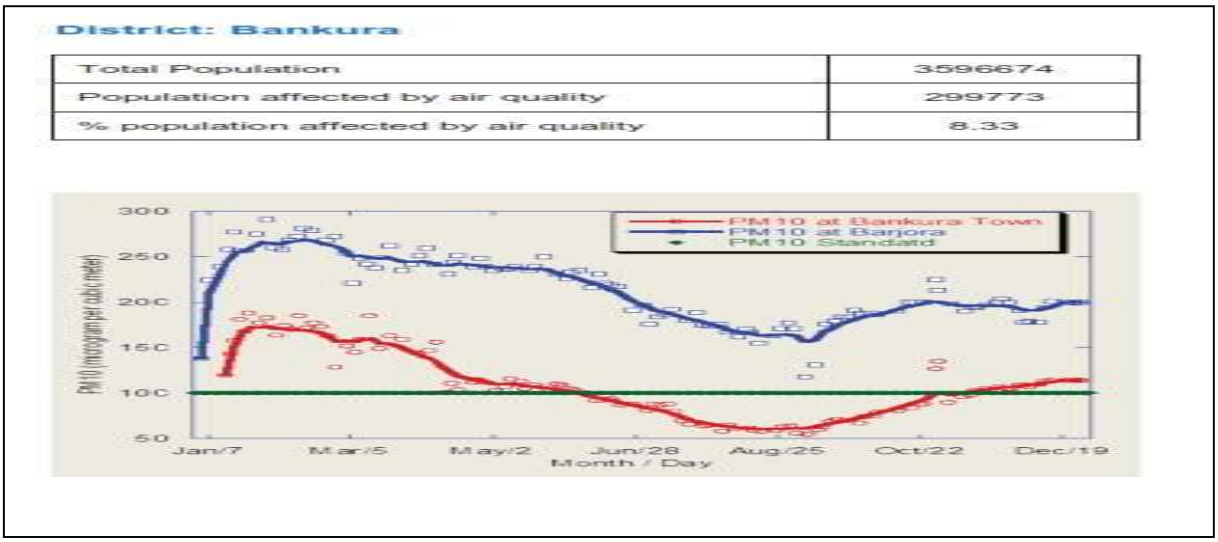
Air quality scenario of Bankura district is presented in tabular form in **the following table** followed by graphical presentation of the annual behavior of the indicator pollutants during year 2015 and the estimated population exposed to such air quality in the district. As no data is available for Indpur block, district air quality data have been considered.

[1] The rationale for severely affected blocks has been assessed based on the consideration that the % of Samples tested with Fluoride Content > 1.5mg/Liter is more than 0.4%.

Figure 4 Air Quality in Respect of Four Traditional Parameters in Bankura District

Year	PM10 (µg/m³)			PM2.5 (µg/m³)			SO_2 (µg/m³)			NO_2 (µg/m³)		
	Value	Stan-dard	% days of NC	Value	Stan-dard	% days of NC	Value	Stan-dard	% days of NC	Value	Stan-dard	% days of NC
2013	85	60	35	Not Done	40	Not Done	7	50	0	40	40	0
2014	69	60	13	Not Done	40	Not Done	8	50	0	54	40	0
2015	99	60	43	Not Done	40	Not Done	8	50	0	55	40	0

Trend of PM10 in Bankura during 2016



D.3.e. Forest

The total geographical area of the district of Bankura is 6882.00 km2 and the total area of forest of this district is 1,45,006.56 ha (1450.06 suqare kilometer)which constitutes 21.5% of total geographical area of the district coverage. A total area of 7305.76 ha has been declared as reserved forests under section 20 of Indian Forest Act. An area of 43643.87 ha of protected forests area has been covered under 438 proposals for declaring as reserved forests.

Bankura district forest is pre dominantly Sal and its associated species and plantation forest of Eucalyptus and Akashmoni. Bankura holds one of the best quality of Sal forest in West Bengal particularly at Radhanagar, Sonamukhi and Patrasayer and the entire Bishnpur subdivisional jurisdiction. Its flora bio-diversity increased substantially over time. From the geographical, socioeconomic and environmental consideration, the district offers lot of scope for development of this activity. In view of Govt. supports for development of this sector, long term potential for development through credit may be estimated at 2500 hect. for next 5 years with annual phasing of 500 ha.

The district is covered under the programmes of National Waste Land Development Board. IWDP is being implementation in 7 blocks viz. Indpur, Chhatna, Saltora, Khatra, Hirbundh, G.Ghati and Ranibandh. Various schemes and projects like NREGS, 13th Finance Commission, CSS Elephant Project are being implemented to improve the living conditions of the forest fringe area population. Elephant depredation is a very major problem in Bankura in view of very fast growing elephant population and seasonally moving elephant start straying back in Bankura for longer time and the number of residential elephants have also increased significantly. All-out efforts are being made with the help of local forest protection committee to tackle the problem with a human face to mitigate the problem and it is an on-going process. State Government has implemented social forestry project in the district covering roadside, riverside, railway embankment plantation etc. West Bengal Forest Development Corporation, Pulpwood Development Corporation are also working for forest and wasteland development in the district during the past years. Govt. has stressed for biotic plantation distribution of seeding etc. in the district.

The total forest area is spread over 27 territorial Range under three forest divisions. Forest area of Indpur range is 5997.656 Ha (Bankura S division) and that of Taldangra range is 7484.080 Ha (Panchyat S.C Div).In forest areas, majority of the population depend on the forest for various purposes like grazing, firewood, collection of Sal leaves and seeds, mushrooms etc. Since the pressure on the forests is high, some minimum amount of forest degradation has almost become unavoidable. However, the Joint Forest Management (JFM) has taken roots in the district and its contribution for greening and conserving the forests of the district is immense.

D.3.f. Agriculture

In spite of presence of small and marginal farmers, agriculture accounts almost 70 per cent of the district's total income. Due to land reforms, usage of high fertile and hybrid crops, the district has overcome its poor state as was to be in the past. Only 60 to 65 per cent of the total land area of the district is fertile due to availability of sufficient water supply either by canal or deep tube wells. Agricultural land of the district is of three types- Sali, Suna and Tara or Danga. 'Sali' is suitable for growing of aman rice, 'Suna' for various crops like 'aus' kharif, sugarcane, cotton, tobacco, mustard etc. 'Suna' is also used for production of fine kind of rice. Remaining lands of the district is not cultivable due to undulation of land and morum soil.

Agriculture in the district is largely dependent of monsoon. Drought constitutes a major hazard in the district. Intermittent gaps of in precipitation and moisture stress during the monsoon gives rise to serious setback in production during the Kharif, which is the main stay of Agriculture in the district. Farmers are working hard to get more production of crop with their limited area of land. Seed farms are working jointly. Fertilizers are available at every village. The main agricultural crop is paddy and it is produced in the 90.0 per cent of the total cultivated area of the district. Wheat, barley, jute and potato are the other important agricultural products of the district.

D.3.g. Eco Sensitive Zone

There is no eco sensitive zone present within the 5km radius of barrage vicinity .

D.4. Social Environment

D.4.a. District Profile

Bankura district The District Bankura is bounded by latitude 22038‟N to 23°38´N and longitude 86036‟E to 87047‟E. It has an area of 6,882 square Kilometres (2,657sq. mile). It is a part of

Midnapur Division of the State and included in the area known as "Rarh" in Bengal. It has 3 subdivisions. The barrage is located at Kadamdeuli village in the block Indpur under Khatra subdivision of Bankura district. Damodar River flows in the northern part of Bankura district and separates it with the major part of Burdwan district. The district head quarter is located in Bankura town. The district is the connecting link between the plains of Bengal on the east and Chhota Nagpur plateau on the west.

The areas to the east and north-east are low lying alluvial plains, known predominantly rice bowl of Bengal. The western portion, with ferruginous soil and hard beds of laterite, marks the gradual descent from the table land of Chhota Nagpur to the delta of lower Bengal, consisting largely of spurs projecting from the western tableland and of low swelling ridges. However, there is no marked ridge of hills. Much of the area is covered with jungles. In the northern portion of the district the alluvium contains seams of coal belonging to the Raniganj system.

Bankura is economically underdeveloped and is mostly dependent on agriculture. Almost 70% of the district's income is generated through agriculture where 80% of the farmers are small & marginal in nature. It is one of the most draught prone districts of West Bengal. However due to protective irrigation system, land reforms and use of high fertile & hybrid crops the economic condition of the district has improved. Also, cottage and small-scale industries, such as Stone-crushing, Weaving, Oilseed-crushing, handicraft units like Dokra, Terra-cotta, Baluchari Sari play a key economic role in district.

The brief demographic characteristic of the district is given in the table below:

Table 7: Demographic Feature

Total No. of Household (Year 2014)	**766902**
No. BPL Household (Rural HH survey of 2005)	28.87%
HH size	5
Population	
Total	3596674
Percent of West Bengal population	3.94%
Percentage of rural population	91.67 %
Percentage of urban population	8.33 %
Female No.	1758579
Female Percentage	48.9
Male No.	1838095
Male Percentage	51.1
SC Total	1174447
Percent of Total population	32.7
Female No.	581007
Male No.	593440
ST Total	368690
Total Percentage	10.3
Female No.	185223
Male No.	183467

Literacy Rate	
Total	2232992
Percentage of Total population	70.26
Female No.	933655
Female Percentage	60.05
Male No.	1299337
Male Percentage	80.05
Percentage in SC population	53.30
Percentage in ST population	59.18
Literacy rate (excluding 0-6 population)	70.26 %
Population Density	523
Decadal growth rate	12.64%
Average Sex Ratio	957
Work Participation Rate (%)	40.8

Source:1) Directorate of Panchayat, Govt. of W.B 2014., 2) Census of India, 2011, 3) L.S.G. Cell under D.M. Office, Bankura

Bankura district has a population of 3,596,674 as per 2011 census out of which 1,758,579 (48.9%) were females and 1,838,095 (51%) were males. The district has a population density of 523 inhabitants per square kilometer. Its population growth rate over the decade 2001-2011 was 12.64% against 13.84% in West Bengal. 30.2% household lives below the poverty line as per district level HH facility survey 2008, under MoH&FW. Bankura has a sex ratio of 957 females for every 1000 males The district has a scheduled caste population of 1,174,447 i.e. 32.7% and a scheduled tribe population of3,68,690 which accounts 10.3% of total population of the district .

The literacy rate of the district 70.26% is below the state average of 76.26% as per the census of India 2011. The gender gap is 20% , higher than the state level gender gap – 16.3%. Far more widen among SC 23.82% and ST 26.98%.

Table 8: Workforce

Total Worker Population	**1466220**
Percentage to total population	40.77
Female No.	415398
F Percent on F pop	28.33
Male No.	1050822
M Percent on M pop	71.67
Main Workers Total	916393
Percentage to respective total population	25.48
Female no.	154305
F Percent on F pop	8.8
Male No.	762088
M Percent on M pop	41.5
Marginal Workers Total	549827
Percentage to respective	15.29

total population	
Female no.	261093
F Percent on F pop	14.85
Male No.	288734
M Percent on M pop	15.71
Non Workers Total	2130454
Percentage of Total	59.23
Female no.	1343181
F Percent on F pop	76.38
Male No.	787273
M Percent on M pop	42.83

Source : Census of India, 2011

The male worker population in the project district is 71.67 percent and female worker population is around 28.33 percent. Male main worker population is significantly higher than female main worker population whereas in case of marginal worker population the gap is very close. However, non-worker female population is significantly higher than male. The work participation rate in Bankura is 44.7 which is higher than the state average of 36.8.

Table 9: Type of Worker

	Both Main & Marginal				
	Cultivators	**Agriculture Labours**	**HH Industrial workers**	**Other Workers**	**Total**
Total	**309723**	**647374**	**61386**	**447737**	**1466220**
Percentage of Total Worker	**21.12**	**44.15**	**4.19**	**30.54**	**100**
Female	32742	262325	31387	88944	415398
Female % of Dist.	7.88	63.15	7.56	21.41	100
Male	276981	385049	29999	358793	1050822
Male % of Dist.	26.36	36.64	2.85	34.14	100

Source : Census of India, 2011

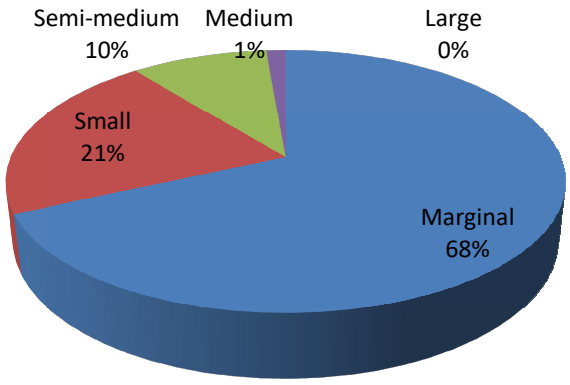
The livelihood of highest percentage of worker population is Agriculture labours, in which female participation is larger 63.15 percentages. In the district, apart from Agricuture labourer, a larger section of workforce ekes out living as other workers. Participation in cultivation comes as the third options.

Table 10: Land Holding

Land size												Av. size of holdings (ha)
Marginal Below 1.0 hectare		**Small 1.0 to less than 2.0 hectares**		**Semi-medium 2.0 to less than 4.0 hectares**		**Medium 4.0 to less than 10.0 hectares**		**Large 10.0 hectares and above.**		**Total**		
No. of olding	**Area of holdings**	**No. of holdings**	**Area of holdings**	**No. of holdings**	**Area of holdings**	**No. of holdings**	**Area of holdings**	**No. of holdings**	**Area of holdings**	**No. of holdings**	**Area of holdings**	
275108	135442	84905	125671	37932	100578	5326	26059	7	84	403278	387834	0.96
68.22	34.92	21.05	32.40	9.41	25.93	1.32	6.72	0.002	0.02	68.22	34.92	

Source : Agricultural Census, W.B.

Figure 5 Land holding pattern in Bankura district



Land holding pattern reflects that the district has significant percentage of marginal and small farmers. 68.22 percent farmers are having less than 1 ha land and percentage of holding to total holding is 34.92 percent. Of the total farmers 21.05 percent are having 1 to 2 ha land with 32.4 percent of the total land whereas only 11 percent farmers are in the holding category of greater than 2 ha land with 33 percent of the total area of holding. The average land holding of the district is less than 1 ha, precisely 0.96 ha.

Table 11: Land Type & Land use (Area in thousand hectares)

Total Geographical Area	688.0	pc on total area
Gross Cropped Area	383.93	55.80
Net area sown	264.09	38.39
Area Sown more than once	220.3	32.02
Cropping Intensity	164	
Area Under Forest	148.93	21.65

Area Under Wasteland	2.0	0.29
Area under Nonagricultural use	148.48	21.58
Barren &Unculturable land	1.42	0.21
Permanent pastures & other grazing land	0.78	0.11
Culturable waste land	2.13	0.31
Current fallow	118.76	17.26
Fallow land other than Current fallow	1.97	0.29
Protected Forest	136230	19.80
Reserved Forest	4572	0.66

Source : Directorate of Agriculture (Evaluation), Govt. of W. B. , Statistical Handbook 2014

Total geographical area of the district is 688 thousand ha. The gross cropped area is 56 percent of the geographical area. The net sown area is 38.4 percent to total geographical area. Area sown more than once is 83 percent of the net sown area. The cropping intensity is 164, whereas that in state is 184.

Land use refers to "man's activity and the various uses which are carried on land" and land cover refers to 'natural vegetation, water bodies, rock/soil, artificial cover and others resulting due to land transformation. Area under agriculture is highestfollowed by area under forest. 21.65 percent is forest area of which 19.8 percent is protected forest area in the district.

D.4.b. Road Network and Connectivity

The National Highway 60 or NH-60 connects NH-5 (At Balasore) to NH-34 (At Morgram). Within Bankura, it runs through Bishnupur, Bankura, Gangajalghati and Mejia, an approximate distance of 93 km before crossing over to Ranigunj. State Highway-2, 4, 8 and 9 are the major State Highways connecting / interconnecting Bankura, with the rest of the districts. Details of the major2 National / State Highways within the district and their connectivity as per available information are presented below:

Table 12 : Roads in Bankura District

Sl. No	National / State Highway Number	Length (km)		Details of Major Blocks which Passing Through
		Total	In Bankura	
1	NH-60	446	93	Bishnupur, Onda, Bankura, Gangajalghati and Mejia
2	NH-60A	84	33	Bankura-II,Bankura-I
3	State Highway-2	323	117	Saltora, Chhatna, Bankura-II, Chhatna, Indpur to SH-4
4	State Highway-4	466	80	Hirbandh, Khatra to Sarenga
5	State Highway-7	289	-	Bishnupur, Joypur, Kotulpur
6	State Highway-8	292	112	Beliatore, Sonamukhi, Patrasayer and Indua
7	State	251	82	Durgapur, Beliatore, Bankura, Onda, Taldangra,

[2] http://www.pwdwb.in/road/state_highway

Highway-9	Simlapal, Sarenga, Raipur

D.4.c.Vicinity Village Profile

There are 44 villages which fall within 5 km radius of the barrage, spread over 5 blocks of the district. The project area does not fall within the 'Schedule V ' areas and also the tribal households in the area do not meet the characteristics outlined in ESS 7 as they are well mainstreamed into the society. The socio-economic profile of the villages is given in the table below.

Table 13 : Vicinity Village Profile

Total Households	5521
Total Population of Village	26691
% of dist. pop	0.74
Total Male Population of Village	13791
% of tot village pop	51.7
Total Female Population of Village	12900
% of tot village pop	48.3
Total SC Population of Village	11002
% on Total Population of Village	41.2
Total SC Male Population of Village	5670
Total SC Female Population of Village	5332
Total ST Population of Village	3771
% on Total Population of Village	14.1
Total ST Male Population of Village	1882
Total ST Female Population of Village	1889

Source: Census 2011

The habitation of the vicinity villages of the barrage site consists of multi caste people such as SC, ST and General caste whereas population of General caste is more followed by scheduled caste population 41.2% and scheduled tribe14.1%. The population of the area is 0.74 percent of the district. There is no schedule V area in West Bengal. However, Debidia, Kharakanali and Itamara villages are dominated by SC and ST. Among these villages, in Debidia, SC constitutes 50.49 % while ST were 33.22 % of total population in the village. Kharakanali village, is SC village. 100.00 % of population of the village is SC, while Itamara village is dominated by ST population. ST constitutes 67.23 % and SC were 3.23 % of total population of the village. Category of tribe is Santhal.

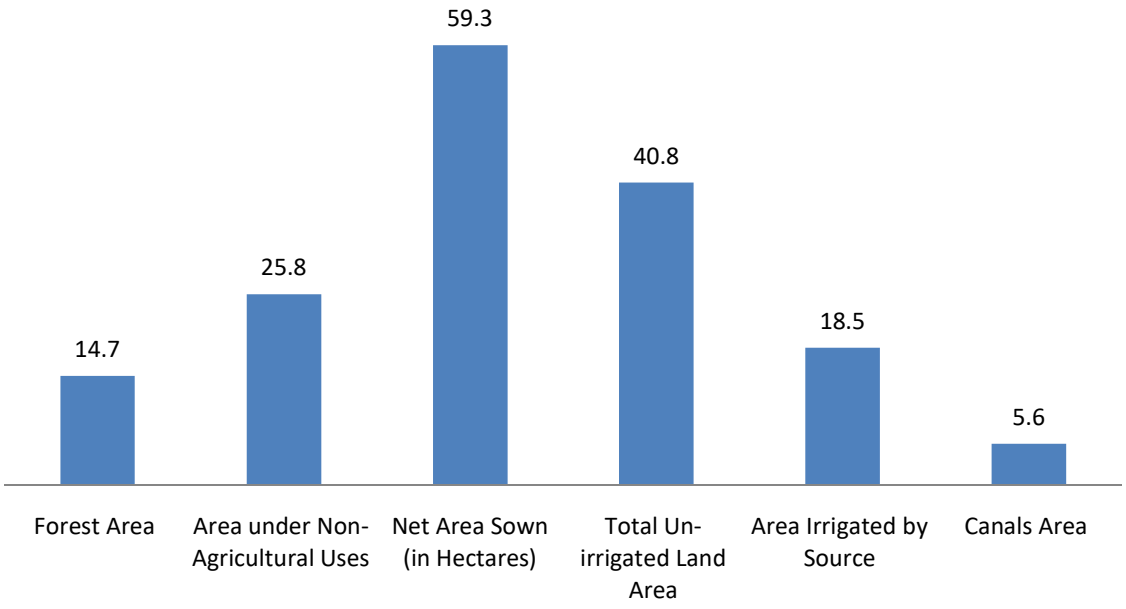
Table 14 : Land Use of Vicinity Villages

Total Geographical Area (in Hectares)	6241.21	pc on total area
Forest Area (in Hectares)	918.9	14.7
Area under Non-Agricultural Uses (in Hectares)	1607.2	25.8

Net Area Sown (in Hectares)	3700.2	59.3
Total Un-irrigated Land Area (in Hectares)	2544.0	40.8
Area Irrigated by Source (in Hectares)	1156.1	18.5
Canals Area (in Hectares)	348.5	5.6

Source: Census 2011

Figure 6 Land Use pattern in Barrage vicinity villages (around 5 km radius)



The geographical area of the vicinity villages covers 0.9% of the district with 15% of it is forest area. Out of the total area59.3% is net sown area and 40.8% is total un-irrigated area.

Table 15 : Workforce in vicinity village

Total Worker Population	**11555**
Female No.	3716
F Percent on tot Work pop	32.2
Male No.	7839
M Percent on tot Work pop	67.8
Main Workers Total	5316
Percentage to respective total work population	46.0
Female no.	5316
F Percent on tot Main work pop	46.0
Male No.	4474
M Percent on tot Main Work pop	84.2
Marginal Workers Total	6239
Percentage to respective total population	54.0
Female no.	2874
F Percent on tot Marginal work pop	46.1
Male No.	3365
M Percent on tot Marginal Work pop	53.9
Non Workers Total	15136
Percentage of Total worker population	56.7

Female no.	9184
F Percent on F pop	60.7
Male No.	5952
M Percent on M pop	39.3

The male worker population in the vicinity villages is 67.8 percent and female worker population is 32.2 percent. Male main worker population is almost double comparing female main worker while in case of marginal worker the difference is not much among female and male marginal worker population, although percentage of male marginal worker is higher than female. That for non-worker population, female number is more than male, as usual reason.

D.4.d. Cultural Environment

As per list of National Monuments in West Bengal and list of State Protected monuments in West Bengal, there are no protected monuments in and around barrage site, i.e. within 5 kn radius of barrage site.

Chapter IV

E. ACTIVITY WISE ENVIRONMENT & SOCIAL SCREENING, RISK AND IMPACTS IDENTIFICATION

E.1. Sub-Project Screening

The subproject screening was undertaken based on site visits and followed a set methodology. Process of risk /impacts identification was done using two step Screening process. Step I identifies the applicable sub-project activities, preconstruction stage and construction stage's major auxiliary or interventions related risks and impacts within the impact zone. Step II conducts an analysis of extent of risk viz. low, moderate, substantial and high associated with various sub activities related to each activity that was identified through Step I. All these were then summarized to arrive at overall barrage sub-project risk category. Description of each step of screening as per formats, and the outcome of each step is given below.

- **Step I Screening (using Form SF-1)**:

Sub-Project Component, Construction Support Preparatory Intervention related vs Nature of risk/impact

Screening indicated that all project components related activities are limited to within the barrage area/premises. Due to nature of these activities, likely impacts will be on physical environment in terms of air pollution, noise pollution and waste generation. None of the proposed structural interventions involve acquisition of private land and/or private assets. These activities in no way cause restriction on access to land or use of resources by local communities and there is no economic displacement envisaged due to the sub-project. Activities interfacing with water bodies – river/reservoir will have risk of spillage of construction material and debris leading to water pollution and impacts on fishes.

Pre-construction and construction stage major auxiliary or preparatory intervention are within barrage area as well as beyond barrage area. Deployment and haulage of heavy machinery, setting up of workshop, operation of concrete mixture and heavy pumps will be within barrage area. Other activities such as labour camp and debris disposal will be beyond barrage area. Transportation of material, debris disposal and labour camp are likely to generate pollution and impact on physical environment.

Project will involve project managers and supervisors, contracted workers – these would also include migrant workers as all the required labour will not be fully supplied locally for a number of reasons, such as worker unavailability and lack of technical skills and capacity. Construction contractors are expected to stay at/near barrage, set up construction equipment and machinery near work location at pre-determined/approved sites. Influx of skilled migrant labour, albeit few in numbers, for construction works is likely. The labour will stay outside the barrage premises, hence risk of SEA/SH is likely.

Proposed non-structural interventions include Emergency Action Plan, Early Warning System and Flood Forecasting System, etc. During implementation, project will reach out to downstream population including the disadvantaged and vulnerable persons and groups. During implementation of EAP, population in vulnerable areas under different release scenario will be

identified and contacted through public consultation meetings. Communities will be made aware about the warning systems and do's and dont's during such scenarios.

Output of this screening is enclosed as Annexure I.

- **Step II Screening (using Form SF-2)**:

All applicable activities identified as having potential risks/impacts that were identified through Step I screening, are screened for associated sub-activity and evaluated for the extent of risk. Sub-activity's Risk/Impact intensity is further categorised as Low (L), Moderate (M), Substantial (S) or High (H) based on following criteria:

Low:	Localized, temporary and negligible
Moderate:	Temporary, or short term and reversible under control
Substantial:	Medium term, covering larger impact zone, partially reversible
High:	Significant, non- reversible, long term and can only be contained/compensated

Occupational Health and safety: OHS is a substantial risk activity in almost all cases and is not being considered under screening criteria. Occupational health and safety is considered an important requirement of every project irrespective of size and type of the projects. It will be part of Contractor's ESMP.

Analysis of extent of risk/impact for sub-activities resulted in identification of most of the activities proposed as Low risk, except for following which have been assessed as having Moderate Risk/impact.

.

- Treatment on u/s face for reducing leakages up to RL 100 m
- Construction & Improvement of approach road to SilabatiBarrage
- Setting up of Labour Camp
- Disposal of Large amount of debris

None of the activities for this sub-project is having substantial or high risk. The outcome of Screening is enclosed as Annexure II. In case of GBV/SEAH, this site was assessed as Low risk.

- **Step III Screening (using Form SF-3):**

This is one of the important screening templates which brings out the risks identified in the SF-2. These risks are distributed in to environmental and social risks to complete a matrix to bring out a complete scenario of risks and their classification in a matrix format. Any of the activity comes an H or S will make the sub project a high-risk sub project and will undergo a detailed ESIA. Low to moderate will prepare Standard ESMP.

Based on consideration of all the above, summary of Risk/Impact in SF-3 for major sub-project activities is given at Table 16 below.

Table 16: Summary of Identified Risks / Impacts in Form SF3

Project Activity	Environment Risks						Social Risks				
	Air, water, noise, land use, Soil, Resource use	Pollution downstream and upstream	General Ecology	Protected Area (Wild Life Sanctuaries, National Park and other natural habitat even if not protected)	Other RET species (flora and fauna) outside protected areas	Fish and Aquatic life within barrage water body	Land	Tribal	Labour	Cultural heritage	GBV/SEAH
Civil (within Dam Boundary)	M	M	M	L	L	L	L	M	M	L	L
Hydro Mechanical	L	L	L	L	L	L	L	L	L	L	L
Instrumental SCADA, surveillance	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Painting	L	M	L	L	L	L	L	L	L	L	L
Road work	M	L	L	L	L	L	L	L	M	L	L
Safety measures (Siren, Lighting)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Major Civil Work like Additional Spill Way	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Major Hydraulic Structure (tunnelling)	M	M	L	L	L	L	L	L	L	L	L
Major Civil Work extending beyond Barrage Area Like training Structure	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Additional activities for Tourism Solar/Fisheries/ Water recreation enhancement	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Criteria for Risk Evaluation:

Low: Localized, temporary and Negligible

Moderate: temporary, or short term and reversible under control

Substantial: medium term, covering larger impact zone, partially reversible

High: significant, non-reversible, long term and can only be contained/compensated

Occupational Health and safety: OHS is a substantial risk activity in almost all cases and is being treated separately through OHS plan in accordance with WB ESHS guidelines and shall be applicable to all sub-projects. Hence is not being considered under screening criteria.

E.2. Stakeholders Consultation

In the present situation of the COVID 19 pandemic, Government of India has announced country wide lockdown between March 23 and May 31, 2020 and thereafter restriction on large public gathering which constrained holding of consultation meetings. However, 15 persons, outside the dam authority were contacted ensuring social distancing and their views recorded while preparing ESDD. Two sets of questionnaires were prepared, one for each category of stakeholders – direct workers and community stakeholders.

The purpose of Stakeholder consultation as part of environmental and social due diligence, is as follows:

- Provide initial information to the workers and communities on the proposed project interventions and particularly the non-structural interventions, if any;
- Help identify potential stakeholders who are involved at this stage and will be involved a later stage.
- Assess their responses in understanding the potential risks and prepare mitigation plan to address their concerns
- Identify mechanisms that would be deployed to engage with different stakeholders and particularly communities living downstream

Stakeholder consultation meetings were conducted at the barrage site on 15th October, 2020. It was attended by SDO, Engineer and office personnel working at barrage, worker from nearby villages and people from nearby villages. List of stakeholders who participated consultation is enclosed as **Annexure IV**.

Following is the outcome of the stakeholder consultation exercise.

E.2.a. Interaction with Dam/ Barrage Officials

- **Implementation arrangement:** At present Executive Engineer at SPMU level and Assistant Engineer at Barrage site deal with the communities regarding E & S issues.

- **Legal issues relating to displacement or resettlement i.e. pending from the time of barrage construction:** No such issue is pending.

- **Proposed rehabilitation works Location of proposed works:** All rehabilitation work Silabati Barrage will be limited to the Barrage compound only. The local peoples will be happy if they do the rehabilitation work.

- **Tree Felling:** There are around 90 trees in the approach road of the barrage site. Varieties are Date, Bael, Sonjhuri, Ja, Arjun, Krishnachura, Radhachura, Simul, Chalta. For removal of trees NOC has to be collected from forest department

- **Archeological structure:** No Archeological structure exists near the barrage.

- **Distance from the barrage to the nearest Habitat:** Kadamdauli Village is the nearest habitation which is 500 Meters from downstream canal.

- **Eco sensitive zone:** No Eco sensitive zone is noted within the dam vicinity.

- **Existing Mechanism to contact barrage officials by community:** Silabati Section Office is located nearby the Silabati Barrage. Officers & staffs are allotted duty alternatively for 24 Hour during flood seasons. Generally, Local people contact to them directly or by telephone during any emergencies. They also contact local government and police if required.
  Khalasis and other staffs roam in the nearby villages during flood season. Villagers may also contact them for any emergency. For any necessary issue community people give mass petition or letter to the Dam / Barrage Officials.

- **Information dissemination - Mechanisms to communicate with downstream communities on unregulated releases of water during high flood time:** Barrage authority informs Local Police and Local authority (BDO, Panchayat) through whatsapp, letter, email etc.

- **Mechanism to ensure downstream community fully aware of the mechanism:** Barrage Authority depends upon Police and Local authority (BDO, Panchayat). Sometimes Local Police arrange Police picketing to restrict local people's movement in the danger zone.

- **Gender:** There is no women employee at the barrage site and nearby rest house.

- **Grievance mechanism**: No Grievance Redress Mechanism (GRM) exists. If required Executive Engineer at Dam level and Chief Engineer at HO level look in to the matter.

- **Areas within the barrage restricted access:** The Barrage Bridge and Canal Bridges are important means of communication, the authority allow s local people to access.

- **Tribal area:** Tribal population exists in the area. Soren, Murmu (Santhali) Tribes lives in adjacent Itamara village.
- **Tourism potential**: It is not a tourist spot.

- **Engagement of local labour:** Local people are engaged via Labour Contractor or staff

- **Information dissemination/ awareness programme on social and environment:** No such programmes are organized.

E.2.b. Interaction with Communities

- Schedule V area or tribal area: It is not a Schedule V area. Itamara village located within 5 km radius of the project site is dominated by Santhali tribe – Murmu, Soren.
- **Immediate downstream vicinity area and livelihood of people: :**7 such villages are situated. However, in significant number of people's livelihood from these villages depends on barrage directly. Few people worked under labour contractor or Master roll staff and some people engaged with fishing.
- **Fishing occupation practiced in the area:** Few households in Kadamdouli and Salghat Village occasionally go for fishing mainly for own consumption.
- **Lands taken for the original barrage construction and legacy issues**: There are no pending resettlement issues.
- **R & R affected person currently working with barrage:** No
- **Affected or impacts due to barrage operations:** No. Few have farm lands, but operations do not block those farm lands.
- **Women affected by the barrage operations:** No
- **Any barrage related accident**: No
- **Foul smell from barrage:** Foul smell comes from the barrage area due to decomposition of vegetation at reservoir which disappears during summer and winter. However, they have not communicated with Barrage Authority for that.
- **Communication with Dam authority and attitude of barrage authority:** No such communication has taken place till now. If it is required they will send letter or public petition. During monsoon Dam authority comes to village to communicate and they keep watch of the situation. They help villagers in emergency time.
- **Aware of any early flood warning system:** The administration, arranges for vehicles with loudspeakers to move around in the downstream villages to convey information on release of water. Community members identify this as an early warning system. In addition, Pradhan and Police are informed by dam authorities, who, in turn, warn the villagers.

E.3. Descriptive Summary of Risks And Impacts From Activities Based On Screening

E.3.a. Environmental Impacts and Risks

1. Environment risks and impacts, as assessed above, for various project activities under this sub-project are categorized as Low and Moderate due to localised nature of proposed activities i.e. activities remain limited to barrage area except for labour camp and muck/debris disposal.
2. Execution of civil and hydro-mechanical work within barrage body will generate localised impacts on physical environment and resource use.
3. Civil work interfaced with water body such as work on upstream face of barrage shall pose risk of water pollution and impact on fish fauna. Ingredients for the preparation of mortars and grouting suspensions include cement, clay and fillers, bentonite, asphalt, additives for stability and water. Some ingredients and chemicals used in the preparation of mortars and grouting suspensions may be toxic and irritants. Their use may have negative impacts on both humans and the environment.
4. No Objection Certificate for Tree felling within approach road is required from forest department. Compensatory plantation will be applicable as 1:5 ratio
5. Construction and demolition waste and muck require careful disposal at pre-identified and approved site to minimize the risk of pollution on this count.
6. An Archeological structure is present 5 km away from barrage site. There will be no impact on archeological structure due to construction work of barrage.
7. No impact on general ecology is envisaged.
8. Rehabilitation work would require labour to work on various sections of barrage involving working at height, working in confined spaces, working on reservoir side, etc; Further, workers will also be exposed to dust and noise and will have to handle chemicals/gases for some of the works; these will lead to occupational health and safety risks

E.3.b. Social Risk and impacts

1. As the interventions are within the barrage premises and on the barrage structure, there shall be no adverse impacts on land and assets due to any sub-component or sub-activities
2. There are Scheduled Tribes households in the vicinity, which are mainstreamed into the overall society and do not meet the characteristics outlined in ESS 7. Further, there will be no physical interventions outside the barrage.
3. Number of migrant labour will be low as these works require only for few item of works. These workers will mostly operate from labour camps within the barrage premises/proximity and hence there would be minimal interface with communities and therefore significantly lower SEAH/GBV risks.
4. Waste generation from labour colony can pollute drinking water sources of community; risk is low and can be mitigated by providing adequate sanitation facilities.
5. No impacts are envisaged on cultural heritage as works shall not be undertaken in their vicinity or result in any impact.
6. Labour related risks include:
    - Safety issues while at work like injuries/accidents/ fatalities leading to even death, while at work; Occupational health and safety risks due to exposure of workers to unsafe conditions while working at heights, working using lifts, handling of equipment and machinery, exposure to air and noise pollution etc. will be addressed through OHS guidelines.
    - Short terms effects due to exposure to dust and noise levels, while at work
    - Long term effects on life due to exposure to chemical /hazardous wastes

- Inadequate accommodation facilities at work force camp, including inadequate sanitation and health facilities
- Sexual harassment at work
- Absence or inadequate or inaccessible emergency response system for rescue of labour/workforce in situations of natural calamities.
- Health risks of labour relating to HIV/AIDS and other sexually transmitted diseases
- Non-payment of wages
- Discrimination in Employment (e.g. abrupt termination of the employment, working conditions, wages or benefits etc.)
- Unclear terms and conditions of employment
- Discrimination and denial of equal opportunity in hiring and promotions/incentives/training opportunities
- Denial for workers' rights to form worker's organizations, etc.
- Absence of a grievance mechanism for labour to seek redressal of their grievances/issues

Chapter V

F. CONCLUSIONS AND RECOMMENDATIONS

F.1. Conclusions

F.1.a. Risk Classification

As per the ESDD exercise, risk/impacts that have been identified relate to Water Quality, Fisheries, Physical Environment, Occupational Health, Labour and SEAH/GBV. The summarized environmental and social risks such as, of labour and OHS to labour/community of identified activities with level of risk is presented in preceding chapter. Environment risks of air, water, noise, and resource use as well as social risks of labour, civil work within the barrage body and road work areModerate

Hence the overall risk of this sub-project Barrage is categorized as Moderate.

F.1.b. National Legislation and WB ESS Applicability Screening

The applicability analysis of GoI legal and regulatory framework indicates that while, there are various legislation which will have to be followed by the contractor for the protection of environment, occupational health and safety of workers and protection of workers and employment terms. None of Indian legislation is applicable warranting obtaining clearance prior to start of construction/improvement work.

ESS standards are found relevant to this sub-project as per reasons given in Table 17 below:

Table 17: WB ESF Standards applicable to the sub-project

Relevant ESS	Reasons for Applicability of the standard
ESS1: Assessment and Management of Environmental and Social Risks and Impacts	**During construction work of barrage safety, baseline pollution level may be increase; Due to construction activity labour, Staff and others persons safety.**
ESS2: Labour and Working Conditions	**Due to engagement of Direct workers, Contracted workers and Community workers**
ESS3: Resource Efficiency, Pollution Prevention and Management	**Civil and mechanical work including resource consumption; requiring protection of physical environment and conservation of resources**
ESS 4: Community Health and Safety	**Transportation of material, labour camp near habitation; and accidental risk during repair /improvement work and also leading to SEA/SH GBV risk**
ESS 10: Stakeholder Engagement Plan	**For engagement of stakeholders in all structural and non- structural interventions**

F.2. Recommendations

F.2.a. Mitigation and Management of Risks And Impacts

Since risks and impacts are low to moderate category, a generic and standard ESMP customized to sub- project in accordance with the ESMF shall be followed. It shall cover the following aspects:

1) SPMU shall customize the standard Environmental and Social Management plan (ESMP) that has been provided in the Environmental and Social Management Framework (ESMF) and make it part of bid document for effective adherence by contractors.

2) It is recommended that ESMP provides due measures for labour management and protection of environment quality and resource conservation (during handling of resources) in line with ESF standard ESS2 and ESS3 respectively. Similarly, any impacts identified on fisheries have to be conserved. Likewise, due attention will be given to Occupational Health and Safety of workers and community in line with the requirements of ESS4 and World Bank Group guidelines on Occupational Health and Safety (OHS). Hence SPMU shall develop following plans in line with outline provided in the ESMF and ensure its adherence by contractor:

- Resource Conservation Plan (RCP)
- Gender Based Violence or SEA/SH related actions(ESS1)
- Labour Management Procedure(ESS2)
- Resource Efficiency and Pollution Prevention(ESS3)
- Community Health and Safety(ESS4)
- Stakeholders Engagement Plan(ESS10)
- Emergency Action Plan (EAP)

3) Contractor shall submit BOQ as per ESMP of the subprojectand will also include environmental and social budget as part of bid submission..

Mitigation plans to meet requirements for relevant Standards with responsibility and stages are given in **Table 18** below:

Table 18: List of Mitigation Plans with responsibility and timelines

WB-ESS Triggered	Mitigation Instrument	Responsibility	Timelines
ESS1: Assessment and Management of Environmental and Social Risks and Impacts	• Gender Based Violence or SEA/SH related actions	SPMU/Implementation agency	Before mobilization of contractor
ESS2: Labour and Working Conditions	• Labour Management Procedure (LMP) including OHS management plan • GBV/SEAH	SPMU /Implementation agency	Before mobilization of contractor GBV/SEAH by appraisal
ESS3: Resource Efficiency, Pollution	• Pollution Prevention and Environment Quality Management	SPMU/ Implementation agency	Before mobilization of contractor

WB-ESS Triggered	Mitigation Instrument	Responsibility	Timelines
Prevention and Management	Plan(PPEQMP) • ESMP • Muck Management Plan • Resource		
ESS 4: Community Health and Safety	• Community Health and Safety Management Plan (CHSMP) • EAP	SPMU/ Implementation agency	Before mobilization of contractor
ESS 10: Stakeholder Engagement Plan	• **SEP in accordance with project SEF**	**SPMU/ Implementation agency**	**By negotiation (and to be updated once the EAP preparation is to commence**

ESDD, ESMP and other related plans will be placed on the website of the department as well as other accessible locations such as the office of Engineer in Charge at Barrage site as well at SPMU for reference and record. The executive summary of these documents would be disclosed/disseminated through other appropriate means like project meetings, workshops etc. Each implementation agency will translate these documents in their local language, if required, and will upload in their respective websites and also make available at other accessible locations.

F.2.b. Institutional Management, Monitoring and Reporting

ESMP will be customized for the sub project by SPMU from standard ESMP included in ESMF before including in the bid document.

SPMU will designate Nodal Officer full time in-house engineering staff with E&S expertise to coordinate and supervise E&S activities. He shall be at the level of Executive Engineer/ Deputy Directors and shall provide commensurate time to comply with E&S related activities. Brief TORs for these Nodal E&S officers is included in ESMF. The SPMU, in case in-house expertise not available, will hire the qualified staff on need basis to support management of E&S risks including Environmental and Social Experts for ensuring compliance with the Bank's ESF and ESS's and ensuring that these activities shall be implemented as per the procedures.

SPMU shall advise contractors about applicable legislative requirements and ensure that contractors prepare its own ESMP as outlined in ESMP for this sub-project and submit compliance reports to SPMU on quarterly basis. SPMUs will share regular implementation status of ESMPs to The World Bank in line with ESMF on quarterly basis.

SPMU shall establish and operationalize a grievance mechanism to receive and facilitate resolution of complaints and grievances, from the communities and other stakeholders including implementation partners. GRM works within existing legal and cultural frameworks and shall

comprise project level and respective State level redressal mechanisms. Most Project related grievances could be minor and site-specific.

SPMU will have sufficient staff with skills on Environment and Social aspects. Awareness raising and capacity building on the new Environmental and Social Framework (ESF) need to be carried out for the environment and social staff engaged and this will be an area of continued focus, with a view to generate awareness at to barrage level. D/PMC will develop formats for regular supervision and monitoring on E&S issues and undertake site visits/ inspections of the barrage sites to monitor for compliance; collate and review QPRs and set up a monitoring and reporting system on E&S issues.

Overall, the proposed activities within this barrage sub-project have low to moderate risks resulting in the overall sub-project to be categorized as Moderate risk category risk category. These risks and impacts can be effectively mitigated with effective implementation of mitigation plans by SPMU, Contractors and monitoring by D/PMC and SPMU.

Annexure I: Form SF1

Sl. No	Project Component	Applicable (A), Not Applicable (NA)	Environment and Social Risk Associated within barrage area (DI), Beyond barrage Area (DE)	Likely Nature of Risk/Impact Water Quality (WQ), Fisheries (F), Conservation Area (CA), Protected Area (PA), Ecological (E), Physical Environment (PE), Cultural (C), Tribal Presence (T), Impact on private land/assets/encroachers/squatters (LA), Labor (L), GBV risks (G), (Write whichever is applicable)
1	2	3	4	5
A	**Nature of Project Component and related sub activity Related**			
1	Reservoir Desiltation	**A**	**DI, DE (depending on disposal area)**	**WQ, F**
2	Major structural changes – Spillway construction (Improving ability to withstand higher floods including additional flood	**NA**		

Sl. No	Project Component	Applicable (A), Not Applicable (NA)	Environment and Social Risk Associated within barrage area (DI), Beyond barrage Area (DE)	Likely Nature of Risk/Impact Water Quality (WQ), Fisheries (F), Conservation Area (CA), Protected Area (PA), Ecological (E), Physical Environment (PE), Cultural (C), Tribal Presence (T), Impact on private land/assets/encroachers/squatters (LA), Labor (L), GBV risks (G), (Write whichever is applicable)
	handling facilities as needed.)			
3	Structural strengthening of dams to withstand higher earthquake loads	NA		
4	Structural Improvement/Repair work upstream of Dam site (interfacing dam reservoir) (like resetting of Rip-Rap, repair of training walls, treatment of Honeycombed etc.)	A	DI	WQ, E, L
5	Structural Improvement/Repair work -Downstream of Dam site (with no interfacing with dam reservoir) (like repair of parapet walls, damage spillway crest, downstream training walls, etc.)	A	DI	WQ,E,L
6	Re-sectioning earth dams to safe, stable cross sections	A	DI	WQ, F, C
7	Hydro-mechanical activities with interface with dam reservoir	A	DI	L
8	Hydro-mechanical activities Downstream of Dam site (with no interfacing with dam reservoir)	NA		
9	Instrumentation, General lighting and SCADA systems	A	DI	C
10	Basic Facilities (like access road improvement, renovation of office, etc)	A	DI	PE, L, E
11	Utility installation like standby generator, or setting up solar power systems	A	DI	

Sl. No	Project Component	Applicable (A), Not Applicable (NA)	Environment and Social Risk Associated within barrage area (DI), Beyond barrage Area (DE)	Likely Nature of Risk/Impact Water Quality (WQ), Fisheries (F), Conservation Area (CA), Protected Area (PA), Ecological (E), Physical Environment (PE), Cultural (C), Tribal Presence (T), Impact on private land/assets/encroachers/squatters (LA), Labor (L), GBV risks (G), (Write whichever is applicable)
12	Painting of dam u/s or d/s or both faces	NA		
13	Water recreation activities	NA		
14	Tourism Development	NA		
15	Installation of Solar power/floating solar	NA		
16	List any other component not listed above	NA		
i	Addition of Geo-membrane / Concrete cladding			
B	**Pre-construction and construction stage major auxiliary or preparatory intervention**			
1	Acquisition (diversion of forests land for non-forest purposes) of forest land	NA		
2	Acquisition of private land Resettlement and Rehabilitation (including physical or economic displacement/impact on livelihood;	NA		
3	Temporary loss of business or Damages to crops or trees or structures outside the ROW during Construction activities by Contractor	NA		
4	Borrowing earth to meet Borrow materials requirement	A	DE	PE
5	Sourcing of Quarry materials	A	DE	PE

Sl. No	Project Component	Applicable (A), Not Applicable (NA)	Environment and Social Risk Associated within barrage area (DI), Beyond barrage Area (DE)	Likely Nature of Risk/Impact Water Quality (WQ), Fisheries (F), Conservation Area (CA), Protected Area (PA), Ecological (E), Physical Environment (PE), Cultural (C), Tribal Presence (T), Impact on private land/assets/encroachers/squatters (LA), Labor (L), GBV risks (G), (Write whichever is applicable)
6	Blasting	NA		
7	Setting up Labour Camps (location within dam premises or outside)	A	DI,DE (depending on location of camp)	PE, C, WQ, G
8	Heavy machinery deployment and setting up maintenance workshop	NA		
9	Setting up Hot mix plant	NA		
10	Deployment of Concrete mixture and heavy pumps	A	DI	PE, WQ,G
11	Temporary land acquisition	NA		
12	Need of Tree felling/ vegetation clearance	A	DI	PE, E
13	Disposal of large amount of Debris	A	DI, DE (depending on disposal area)	PE, E, WQ, F
14	Transport of large construction material	A	DE	PE, L
15	Utility shifting	A		
16	Discharge of reservoir water (lowering of reservoir water involved)	A	DE	PE, L
	List any other not listed above			

Note : Occupational Health and Safety aspects / impacts/ risks are considered important part of any dam / barrage project and this risk is separately classified. It shall be managed as per defined OH&S plans in every project irrespective of size and type of project.

Annexure: II Form SF2

Sl. No	Applicable Sub-Project Component/ Construction preparatory Work related Sub activity (as per SF-1)	Nature of Risk (Conforming to Column 5 of SF-1) and nature of sub activity	Elaborate cause (risk) and its effect (Impact) on environment /social (Pl give brief text summary)	Risk/Impact intensity for each type of risk/impact Low (L), Moderate (M), Substantial (S), High (H)
1	2	3	4	5
A	**Project Component Related**			
1.	**Structural Strengthening/Improvement/Repair work -upstream of Dam site**			
a	Treatment on u/s face for reducing leakages	**WQ, PE, L**	Air pollution, noise pollution, , risk of reservoir water contamination, generation of construction debris, labour	**M**
b	Drilling and Grouting work of Silabati Barrage	**WQ, PE, L, F**	Air pollution, noise pollution, , risk of reservoir water contamination and impact on fishes, generation of construction debris, labour	**M**
c	Upstream cement grouting of Barrage body for reducing leakages	**WQ, PE, L, G**	Air pollution, noise pollution, , risk of reservoir water contamination and impact on fishes, generation of construction debris, labour	**M**
d	Constructing instrumentation room and Improvement in the existing inspection building	**PE, L, G**	Air pollution, noise pollution, construction debris, Labour	**L**
2.	**Structural Improvement/Repair work -Downstream of Dam site (with no interfacing with dam reservoir) (like repair of parapet walls, damage spillway crest, downstream training walls, etc.)**			

Sl. No	Applicable Sub-Project Component/ Construction preparatory Work related Sub activity (as per SF-1)	Nature of Risk (Conforming to Column 5 of SF-1) and nature of sub activity	Elaborate cause (risk) and its effect (Impact) on environment /social (Pl give brief text summary)	Risk/Impact intensity for each type of risk/impact Low (L), Moderate (M), Substantial (S), High (H)
a	Downstream cement grouting of Dam body for reducing leakages	**WQ, PE, L**	Air pollution, noise pollution, , risk of river water contamination and impact on fishes, generation of construction debris, labour	**M**
b	Strengthening of the dam buttress	**WQ, PE, L**	Air pollution, noise pollution, risk of spillage of wastewater to river, construction debris, muck, Labour	**L**
c	Improvement of bridges & culverts at Silabati Barrage	**WQ, PE, L**	Air pollution, noise pollution, water pollution, Labour	**M**
3.	**Hydro-mechanical activities Downstream of Dam site (with no interfacing with dam reservoir)**			
a	Repairs/ replacement of gates & hoists	**PE, L**	Water pollution, impact on fish, Noise pollution, waste generation from removed parts, Labour & GBV risk	**M**
b	Electrical works	**PE, L**	Waste generation from removed parts and packing material, Labour	**L**
4.	**Instrumentation, General lighting and SCADA systems**			
a	Dam Instrumentation (Geo-technical, hydro-meteorological, Seismic, Geodetic, data collection, storage, data transfer, analysis, retrieval, Operation &Maintenance etc.).	**PE, L**	Waste generation from removed parts and packing material, labour	**L**
B.	**Pre-construction and construction stage major auxiliary or preparatory**			

Sl. No	Applicable Sub-Project Component/ Construction preparatory Work related Sub activity (as per SF-1)	Nature of Risk (Conforming to Column 5 of SF-1) and nature of sub activity	Elaborate cause (risk) and its effect (Impact) on environment /social (Pl give brief text summary)	Risk/Impact intensity for each type of risk/impact Low (L), Moderate (M), Substantial (S), High (H)
	intervention			
1	Setting up Labour Camps (location within dam premises or outside)	**WQ, PE**	Wastewater generation from domestic activities, waste generation and involving community.	**M**
3	Deployment of concrete mixture and heavy pumps	**PE, WQ,G**	Concrete mixture and pumps will be deployed for road repair and other civil works and de-watering - waste generation, wastewater and air emissions from operations, hazardous waste generation from oil waste, Labour	**L**
4	Disposal of large amount of Debris	**PE, E, WQ, F**	Debris will be generated from various repair activities - air and noise emissions from debris handling and transportation, water pollution risk due to debris finding its way to water body, and GBV risk due to labour involvement	**M**
5	Transport of large construction material	**PE, L**	Material will be transported from various vendors and suppliers to site for civil, hydro-mechanical work and instrumentation -	**L**

Sl. No	Applicable Sub-Project Component/ Construction preparatory Work related Sub activity (as per SF-1)	Nature of Risk (Conforming to Column 5 of SF-1) and nature of sub activity	Elaborate cause (risk) and its effect (Impact) on environment /social (Pl give brief text summary)	Risk/Impact intensity for each type of risk/impact Low (L), Moderate (M), Substantial (S), High (H)
			,air and noise emissions from transportation, Labour	
2	Heavy machinery deployment and setting up maintenance workshop	**PE, L, G**	Heavy machinery will be deployed for repair and maintenance of gates and hoists and for other activities - waste, wastewater and air emissions from machines operations, hazardous waste generation from oil waste, Labour & GBV risk	**L**
3	Deployment of concrete mixture and heavy pumps	**PE, L, G**	Concrete mixture and pumps will be deployed for road repair and other civil works and de-watering - waste generation, wastewater and air emissions from operations, hazardous waste generation from oil waste, Labour & GBV risk	**L**
4	Disposal of large amount of Debris	**PE, L, G**	Debris will be generated from various repair activities - air and noise emissions from debris handling and transportation, water pollution risk due to debris	**M**

Sl. No	Applicable Sub-Project Component/ Construction preparatory Work related Sub activity (as per SF-1)	Nature of Risk (Conforming to Column 5 of SF-1) and nature of sub activity	Elaborate cause (risk) and its effect (Impact) on environment /social (Pl give brief text summary)	Risk/Impact intensity for each type of risk/impact Low (L), Moderate (M), Substantial (S), High (H)
			finding its way to water body, and GBV risk due to labour involvement	
5	Transport of large construction material	**PE, L, G**	Material will be transported from various vendors and suppliers to site for civil, hydro-mechanical work and instrumentation - ,air and noise emissions from transportation, Labour and GBV risk	**L**

Criteria for Risk Evaluation:
Low: Localized, temporary and Negligible
Moderate: temporary, or short term and reversible under control
Substantial: medium term, covering larger impact zone, partially reversible
High: significant, non- reversible, long term and can only be contained/compensated
Occupational Health and safety: OHS is a substantial risk activity in almost all cases and is being treated separately through OHS plan in accordance with WB ESHS guidelines and shall be applicable to all sub-projects. Hence is not being considered under screening criteria.

Annexure III: Stakeholders Consultation Questionnaire

A. Interaction with Barrage Engineers/Staff

Sl No.	Questions	Response provided / Observations
1.	Who is responsible for taking care for E&S related activities at barrage site and at SPMU level?	Observations are covered in E2a
2.	Have any land related litigation like unauthorized encroachers or squatters living within barrage premise? If yes, are these not a threat for the barrage security and barrage premise? Any official action taken in the past? Does the state government have legalized these squatters and these have full right in the property or barrage authorities.	
3.	For dealing of Environment and Social issue,have any institutional arrangement like in house team of expert / hired agency or individual experts?	
4.	(a) Please confirm whether all proposed structural rehabilitation activities for this barrage are limited to barrage compound only or any activities are proposed beyond barrage complex like catchment area treatment plan, stabilization of reservoir rim area, slope stabilization de-silting etc.? Please specify if any possibility of local community interference exists during the implementation of rehabilitation measures; including stakeholder's consultation meeting planned for dissemination of emergency action plans which is a non-structural measure. (b) Is there any unsettled issues (legacy) related to displacement or resettlement, pending since time of barrage construction? If yes, please give brief detail.	
5.	Is there any tree felling issue within the downstream vicinity, if yes, provides number of trees, species and girth of the tree.	
6.	Is there any archaeological structure within 1km radius?	
7.	Distance from barrage to the nearest Habitat	

Sl No.	Questions	Response provided / Observations
8.	Is there any Eco sensitive zone like National Park, Sanctuary, Bio reserve, Elephant Corridor, etc within 10 km radius	
9.	In emergency situation how to contact barrage officials by community? Is there any existing mechanism known to communities to contact barrage officials (through telephone/ mobile/e-mail/official website?)	
10.	What is the existing mechanism to communicate with downstream communities/public on unregulated releases of water during high flood time siren/written communication to district authority / telephone / mobile / text messages or any other mode of communication?	
11.	How do you ensure that downstream Community is fully aware of the above existing mechanism?	
12.	Are there women employees at the barrage site?	
13.	What is the present Grievance Redress Mechanism (GRM) within the department to address any kind of grievance / complaints by general public? And how to be maintained.	
14.	Details of any grievance received lately related to this new Scheme?	
15.	Is barrage premises a restricted area or has open access to general public?	
16.	What is the community profile of surrounding of barrage area. If any tribal's living in the surrounding area of barrage complex? Which tribes are these? Please give brief detail.	
17.	Have any tourism or water recreation activity associate with this barrage. if yes, how many approximate tourist visits annually, annual revenue generated, whether any portion of this generated, revenue is diverted to regular O&M of this barrage.	

Sl No.	Questions	Response provided / Observations
18.	Do you engage any local labourers for routine barrage maintenance work? If yes, what is the process of engaging these locals for work at barrage whether through Government approved contractor or hired individually?	
19.	Have you conducted any social, environmental awareness program in every year	

B. Interaction with Local Community

Sl.no	Questions	Response provided / Observations
1.	How many villages are in immediate downstream vicinity?	Observations covered in E2b
2.	Are they dependent on barrage in any way for their livelihood?	
3.	Anybody affected by the dam operation? If so, in what manner? Does any one have farmlands at downstream?	
4.	Are you aware of fishing Seasons; Are the barrage authority earning revenue; any access to general public for fishing, any suggestion etc.	
5.	Is there any fishing community living immediately downstream of barrage whose livelihood are directly linked with the fishing activities of this barrage? How many villagers' livelihood is fishing?	
6.	Does any village displaced and rehabilitated during the construction of Silabati barrage. If so, in what manner. Were their lands taken, If so, how long back. Is there any pending compensation issues?	
7.	Any R&R affected person known to you who is currently working with barrage authorities? If so, in what capacity (employee/ direct worker/ contractor	
8.	Are you aware of local women affected in anyway by barrage operation?	
9.	Have you any experience about barrage related incident happened in the past wherein some loss of life encountered? If yes, brief	

Sl.no	Questions	Response provided / Observations
	summary may be given. Have people suffered? If yes, what is the nature of damage?	
10	Do you get any bad smell from barrage sometime; If yes, then do you contact barrage authority for that.	
11	In the past, on any occasion, did you contact Barrage authorities for any specific reasons affecting public in general, such as water release etc.? If so, how did you contact, how many time and to whom you contacted. What was it about. How was the response of barrage authority? Who contacted you. How long did it take to resolve	
12	If required how do you contact the barrage authorities; through telephone/mobile/e-mail/personally?	
13	How the Barrage authority officers behave when you interact with them	
14	Have you benefited by the action of Barrage Authority, if yes please explain	
15	Are you a regular follower of official website of barrage authorities as a general public, in case you are a contractor, do you follow various tenders notices being invited for various maintenance of this barrage?	
16	Are you aware of any early flood warning system for this barrage or any other system wherein downstream communities getting regular update during flood season for any uncontrolled release of water?	
17	Give your view about Silabati barrage, how this Barrage is helping the country, state, district or local communities in meeting its objectives, any specific concern can also be given?	
18	Any Suggestion to improve overall system by barrage authorities in any way, please give in brief?	

Annexure IV: Stakeholder's consultation: List of Participants

Sl. No.	Name	Relation with Barrage / Designation
1.	Sk Sabir Ahmed	SDO, Assistant Engineer, Silabati Barrage
2.	Soumitra Majhi	Junior Engineer, Silabati Barrage
3.	Tarun Kumar Singha	Gate Operator
4.	Prithiraj Bouri	Villager
5.	Sukanta Mondal	Villager
6.	Harichandra Murmu	Agriculture Labour
7.	Mahadev Kisku	Labour
8.	Manoj Hansda	Agriculture Labour
9.	Satyakinkar Murmu	Labour
10.	Joydev Murmu	Labour
11.	Skumar Kisku	Labour
12.	Jaydeb Bauri	Agriculture Labour
13.	Lakshmi Kanta Lohar	Labour
14.	Goutam Namata	Labour
15.	Sahadeb Bauri	Labour
16.	Ajay Gorai	Labour
17.	Joydeep Pramanik	Labour
18.	Krishnendu Singha	Contracter
19.	Tapan Kumar Singha	Farmer
20.	Ananta Bauri	Farmer

Annexure V: Photographs of infrastructure proposed for rehabilitation works

Leakage through gates of Indpur Canal Head Regulator

SMC tail regulator bridge parapet wall in damaged condition

Silted up Reservoir u/s of Silabati Barrage

Weathering of the surface of glacis