Environmental and Social Management Framework
(ESMF)

including

Labor Management Procedures (LMP)
Resettlement Planning Framework (RPF)

And

Standard Formats for
Environmental and Social management Plan (ESMP)

August 2025

BIHAR WATER SECURITY AND IRRIGATION MODERNIZATION PROJECT
BWSIMP
(P505190)

Contents

Abbreviations

ASI	Archaeological Survey of India
BAPEPS	Bihar Aapda Punarwas Evam Punarnirman Society
BMP	Biodiversity Management Plan
BWSIMP	Bihar Water Security and Irrigation Modernization Project
C&D	Construction and demolition
CERC	Contingent Emergency Response Component
CPCB	Central Pollution Control Board
CRA	Climate Resilient Agriculture
CTE	Consent to Establish
CTO	Condition to Operate
DoA	Department of Agriculture
DPR	Detailed Project Report
DPT	District Project Team
DSR	Direct Seeded Rice
E&S	Environmental and Social
EHSG	Environmental Health and Safety Guidelines
EIA	Environmental Impact Assessment
ESA	Environmental and Social Risk Assessment
ESCP	Environment and Social Commitment Plan
ESF	Environmental Social Framework
ESIA	Environmental and Social Impact Assessment
ESMF	Environment and Social Management Framework
ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Standards
FF	Flood Forecasting
FMISC	Flood Management Improvement Support Centre
FPC	Farmer Producer Company
FPO	Farmer Producer Organization
GBV	Gender-Based Violence
GDP	Gross Domestic Product
GDP	Gross Domestic Product
GHG	Green House Gas
GIS	Geographic Information System
GoB	Government of Bihar
GoI	Government of India
GRC	Grievance Redress Cell
GRM	Grievance Redress Mechanism
GRS	Grievance Redress Service
ha	Hectare
HIRA	Hazzard Identification and Risk Assessment
INM	Integrated Nutrient Management
INMP	Integrated Nutrient Pest Management

IPM	Integrated Pest Management
IPNM	Integrated Pest and Nutrient Management
JEEViKA	Bihar Rural Livelihood Promotion Society
KPI	Key Performance Indicator
LMP	Labour Management Procedures
M&E	Monitoring and Evaluation
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
MoEF&CC	Ministry of Environment, Forests and Climate Change
MWRD	Minor Water Resource Department
NGO	non-governmental organizations
O&M	Operation and Maintenance
OBC	Other Backward Classes
OFD	On-Farm Development
OHS	Occupational Health and Safety
PA	Protected areas
PAP	Project Affected People
PBC	Performance Based Condition
PD	Project Director
PDO	Project Development Objective
PHED	Public Health and Engineering Department
PIM	Participatory Irrigation Management
PIR	Project Implementation Report
PIU	Project Implementing Unit
PM10	Particulate Matter10
PM2.5	Particulate Matter2.5
PMC	Project Management Consultancy
PMTC	Project Management Technical Consultant
PMU	Project Management Unit
POM	Project Operations Manual
PPE	Personal Protective Equipment
R&R	Resettlement and Rehabilitation
RAP	Resettlement Action Plan
RDD	Rural Development Department
RFCTLARR	Right to Fair Compensation and Transparency in Land Acquisition
RPF	Resettlement Policy Framework
RPF	Resettlement Planning Framework
SC	Scheduled Caste
SEA	Sexual Exploitation and Abuse
SEP	Stakeholder Engagement Plan
SH	Sexual Harassment
SHG	Self Help Group
SHG	Self Help Groups

SLSC	State Level Steering Committee
SOP	Standard Operational Procedure
ST	Scheduled Tribes
SWP	State Water Policy
WALMI	Water and Land Management Institute
WB/WBG	World Bank / World Bank Group
WRD	Water Resources Department
WUA	Water User Association

Executive Summary

1. Bihar Water Security and Irrigation Modernization Project (BWSIMP, P505190) aims to support transformation by combining multisectoral investments in irrigation and flood risk reduction with significant shifts in water governance. The Project Development Objective (PDO) is to improve irrigation services and enhance flood resilience in Bihar. The institutional improvements needed to achieve the PDO will be supported through the Performance Based Conditions (PBCs). The Project would benefit the state's entire population through its institutional and non-structural interventions, while approximately 4.34 million people, in 72 blocks in 12 districts[1] are expected to directly benefit from targeted structural interventions. The Project is an Investment Project Financing (IPF) operation with five components. US$28 million of the loan amount will be disbursed through four PBCs, which are further divided into 10 sub-PBCs.

2. The purpose of this ESMF is to assess and understand the type and scale of environmental and social impacts and risks associated with various project components and activities and to provide guidance on how these identified as well as undetermined E&S risks and impacts are to be managed and mitigated under the project and its sub-projects, either through changes in project design or through additional mitigation measures and instruments during various stages of project preparation and operation.

3. The methodology for the preparation of this ESMF involved review of project documents and other relevant literature related to the water resource sector in Bihar, site visits, meetings and consultations with various stakeholders, nuanced risk mapping against proposed activities as well as findings from draft Environmental and Social Impact Assessments in the Detailed Project Reports.

4. The ESMF begins by mapping applicable National and State regulations policies together with the World Bank's Environmental and Social Framework (ESF) to guide the effective management of environmental and social risks emerging from the project activities. The implementation of the subprojects is also be governed by the Government of India and the Government of Bihar's (GoB) applicable guidelines and, regulations. Environmental legislation related to protection, biodiversity, pollution, resource management, waste management, safety etc. are covered. The social legislation covers inclusion, labor welfare, gender, land management, resettlement, citizen engagement, citizen rights, governance etc.

5. The ESMF provides an extensive overview of Bihar's environmental baseline, covering aspects such as physiography, hydrogeology, climate, soil, and water resources. Bihar, located in eastern India, has a diverse geology ranging from Archaean metamorphic to recent alluvial sediments, with significant groundwater resources. The state experiences a humid subtropical climate with most of its annual rainfall occurring during the southwest monsoon season. Bihar's soil types are varied, supporting a range of crops, and agriculture is a major economic activity, with about 76% of the population engaged in agricultural activities facing challenges like flood, erosion, droughts, and groundwater quality.

[1] Beneficiaries from irrigation interventions: Saharsa, Supaul, Madhepura, Darbhanga, Buxar, Gopalganj, Kaimur, Madhubani, and Rohtas; Beneficiaries from flood management interventions: Darbhanga, Gopalganj, Katihar, Madhubani, Samastipur, West Champaran and Supaul.

6. Bihar's total population is 130.7 million[2] (Source: Bihar Caste Survey, 2023) with a sex ratio of 918 females per 1000 males. The average household size in Bihar is approximately six members, with 7.4% of households being female headed. As per Census 2011, the religious composition of Bihar shows that 83% of the population are Hindus, while 17% are Muslims. The Scheduled Caste population in Bihar is 15.9%, while the Scheduled Tribe population is significantly lower at 1.3%. Bihar has a notable percentage of people with disabilities, constituting **8.69%** of the national total. The labor force in Bihar comprises **34,724,987** workers, with a significant majority (90%) engaged in rural areas according to census, 2011. Bihar's economy is primarily agrarian, accounting for **24%** of the GDP while **15%** is from industry, and **61%** is from services as of 2021. **26.59%** of the population lives below the poverty line, with significant rural poverty at **36.95%** (Niti Ayog's 2023). The state has a high rate of violence against women and girls (VAWG) compared to other states. According to the National Family Health Survey (NFHS-5), 61% of ever-married women and 23% of never-married women in Bihar have experienced physical and sexual violence.

7. The key Implementing Agency is the Irrigation and Flood Division within WRD. A PMU is being set up in WRD where the Project Director is based and an Environmental as well as a Social Specialist has been hired. The Project Management Technical Consultant (PMTC), currently at an advanced stage of procurement, will support the PMU on specific technical, institutional, and monitoring tasks. Based on the Terms of Reference developed, an Environemtal and a Social Specialist is to be hired at the PMTC. The project activities will be implemented through Project Implementation Units (PIU) established in (i) Department of Agriculture, (ii) Rural Development Department, and (iii) WRD (field level units). About 20 divisions (out of 158 working divisions) of WRD are expected to be involved in project implementation. E&S focal points will be designated at all PIUs. The district/circle offices in the project districts will form District Project Teams (DPTs) with field level PIUs. The DPTs will report to and provide all necessary field-level information to the nodal officers of respective PIU. E&S Focal points will be designated at the PIUs to work with PMU E&S Specialists. During project preparation, the WB team has been supporting the Division teams and with the PMU through the project preparation. The Capacity Development strategy and plan includes E&S components for PMU and PIU teams, PMTC staff, Contractor and its staff, Water User Associations as well as other stakeholders.

8. The project **Environmental risk is classified as Substantial** because of the nature of construction, expected amounts of waste, impacts on "critical habitats" and significant OHS and CHS issues. Though the present project components are to be restricted to existing structures (on government land, owned by WRD), the **Social risk rating is Substantial** as field surveys show encroachments for habitation, livelihood, farming, and grazing along some parts of the embankments and canals identified for renovation by encroachers or non-title holders. The tools for E&S risk management have been developed and detailed in ESMF.

[2] Census of India, Population Projections for India and States 2011-2036, July 2020, Report of the Technical Group on Population Projections, National Commission on Population, Ministry of Health & Family Welfare, page 85, table 11.

Process in the Project Cycle	Tools for E&S management and monitoring
1. FEASIBILITY • Irrigation Potential (IPC & IPU) • Life of Canal System • Flood Proneness Area • Drought Prone Area	E&S Screening Checklist - will be filled and submitted BWSIMP *ESMF, RFP, SEP, LMP* will be prepared for overall project guidance.
2. PREPARATION OF SCHEME BY FIELD ENGINEERS • Identification of Vulnerable reaches for prioritization • Damages to canal structure • Selection of schemes	An Environmental and Social Impact Assessment (ESIA) of these activities proportional to risk of the activity defined will be caried out during that time. Prepare ESIAs (including ESMP) under the project. ESIA (including ESMP) to be included in the DPR. Specialized Mitigation Measures to be prepared: RAP, OHS plan, GBV plan, Dolphin program.
3. REVIEW and APPROVAL • Technical Review and approval of Scheme by SE, CE and recommendation of the scheme to PMU • Approval of Scheme by Project Co-Ordinator	
4. DETAILED DESIGN • Surveys and Preparation of DPRs • Review of DPR • Approval of DPR	
5. **TENDERING** • Preparation of Bid documents by PMTC • Tender Evaluation and Award	Contractor ESMP (C-ESMP) to be included in Bid Documents which covers E&S responsibilities of Contractor including monitoring and reporting and Contractual Remedies
6. IMPLEMENTATION	Reporting against Contractor-ESMP Reporting against RAP Reporting against agreed specific mitigation measures Reporting against Contractor-ESMP
7. REPORTING AND MONITORING	

9. A draft stakeholder engagement plan (SEP) includes a comprehensive map of stakeholders, strategy for engagement with each and monitoring mechanisms. The document aims at a (i) robust communications strategy for information dissemination and managing perceptions; (ii) systemized two-way communication with all beneficiaries during design and implementation; and (iii) efficient and responsive grievance redress mechanism (accessible to all stakeholders including labor and issues of SEA/SH). Individual households and communities will be timely informed of impacts during construction and operations. Since the project works on ensuring last mile irrigation, creation of an efficient GRM that responds to the grievances of the tail-end farmers in a timebound manner will not only be important from an inclusion perspective but will also be an indicator of the efficacy of the entire irrigation system. Public campaigns to create awareness about this GRM will be an important stakeholder engagement strategy adopted by the project. Simple, timely and advance advisories/ alerts about the schedule for release of water from canals as well as for flood alerts will help the farmers in better planning. The Stakeholder Engagement Plan (SEP) recommends measures in improving water governance through stronger stakeholder partnership. For participatory irrigation management, WUAs will be strengthened to work in coordination with Department personnel, citizen leaders, elected representatives, service providers, water users including farmers and representation of vulnerable and women. The SEP also provides a blueprint for a robust GRM. The results framework will track beneficiary satisfaction & performance of GRM including access to the vulnerable.

10. The project will have civil works contracts and employ both direct, contracted workers and community workers (Self-help groups) for non-engineering minor works of completing last mile of the field channels. The contractor will employ local labour and depending upon the scale and skill requirement, may source migrant labour. All workers under the project will be governed by Codes and laws regulating labour in India to cover workers work/service conditions, remuneration, Occupational Health and Safety and Worker's Code of Conduct and workers grievance redressal. The project Labor Management Procedure (part of this ESMF) includes OHS issues, Code of Conduct to be signed by all labourers, and workers' accommodation processes and standards to be maintained and monitored for any labor camps. The project will also have a grievance mechanism for labour issues including issues of SEA/SH accessible to all.

11. The project involves moderate adverse risks to occupational health and safety. The Occupational Safety, Health and Working Conditions Code, 2020, along with the Draft Occupational Safety, Health and Working Conditions (Bihar) Rules, 2021, provides guidelines for ensuring worker safety during these activities. Employers are required to arrange for medical examinations, establish safety committees, and report accidents to relevant authorities. Contractors must prepare and implement a Site-Specific Occupational Health and Safety Plan, including measures like community liaison, compliance with the Worker's Code of Conduct, and provision of Personal Protective Equipment (PPE) kits. Additionally, contractors are responsible for training workers in safety procedures, maintaining first aid kits, and minimizing potential hazards.

12. There are likely resettlement impacts as there are encroachments for habitation, livelihood, farming, and grazing along some sections of the embankments and canals, for which resettlement support will need to be provided. A Resettlement Policy Framework (RPF), part of this ESMF will guide avoidance, mitigation, and management of physical and economic impacts on communities along the irrigation/flood protection structures including non-title holders. Draft RPF specifies entitlement options and provides procedures for preparation and implementation of Resettlement Actions Plans (RAPs) for each sub-project. The RAPs will provide details of the entitlements and resettlement support to be offered to the informal occupants to facilitate their rehabilitation.

13. The project does not have any footprint inside protected areas such as national parks, wildlife sanctuaries, or tiger corridors. The sub-projects are primarily within modified habitats. However, the river systems in North Bihar, including the Kosi and Bagmati rivers, are habitats for various species such as crocodiles, magars, fishes, and Gangetic turtles. Studies conducted by MoEF&CC and National Mission for Clean Ganga indicate that the Kosi and Bagmati rivers are important habitats for the endangered Gangetic River Dolphin. Additionally, certain sections of the River Kosi, Gandak, and Ghaghra are identified as "Critical Areas" for dolphins, acting as vital links between Nepal's river systems and the Ganga, essential for maintaining a viable dolphin population.

14. The Dolphin Program under this project is aimed at conserving dolphin habitats in the River Kosi and Bagmati in North Bihar, which are crucial for maintaining the dolphin population link between India and Nepal. The project includes measures to mitigate construction impacts and protect aquatic life.

15. The ESMF provides an indicative list of E&S capacity development activities required at every stage of the project for key stakeholder. It also gives a reporting and monitoring mechanisms throughout the tenure of the project. The Environmental and Social Commitment Plan (ESCP) defines the category, timelines and responsibility of reporting.

1 Introduction

1.1 Project Overview

The proposed Bihar Water Security and Irrigation Modernization Project (BWSIMP, the Project) aims to support transformation by combining multisectoral investments in irrigation and flood risk reduction with significant shifts in water governance. While investments in irrigation and flood protection will be site-specific, the Project will focus on improving water governance through enhanced institutional capacity and stakeholder partnerships, ensuring that lessons learned can be applied and scaled across the state.

The three investment areas are complementary and mutually reinforcing: a.) **Irrigation as a mitigative measure against climate-exacerbated floods and droughts.** Well-functioning irrigation schemes are essential for the equitable distribution and management of water resources from head to field and for improving crop productivity. Additionally, enhancing On-Farm Development (OFD) activities[3] and supporting the implementation of DoA's Climate Resilient Agriculture (CRA) program will contribute to improved agricultural productivity, farming system resilience, improved food security, and sustainability. b.) **Flood risk reduction to enhance resilience.** Investing in flood protection offers numerous benefits, including safeguarding communities, infrastructure, and livelihoods from the devastating impacts of floods. Specifically, for agriculture, implementing robust grey and green flood protection measures, apart from strengthening existing flood control structures (embankments), in and around irrigation command areas can significantly lower flood-related losses for farmers. c.) **Water governance and institutional strengthening as a foundational element for sustainability.** Structural investments in irrigation and flood protection will not be sustainable without stronger institutions that can effectively and efficiently plan, maintain, and operate them. This requires an enabling environment with adequate legislative, policy, and regulative frameworks; enhanced technical capacity within the WRD and WUAs; and a collaborative culture that welcomes partnerships, fosters mutual learning, and induces behavioral change. Orienting WRD on the criticality of forging a functional and realistic partnership with WUAs is essential. A shift towards farmer-centric irrigation service delivery is becoming essential.

The Project Development Objective (PDO) is to improve irrigation services and enhance flood resilience in Bihar. The institutional improvements needed to achieve the PDO will be supported through the Performance Based Conditions (PBCs).

The Project would benefit the state's entire population through its institutional and non-structural interventions, while approximately 4.34 million people, in 72 blocks in 12 districts,[4] are expected to directly benefit from targeted structural interventions. **The Project is an Investment Project Financing (IPF) operation with five components.** US$28 million of the loan amount will be disbursed through four PBCs,[5] which are further divided into 10 sub-PBCs.

[3] Includes construction of new earthen channels (for distribution of water) and roads/crossings (for the passage of farmers and cattle across the fields).

[4] Beneficiaries from irrigation interventions: Saharsa, Supaul, Madhepura, Darbhanga, Madhubani, Gopalganj, Buxar, Kaimur and Rohtas; Beneficiaries from flood management interventions: Darbhanga, Gopalganj, Katihar, Madhubani, Samastipur, West Champaran and Supaul.

[5] Disbursements will be triggered by the documented execution of eligible expenditures and verification of achievement of PBCs, thereby incentivizing achieving results.

1.2 Component wise Project Activities

Component 1 - Climate Resilient Irrigation (CRI) (approximately 56 percent of project amount)

- Improvement of Headworks (Mechanical and technical repairs and renovation of Kosi, Gandak, and Sone Barrages).
- Sediment Management (Hydraulic flushing sediment basins, at the head of two canal systems viz., WKMC and SMC; and establishment of in-house dredging facility)
- Lining and desilting of select canal/river reaches (North Bihar: Western Kosi Main Canal and its Jhanjharpur Branch Canal; and Saran Main Canal; South Bihar: Sone Western Canal)
- Modernization of hydraulic structures, including service outlets (Modernization of existing hydraulic structures; and Discharge-Level measuring type of Real Time Data Acquisition System (RTDAS) in the restored canals)
- On-Farm Development (in restored commands)
- Strengthening of Water and Land Management Institute (WALMI), Central Design, Research & Quality Control (CDR&QC) & Master Planning Investigation & Project Preparation (MPI&PP).
- Establishment of a SCADA System in Reservoirs and other storage (Weir/Barrage/diversion structures and Canal distribution networks including development of Asset Management System.
- Allied activities

Component 2 - Flood Risk Reduction (FRR) (approximately 34 percent of project amount)

- Raising, Strengthening and Pakkikaran of Bagmati Left Embankment from km 0.00 to 73.44 km (Sirniya to Fuhiya)
- Anti erosion work from village Patthartola to Kamlakani in Kursela Block, District Katihar, Bihar
- Strengthening and Pukkikaran of extended Sikarhatta Manjhari bundh with restoration of 11 no. spurs of extended Sikarhatta Manjhari Bundh (14.00km.-20.00 km.)
- Restoration of 25 nos. Spurs of Eastern Kosi Embankment (0.00 km. -65.00 km.) of River Koshi
- Allied activities

Component 3 -Water Governance (approximately 6 percent of project amount)

- Revision of Standard Operational Procedure (SOP) and Irrigation Service Delivery rules and Establishment of a PIM Cell and PIM Units in four Project Zones.
- Establishment of Hydrologic Agricultural Information Support Centre (HAISC)
- Strengthening of Flood Management Improvement Support Centre (FMISC) and the Mathematical
- Modelling Centre (MMC).
- Strengthening and extension of RTDAS to have a data repository for the development of models.
- Compilation of a new Bihar State Water Policy (BSWP) and a charter for Bihar State Water Regulatory Authority (BSWRA)

Component 4: Project Management (approximately **4 percent** of project amount): Monitoring & Evaluation, PMU, PMTC, Operations of Project Implementation Units

Component 5*: Contingent Emergency Response Component (CERC)*

1.3 Overview of the ESMF for the project

The purpose of this ESMF is to assess and understand the type and scale of environmental and social impacts and risks associated with various project components and activities and to provide guidance on how these identified as well as undetermined E&S risks and impacts are to be managed and mitigated under the project and its sub-projects, either through changes in project design or through additional mitigation measures and instruments during various stages of project preparation and operation. The framework provides guidance on how project activities are to be screened to identify potential E&S risks, including their nature, location, scope and magnitude, the likely measures that need to be in place for mitigating them based on proportionality of their impact, the extent to which the national framework and country systems support risk management and how gaps between the ESF requirement and borrower framework are to be bridged, the institutional mechanism and responsibilities for implementing and monitoring those measures, including the steps for capacity building of project stakeholders to implement those measures.

The methodology for the preparation of this ESMF involved a) review of project documents and other relevant literature related to the water resource sector in Bihar, b) several rounds of site visits, meetings and consultations with various stakeholders, c) assessment of secondary data related to the socio-economic profile of the state and the proposed project areas and collection of primary data required for establishing the project E&S baseline, d) mapping of the national and state legal policy framework relevant to the project to assess gaps and additional requirements, e) undertaking a risk screening of the key project components and proposed activities and determining the risk management tools required to address them.

The ESMF provides a structure for management and mitigation of impacts and for optimizing the project's environmental and social benefits. It outlines the procedures to be followed for ensuring regulatory compliance, engaging with stakeholders, disclosing information to ensure transparency, setting up an accountable grievance redressal mechanism (GRM). It provides an institutional mechanism within the project to ensure effective E&S risk management, detailing related roles and responsibilities for monitoring and implementation and proposing a budget for their implementation and for the capacity building of project proponents and beneficiaries around relevant E&S issues.

2 Legal and Institutional Framework

This chapter deals with the laws, regulations and policies, of Government of India, Government of Bihar and the World Bank, related to environmental and social issues. Only the laws, regulations and policies relevant to the project are discussed here. This section needs to be updated as when new laws, regulations and policies are made and enforced or the existing ones are revised.

2.1 Applicable National and State Regulations and Policies

Applicable National and State regulations policies together with the World Bank's Environmental and Social Framework (ESF) will guide the effective management of environmental and social risks emerging from the project activities. These will include environmental considerations like the location, environmental pollution control requirements, institutional mechanisms for ensuring environmental regulation, occupational health and safety requirements, resource utilization, considerations related to cultural heritage, and the social consideration related to land acquisition and resettlement, labor and working conditions, livelihoods impacts and their restoration, community consultations and engagement as well as measures for ensuring transparency including information disclosure. A compilation of the key environmental and social regulations and guidelines that are relevant to the project and the proposed project activities are presented below.

The implementation of the subprojects will also be governed by the Government of India and the Government of Bihar's (GoB) applicable guidelines and, regulations. These regulations are aimed to regulate those activities that are likely to cause adverse environmental and social impacts such that those impacts can be minimized or at best avoided. It is the responsibility of the project implementing agencies to ensure that subprojects are compliant with the legal framework, whether applicable international, national, state, municipal/ local. Compliance is required in all stages of the subprojects, including design, construction, operation, and maintenance.

Table 1: Relevant National and State Level Legislations (E&S)

S. No.	National/ State Legislation	Description on provisions related to the Project	Relevance to the Project	Applicability through the phase of the project
ENVIRONMENTAL LEGISLATIONS				
1	National Environment Policy 2005	National Environment Policy deals with the issues related to the control and regulation of environmental degradation and underline the needs for water conservation for different use and appropriate management, including integrated water management considering ecological use as a means.	The Project should adhere to NEP principle of "enhancing and conservation of environmental resources and abatement of pollution". ESIA and ESMP to examine the provisions of this policy, examine the clauses that are attracted and suggest remedial measures.	All phases of the project. The Contractor needs to comply to the environmental laws and adhere to the standards

S. No.	National/ State Legislation	Description on provisions related to the Project	Relevance to the Project	Applicability through the phase of the project
2	Environmental (Protection) Act, 1986 Environmental Impact Assessment Notification, 2006 its amendments	This Act empowers the Central Government to take necessary action to protect the environment and in the prevention of environmental pollution. As per the EIA Notification 2006 and amendments thereafter any project which leads to an increase in culturable area of more than 10000 ha needs an environmental clearance.	The Applicability of the environmental clearance need to be ascertained on a case-to-case basis by WRD.	Pre-construction, Construction and Operations phase
		Construction of new projects or activities or the expansion or modernization of existing projects or activities listed in the Schedule to the notification under the Act will only be undertaken after the prior environmental clearance from the Central/State Government as applicable.		
3	The Biological Diversity Act, 2002 and Wildlife Protection Act, 1972, 1993	This Act aims to integrate conservation, promotion and sustainable use of biological diversity into projects. The State Government can declare areas rich in biological diversity, or when biological resources are threatened by overuse, abuse or neglect, as areas of biological importance for preservation.	Not Applicable. There is no such area in the vicinity of the project which has been declared as an ecological reserve or for preservation of the biodiversity. However, the River Kosi Bagmati are identified as critical areas for dolphins as they are help maintain a critical link between the Indian and Nepal Population.	Not Applicable for this project as there is no such area declared under this act.
4	Water Prevention and Control of Pollution) Act, 1974, Amendment there of	To prevent and control water pollution.	Applicable. Effluents are expected to be generated during construction of the project. The effluents should meet the discharge standards specified in the Rules.	Construction phase The Contractor needs to obtain CTE and CTO for the Camp and establishment of Plant and machinery and ensure that it meets the conditions specified in the permits.
5	Noise Pollution (Regulation and Control) Rules, 2000	A level of noise permitted in different areas, including those of vehicular traffic, generators, and	Applicable, the machineries and construction activities would comply with the standard specified in the rules.	Construction phase The contractor needs to ensure compliance to the rules and adhere to the norms in

S. No.	National/ State Legislation	Description on provisions related to the Project	Relevance to the Project	Applicability through the phase of the project
		construction activities is defined under these rules. During operation phase noise can be created during cruise operation.		"Silence Zone" and "residential Zones"
6	Air (Prevention and Control of Pollution) Act, 1981, its Rules and amendments	Prevention and control of air pollution. State PCBs have been set up to monitor and manage activities that would lead to air pollution in and around the project area. Under the Act air quality standards are to be maintained in residential, ecologically sensitive areas.	Applicable. During construction phase, likely use of diesel generators, movement of heavy transport may cause air pollution. Contractor is required to keep all his vehicles maintained and control all the construction activities so that ambient air quality remain within prescribed limit. Necessary permits to be taken by the contractor for DG set and Batching plant if applicable. DG set will be used as back-up power during the operation phase. This will also require adhering to the relevant standard.	Construction phase The Contractor needs to obtain the CTE/ CTO for all plant and machinery and ensure compliance to the CTE/ CTO conditions. It shall also ensure that all plants and machinery meet the emission requirements.
7	Hazardous & Other Wastes Management and Trans boundary Movement) Rules, 2016	Proper handling storage and disposal of hazardous waste.	Applicable. Project has potential to generate hazardous waste (Used Oil) during both construction phases. The same shall be handled as per the applicable rules of the Act.	Construction phase The Contractor needs to obtain Hazardous waste permits for waste oil and maintain records and returns as per the provisions of the Act.
8	Plastic Waste Management 2016	The plastic waste like polythene, plastic bags, plastic bottles etc. during project construction and operation phases.	Applicable, during operation phase, project proponent will implement the provision of this Act for disposal of Plastic waste.	Construction Phase
9	National Policy on Safety, Health, and Environment at Workplace	The policy aims to secure health of strength of employees and ensure humane conditions of work, including maternity relief to women	Applicable during construction period.	Construction phase

S. No.	National/ State Legislation	Description on provisions related to the Project	Relevance to the Project	Applicability through the phase of the project
10	Solid Waste Management Rules, 2016	The provisions of the Act prevent littering and mandate proper segregation, collection, storage and disposal of municipal solid waste.	Applicable. The project will have provisions to manage and dispose solid wastes generated during project construction and operation phases.	Construction l phase. The Contractor should manage the municipal solid waste generated at the camp as pe the provisions in the law.
11	Construction and Demolition Waste Management Rules, 2016	Rules and regulation for construction & Demolition Waste	Applicable. The project shall generate construction and demolition waste, which shall be handled as per applicable rules. The same shall be mandatorily included in the bid document for construction works.	Construction phase The Contractor shall ensure maximum use of the construction waste and ensure that residual waste is handles as per the provisions of the rules
12	The Gas Cylinder Rules 2004	To regulate the storage of gas / possession of gas cylinder more than the exempted quantity	Applicable if contractor store more than the exempted quantity of gas cylinder.	Construction phase
13	Motor Vehicle Act, 1998	Empowers State Transport Authority to enforce standards for vehicular pollution. From August 1997 the "Pollution Under Control Certificate is issued to reduce vehicular emissions.	Applicable, as the proposed development activities will engage several vehicles (transport of materials, worker movements, etc.).	Pre-construction, Construction l phase All vehicles associated directly or indirectly with the Project should have a Pollution Under Control (PUC) Certificate .
14	Public Liability and Insurance Act, 1991	Enacted for the purpose of providing immediate relief to persons affected by accidents while handling hazardous substances and other incidents.	Applicable. The project is being carried out in mainly urban areas where there are already existing vessel movements as well as several other human activities at the jetty locations (vendors, locals moving around, etc.). Protection to general public from the accidents due to hazardous material (especially if any used at the vessel yards, gangway/pontoon manufacturing units) is essential.	Construction phase The Contractor shall have necessary insurance cover to cover for such exingencies
SOCIAL LEGISLATIONS				

S. No.	National/ State Legislation	Description on provisions related to the Project	Relevance to the Project	Applicability through the phase of the project
1	Constitution of India (Article 15, 16, 46)	The Indian Constitution prohibits any discrimination based on religion, race, caste, sex, and place of birth and contains a clause allowing the union and state governments to make special provision for the advancement of socially and educationally vulnerable classes of citizens or for the Scheduled Castes and Scheduled Tribes. Article 16 refers to the equality of opportunity in matters of public employment and directs the state to protect them from social injustice and all forms of exploitation	The provisions under the Constitution guarantee access, equity and inclusiveness for all including the vulnerable groups in the distribution of Program benefits, without discrimination.	Pre-construction and Operational phase
2	The Bihar Irrigation Act, 1997	The Act consolidates the law relating to irrigation embankment, drainage, levy and assessment of water rates. It provides the State government all rights in the water of any river, natural stream or natural drainage, channel, natural lake or other natural collection of water.	The Act introduces Participatory Irrigation Management (PIM) in the management of command areas, through creation of Water User Associations (WUAs) and making them responsible for O&M as well as tariff collection.	Operational phase
3	Bihar Irrigation and Drainage Rules, 2003	The rules include some of the relevant laws and regulations that govern Water Users Associations (WUA)s in Bihar. It implements the provisions of the Bihar Irrigation Act, 1997 and outlines a state action	It gives direction in strengthening of Water Users Association (WUA) wrt Standard operation procedure of WUA , Irrigation work forms, in ESIA and ESMP.	Operational Phase

S. No.	National/ State Legislation	Description on provisions related to the Project	Relevance to the Project	Applicability through the phase of the project
		plan in the event of floods		
4	The Right to Information Act, 2005	Empowers citizens to demand information on functioning of public systems if it impacts their lives or is of public interest. Designates a Public Information Officer in all public offices to provide info; creates State /Central Information Commissions (statutory) to look into appeals regarding unsatisfactory information provided to citizens or unclear interest in demanding information.	Ensures transparency and accountability in the govt operations and citizen's access to public information.	Pre-construction and Operational phase
5	Bihar Right to Public Services Act, 2011	To provide for the delivery of notified public services to the people of the State within the stipulated time limit	Timely, transparent, and easy-to-access public services.	Pre-construction and Operational phase
6	Panchayati Raj Act, 73rd constitutional amendment act, 1992	The act strengthens the decentralized governance system and promotes bottom-up planning. The most critical part are that it strengthens the structure of representative democracy and political representation at the local level.	The Act empowers the local self-government to prepare GP level plans at Gram sabha, to execute and monitor the same. In ESIA and ESMP it gives direction for managing and monitoring irrigation work, flood protection work.	Pre-construction and Operational phase
7	Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act (RFCT in LARR), 2013	To ensure, in consultation with institutions of local self-government and Gram Sabhas established under the constitution of India, a humane,	Make adequate provisions for such affected persons for their rehabilitation and resettlement; (iv) ensure that the affected persons become partners in development leading to an improvement in	Construction phase

S. No.	National/ State Legislation	Description on provisions related to the Project	Relevance to the Project	Applicability through the phase of the project
	and Bihar Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Rules, 2014	participative, informed and transparent process for land acquisition for industrialization, development of essential infrastructural facilities and urbanization with the least disturbance to the owners of the land and other affected families; provide just and fair compensation to the affected families whose land has been acquired or proposed to be acquired or are affected by such acquisition.	their post-acquisition social and economic status and for matters connected therewith.	
8	The Equal Remuneration Act, 1976; Employee Compensation Act, 1923; and Personal Injuries (Compensation Insurance) Act, 1963; The Minimum Wages Act, 1948, Payment of Wages Act, Maternity Benefit Act, 1961	Provide equal remuneration to men & women workers, prevent discrimination against women in matters of employment, employers to compensate workman's spouse / dependent sons, daughter in case of injury at workplace and mandatory worker insurance by employers against such liability.	Prevents gender discrimination in employment and provides for employee welfare, including social assistance against any incident/ accident.	Construction phase
9	The Child Labour (Prohibition and Regulation) Act 1986, and Rules 1988; Children (Pledging of Labour) Act, 1933 (as amended in 2002); Contract Labour Act 1970; The Bonded Labour System (Abolition) Act, 1976	These Acts mandate the employers of any establishment employing construction workers to provide basic amenities and welfare facilities. The laws also prohibit employment of child and bonded labour.	Ensures safety, welfare, and other conditions of service to construction workers employed	Construction phase
10	Building and Other Construction Workers (Regulation of	To regulate the employment and conditions of	Safe and healthy working environment. Responsiveness	Construction phase

S. No.	National/ State Legislation	Description on provisions related to the Project	Relevance to the Project	Applicability through the phase of the project
	Employment and Conditions of Service) Act, 1996 and	service of building and other construction workers.	in case of mishaps and accidents.	
11	Inter-State Migrant Workmen's (Regulation of Employment and Conditions of Service) Act, 1979	To regulate the employment of inter-State migrant workmen and to provide for their conditions of service	Protects migrant and seasonal agricultural workers by establishing employment standards related to wages, housing, transportation, disclosures and recordkeeping	Construction phase
12	The Sexual Harassment of Women at Workplace (Prevention, Prohibition, and Redressal) Act 2013	Protects women workers from sexual harassment and abuse of power at their workplace and provides for constituting an Internal Complaints Committee in every organization employing 10 or more workers, including women, to look into complaints of sexual harassment. Provides guidance on redressal against such complaints, including its internal investigation in a time bound manner.	Recognizes the need for legal protection of women workers against abuse, exploitation in all government institutions.	Pre-construction, Construction and Operational phases
13	National Policy for Women, 2016	The policy articulates various mandates for the holistic empowerment of women in the country. It includes various areas such as health, education, livelihoods, access to social protection, and protection from violence and discrimination at the core of its provisions. The policy's mandate seeks to guide governance and policy making practices across	Guides inclusion and accessibility provisions and overall women's empowerment and SEA relevant to the program.	Pre-construction, Construction and Operational phases

S. No.	National/ State Legislation	Description on provisions related to the Project	Relevance to the Project	Applicability through the phase of the project
		departments at the national and state level.		
14	Bihar Panchayat Raj Act, 2006	It replaced the Bihar Panchayat Raj Act, 1993, and aligns with the 73rd Constitutional Amendment, providing responsibilities to local government in the area of water management and minor irrigation, including supporting state government in its construction and maintenance, levying tariff.	The Act makes PRIs responsible for a) construction, renovation and maintenance of minor irrigation works and lift irrigation and b) Providing timely and equitable distribution through irrigation schemes under the control of the Zila Parishad	Operational Phase
15	Mahatma Gandhi National Rural Employment Guarantee Act, 2005	The Act provides guarantee to wage employment for 100 days per year to members of vulnerable and poor families and aims to create productive assets and infrastructure in rural areas.	The project will seek convergence with the scheme under the Act for undertaking O&M functions in the restored commands and in the process provide employment to landless and vulnerable families.	Operational Phase

2.2 Operational Policies and Directive of the World Bank

The relevant and applicable safeguards policies of the World Bank are also reviewed. The below table describes the relevant safeguard policies of the World Bank and discusses their applicability to the project.

Table 2: ESS Operational Policy and Directives of World Bank

Policy	Key features	Relevance & Extent of Relevance to the sub-project/project
ESS-1 Assessment and Management of Environmental and Social Risks and Impacts	Identify, assess, evaluate, and manage the environmental and social risks and impacts consistent with the ESF. Adopt differentiated measures so that adverse impacts do not fall disproportionately on the disadvantaged or vulnerable, and they are not disadvantaged in sharing development benefits and opportunities	**Relevant** Specific intervention envisaged under this project such as those for construction of field channel, anti-erosion, micro-irrigation and raising strengthening & pakkikaran of river embankment may have some potential adverse environmental impacts in their area of influence. Such impacts will depend upon the location, nature and magnitude of interventions- there will be clarity on this once the said details are known and the result from the environment screening process are available. ESS1 has been found relevant

Policy	Key features	Relevance & Extent of Relevance to the sub-project/project
		to ensure that such investments are planned and designed to be sound and sustainable by integrating environmental dimension into the overall decision-making process. Sub-project level ESIA will be carried out for the Identification of any potential impacts and mitigation/ enhancement measure to address likely impact is proposed.
ESS-2 Labor-and-Working-Conditions	Promote safety and health at work. Promote fair treatment, non-discrimination, and equal opportunity for project workers. Protect project workers, with particular emphasis on vulnerable workers. Prevent the use of all forms of forced labour and child labour. Support the principles of freedom of association and collective bargaining of project workers consistent with national law. Provide project workers with accessible means to raise workplace concerns.	**Relevant** The project will involve large scale civil works including repair and lining of canals and embankments which will involve large scale deployment of construction workers. While implementing the projects these potential impacts will be addressed based on national labor laws[6] as well as additional management measures proposed under the LMP. All the safety concerns will be considered to avoid any adverse impacts on their lives. The Project will have a labor Management Plan (which will be part of the ESMF) and site-specific plans will be pared by the Contractor. The Contractor will also prepare C-ESMP (which includes Occupational Health Safety Plan, Hazzard Identification and Risk Assessment). And submit it along with the Work Plan and Methodology.
ESS-3 Resource-Efficiency-and-Pollution-Prevention-and-Management	Promote the sustainable use of resources, including energy, water, and raw materials. Avoid or minimize adverse impacts on human health and the environment caused by pollution from project activities. Avoid or minimise project-related emissions of short and long-lived climate pollutants. Avoid or minimise the generation of hazardous and non-hazardous waste. Minimise and manage the risks and impacts associated with pesticide use. Requires technically and financially feasible measures to improve efficient energy	**Relevant** Relevant to sub projects to be taken up viz. earthwork, lining, strengthening & pakkikaran of hydraulic structures. However, assessment procedures and mitigation measures have been put into place through the ESMF so that any likely negative impacts on the natural environment are minimized. The framework proposed screening activities such as construction of field channel, strengthening & pakkikaran work. Based on these screening exercises, environmental assessment for the sub projects will analyze impacts on natural environment and promotes sustainable use of resources. Projects is not financing procurement of any pesticides. Control measurements to avoid dust pollution and degradation of air & water quality will be considered to mitigates ant adverse impacts.

[6] Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act 1996; Building and Other Construction Workers Welfare Cess Act, 1996; Contract Labour (Regulation & Abolition) Act 1970; Minimum Wages Act 1948, Payment of Wages Act 1936; Child Labour (Prohibition & Regulation) Act 1986; Bonded Labour System (Abolition) Act, 1976; Inter-State Migrant workmen's (Regulation of Employment & Conditions of Service) Act 1979; Employees Compensation Act 1923; Employer's Liability Act, 1938; Employees State Insurance Act 1948; Personal Injuries (Compensation Insurance) Act, 1963; Maternity Benefit Act 1961; Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013; Payment of Wages Act 1936; Equal Remuneration Act 1976

Policy	Key features	Relevance & Extent of Relevance to the sub-project/project
	consumption, water, and raw materials and introduces specific requirements for water efficiency where a project has high water demand.	
ESS-4 Community-Health-and-Safety	Anticipate or avoid adverse impacts on the health and safety of project-affected communities during the project life cycle from routine and non-routine circumstances. Promote quality, safety, and climate change considerations in infrastructure design and construction, including dams. Avoid or minimize community exposure to project-related traffic and road safety risks, diseases, and hazardous materials. Have in place effective measures to address emergency events. Ensure that personnel and property are safeguarded to avoid or minimize risks to the project-affected communities.	**Relevant** Conduct comprehensive assessments to identify potential health and safety risks associated with the project & engage local communities in the assessment process to incorporate their insights and concerns. Provide training for workers and community members on health and safety practices & Conduct drills to prepare both project personnel and community members for emergency situations. Since the works would be carried out in areas where the community exists and existing roads would be used for transportation of men and material a "Traffic Safety Plan" will be prepared.
ESS-5 Land-Acquisition-Restrictions-on-Land-Use-and-Involuntary-Resettlement	Avoid or minimize involuntary resettlement by exploring project design alternatives. Avoid forced eviction. Mitigate unavoidable adverse impacts from land acquisition or restrictions on land use by providing compensation at replacement cost and assisting displaced persons in improving, or at least restoring, livelihoods and living standards to pre-displacement levels or to levels prevailing before the beginning of project implementation, whichever is higher. Improve living conditions of poor or vulnerable persons who are physically displaced by providing adequate housing, access to services and facilities, and security of tenure.	**Relevant** Proposed investment does not include any private land acquisition but involves resettlement of illegal settlers/ non-title holders/ encroachers/ squatters[7] along the existing canal RoWs as well as the embankments proposed to be repaired. During the construction period access related restrictions will also be imposed on the local communities, especially those accessing the RoW. The ESMF as well as the RPF will provide guidance on how permanent and temporary resettlement impacts are to be addressed in line with ESS5 guidance during the preparation and implementation of site-specific RAPs for the sub-projects.

[7] Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 does recognize the rights and entitlements of non-title holders and other categories of informal occupants of the land, setting out of a clear cut-off date, compensating indirect impacts of land acquisition and valuation of assets and structures based on replacement value, instead of market value.

Policy	Key features	Relevance & Extent of Relevance to the sub-project/project
	Conceive and execute resettlement activities as sustainable development programs.	
ESS-6 Biodiversity Conservation and Sustainable Management of Living Natural Resources	Protect and conserve biodiversity and habitats. Apply the mitigation hierarchy and the precautionary approach in designing and implementing projects that could impact biodiversity. To promote the sustainable management of living natural resources.	**Relevant** Even though the structures will not be located within the protected areas the Rivers of North Bihar e.g. Kosi , Bagmati are important habitats as they maintain and critical link between the Indian and the small Nepal Population of dolphins . These rivers are thus considered as "critical habitats". The ESMF provide and overall assessment of the impacts and presents and outline of the Dolphin program. This will be supplemented by site specific mitigation measures proportional to the risk in the sub-project.
ESS-7 Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	Ensure that the development process fosters full respect for affected parties' human rights, dignity, aspirations, identity, culture, and natural resource-based livelihoods. Promote sustainable development benefits and opportunities accessible, culturally appropriate, and inclusive. Improve project design and promote local support by establishing and maintaining an ongoing relationship based on meaningful consultation with affected parties. Obtain the Free, Prior, and Informed Consent (FPIC) of affected parties in three circumstances. Recognize, respect, and preserve the culture, knowledge, and practices of Indigenous Peoples and provide them with an opportunity to adapt to changing conditions in a manner and in a timeframe acceptable to them.	**Not Relevant** Proposed investments do not have any impact on tribal habitats under the project areas.
ESS-8 Cultural-Heritage	Protect cultural heritage from the adverse impacts of project activities and support its preservation. Address cultural heritage as an integral aspect of sustainable development. Promote meaningful consultation with stakeholders regarding cultural heritage. Promote the equitable sharing of benefits from the use of cultural heritage.	**Relevant** A few project interventions may be located close to sites, structures, natural/man-made features that have historical, archaeological, religious or other cultural significance. Through screening and EA/SA process, the project's potential impacts on physical cultural resources will be determined and management measures, as required will be taken and integrated into the sub-project cycle. The ESMF also provides procedures to deal with chance finds during the sub-project implementation.

Policy	Key features	Relevance & Extent of Relevance to the sub-project/project
ESS-9 Financial-Intermediaries	Sets out how Financial Intermediaries (FI) will assess and manage environmental and social risks and impacts associated with the subprojects it finances. Promote good environmental and social management practices in the subprojects the FI finance. Promote good environmental and sound human resources management within the FI.	**Not relevant**
ESS-10 Stakeholder-Engagement-and-Information-Disclosure	Establish a systematic approach to stakeholder engagement that helps Borrowers identify stakeholders and maintain a constructive relationship. Assess stakeholder interest and support for the project and enable stakeholders' views to be considered in project design. Promote and provide means for effective and inclusive engagement with project-affected parties throughout the project life cycle. Ensure that appropriate project information is disclosed to stakeholders in a timely, understandable, and accessible manner.	**Relevant** The SEP will include a comprehensive map of stakeholders, strategy for engagement and monitoring mechanisms. The project aims at a (i) robust communications strategy for information dissemination and managing perceptions; (ii) systemized a two-way communication with all beneficiaries during design and implementation; (iii) efficient and responsive grievance redress mechanism. *Information disclosure and public hearings to discuss E&S impacts are mandated under the EIA notification and* Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013*, mainly during the planning/ preparation stage. There is no requirement to ensure continuous engagement through the project cycle, to prepare an engagement plan or to create a dedicated GRM.*
Environmental and Social Directive for Investment Project Financing	This Directive applies to the Bank and sets out the mandatory requirements for implementing the Environmental and Social Policy for Investment Project Financing (IPF).	**Applies to Bank**
World Bank's Guidance note on managing the risks of adverse impacts on communities from temporary project-induced labour influx, 2016	The document provides guidelines to address issues and risks arising from the influx of migrant labour leading to gender-based violence, forced labour etc.	**Relevant** No major influx of labour during construction activities is envisaged in BWSIMP, as most workers will be either local or from within the state. However, the LMP will provide measures on how influx related adverse impacts, including SEA/ SH risks, are to be handled at project sites.
General EHS Guidelines, April 2007, IFC	The General EHS Guidelines contain information on cross-cutting environmental, health, and safety issues potentially applicable to all industry sectors.	**Relevant** General requirements on environmental, health, and safety issues during construction and operations

2.3 Permits Required

The table below provides the list of other Permissions required during Pre- Construction and Construction phase.

Table 3: Permissions required for Construction Phase and Operation Phase (by the employer)

Sr. No	***Requirement***	***NOC process***	***Applicability for this Project***
1.	No Objection Certificiate (NoC) from Central Water Commission (CWC)	The CWC will review the DPR for Irrigation project and would provide the clearance subject to the applicability of other clearances.	CWC will not specially assess the environmental risk. However, the submission to the CWC for clearance will include a summary of the environmental and social impact of the project.
2	Consent to Establish (CTE) and Consent to Operate (CTO)	The Contractor needs to obtain the CTE and CTO for the Plant and Machinery	CTE and CTO form State Pollution Control Board for setting up of Plant and Machinery
3	NOC for Water Source	The Contractor needs to apply to CGWA or local authority if tubewell are sunk during the construction / Submission of NoC of the source from which water is procured	Abstraction of groundwater for construction
4	Labour License	Labour license and permits for the labours employed	The Contractor needs to obtain labour license, permit and submit returns under the project

3 Environmental and Social Context in Project Areas

3.1 Environmental Baseline

3.1.1 Physiography

Bihar, located in eastern India, the twelfth largest Indian state in terms of territory and third largest state in terms of pupulation. The land locked Bihar shares boundary with Nepal to the North, the states of West Bengal in the east, Jharkhand and Uttar Pradesh is in south and west. On basis physical and structural conditions Bihar is delimited by the Himalayan foothills, the Indo- Gangetic plains, the Vindhyan plateau, and the Gondwana basin. The project is primarily confined in the northern half of the Ganga Basin and some parts in southern half.

3.1.2 Hydrogeology

Bihar has diversified geology, ranging from Archaean metamorphic to recent alluvial sediments. The alluvial plains contain both shallow and deep aquifers. Shallow aquifers are often recharged during the monsoon, while deeper aquifers may be tapped for irrigation and drinking water. Southern parts of Bihar, Plateau, there are crystalline rocks, such as granite and gneiss, affecting groundwater availability. During the Pre-Monsoon period, the minimum depth to water level in the phreatic aquifer of 2.15 m bgl has been observed in the Siwan district, and maximum water level of 20.68 mbgl has been observed in the Aurangabad district. The depth to water level rests in the range of 5 – 10 mbgl mostly in the areas adjoining to the river Ganga.

3.1.3 Climate

Bihar lies completely in the subtropical region of the temperate zone, and its climate type is humid subtropical.

3.1.4 Temperature

Bihar average daily maximum temperature is 26^{o} C, and temperature are often above 25^{o} C for several months. The coldest month December-January with temperature as low as 10^{o}C.

3.1.5 Rainfall

Bihar experience more than 85% of the annual rainfall during southwest monsoon season. The average annual rainfall in Bihar is approximately 1,177.90 to 1,413.90 millimeters (about 45 to 55 inches). Most of the rainfall occurs during the monsoon season, which typically lasts from June to September. This period contributes to about 80-90% of the annual rainfall and the average numbers of rainy days are 84.00 (as per Bihar at Glance-2021 Directorate of Economics & Statistics, Bihar, Patna). Recent days Climate change affect the distribution and intensity of rainfall, experiencing impact on number of rainy days in Bihar.

3.1.6 Soil

Bihar state has a diverse range of soil types. Alluvial soil is most prevalent, highly fertile in nature, support a variety of crops making most of the people of Bihar to rely on farming for their livelihood. Soil characteristics are solely depends on their location and its formation. Different types of soil like Balthar soil (Sandy, calcareous, yellow) found in Kaimur region, Khadar soil (Dark brown and fertile) dominant in Muzaffarpur, Katihar, Saharsa, and Darbhanga. Terai (Sandy calcareous brown and light yellow visible in Champaran and Kishanganj, Bhangar is acidic lime soil seen in Patna, and Rohtas area and Balsundari

alkaline nature soil dominant in Saharsa, East and West Champaran districts of Bihar. Northwest corner of Bihar occupies highly moistures swamp soil. Ecological important wetlands are found in that particular area which plays indispensable role in climate regulation.

3.1.7 Landuse

Bihar has a geographical area of about 94,200 sq.km. Of the total geographic area of 94.16 lakh ha, about 60% is cropped and only about 22.19% of the area is cropped twice. The gross and net sown area in the State is estimated at 72.65 lakh ha and 50.45 lakh ha respectively. The cropping intensity is 1.36. Net sown area is in declining trend and land under non agriculture uses have increased. Forest area is limited (6.22%) and the area under pastures and grazing lands is extremely scarce (0.15%).

3.1.8 Water Resources

Bihar is richly endowed with water resources and primarily relies on surface water from rivers as well as groundwater resources which in use for drinking, irrigation and industrial purposes. Canals are the main source of irrigation through perennial and seasonal canal. Tube wells and dug wells dependency are also commonly seen for irrigation. Ganga is the main river which is joined by tributaries with their sources in the Himalayas. Some of them are Saryu (Ghaghra), Gandak, Burhi Gandak, Bagmati, Kamla Balan and Mahananda. There are some other rivers that start from the plateau area and meet in Ganges or its associate rivers after flowing towards north. Such major rivers are Sone, Uttari Koyal, Punpun, Panchane and Karmnasha. These rivers make the water available for irrigation purpose and help in generating the hydro-thermal energy for the state. Apart from this they provide a medium for water transport, provide fishes for fishery industry and enrich the natural resources of state in many other ways.

3.1.9 Surface Water

Surface water resources in the state mainly include river water system which covers around 3200 km covering around more than 200,000 ha land. The total area of ponds in Bihar is estimated to be around 100,000 hectares (1,000 square kilometers), around 12,000 hectares (about 120 square kilometers) of reservoirs. Important reservoirs include the Kosi Barrage, Gandak Barrage, and Bhima Dam. Oxbow lakes formed by the meandering rivers like the Ganges and Kosi, are scattered throughout the state, area covered by these lakes could be several thousand hectares. The riverine plains is approximately 70-80% of Bihar's total land area, which is about 94,163 square kilometers (approximately 23.3 million acres) and other flood plains in Bihar are vital for agriculture and local livelihoods.

3.1.10 Surface Water Quality

Water quality of the Ganga River and its tributaries in Bihar is alarming and not fit for bathing. As per the BSPCB annual report 2023-2024 Total Coliform and Fecal coliform parameter are exceeding the maximum permissible limits and could be used only after treatment followed by disinfection.

3.1.11Floods

Most of the rivers in North Bihar are glacial fed with their catchment primarily in Nepal and Tibetan regions. They are, therefore, positioned to receive very high flows during monsoon when discharge of these rivers is 50 to 90 times larger than fair weather flow. This causes frequent and large-scale flooding of North Bihar. A study of the flood stages in various river systems revealed that early flood takes place during the month of May-June in River Bagmati, Kosi and Kamla. Thereafter, flood generally comes in River Burhi Gandak in

the month of mid-July. During these months River Ganga generally remains low but by September, the master drain, the Ganges, also rise making the flood-problem very acute. Thus, from the month of May to September, for five neat months, Bihar suffers through the ravages of floods. As such, 73.63%[8] of the geographical area of North Bihar is prone to floods. Out of 38 districts, 28 districts are flood prone. In 28 flood affected districts (15 districts most vulnerable & 13 vulnerable) affecting around 7,99,82,950[9] persons.

3.1.12 Erosion

Erosion, movement and deposition of sediment in a river are natural regulating functions of a river. Rivers tend to maintain a balance between the silt load carried & silt load deposited, maintaining a river regime. Soil erosion caused by heavy floods is a matter of concern as it leads to several associated problems like changes in river course, causing loss of land, etc. The rivers in the northern part have the problem of heavy silt load depositing, shifting of river courses and erosion of the bank.

3.1.13 Droughts

Even though the state so rich in water resources, it also suffers from severe droughts. Bihar often faces drought situation of different scales/levels that intrinsically lead to famine situations. This situation necessarily occurs when the summer monsoon gets weak, and which causes percentage departure of seasonal rainfall from the normal. Although, the average rainfall in Bihar is 1120 mm, but considerable variations occur with 2000 mm in the extreme eastern and northern part and less than 1000mm in the western and south-western part of the state. As a result 33% of the State receives less than 750 mm rainfall, making the southern part of Bihar vulnerable to drought. Even the 35% of north-eastern part of Bihar that receives around 1120 mm rainfall suffers drought once in four to five years due to scanty rains.

3.1.14 Groundwater

Groundwater is a major source of water for domestic, agriculture and Industrial use in Bihar. The groundwater potential in Bihar is approximately 95 billion cubic meters (BCM) annually. The net annual ground water availability is 27.42BCM. In 2022, the state extracted 13.5 BCM of GW for all uses. Over-extraction of groundwater, particularly in certain districts, poses sustainability challenges and declining The stage of ground water development exceeds 50% in Nalanda, Jehanabad, Begusarai, Siwan, Saran and Patna. The state features several aquifer systems, predominantly alluvial aquifers, which are replenished by rainfall and river systems

3.1.15 Groundwater Quality

Bihar has substantial water resources; the quality remains a pressing issue due to contamination and pollution. Many areas face challenges with high concentration of Iron and contamination from heavy metals like arsenic and fluoride. Arsenic contamination is especially prevalent in some districts like Gopalganj, Muzaffarpur, and Bhagalpur. Out of the 38 districts, 18 have high arsenic contamination in Ground water. The worst affected districts are Buxar, Bhojpur and Bhagalpur. Arsenic is found in excess (more than0.05mg/l) in some parts of Kosi Basin Districts, viz., Darbhanga, Katihar, Khagaria and Samastipur. Groundwater sources contain high levels of fluoride. The primary sources of fluoride contamination include natural geological formations affecting around 11 districts of Bihar. Among the Kosi Basin Project Districts, some parts of Supaul District are having Fluoride in excess of 1.5 mg/l. Iron is vital for health, excessive

[8] http://bsdma.org/Know-Your-Risk.aspx?id=3
[9] http://bsdma.org/images/global/SDMP.pdf

exposure can cause health issues such as gastrointestinal problem and may impact individuals. Iron is present in more than permissible limits, i.e., above 1.0mg/l in some parts of Districts viz; Begusarai, Katihar, Khagaria, Samastipur, Madhepura, Saharsa, Supaul, Purnea and Kishanganj.

3.1.16 Ecological Profile

The state of Bihar presently has 6845 sq km notified natural forest area which is 7.27 % of the geographical area of the state. These natural forests are spread in the districts of West Champaran, Kaimur, Rohtas, Aurangabad, Gaya, Jahanabad, Nawada, Nalanda, Munger, Banka and Jamui. The north Bihar except West Champaran is devoid of Natural Forests. There is one National Park and 12 Wildlife Sanctuaries which constitute the Protected Area network of the State covering 3.44% of its geographical area.

Floral Profile

The state has limited area under natural forests. Sal (Shorea robusta) forests are found in the West Champaran district in the Terai region in the north and in Kaimur, Rohtas, Aurangabad, Gaya, Jamui, Munger and Banka districts in southern Bihar. The West Champaran district has moist deciduous Sal forest while South Bihar has dry deciduous Sal Forests. Most of the natural forests are notified as Protected Forests. As per the Champion & Seth Classification of Forest Types (1968), the forests of Bihar belong to four Forest Type Groups further divided into 13 different Forest Types. The important Tree species of Bihar are Sal (*Shorea robusta*), Shisham (*Dalbergia sissoo*), Teak (*Tectona grandis*), Gamhar, Kadamb, Semal ,Neem Peepal Bargad,Arjun, Asan, Haldu, Mahua and Kend etc. The meandering rivers in plains of Bihar leave behind oxbow lakes (*mauns or dhars*) and cut-off meanders (saucer shaped depressions, called chaurs). These chaurs in North Bihar are part of the national wetlands and International Bird Areas. These wetlands and many varieties of local bird species as well as migratory birds. Different Natural wetlands like Kanwar lake, Baraila lake, Kusheshwar nath Lake, Udaypur lake and man-made lakes Nagi Dam& Nakti Dam have been declared as Bird Sanctuary. The Bihar has breeding population of greater adjutants in Naugachia area of Bhagalpur district.

Faunal Profile

The important Terrestrial species are Tiger, Leopard, Bear, Hyena, Bison, Chital, Barking Deer etc. The Valmiki Tiger Reserve in West Champaran is part of the Tiger Landscape in India and shares boundary with the Royal Chitwan National Park and Parsa wildlife sanctuary of Nepal. However, the project does not have any footprint in this landscape. Besides terrestrial fauna there are number of important aquatic animals e.g. many varieties of Crocodile, Magar and Fishes, Gangetic turtles are present in River systems. Fresh water Ganges River Dolphin (*Platanista gangetica*)[2] is present in the River Ganges, Kosi, Gandak, Mahananda, Bagmati and Paimar rivers of the state. Vikramshila Gangetic Dolphin Sanctuary has been notified at Bhagalpur portion of the River Ganges. The GoI report *(STATUS OF GANGES RIVER DOLPHINS, THREATS AND BEST PRACTICES FOR CONSERVATION 2021, Wildlife Institute of India, MoEF&CC)* on the Gangetic Dolphins indicates that the population of the dolphin in the tributaries of the Ganga i.e. Kosi, Gangak, Bagmati have a declining range, while the dolphin range in mainstem Ganga of Bihar, seems fairly stable with high population densities across the stretch. The population of the dolphin in the tributaries are presented below.

Table 3: Dolphin population estimate and hotspots and critical conservation regions in Bihar

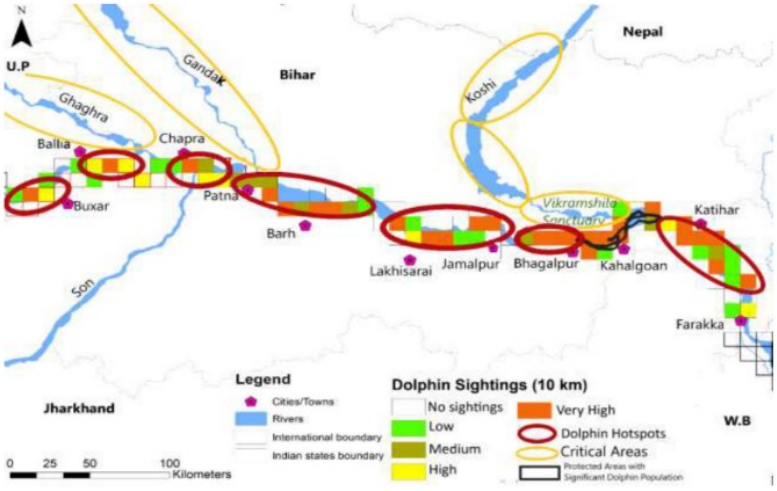
River	Areas	Population	Minimum	Maximum	Important areas for Dolphin

Ghaghra	Uttar Pradesh and Bihar	533	350	766	
Kosi	Bihar	311	209	434	Supaul, Saharsa, Samastipur, Khagaria, Bhagalpur (Districts)
Gandak	Uttar Pradesh and Bihar	169	94	268	Pashchim Champaran, Gopalganj, Purba Champaran, Muzaffarpur,Saran, Vaishali (Districts)
Mahananda	Bihar and West Bengal	264	180	363	
Bagmati	Bihar	120	81	168	

Source: India's Role on Conserving Ganges River Dolphin, Sandeep Kumar Behera, Ph.D. National Mission for Clean Ganga (NMCG)

The GoI report also identifies dolphin hotspots along the Ganga basin and identifies some critical stretches which is presented in. This critical stretches/links area important to maintain a viable dolphin population, as they connect the rivers of Nepal with Ganga. Kosi and Gandak are the most important tributaries for dolphin, gharial and other aquatic fauna. The River Kosi and Bagmati originate in Nepal. These rivers are habitats of dolphins and as per the MoEF&CC and they are considered as "critical areas" as per the Study Report. They help maintain the link between the dolphin population of India and Nepal and thus are identified as "Critical Areas". As per the criterion of specified in ESS 6 the Kosi, Bagmati rivers support "globally or nationally significant concentrations of migratory or congregatory species" and "Habitat of significant importance to Critically Endangered or Endangered species". So, these are "Critical Habitat" under the ESS 6.

Figure 1: Dolphin hotspots and critical areas in Bihar



Agroclimatic Zones:

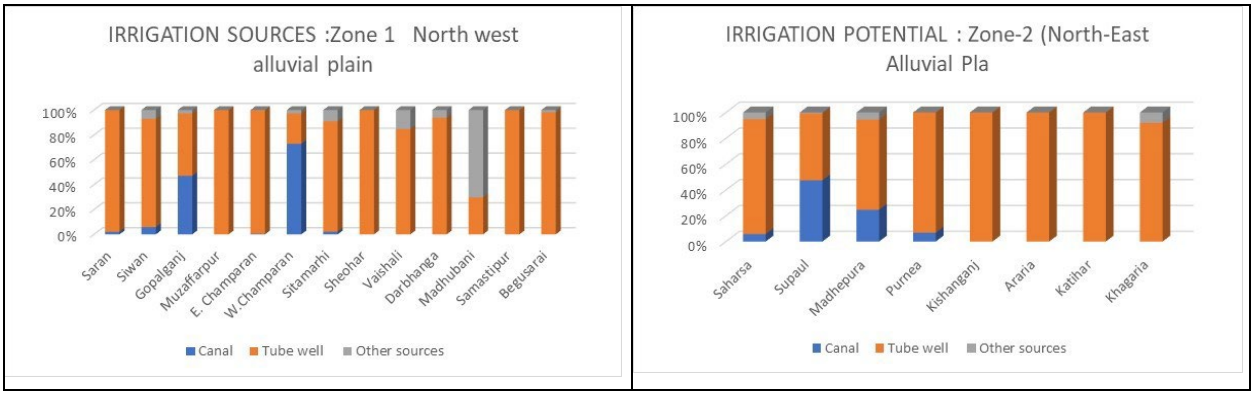
Bihar has been classified in 3 agro-climatic zones: North-West Alluvial Plain (Zone1), North-East Alluvial Plain (Zone 2), and South Alluvial Plain (Zone 3), the last zone being further classified in two sub-zones 3A and 3B. Monsoon arrives earliest in the northeastern Zone2, which also receives the highest rainfall among all three zones. Zone 3 receives monsoon showers last of all three zones and also the least amount.

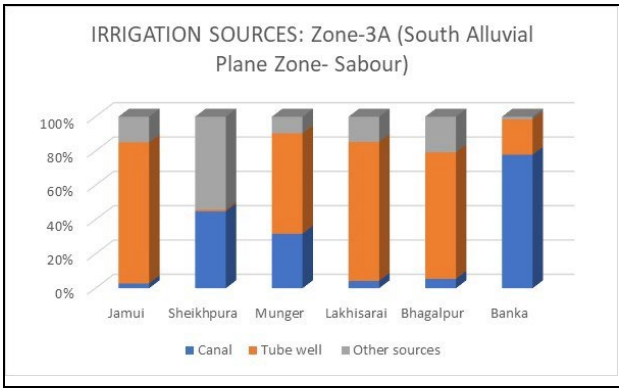
Table 4: Agro climatic zone-based profiling

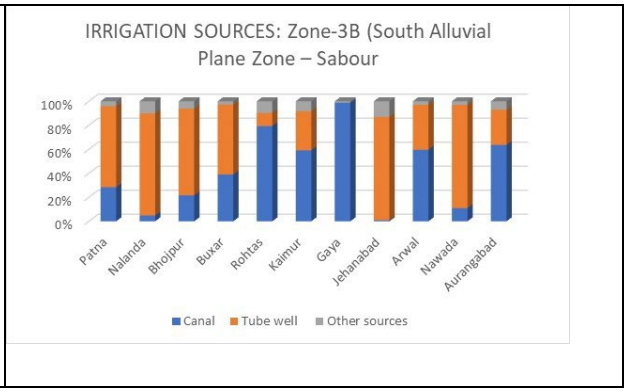
Agro-Climatic Zone	Districts	Soil	Important Cropping sequence
Zone-1 (North west Alluvial Plain Zone- Pusa)	Saran, Siwan, Gopalganj, E.Champaran, W.Champaran, Sheohar, Sitamarhi, Madhubani, Darbhanga, Muzzafarpur, Vaishali, Samastipur, Begusarai	Sandy loam, loam	Rice – Wheat, Rice-Rai, Rice-Sweet Potato, Rice -Maize(Rabi), Maize-Wheat, Maize-Sweet Potato, Maize-Rai, Rice-lentil
Zone-2 (North-East Alluvial Plane zone- Purnea)	Supaul, Khagaria, Saharsa, Madhepura, Purnea, Katihar, Kishanganj, Araria, Naugachia.	Sandy loam, Clay loam	Jute-Rice, Jute-Wheat, Jute-Potato, Jute-Kalai, Jute-Mustard, Rice- Wheat/ Moong, Rice-Toria
Zone-3A :(South Alluvial Plain Zone-Sabour)	Sheikhpura, Lakhisarai, Jamui, Banka, Munger and Bhagalpur	Sandy loam, Clay loam, loam, Clay	Rice-Wheat, Rice-Gram, Rice-Lentil, Rice-Rai
Zone-3B (South Alluvial Plain Zone – Sabour)	Bhabhua, Rohtas, Aurangabad, Buxar, Bhojpur, Jehanabad, Gaya, Nalanda, Patna, Nawada		

This clearly shows that across the state rice or Jute is the main crop during the Kharif Season (both waters consuming). The Rabi crops include less water consuming crops like wheat, pulses, oilseeds. The review of the irrigation requirement across all these agroclimatic regions (Figure 2) clearly indicate an dependence on groundwater.

Figure 2: Irrigation Source in different districts







Source: https://www.bameti.org/wp-content/uploads/2021/02/State-Profile.pdf

3.1.17 Agriculture

Agriculture is regarded as the backbone of economic activity in the state. Approximately 80% of the land area is arable and benefits from favorable monsoon rainfall, although agricultural and irrigation practices are not yet modern or fully developed. About 76% of the state's population is engaged in agricultural activities. Bihar has a total geographical area of approximately 93.60 lakh hectares, with 56.03 lakh hectares being net cultivated area and 79.46 lakh hectares being gross cultivated area. Around 33.51 lakh hectares of net area and 43.86 lakh hectares of gross area receive irrigation from various sources. The principal food crops include paddy, wheat, maize, and pulses, while the main cash crops comprise sugarcane, potato, tobacco, oilseeds, onion, chillies, and jute.

There are four classes of crop periods in Bihar:

- ***Bhadai:*** Sown in May-June (pre-monsoon) and harvested post-monsoon, this crop includes rice, maize, jute, and in some areas, pulses and vegetables. Main districts for these crops are Purnia, Saharsa, Madhepura, Supaul, Kishanganj, and Katihar. Marua is grown in Muzaffarpur, Vaishali, Saharsa, Samastipur, and Sitamarhi, while maize is cultivated in the Diara lands of the Ganga and Kosi belt.

- ***Aghani:*** This is the primary crop period in Bihar, comprising crops sown during the rainy season immediately after the onset of the monsoon. Paddy is the main crop, sown until August and harvested in November-December. Major rice-producing districts include Purnia, Madhubani, Darbhanga, Sitamarhi, Saharsa, and Rohtas, with two paddy crops often practiced due to the prolonged monsoon season.

- ***Rabi Crop***: Typically sown in October-November and harvested in March-April, this winter crop mainly comprises wheat, along with minor pulses and oil seeds.

- ***Summer Crop***: During this period, summer paddy, vegetables, oil seeds, maize, and pulses are grown.

The yield of major crops are as follows:

- Paddy: Producing approximately 65.5 lakh MT annually, paddy cultivation includes Aghani paddy (80% of the area), Boro paddy (2%), and Summer paddy (3%).

- Maize: Constituting the third main crop of Bihar, maize is sown in 8% of the cultivable area, primarily southwest of Burhi Gandak River and in Saran, Gopalganj, Siwan, Samastipur, and Purbi and Paschim Champaran. With an annual production of around 18 lakh MT, Khagaria, Samastipur, and Purnia have the highest productivity, whereas Jamui, Buxar, and East Champaran have the lowest.

- Barley: Grown under similar conditions to maize, barley is produced as a mixed crop, with Purbi and Paschim Champaran leading in production.

- Marua (Ragi): Cultivated in less fertile sandy soil with minimal water requirements, marua is sown in June and transplanted after rainfall. It is nutritious and promoted by the government's agricultural roadmap, grown in Saharsa, Supaul, Madhepura, and Darbhanga.

- Pulses: Bihar ranks 9th nationally, contributing about 0.52 million tons to the national pulse pool, with 12-13 lakh hectares used for such crops. Southern Bihar produces more pulses than the north.

- Main Cash Crops: Sugarcane, Tobacco, Potato, Jute, and Chilli: Sugarcane thrives in alluvial soil with lime; potato, the primary cash crop, is widely grown, with Nalanda being the leading producer. Jute is cultivated in high-rainfall areas near water bodies, primarily in Purnia, Kishanganj, Katihar, and Saharsa. Chilli is grown year-round on approximately 75,000 hectares of land.

3.1.18Horticulture

Bihar ranks 8th in terms of area (11.21 lakh ha) and 5th in terms of production (173.35 lakh MT) of horticultural crops in the country. Major fruits grown in the state include mango, litchi, guava, pineapple, banana, aonla, bel, and makhana. Bihar's 'shahi' litchi and 'malda' mango are notable for their taste and flavor. Nearly 40 percent of the total litchi production in the country comes from Bihar. The main fruit-growing districts are Muzaffarpur, Vaishali, Samastipur, Bhagalpur, Banka, Darbhanga, Munger, Jamui, Gaya, Aurangabad, Nalanda, Patna, West Champaran, East Champaran, Kishangaj, Purnea, Araria, Katihar, and Khagaria. With a wide range of agro-climatic and soil conditions, the production level of vegetables in the state has been notable. Besides meeting the demand locally, Bihar's vegetables are also exported nationally. Major vegetables grown on a commercial scale include cauliflower, potato, okra, brinjal, onion, chillies, cabbage, gourds, peas, cowpea, and melon.

3.1.19Archeological Heritage

The rich culture and heritage of Bihar is evident from the innumerable ancient monuments that are dotted all over the state. First Neolithic culture in the Ganga Valley was found at Chirand on the left bank of Ganga in the Saran district near the confluence of Ganga and Ghaghra. Bihar is home to two UNESCO world Heritage site: the Mahabodhi Temple Complex at Bodh Gaya and the Ancient Ruins of Nalanda University. The other monuments of national importance have been recognized by the Archeological Survey of India (ASI) in Bihar and many of them are located in project districts namely, Araria, Banka, Buxar, Saran, East Champaran, Gopalganj, Katihar, Patna, Purnea and Vaishali. Bihar state is one of the oldest inhabited places in the world, the earliest proof of human activity in Bihar is Mesolithic habitational remains in Munger. However, none of the sub-projects have footprint in these areas of areas surrounding it.

3.2 Social Baseline

The Project would benefit the state's entire population through its institutional and non-structural interventions, while approximately 4.34 million people, in 72 blocks in 12 districts[10] are expected to directly benefit from targeted structural interventions.

3.2.1 Administrative Setup

The BWSMIP will make investments in 72 blocks of 12 districts. The list of project districts is as below.

Table 5: Districts and blocks

S. No.	Districts	No. of Blocks covered	S. No.	Districts	No. of Blocks covered
1.	Bhojpur	13	6.	Madhubani	20
2.	Buxar	9	7.	Nalanda	7
3.	Gopalganj	5	8.	Rohtas	16
4.	Supaul	6	9.	Kaimur	10
5.	Madhepura	4	10.	Samastipur	4

3.2.2 Demographic Profile:

Some of the important demographic indicators of Bihar state and project districts are compared in the table below:

Table 6: Population Details

Item	Bihar	Project Districts	Population per sq. km.
Area, Sq. Km	94,163	43,307	1,106
Total population, Census 2011	104,099,452	4,71,85,942	1,090

Source: Census 2011

According to census 2011, the population of the state of Bihar is 104,099,452 persons, consisting of 52.2% males and 47.8% females. The average population of a district of the state is 2,731,701. The population of the state is predominantly rural, with 89% of the population residing in rural areas. The Census 2011 has recorded 25.07 percent decadal population growth in Bihar.

[10] Beneficiaries from irrigation interventions: Saharsa, Supaul, Madhepura, Madhubani, Gopalganj, Buxar, Kaimur and Rohtas; Beneficiaries from flood management interventions: Darbhanga, Gopalganj, Madhubani, Samastipur, and Supaul.

Table 7: Demography of project districts

Project District	No. of Households	Population			Sex ratio	SC	ST	Literacy (%)			Religion (%)	
		Total	Male	Female		Total Percentage		Total	Male	Female	Hindu	Muslim
Bhojpur	4,16,090	2,728,407	1430380.00	1298027.00	907	15.59	0.48	70.47	68.06	48.20	92.30	7.25
Buxur	2,61,660	1706352	887977.00	818375.00	922	14.75	1.57	70.14	66.84	48.42	93.27	6.18
Kaimur	2,50,884	1626384	847006.00	779378.00	920	22.69	3.57	69.34	79.37	58.40	89.54	9.55
Darbhanga	8,03,012	3937385	2059949.00	1877436.00	911	15.64	0.07	56.56	54.64	36.81	77.28	22.39
Gopalganj	413044	2562012	1267666.00	1294346.00	1021	12.49	2.37	53.98	62.63	45.51	82.72	17.02
Madhepura	4,01,289	2001762	1047559.00	954203.00	911	17.30	0.63	52.25	49.42	33.21	87.61	12.08%
Nalanda	4,77,529	2877653	1497060.00	1380593.00	922	21.12	0.05	64.43	61.42	43.49	92.78	6.88
Rohtas	4,60,345	2959918	1543546.00	1416372.00	918	18.57	1.07	73.37	68.79	52.11	89.37	10.15
Madhubani	21,58,066	44,87,379	23,29,313	21,58,066	926	13.08	0.09	58.62	57.53	37.78	81.39	18.25
Saharsa	3,68,979	19,00,661	9,97,174	9,03,487	906	16.69	0.32	53.20	50.78	33.05	85.72	14.03
Supaul	4,43,073	22,29,076	11,55,283	10,73,793	929	15.89	0.46	57.67	56.06	35.91	81.20	18.36
Samastipur	835493	4261566	2230003	2031563	911	18.85	0.09	0.62	0.58	0.42	0.89	0.11
Saran	631097	3951862	2022821	1929041	954	12.00	1.05	0.66	0.64	0.45	0.89	0.10
Total	6,661,010	37,230,417	19,315,737	17914680		16.51	0.91	52.41	52.06	36.44	73.46	10.95

Source: Census 2011

3.2.3 Sex Ratio

The project area covers 19.6% of Bihar population and in project area male comprises 51.9% of population and 48% female population.

Table 7: Population Distribution by Gender

State/Project Area	Total	Male	Female
Bihar	104,099,452	54,278,157	49,821,295
Project Area	37,230,417	19,315,737	17,914,680
Percentage	35.76	51.88	48.12

3.2.4 Literacy

The literacy rate of the state is far below the national rate. Further, the gender gap in literacy rate is also as high as 19.7%.

Table 8: Literacy Rate

Year 2011	Bihar	India
Total literacy rate	61.80	74.04
Female literacy rate	51.5	65.46
Male literacy rate	71.20	82.14

3.2.5 Households

The household size in the state of Bihar roughly stands at six members per household. The number of members per household in rural areas is about five, whereas in urban areas it is about six.

Table 9: Household Distribution

S. No	Total	Number
1	No. of House holds	1,89,13,565
2	Total Population	104,099,452
3	No. of persons per Household	6
RURAL		
4	No of Households	16,862,940
5	Total Population	9,23,41,436
6	No. of persons per Household	5
URBAN		
7	No of House holds	2,050,625
8	Total Population	11,758,016
9	No. of persons per Household	6

Source: Census 2011

Bihar has significant number of female-headed households. As per 2011 census 7.4% of households headed by women, which is higher than the national average. Over 50% women in some districts are heads of households. Among the project districts, women headed households is highest in Darbhanga, 11.18

Table 10: Women Headed Households in Project District

Project District	Total number of female-headed households	Percentage on total HHs
Bhojpur	34,017	*8.18*
Buxur	17,431	*6.66*
Kaimur	13,537	*5.40*
Darbhanga	89,786	*11.18*

Project District	Total number of female-headed households	Percentage on total HHs
Gopalganj	37,086	*8.98*
Madhepura	22,472	*5.60*
Nalanda	37,634	*7.88*
Rohtas	28,645	*6.22*
Madhubani	71,260	*3.30*
Saharsa	22,460	*6.09*
Supaul	30,243	*6.83*
Samastipur	64,127	*7.68*
Saran	65,277	*10.34*
Bihar	*14,06,384*	*7.4*

Source Census 2011

3.2.6 Religious Profile

The population of Hindus in Bihar is about 83%, whereas the Muslim population is 17%. The rest comprises 0.12% Christians, 0.02% Sikhs, 0.02% Buddhists, 0.02% Jains, while 0.01% belong to other religions and about 0.24% did not state their religion.

Table 11: Percentage Population by Religion

S No.	Community	Bihar		Project Districts	
		Population ('000)	Percentage	Population ('000)	Percentage
1	Hindus	86078686	82.69	40082057	84.94
2	Muslims	17557809	16.87	6909864	14.64
3	Christians	129247	0.12	45779	0.10
4	Sikhs	23779	0.02	11433	0.02
5	Buddhists	25453	0.02	18384	0.04
6	Jains	18914	0.02	7098	0.02
7	Other Religious persons	13437	0.01	5256	0.01
8	Religion not stated	252127	0.24	106071	0.22
10	**Total**	104099452	100	47185942	100

Source: Census 2011

3.2.7 Scheduled Castes and Scheduled Tribes

The Scheduled Caste population of Bihar was 15.9% in 2011, as compared to 16.6% for India. The corresponding figures for 1991 were 15.5% and 16.5%. The Scheduled Tribe population was 1.3% in 2011, as compared to 8.6% for India in 2011.

Table 12: Scheduled Caste and Scheduled Tribe in Bihar

	Total Population			Rural			Urban		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Schedule Caste	13048608	6784676	6263932	12178555	6321221	5857334	870053	463455	406598
% age	15.9%	52%	48%	16.4%	51.9%	48.1%	10.0%	53.3%	46.7%
Schedule Tribe	758351	393114	365237	717702	371009	346693	40649	22105	18544
% age	0.9%	51.8%	48.2%	1.0%	51.7%	48.3%	0.5%	54.4%	45.6%

Source: Census 2011

The notified Scheduled Castes in Bihar are Bantar, Bauri, Bhangi, Bhogta, Bhuiya, Bhumji, Chamar, Mochi, Chaupal, Dabgar, Dasadh, Dhangad, Dharhi, Dhobi, Dom, Ghasi, Halalkhor, Hari, Kanjar, Kurariar, Lalbegi, Mehtar, Musahar, Nat, Pan, Pasi, Rajwar, Sawasi and Turi.

Table 13: Scheduled Caste and Scheduled Tribe in Project Districts

Particulars	**Total Population**		
	Total	**Male**	**Female**
Schedule Caste	8,706,622	4,511,579	4,195,043
Percentage	17.44	51.9	48.1
Schedule Tribe	306,270	156,011	150,259
Percentage	0.66	51.0	49.1

Source: Census 2011

In terms of the proportion of SCs, Gaya has the highest proportion (30.4%) followed by Kaimur (22.7%). Of the 17 project districts, Katihar has the least proportion of SCs (0.76%) followed by Saran (11.9%). The maximum proportion of STs are in Kaimur (8.27%) followed by Buxur (2.83%).

a. *Mahadalits* in Bihar: The Government of Bihar has identified 20 categories of scheduled castes which are acutely deprived and most vulnerable in terms of educational, economic, socio-cultural and political status and has formed a State *Mahadalit* Mission for their development. The literacy rate of *Mahadalits* is 16.7% against 28.5% among all the scheduled castes in Bihar. The top three districts in terms of *Mahadalit* proportion are Gaya (29.62%), Nawada (24.04%) and Aurangabad (23.46%).
b. Persons with Disability: As per census 2011, disabled persons constituted 2.21% of the total population in India and out of that nearly 50% of the disabled persons belonged to the five States, of which Bihar has 8.69% of the total PwDs in the country. In Bihar 47.3% of disabled persons are literate whereas literacy rate in the state is 61.80%.
    - Bihar has the highest share of disabled children to the age group 0-6 years, 12.48% of the population of disabled persons of the state, whereas the same at India is 7.62%.
    - Under the various categories of disability, Bihar has the highest number of persons with disability in speech.
    - In Bihar 37.12% of disabled population are workers, a little higher than national percentage 36.34%.

The state has programs targeting people with disabilities, like Bihar Disability Pension Scheme; Mukhyamantri Divyangjan Sashaktikaran Chhatra Yojana and State Social Security Pension Scheme.

3.2.8 Labor Force Participation

There is total 34,724,987 workers working in the State according to census 2011. Out of total workers, 31,359,767 workers (90%) are in rural area while 3,365,220 workers (8.69%) are in urban areas.

Table 14: Workforce participation in Bihar

Number of Workers			
	Main Worker	**Marginal Worker**	**Non-Worker**
Bihar No.	2,13,59,611	1,33,65,376	6,93,74,465
Percentage	20.52	12.84	66.64
India No.	36,25,65,571	11,93,23,297	72,89,66,109
Percentage	29.94	9.85	60.20

Source: Census 2011

Table 15: Workforce participation in Project Blocks

	Main Workers			Marginal Workers		
	Total	**Male**	**Female**	**Total**	**Male**	**Female**
Project Blocks: No.	41,04,886	32,89,942	8,14,944	27,68,300	16,08,681	11,59,619
Percentage	59.72	67.16	41.27	40.28	32.84	58.73

Source: Census 2011

In the project area 41 lakh workers (59.7%) are main workers and 28 lakh (40%) are marginal workers. The proportion of female workers is more among marginal workers than in main workers category, as generally women spent more time in household chores and in care giving provision or unpaid work.

Table 16: Total Workers in Agriculture in Bihar

Particulars		**Total Lakh**	**Rural Lakh**	**Urban Lakh**
Cultivators	Total	54.13	52.61	1.52
	Female	7.24	7.09	0.14
	Male	46.89	45.51	1.37
Agricultural labour	Total	95.37	92.26	3.12
	Female	21.64	21.13	0.51
	Male	73.73	71.13	2.6
Total Agricultural workers	Total	149.5	144.87	4.64
	Female	28.88	28.22	0.65
	Male	120.62	116.64	3.97
Total Workforce	Total	347.25	313.6	33.65
	Female	95.03	89.23	5.79
	Male	252.22	224.37	27.85
Percentage of Male / Female in total workforce	Female	19.32	19.48	14.01
	Male	80.68	80.51	85.56

Source: Census 2011

Agriculture sector engages nearly three-fourths of Bihar's population, and Bihar is one of India's top producers of vegetables and fruits. As per the above table, out of total 54.13 lakh cultivators in the state, women cultivators of the state are only 7.24 lakh. The share of female agricultural workforce in total agricultural workforce is assessed to 19.32% in the state whereas that of male workforce is 80.68%.

Around 89% of the population in Bihar lives in rural area as per census 2011, and their main source of livelihood is agriculture. However, the size of land holding is very small as evident in India. At present (As per Agriculture Census 2015-16) the average size of operational land holdings in the state is 0.39 hectares. The total number of land holdings are 164.13 lakhs out of which 149.71 lakh (91.2%) were marginal farmers in 2015-16 which was 91.06% in 2010-11, 9.44 lakh (5.75%) small farmers in 2015-16 and 9.48 (5.86%) in 2010-11. Further, 4.98 lakh (3.03%) in 2015-16 and 4.99 (3.08%) in 2010-11) farmers hold land above 2 hectares. It shows there is minimum changes in the land holding pattern.

Table 17: Distribution of Holdings by Size

Size	No. of Operational Holdings ('000)		Area of Operational Holdings ('000 ha)		Average Size of Holdings (Ha)	
	2015-16	2010-11	2015-16	2010-11	2015-16	2010-11
Marginal (0-1Ha.)	14971	14744	3728	3669	0.25	0.25
Small (1-2 Ha.)	944	948	1178	1186	1.25	1.25
Semi-Medium (2-4 Ha.)	414	415	1076	1073	2.6	2.59
Medium (4-10 Ha.)	81	81	431	415	5.29	5.09
Large (10-above Ha.)	3	3	45	45	14.48	14.45
Total	**16413**	**16191**	**6457**	**6388**	**0.39**	**0.39**

Source: Agriculture Census 2015-16

3.2.9 Housing

Most of the houses have G.I. or Asbestos/metal sheets roof (20.1%) followed by polythene / plastic roof, although in the state as high as 33.6% houses have grass/ thatch/ bamboo or wood roof and 23% houses have concrete roof. In project area a tiny 0.45% houses have concrete roof.

Table 18: Type wise distribution of Housing

State/ Project area	Total number of census houses	Material of Roof								
		Grass/ Thatch/ Bamboo/ Wood/ Mud, etc.	Plastic/ Polythene	Hand made Tiles	Machine made Tiles	Burnt Brick	Stone/ Slate	G.I./ Metal/ Asbestos sheets	Concrete	Any other material
Bihar No.	22,783,067	7,656,471	283,575	4,031,787	210,681	1,615,410	1,236,476	2,412,593	5,234,365	101,709
Percentage	100	33.61	1.24	17.70	0.92	7.09	5.43	10.59	22.97	0.45
Project districts no.	10,247,895	3,287,656	144,704	1,882,177	100,211	869,511	797,472	1,060,181	2,059,510	46,473
Percentage	32.08	1.41	18.37	0.98	8.48	7.78	10.35	20.10	0.45	32.08

3.2.10Economy

With around 89 percent of the total population living in rural areas, agriculture as the primary feeder of rural economy continues to operate on margins of land. Thus, agriculture continues to define both the potentialities and constraints to the development in Bihar. However, Bihar, once restricted to the lowest levels of development in the country. Further, the GDP of the state is 9,76,514 crores at the current market price (2024–25). The GSDP stands at 9.765 lakh Crores Rupees as per 2023-24. In actual terms, as of 2012–2013, Bihar state GDP was ranked 8 out of 29 states. The state also has a small industrial sector. As of 2021, agriculture accounts for 24%, industry 15% and service 61% of the economy of the state. Since November 2005, the government, has implemented several economic and social reforms. Such reforms have yielded a positive improvement in the economy of the state. The

strong growth process has resulted in gradually narrowing the gap in per capita income of the state. Despite facing challenges in form of floods, droughts, high fertility rate, low urbanization and high population density the State has done exceptionally well with its minimal resources. The Mahatma Gandhi National Rural Employment Guarantee Act, 2005 (MGNREGA) aims at enhancing livelihood security in rural areas by providing 100 days of guaranteed wage employment in a year to every household whose adult family member volunteer to participate in unskilled or manual work. Since its inception in 2005, the performance of MGNREGA has been commendable in the state.

Table 19:Performance of MGNREGA 2014-15 to 18-19

Year	2016-17	2017-18	2018-19
No. of HHs job cards issues (lakh)	142.4	148.3	155.3
No. of HHs provided with employment	22.3	22.5	29.2
No. of HHs obtaining 100 days of employment (lakh)	0.2	0.2	0.2
Employment generated (lakh person-days)	858.4	817.2	1234.1
Average employment per household (person-days)	37.4	36.4	42.2

The table above shows the highest number of job cards was issued in 2016-17 (8.8 lakh), while the lowest was issued in 2017-18 (5.9 lakh), which again increased to 7.01 lakh in 2018-19. Between 2017-18 and 2018-19, the number of job cards issued increased from 148 lakh to 155 lakh. Similarly, the number of households receiving employment has increased by about 32 percent from 22 lakh in 2017-18 to 29 lakhs in 2018-19. The number of households which obtained 100 days of employment has also increased in the last three years. The number of person-days generated has again increased three, from 352 lakh person-days in 2014-15 to 1234 lakh person-days in 2018-19. However, the average number of days of employment per household has been fluctuating over the years. It was the lowest in 2014-15 (34.0 human-days) and the highest in 2015-16 (45.1 human-days). The primary reason for such low and fluctuating average number of days of employment per household has been the dropout of workers, without completing the mandatory 100 days of work.

3.2.11Below Poverty Line Families

As per NITI Aayog's Sustainable Development Goals dashboard, based on Multidimensional Poverty Index in 2023, 26.59% population of the state lives below the poverty line and of which 36.95% is rural population. The state holds the lowest in rank with respect to poverty indexation among 28 states of the country. In India 11.28% population lives below poverty line and that in rural area it is 19.28%. There is a wide variation in district wise MPI headcount ratio ranging from 52 percent in Araria to 17.4 percent in Siwan. Araria, Purnea, Supaul, Saharsa, Madhepura, Kishanganj & Katihar are in the top 7 districts that have high proportion of multidimentional poverty in 2019-20. On the other hand, Siwan has the lowest proportion of MPI poor people at 17.4%, which is followed by Munger (21.6%) and Rohtas (21.9%). However, Bihar has become the first state in the country that has reduced MPI poverty at the fastest rate of 18.13 percentage point and is able to lift around 2.25 crore people out of MPI poverty during the last five years. Bihar's achievement in moving 2.25 crore people out of poverty is a huge contribution in reducing the national MPI poverty, which is 13.5 crore.

3.2.12Local Governance

Panchayati Raj: In pursuance of the provisions made in the 73rd Constitution (Amendment) Act, 1992, the Bihar Panchayat Raj Act, 2006 has been enacted. At present, 8053 Gram Panchayats, 533 Panchayat Samitis and 38 Zila Parishads are functional in the State. Gram Panchayats are divided into wards, which

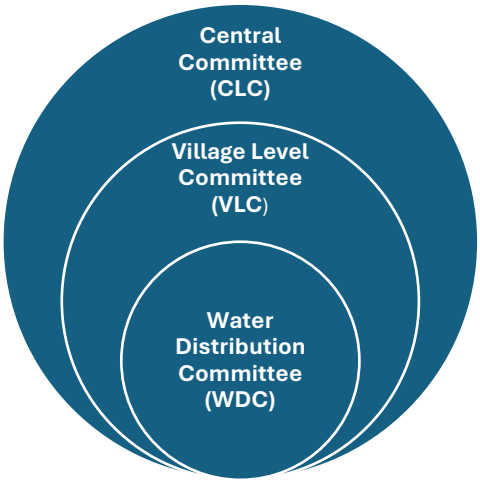
are approximately 1.15 lacs in number. In addition to establishment of three-tier Panchayats, a *Gram Katchahry* (village court) has also been established at each Gram Panchayat for dispensation of justice at the doorsteps of rural populace, which has got the authority to bring about amicable settlement of certain criminal and certain civil disputes between the rival parties, and in case of failure to do so, to impose a fine upto rupees one thousand to the party found guilty after deciding on the matter through prescribed procedures.

Apart from providing reservation to members of Scheduled Castes, Scheduled Tribes and Backward Classes in seats of members and chairpersons of three-tier Panchayats and Gram Katchahry, fifty percent horizontal reservation has been provided to women belonging to both reserved and general categories. To usher in decentralization at the grassroots level, along with provision of Gram Sabha at the Gram Panchayat level, Ward Sabha has been created at each Ward level under the chairmanship of the Ward Member. The Ward Sabha, through Ward Implementation and Management Committee, implements several important schemes of public importance assigned to the Ward by the Gram Panchayat.

Panchayats at the different levels have been entrusted with the responsibility of carrying out important functions and duties regarding 29 subjects described in the Eleventh Schedule of the Constitution. Most of the Panchayat's revenue comes from grants from the state and central governments. The central government provides around 80% of the grants, while the state government provides around 15%. Other sources are tax imposes by PRI on holdings, vehicles, lighting and more. Employees of different departments working at the panchayat level render necessary assistance and guide to the Panchayats subject to directions of the department.

3.2.13 Participatory Irrigation Management

In Bihar, Water User Association (WUA) based Participatory Irrigation Management (PIM) model has been developed which is known as Bihar model. The Bihar Irrigation Act, 1997, and the Bihar Irrigation and Drainage Rules, 2003 are some of the relevant laws and regulations that govern Water Users Associations (WUA)s in Bihar. Here, WUAs are formed at distributary level.



The WUAs in the state collect water fees and keep 70% of the revenue, paying the remaining 30% to the government. Further, here WUAs were given the license to procure paddy and wheat on behalf of the FCI during Kharif 2004-05. The Scheme level committee (SLC), known as WUA is registered under society act 1960. It is federating body of VLCs under jurisdiction of a particular Distributary. The SLCs have an executive body and general body. Executive body has positions of president, vice-president, secretary, treasurer and executive body members. The SLCs under an MOU signed with WRD are involved in O&M of the system, water distribution, efficient water use and financial matters including provision of resources to VLCs and solving any conflicts between VLC's.

The VLC generally also has a general body as well as an executive body with president, vice-president, secretary, treasurer and executive body members. The general body members are the farmer water users of the village. The presidents of VLCs form the general body of the SLC, and out of these, the executive body members of the SLC are elected. The VLCs manage the village level water allocation

and distribution, collection of fees from farmers, and minor repairs. Some subcommittees, such as Water/Outlet/Field committees, are established under the VLC.

The main role of WUAs is: i) helping in distribution of irrigation water equitably and in a phased manner, ii) optimizing cropping systems to save water, iii) Stop the wastage of water. (iv) Resolve irrigation-related disputes (v) keep canal system in proper condition through regular maintenance (vi) maintain office related records (vii) maintain good relations among different levels of the committee and with WRD, (viii) conduct elections as per rules. Basically, WUAs have critical role in planning, implementation, and functioning of minor and below minor outlet level irrigation scheme. However, still devolution of Capital investment and water pricing decisions remain quite centralized. The devolution is seen in water distribution, monitoring use/misuse of water, collection of fees, and managing repairs and maintenance.

Table 20: Status of WUAs Constituted in Bihar

(Constituted at Distributary Level)				
Scheme	**No. of WUAs**	**CCA (ha)**	**Average CCA/ WUA**	**CE Zone**
Sone Canal Project	34	114663	3372	Dehri
Kudra Weir Scheme	9	19520	2169	Dehri
Gandak Canal	17	37203	2188	Siwan
Gandak Canal	3	15270	5090	Motihari
Kosi Canal Project	1	5200	5200	Darbhanga
Total	**64**	**191856**	**3604**	

The Project will work towards increasing female representation in leadership roles across the 400 newly formed WUAs through the following targeted interventions: dedicated outreach to WUAs and grassroots women's groups; special membership drives through community campaigns to boost female participation; leadership development programs to equip women with governance, decision-making, and financial management skills; and policies to encourage and sustain female leadership. By increasing women's representation in WUAs, the Project will contribute to formalizing their role in agriculture, strengthening their authority and ensuring that their perspectives and priorities are reflected in decision-making, leading to a more equitable distribution of irrigation resources. Progress on these actions will be tracked via Proportion of women in Executive Committees of WUAs - the target for this indicator has been set at 20%.

3.2.14 Land Use Pattern:

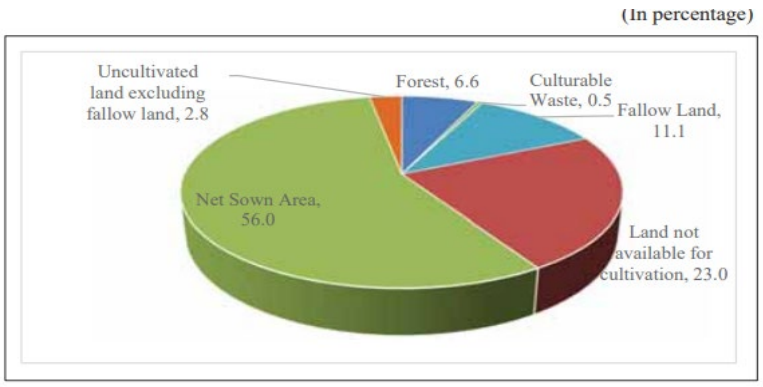
According to Economic survey of Bihar 2017-18, in Bihar about 56% of total geographical area is used for sowing crops. While rest 44% is used for other purposes or are un-culturable, fallow, forested, barren or tree cropped and pasture lands. The varying agro-ecological conditions, climatic factors and soil quality are contributing factors to decide the pattern of land use in the state.

Table 21: Land Utilization Pattern 2017-18

Particulars	**Area in'000 Ha**
Geographical area	9359.57 (100)
Forests	621.64 (6.6)

Barren &Unculturable land	431.72 (4.6)
Land put on Non-agricultural use	1718.31 (18.4)
Culturable Waste land	44.28 (0.5)
Permanent pasture	15.08 (0.2)
Land under trees and Groves	248.15 (2.6)
Fallow land other than current fallow	118.92 (1.3)
Current Fallow	919.5 (9.8)
Total Un-culturable land	4117.60 (44.0)
Net Area sown	5241.97 (56.0)
Gross Area sown	7525.18
Cropping Intensity	1.44

Source: Directorate of Economics and Statistics, GoB, 2017-18



The figures under parenthesis denote percentage share in total geographical area

3.2.15Gender

The state has several gender related challenges, such as lower literacy rate among women, early marriage, pressure of dowry. Gendered social norms limit equal footing for women. Particularly in rural area woman are exploited and neglected.

- **Sex ratio:** As per census 2011, the sex ration in Bihar is 918 females per 1000 males. The child sex ratio is 935. Women are 47.85% of the population and closely same in project area, 48.06%.
- **Literacy rate:** The literacy rate among female is 51.5%, around 14% less than the national female literacy rate. Further, it is 19.7% less than the male literacy rate of Bihar.
- **Workforce participation:** In the state, women in large numbers work in small industries. And women are also a major contributor in the agrarian sector.
- **Weak Agency:** Less than 10 percent of the executive committee members across all WUAs in the state are women

Table 22: Total Workers (Male-Female) in Agriculture in Bihar

Particulars		**Total Lakh**	**Rural Lakh**	**Urban Lakh**
Cultivators	Total	54.13	52.61	1.52
	Female	7.24	7.09	0.14
	Male	46.89	45.51	1.37
Agricultural labour	Total	95.37	92.26	3.12
	Female	21.64	21.13	0.51
	Male	73.73	71.13	2.6
Total Agricultural workers	Total	149.5	144.87	4.64

	Female	28.88	28.22	0.65
	Male	120.62	116.64	3.97
Total Workforce	Total	347.25	313.6	33.65
	Female	95.03	89.23	5.79
	Male	252.22	224.37	27.85
Percentage of Male / Female in total workforce	Female	19.32	19.48	14.01
	Male	80.68	80.51	85.56

Source: Census 2011

The above table reflects, out of total 54.13 lakh cultivators in the state, women cultivators of the state are only 7.24 lakh. The share of female agricultural workforce in total agricultural workforce is assessed to 19.32% in the state, whereas that of male workforce is 80.68%. Female agricultural workers in total agricultural workers were computed to 19.48% & 14.01% for rural and urban areas respectively. In case of male work force the same is 80.51% and 85.56% respectively. Besides, as per census 2011, 79.5% of the workforce engaged in animal husbandry are women. However, there is significant gender wage gap. Women are underpaid. Further, only 13.32% of the state's total landholdings are owned by woman.

3.2.16Gender based violence

The state has a high rate of violence against women and girls (VAWG) compared to other states. According to the National Family Health Survey (NFHS-5), 61% of ever-married women and 23% of never-married women in Bihar have experienced physical and sexual violence. However, the incidence of spousal violence in Bihar has decreased compared to previous NFHS surveys. The state government has introduced policies to address gender inequality, including Reservation of women in government jobs and Panchayats; Policies for health, education, and social protection; Helplines for women and girls, which provide free counseling and legal assistance

Women & Child Development Corporation, Bihar a Registered organization, (Societies Registration Act, 1860) working under Department of Social Welfare, Government of Bihar is the nodal agency for implementing women & child development programmes of the State. It is working in close partnership with Community Based Organizations, Administration & NGOs and mainstreaming the social, cultural and economic empowerment process for the women and girls of Bihar.

The organization has established 181 Women Helpline to provide immediate and emergency 24X7 service to women, girls affected by violence through referral and providing information about women empowerment and protection laws, related government schemes, programs running currently in the state. Under 181 Women Helpline any victim can call and register their complaint like Mental Harassment, Physical Harassment, Molestation, Dowry Harassment Cases, Dowry Murder Case, Domestic Violence, Human Trafficking, Sexual Harassment, and other cases. Each district in the state has the provision of Women Help line. The contact details are available at the website https://wcdc.bihar.gov.in/Helpline

4 Analysis of Alternatives

The analysis of alternatives was carried out to assess the alternative scenarios that can be considered while planning, developing, constructing, and implementing the project regarding their environmental and social implications. The analysis was carried out for "no-project" and "with-project" scenarios. The sections below consider the possible alternative scenarios in the project.

4.1 Analysis of Alternative Approach

The Analysis of alternatives looks at the potential project intervention and technical alternatives, e.g., resources that might be available, status of the irrigation canal system, flood/ drought situation, as well as likely risks for the environment and the local community with the intention to minimize adverse E&S impacts and maximize project outcomes and benefits. However, it would be essential to note that the alternative scenario analysis cannot always be applied equally across all interventions and / or across the state. These may vary with different agroclimatic zones, existing situations depending on the variability of physiographic and other physical and other constraints. Thus, there may be a requirement to reconsider these alternatives during the Technical Review stage on a case-to-case basis.

The irrigation and flood protection technologies and agriculture intervention will be customized to the local needs based on their suitability, technical needs, resources availability, natural climatic disasters, etc. Local conditions, demands and the agro-climatic characteristics will determine the effectiveness and thus the selection of alternative. Example the flood protection and irrigation system modernization would be more in focus in the Northern part while in the southern areas which is dry the canals system rejuvenation is the only requirement.

4.2 Analysis of 'No Project' Scenario

Bihar's economy faces significant challenges due to natural disasters, primarily floods and droughts, which are being exacerbated by climate change. The proposed Bihar Water Security and Irrigation Modernization Project aims to support transformation by combining multisectoral investments in irrigation and flood risk reduction with significant shifts in the water governance. Unless these interventions are carried out the rural economy will not be able to overcome the exacerbated issues of a) flooding due to Climate change, b) periodic droughts, and. c) livelihood losses and asset damages faced due to their frequent recurrence. Additionally, the agricultural component and the formation of WUA's will help the better utilization of water resources for agriculture, enhance productivity, improve resilience and help in reducing rural distress in the rural areas of Bihar. With project and without project scenario is presented in below:

Table 23: Analysis of "No Project" and "With Project" Scenario

S.No	No Project Scenario	With Project Scenario
1.	The present irrigation sources are primarily based on ground water and the continuing dependence on ground water irrigation can also run the risk of horizontal migration of arsenic.	There will be shift of dependence from ground to surface water sources. This will also take care of the issue of arsenic in ground water.
2.	The flood in Bihar is widespread. The Bihar Kosi Basin Development Project (P127725) has developed some Flood Forecasting (FF), 3-day lead forecasts and 5-day advisory forecasts only in the Kosi Basin and yet to be applied state-wide.	The project will strengthen institutions for the flood foresting and preparedness in the state and thus attenuate the risk to the population exposed to floods by helping them to safeguard their land, livestock, assets and lives through availability of advance information and reduction in their scale

		through repair and strengthening of embankments and riverbanks in flood prone areas.
3	Usually, the south and southwest regions of Bihar face regular drought conditions, on average once in every two years. North Bihar is less drought prone but can experience long dry spells as well during the monsoon season. This variability in climatic conditions affect the natural resource use especially groundwater	The project will develop well-functioning irrigation schemes that are essential for the equitable distribution and management of water resources from head to field and for improving crop productivity. They also help mitigate the impacts of flooding and droughts and reduce the stress on ground water.
4	Traditional Flood protection has been through development of embankment (using soil) and protection of the same using bounders. Since there are challenges in the design the	The project envisages use of blue – green infrastructure. The project will support: (i) flood-resistant landscaping, including flood-resistant plantings (native plants with deep roots) and vegetative buffers along water bodies, to stabilize soil and reduce erosion during floods; and (ii) laying of Jute Geo textile (JGT) on identified erosive natured embankment/canals. Thus the embankment will be stable and less resource consuming.
5	Agriculture in the state is highly vulnerable to these 2 climate events and their frequent occurrence leads to production and productivity losses	Promotion of climate resilient agriculture and use of indigenous crop varieties will help in reducing the climate vulnerability of farmers, especially among small and marginal ones, through crop diversification, assured incomes and by lowering production costs.

5 Environmental and Social Risks and Impacts

5.1 Impacts Associated with Project Interventions

The project will have both positive and adverse social impacts. The project components which will have some physical E&S issues involve the: A) Rehabilitation and Modernization (R&M) of three irrigation schemes. Its Sub-components will be implemented through five activities, viz., (i) Improvements in the Headworks; (ii) Sediment management; (iii) Lining and de-silting of selective reaches of canal/river sections; (iv) Modernization of hydraulic structures, including service outlets; and (v) On Farm Development (OFD). B) Flood Risk Reduction will include activities like strengthening of weak embankments and riverbanks and raising their heights to reduce exposure to floods. The intervention in these vulnerable reaches will also include raising of the embankments and riverbanks, erosion control measures etc. These activities above will involve construction activities. In addition, there would be an institutional support for development of better water governance so that the benefits of the improved water infrastructure can reach the beneficiaries and full irrigation potential can be harnessed. In addition, the project involves: C.) Climate Resilient Agriculture (CRA) in restored irrigation command areas: CRA interventions aim at enhanced beneficiary level outcomes for farmer resilience, water productivity, and farm profitability, and will be implemented through two activities, viz., i) Drought Adaptation and Mitigation through reduced GHG emissions and leveraging of climate co-benefits through voluntary carbon markets; and ii) Establishing functional linkages with agriculture service providers like FPOs, SHGs and other collective and local institutons.

The construction activities will have some impacts which will be limited to the duration and the location of the construction activity. No residual or cumulative impacts are envisaged. Even though a detailed Environment and Social Impact Assessment (ESIA) would be carried out to identify the sub-project level issue and an impact and higher order assessment. The mitigation measures have been presented in the ESMF to provide guidance for the subsequent sub-project level assessments.

5.2 Risk rating of Impacts Associated with the Project Interventions

The sub-projects and detailed project activities have already been identified. A preliminary screening has been carried out by overlaying the project footprint over the environmental and social sensitivities e.g. protected areas, internationally recognized areas, ecological corridors, archeological sites etc. The preliminary screening indicates that most of the proposed activities carry moderate to low risks, while some related to drought proofing and flood reduction pose significant risks that can be managed through properly planned mitigation measures. A summary of the likely risks and impacts of the proposed project activities is analysed in the table below:

Table 24: Potential Environmental and Social Risks and Impacts: Screening and Risk Categorization

Activity	Potential E&S Risks and Impacts	Risk Category (L/M/S)
CLIMATE RESILIENT IRRIGATION		
Rehabilitate and modernize five schemes through a) Improvements of canal headworks; b) Sediment management lining and desilting of select reaches;	Potential risks include displacement of people located near the headworks and weirs during machinery upgrades for automation and silt management, temporary access restriction to the canal RoWs due to construction or silt extraction, temporary stoppage of access to irrigation, lack of prior information and consultation with community regarding construction/	Substantial

Activity	Potential E&S Risks and Impacts	Risk Category (L/M/S)
c) Modernization of hydraulic structures, including service outlets	repair schedules. OHS risks for workers involved in the repair works, including SEA/ SH risks for female workers	
d) On-farm development	Risks related to integration of climate-resilient water and agriculture practices for water-use efficiency include exclusion of small, marginal and women farmers from project benefits, lack of access to appropriate farm advisories related to CRA, loss of productivity and income due to changes in traditional cropping practices, lack of adequate consultation with stakeholders- individual farmers and producer organisations.	Moderate
Re-constitution of WUAs, with emphasis on participation of female cultivators	Risk of exclusion of small and marginal farmers as well as farmers belonging to SC and *Mahadalit* categories not getting decision-making/ executive roles in the local WUAs or Central level WUA committees, lack of community awareness about the importance of WUA and its roles and lack of adequate consultation with relevant demand side stakeholders.	Moderate
Handing over of outlet level canals and field channels to WUA	Risk of inadequate capacities and awareness, among old and newly constituted WUAs about their roles and functions related to irrigation management, O&M and tariff collection before being handed over the channels/ outlets	Low
Pilot for engaging an ISP for the O&M of irrigation infrastructure	Risk of inadequate consultation with local stakeholders before selection of the private ISP, leading to poor ownership of the model, low tariff collection, poor O&M and hence inadequate access to timely irrigation impacting agriculture incomes, especially among smallholders and vulnerable households.	Moderate
Scoping study on upscaling of models	Risk of the study not consulting relevant stakeholders or not assessing the needs of smallholders or irrigation access to all including those on the tail-end before recommending models for upscaling	Low
Establishing a Centre for Climate Resilient Agricultural Systems (CCRAS) and demonstrating CRA practices	Risk of the centre not assessing the needs and support required by farmers for switching from existing production systems to new CRA systems, lack of adequate information, handholding and extension support from to farmers for adopting new water-efficient and climate resilient practices	Moderate
Promoting collaboration between agriculture service providers, self-help groups (SHGs) and/or Farmer Producer Organizations (FPO).	No risk	
Strengthening of WALMI for staff training, exposure trips and seminars	Low institutional capacities within extension staff of agriculture and water resource department to engage with communities on CRA related aspects or provide information in simple, usable form.	Low
Farmer training, exposure and exchange visits and workshops	Risk of exclusion of women farmers from exposure visits and off-site trainings, exclusion of farmers belonging to vulnerable category; risk of farmers not being provided information in simple comprehendible	Moderate

Activity	Potential E&S Risks and Impacts	Risk Category (L/M/S)
	manner or being provided after training support to undertake changes in the fields.	
FLOOD RISK REDUCTION		
Strengthen select reaches of embankments and riverbanks	Risks include possible temporary or even permanent displacement of informal occupants located near the embankments, riverbeds during the construction period or even loss of livelihoods and income. There may be temporary access restriction due to construction activity; risk of lack of prior information and consultation with community regarding construction/ repair schedules. OHS risks for workers involved in the works, including SEA/ SH risks for female workers	Substantial
Raising the height of select embankments	Same as above	Substantial
Flood-resistant landscaping, including flood-resistant plantings	Some of these plantations and landscaping site may have the presence of informal settlers and face permanent resettlement impacts; risk of local communities not being consulted for landscape planning	Substantial
Laying of jute geo textile on identified embankment/canals	Some of these identified embankments and canals may have the presence of informal settlers and face economic or physical displacement or access restrictions.	Moderate
Advanced flood forecasting and early warning system (FF-EWS) in the five flood prone river basins	Risk of the forecasting and warning systems not being available in simple language and not being accessible to those without mobile ownership	Moderate
WATER GOVERNANCE		
Revision of SoPs to improve O&M of irrigation schemes	Risk of the SoPs not addressing the needs of smallholders and other vulnerable farmers, leading to their exclusion	Moderate
Establishment of PIM Cell and PIM Units	Risk of PIM staff not being adequately conversant with participatory approaches to promote people's participation in planning and management of irrigation systems	Low
Revision of Bihar Irrigation Service Rules.	No risks	
Establishment of Hydrologic and Agricultural Information Support Centre (HAISC)	Risk of HAISC not being able to galvanize other agencies for information sharing and forecasting, leading to sub-optimal benefits for farmers in the affected areas	Low
Development of advanced Irrigation Performance Assessment (IPA) tool	IPA may not provide information regarding irrigation schedules and drought spells in accessible formats to the farmers	Low
Development of advanced tools for drought forecasting and early warning	Same as above	Low
Operationalization of flood monitoring using a real-time data acquisition system (RTDAS)	Same as above	Low
Procurement of topographic and bathymetric survey data of the project area	No risks	

Activity	Potential E&S Risks and Impacts	Risk Category (L/M/S)
Investments in technology, personnel, and infrastructure	No risks	
Completion of river morphology studies	No social risks	
Scoping study for revision of the current Bihar State Water Policy (SWP), drafting the new SWP	Risk of scoping study not consulting vulnerable stakeholders and women farmers adequately, or assessing their irrigation related access leading to their exclusion under the new policy	Moderate
Preparing the charter (or terms of reference) for the Bihar State Water Regulatory Authority (BSWRA)	Same as above	Low

5.3 Activities excluded under the program

Table 25: Negative list

Project will not support activities that involve:

1. Use of child labor and/or forced labor
2. Any adverse impact to any physical and/or cultural resources
3. Any risk/ impact to forests and/ or protected areas e.g. sanctuaries, notified wetland, or any eco-sensitive area because of subproject activities
4. Activities requiring diversion of forest land to non-forestry purposes (or infringement in eco-sensitive areas)
5. Any construction within 200 meters of cultural, historic, religious site/ buildings designated as Archaeological sites
6. Any activity that will have adverse impacts on IPs and without obtaining Free Prior and Informed Consent (FPIC).
7. Purchase of pesticides, insecticides and chemical fertilizers

This ESMF does not include the issues covered under O.P/B.P 7.50 and O.P/ B.P 7.60 which are being handled separately

5.4 Risks/Impacts and Mitigation Measures

The activities which will be performed under the different types of sub-project have been identified. Considering the environmental and social sensitivities in the project the potential environmental and social issues were identified, and only significant environment and social issues have been presented in the table below:

Table 26: Risk and Mitigation Measures

S. No.	Nature of work	Potential Envt and Social Risks /Impacts	Management/ Mitigation Measures
1	*a. Rehabilitation of Dam & Barrages and construction &modernization of Spurs and Embankments* *b.* Raising, Strengthening, and blacktopping work etc *c. Renovation and Modernization of Canals.*		
1.1	Survey (Topographic Survey, Bathymetric Survey)	**E**: Potential Risks to Benthic and terrestrial ecology **S:** Potential temporary or permanent negative impacts on Land due to dumping of excavated material	Identification of encumbrance-free land for dumping Undertaking Benthic and Terrestrial Ecological survey/ study.

S. No.	Nature of work	Potential Envt and Social Risks /Impacts	Management/ Mitigation Measures
1.2	Analysis of existing data to revise the design and prepare the DPR	**E:** Identification of the Environmental Impacts **S**: Identification of the Social Impacts	Preparation of an Environmental and Social Impact Assessment (ESIA), an Environmental and Social Management Plan (ESMP), and, if required, a Resettlement Action Plan (RAP) and a Biodiversity Management Plan (BMP). The elements which need to be covered in the ESMP are presented in section A suitable technology will be adopted to ensure ecological impacts are minimized. Adoption of Green/ blue technologies to minimise the natural resource requirement
1.3	a. Civil works (retrofitting, minor repairs, grouting, gunning) b. Mechanical Works (Gate Works, Hoist works) c. Rehabilitation: earthwork d. Rehabilitation: provision of additional spillway e. Rehabilitation: repair of boulder apron f. Rehabilitation: Change of Gates g. Repair& Construction of Approach Road h. Instrumentation Systems i. De-silting (earthworks) to shape the channel and improve conveyance. j. Construction of embankment along the river Hydraulic Structure: Construction of outlets, SLR and DLR bridges etc	**E:** Construction-related impacts of water, air pollution OHS issues Community Health Safety Issues **S:** Labour, Labour camps, Labour influx	Construction activities should only be initiated once the Contractor submits: - CESMP - OHS Plan - Labour Management Plan including layout of the construction camp Construction activities should start when the engineer approves the above submitted by the Contractor. Contractor to follow the CESMP, OHS and LMP: - The labour should undergo training as - record of such training should be maintained. Contractor to report on - CESMP measures carried out PIUs to review performance of the CESMP implementation continuously and the corrective action plan to be provided in case of any irregularities. In cases of non-compliance of CESMP, provisions of penalties, included in the Bid to be evoked.
1.4	Orientation of Implementing agency and Contractors	E & S: Lack of information regarding proposed activities to be undertaken under the project and its environmental and social consequences may hamper the objectives of the project.	The Water Resources Department shall organize orientation program during all stages of the construction project such as pre-construction phase, construction phase and Operation phase. The orientation session shall involve all project staff along with field level implementation staff of the department and contractor.
1.5	Disclosure and Public Display of Information	Stakeholder engagement for ensuring inclusiveness	Copy of ESMF and ESMP of related sub-project shall be kept at project site and on the website of WRD. Project information needs to be displayed prominently at project sites (boards) with the name of sub-project, start and completion date, contract value, name of contractor, implementing agency, GRM contact information.
1.6	Operation (Preparation of Operation Manual) & maintenance	**E:** Management and disposal of the Silt,	• Development and implementation of silt management plan

S. No.	Nature of work	Potential Envt and Social Risks /Impacts	Management/ Mitigation Measures
		Promoting climate resilient indigenous variety of crop and cropping practices **S:** Changes in Practice for efficient use of natural resources	1. Development of an Integrated pest management Plan and Integrated Nutrient Management Plan for reduction of chemical usage in Agriculture • Promotion of Indigenous plant varieties for Climate Resilient agriculture • Changes in flow regime of the river in dry season due to increase abstraction due to augmentation of the capacity of canal and maintenance of the aquatic habitat to prevent impact on aquatic life
1.7	Soil Erosion and Contamination Construction and rehabilitation activities	**E:** may disturb the surrounding soil and degrading its quality due to waste generation.	• Embankments and excavated slopes will not be left untreated /unattended. • Approved Engineering design will be followed. • Avoid or minimize vegetation removal/clearing. • Sites will be restored upon completion of project.
1.8	Waste Generation	**E:** Wastes including discarded construction material, asphalt, steel, oil, fuel, empty containers and bags, excavated material and municipal waste will likely be generated during the civil work construction and rehabilitation activities.	• Ensure proper waste management including storage, handling, transportation and disposal. • Left over construction and demolition waste materials will be reused, where possible. • Compliance with site specific waste management plan. • Material Safety Data Sheet (MSDS) shall be followed strictly, where applicable.
1.9	Water Contamination	**E:** Water resources may be at risk of contamination from construction site runoff and wastes, if not managed properly, impacting aquatic life and also pose health and livelihood risks to communities.	• Construction camp will not be located within 500m of any water body. • Wastewater from the work site will be disposed through a settling tank of appropriate capacity, which will be levelled back after completion of construction work. • It will be ensured that the wastes are not released into any water bodies, cultivation fields, or critical habitat. • Ensure the compliance with BEQS and IFC/WHO guidelines whichever is stringent. • Construction machinery will be kept properly tuned and maintained. • Fuels and chemicals will be stored on concrete-floored, bounded, covered to provide shade and prevent the ingress of rain and should be located away from the open water sources.
1.10	Noise Pollution	**E:** Operation of construction machinery (such as bulldozers, excavators, pneumatic machinery, etc.), generators, offloading of materials, and construction activities may increase the noise level which	• Main roads will be used to the maximum extent possible. • Vehicles and machinery shall be properly tuned and maintained. • Noisy construction work shall be limited to normal working hours and nighttime should be avoided.

S. No.	Nature of work	Potential Envt and Social Risks /Impacts	Management/ Mitigation Measures
		will impact on Dolphin and aquatic life	• Avoid excessive use of horns and vehicle speeds will be kept low. • Noisy construction activities will be displaced to a fair distance from the nearest sensitive receptors (if any). Construction schedules shall be disclosed to the nearby communities, where required. • Ensure the compliance with BEQS and IFC/WHO guidelines whichever is stringent (as advice of Environment Specialist). • Ensure the effective implementation of GRM.
1.11	Ambient Air Quality	Movement of construction machinery (operation of concrete batching and concrete mixer, diesel generator,) and activities (excavation, site clearance and leveling, filling of earth material, demolition, loading/unloading of material etc.) may cause decline in air quality.	• Vehicles and other equipment shall be properly tuned and maintained. • All dust raising locations shall be kept wet with water sprinkling, where required. • Construction material will be transported in a covered truck. Vehicle speed shall be kept low. • Ensure provision of PPEs to project workers and trained them on their use. • Ensure compliance with the BEQS and IFC/WHO guidelines whichever is stringent (as per advice of Environment Specialist).
1.12	Loss of vegetation and impacts on flora and fauna including aquatic animals, dolphins, fish and other benthic communities	Activities such as clearing of sites, establishment construction camps and mobility of construction machinery increase in noise level and decline in ambient air quality may disturb the flora and fauna. Damage and cut the ornamental plants and trees, for use as fire-wood to fulfil the requirements of construction labours may adversely impacted on flora and fauna. Birds and animals, aquatic species & dolphin may tend to move away due to fear of being hunted / trapped.	• Project will specifically exclude physical investments that could have significant adverse impacts to natural and critical habitats. • Properly planned to avoid or minimize the cutting of trees/shrubs/herbs and loss of agriculture land. • Compensatory plantation will be carried out with a ratio of five trees for each tree fell/cut. Forest and Wildlife Departments shall be consulted to fulfill the legal requirements, where applicable. • Project staff shall be strictly directed not to damage any nearby agriculture land/vegetation/trees; • Vehicle speed shall be kept low. • Construction crew will be provided with LPG as cooking (and heating, if required) fuel. Use of fuel wood will not be allowed. • Hunting, poaching and harassing of wild animals and birds shall be strictly prohibited. • Ensure the compliance with the relevant measures provided for air and noise pollution and waste management.
1.13	Occupational Health and Safety (OHS) risks	Deep excavations, steel fixing, installation of a batching plant, concrete pouring, during installation of contractor camps installation of panels, movement of various heavy machines, manual handling during loading-	• Ensure compliance with the LMP and approved site specific ESMP. • Community liaison will be maintained during the construction stage and ensure compliance with GRM. • Ensure compliance with the Worker's Code of Conduct;

S. No.	Nature of work	Potential Envt and Social Risks /Impacts	Management/ Mitigation Measures
		unloading operation, poor housekeeping and improper management of hazardous and non-hazardous wastes etc., may cause OHS risks.	• Ensure that the site will be restricted for the entry of irrelevant people and appropriate safety signs at sites; • Ensure the provision of appropriate use PPEs to all workers and compliance with BEQS, as placement of gabion boxes and mega geo bags is very risky work and precautionary measures must be taken in its execution. • All the occupational incidents, accidents and diseases will be recorded and reported. • Ensure the provision of fire prevention and firefighting equipment. • Ensure the training of workers in construction safety procedures, use of PPEs, fire safety, waste management, defensive driving, diving under water, hygienic conditions, emergency prevention, preparedness and response arrangements, communicable diseases.
1.14	Community Health and Safety	Dust and noise, roadside accidents/incidents, physical injuries due to falls in excavated sites, exposure to hazardous materials, inappropriate disposal of liquid and solid wastes, conflicts between local community and the workers, spread out of communicable diseases.	• Ensure compliance with site specific community health and safety plan. • Site will be restricted for the entry of irrelevant people particularly children, disabled and elderly peoples. • Ensure the use of appropriate safety signs at the construction site. • Provide adequate fencing around the working areas and excavations. • Ensure the compliance with the mitigation measures provided for air, noise and waste management. • Vehicle limit shall be kept low and horns will not be used while passing through or near the communities. • Effective implementation of GRM will be ensured to timely address the issues. • Ensure due care of the local community and observe sanctity of local customs and traditions. • Warn the staff strictly not to involve in any unethical activities and to obey the local norms and cultural restrictions. • Training and awareness sessions will be conducted regularly. • Sensitization on SEA/SH and access to GRM
1.15	Site Security	Security risks may arise during the implementation of project, particularly in the remote regions since the law-and-order situation is not good and it is not entirely normal. This may lead to security related issues including travel safety and premises safety.	• Project will continue to rigorously engage with the local communities. • Maintain communication through employer with local police and law enforcement agencies and inform about construction activities particularly for sensitive areas. • Ensure the effective implementation of GRM.

S. No.	Nature of work	Potential Envt and Social Risks /Impacts	Management/ Mitigation Measures
1.16	Labour Influx	Conflicts between local communities and outside labor, increased illicit behavior and crime, increased burden on local public services and utilities, the spread of communicable diseases, and risk of gender-based violence, Sexual Exploitation and Abuse (SEA), and Sexual Harassment (SH).	• Preference in hiring local labor wherever possible, for both skilled and unskilled. • Ensure orientation of migrant workers on cultural sensitivity and conduct • Ensure compliance with LMP by the contractor • Adherence of worker's code of conduct by the contractor • Ensure functional and responsive GRM. • Sensitization and awareness on SEA/SH
1.17	Gender Base Violence (GBV)	Risks may arise for women and children (especially of minorities), other vulnerable groups during resettlement action; with the presence of migrant labors in select sites; and during training or on-site capacity development activities for women SHGs/ farmers.	• GBV/SEA/SH is prepared for the Project and same will be implemented. • GBV/SEA/SH complaints received through the GRM will be redirected to the dedicated staff who are trained on the GBV Action Plan with the required sensitivities and confidentiality • Service providers will be identified and mapped to address SEA/SH issues. • Awareness session will be conducted regularly for community and workers through skilled trainers/ service providers • Sensitization of staff responsible for implementation of Resettlement Action to ensure zero tolerance towards ant acts of GBV against the squatters • Targeted communications and awareness to women regarding potential SEA / GBV risks, their rights, and GRM especially for project affected people under resettlement. • Labor and or all project staff will be made aware of the civil, social, and legal rights of women and vulnerable groups and about the actions taken in the event of GBV and SEA/SH. • Project workers (skilled and unskilled) will sign the code of conduct before commencement of civil works. • Provision related to SEA/SH or GBV will be incorporated in the bidding document
1.18	Force/Child Labor	There is a probability to involve the use of child forced/child labor. These risks are likely to be higher in economically disadvantaged and remote areas under the project.	• Hiring children below the age of 15 for any type of labor, and below the age of 18 for hazardous work will be prohibited. • Ensure regular monitoring to check for child labor and will hold regular consultations to keep a check on forced labor. • Follow provisions under LMP for requirements during hiring the labor force. • Awareness will be created among the local communities and project staff. • Beneficiaries (particularly for component 1 & 3) and primary suppliers will be made aware of the labour laws and World Bank regulations regarding child/forced labor.

S. No.	Nature of work	Potential Envt and Social Risks /Impacts	Management/ Mitigation Measures
1.19	Elite Capture and enhanced vulnerabilities	There is a risk that vulnerable groups and communities may be excluded from stakeholder consultations, limiting their ability to provide feedback on project design and impacts, and potentially preventing them from fully benefiting from the project.	• A comprehensive Stakeholder Engagement Plan (SEP) has been developed and will be implemented during course of project. • Ensure the compliance with the GRM and criteria for the project beneficiaries particularly for component 1 and 3. • Ensure that only the genuine beneficiaries are enlisted for the project support. • Project staff will be trained on social inclusion and stakeholder engagement.
1.20	Chance Findings of Important Physical and Cultural Resources	Project may encounter the chance finding of important physical cultural resources during the implementation.	• Subprojects sites will be screened prior to commencement of civil work; • Ensure the compliance with the chance find procedure provided.
1.21	Land Acquisition and Involuntary Resettlement	Land acquisition is not anticipated at this stage; however, resettlement is involved along the canals and embankments. This is for non-title holders or squatters occupying these areas for habitation, livelihood or both.	• Resettlement Policy Framework (RPF) has been prepared and same will be implemented. • Site specific Resettlement Action Plans will be prepared and executed • Access to GRM will be ensured and information on GRM will be displayed/disseminated at sites
2.	On-farm Water Management (OWM), including Micro-irrigation		
2.1	Construction of field channel	Generation and disposal of solid waste	• Excavated soil material will be re-used in backfilling and levelling as much as possible. • Excavated material and other construction waste such as stone chip, sand, cement, wood chippings, which cannot be re-used at the site will be collected and disposed at the nearest approved landfill site. • The contractor will immediately collect any excess excavated soils for backfilling of borrow pits. • The contractor will adopt efficient construction methods and re-use of construction material to minimize the waste to be generated from the construction works.
2.2	Micro irrigation system	Reduction in water demand due to adoption of less water demanding crops. Increased Rabi & Boro cultivation area. Investment in micro-irrigation will improve water use efficiency.	• Capacity Building of farmers and departmental staff on Micro Irrigation, Water management and Farm Mechanisation. • Scheduling water distribution calendar

5.5 E&S considerations at different stages of the project process cycle

Based on the understanding of the processes within the department the E&S entry points in the process cycle are included in the table below:

Table 27: Process Cycle to map E&S entry points

Process in the Project Cycle	E&S Consideration	Tools for E&S monitoring
1. **FEASIBILITY** • Irrigation Potential (IPC & IPU) • Life of Canal System • Flood Proneness Area • Drought Prone Area	Mapping of environmental sensitivities, waterlogged areas, drought prone areas. Mapping of habitation, current land use and assess availability of Land Schedules	***ESMF, RPF, LMP and SEP will be the guiding documents.*** Specifically, Annexure 1: E&S Screening Checklist - will be filled and submitted by Environmental and Social Specialist of PMU[11]
2. **PREPARATION OF SCHEME BY FIELD ENGINEERS** • Identification of Vulnerable reaches for prioritization • Damages to canal structure • Selection of schemes	Verification of environmental sensitivities and design a scheme to avoid E&S adverse impacts. Mapping functionality of WUAs. Verification of habitation, land use, land schedules and cultural heritage	An Environmental and Social Impact Assessment (ESIA) of these activities proportional to risk of the activity defined will be carried out during that time. Prepare ESIAs (including ESMP) under the project. ESIA (including ESMP) to be included in the DPR. Specialized Mitigation Measures to be prepared: - Preparation of the RAP (See Annexure: 2) - For less than 20 people impacted, Abridged RAP will be prepared - ToR for Agency (NGO) to finalize and execute RAP available as Annexure: 3
3. **REVIEW and APPROVAL** • Technical Review and approval of Scheme by SE, CE and recommendation of the scheme to PMU • Approval of Scheme by Project Co-Ordinator	• Verify whether the environmental sensitivity identified has been adequately considered. Include the social sensitivity of the scheme in the design. • Ensure that the E&S processes described above has been followed. In case there are any additional E&S aspects, or the identified aspect need more clarity and support the same direction should be provided	
4. **DETAILED DESIGN** • Surveys and Preparation of DPRs • Review of DPR • Approval of DPR	**Construction Material Requirement**: i) quantification of the soil, boulders and or other material required ii) sources of or other material required iii) sources of such boulders; **Waste Generation and Disposal**: i) Identification of the areas for silt deposition, ii) quantities of C&D waste generated and potential reutilization Silt excavated: quantity of the silt likely to be generated, ii) quality aspects and whether it can be deposited in any agricultural land iii) possible reuse of silt; **Tree Enumeration**: enumeration of trees which need to be felled; **Forest Land**: identification of involvement of forest land; **Hydro-ecological studies**: i) changes in the flows in the river ii) Critical habitat assessment (if required); **Inclusion of Green and Blue infrastructure**: i) identification of the potential alternatives to reduce natural resource use, ii) quantification of the reduction in natural resources. **Land Requirement and Resettlement**: Socio-economic survey of affected persons including	

[11] The sub-projects will be screened for the environmental sensitivities, during the feasibility stage. The KML file of the tentative alignment (in the case of irrigation canal or embankment) / tentative location of the site of intervention (in case of other intervention) will be used for the screening. The kml file will be overlaid on the environmental and social sensitivity map e.g. protected areas, forest, critical habitats, settlement. The screening checklist which has been include in Annexure 1 will help in reduction of environmental and social sensitivity at the technical feasibility stage. Since the sensitivities will be known at an early stage, the environmental and social specialist can carry out a scoping studies e.g. the Bio-diversity assessment and the socioeconomic studies of affected person that may be required to properly assess risks and plan their mitigation

	household survey; **Labour estimates** number of direct and indirect labour; number of migrant and local; labor camp requirements; **Status of WUA**.	
5. TENDERING • Preparation of Bid documents by PMTC • Tender Evaluation and Award	• i) ESHS evaluation criteria is included in the contract ii) ESMP has been included in the contract iii) Standard ESHS clauses are included in the contract iv) ESHS performance Guarantee • i) Code of Conduct for labour is signed and submitted ii) ESHS criteria is evaluated and include in the bidding document • Provisions of Penalty clauses[12] for non-compliance of ESMP	Contractor ESMP (C-ESMP) to be included in Bid Documents which covers E&S responsibilities of Contractor including monitoring and reporting and Contractual Remedies (See Annexure 8 and 9: Format for C-ESMP to be included in Bid documents)
6. IMPLEMENTATION	• i) Obtaining Consent and Permits, ii) approval of the location and layout of the Construction Camp (if any), iii) updating of the E&S documents for changes in the final design, v) Implementation of the ESMP vi) Induction Training and other job specific training • i) onboarding of NGO/Support Organization ii) verification of the RAP, iii) Finalization of RAP/A-RAP, iv) Administrative approval of the RAP/A-RAP, v) implementation/disbursement of R&R assistance	Reporting against Contractor-ESMP Reporting against RAP Reporting against agreed specific mitigation measures Reporting against Contractor-ESMP
7. REPORTING AND MONITORING	i) Develop a Monitoring system, ii) Regular monitoring and reporting, iii) Training and Capacity building, iv) onboarding of the M&E Consultant	

The ESIA for the respective sub-projects will be carried out. Presently ESIA is being carried out for sub-projects which are required to meet the DEA Readiness Criteria[13] . For the rest of the interventions, the contours of several operations will be known later for which further deliberations will be required with the PMU and PIU during the operations phase.

[12] In case of non-compliance of ES requirements, an additional 1% will be retained from each bill and the contractor will be required to comply with the ES requirements within the next two billing cycles. However, if any identified non-compliance is not addressed in the next two billing cycles, then the retained amount will be forfeited. If such incidences of forfeiture due to ES non-compliance happen more than 5 times during the contract period, the contract will be terminated, and the ES performance security (ES – Bank Guarantee) will be encashed.

[13] Department of Economic Affairs, Government of India has stipulated some milestones to be completed at different stage of the project. This includes:" Environmental Management Plan (EMP) for the first two years of project implementation has been finalized. Complete IEE/ EIA and secure approval of MFI" before appraisal of the project.

6 Specialized Mitigation Measures

6.1 Resettlement Action Plan

Socio-economic survey is being carried out as part of the ESIAs and sub-projects show impacts on residential/commercial structures (squatters) and or livelihood impacts. Before the start of the civil works, the detailed plan of the resettlement (or RAP - resettlement action plan) will be prepared calculating the individual entitlements based on the socio-economic survey. RAP will be implemented, including the disbursement of the R&R assistance identified for the people affected by the project (PAPs). The ESMF includes a Resettlement Planning Framework lays down the principles and procedures for management of pre-construction adverse social impacts and guides the social impact assessment and preparation of RAPs. The framework has been developed based on the ESF requirements under ESS5 as well as the national and state legislations which provides guidance on how the resettlement and rehabilitation will be carried out throughout the project. For more, see chapter 9 on Resettlement Planning Framework. Also see, Annexure 2: Format for RAP; Annexure 3: ToR for agency to implement RAPs and Annexure 4: Definitions of Terms Used in R&R.

6.2 Action Plan for prevention of Gender Based Violence, Sexual Exploitation and abuse and Sexual harassment (GBV/SEA-SH)

Action Plan for prevention of GBV is aimed to help prevent, report and address Gender Based Violence (GBV) at work place, at work site, during rehabilitation and create common awareness about GBV. It will create a shared understanding that GBV has no place on the project; and, create a clear system for identifying, responding to, and preventing GBV incidents. The **GBV/SEA/SH risks under the project are Substantial** owing to civil works (local labor, labor influx and labor camps), resettlement and extensive capacity development activities. The project will entail civil works which will require a labour force that may not be fully sourced locally – some of the construction workers may be brought from outside the project areas. These labourers may be required to set up construction camps/on-site accommodation. This may increase risks of SEA for women and children coming into close contact with workers (whether from within or outside the community). This influx may also lead to conflicts between local communities and outside labor, may increase illicit behavior and crime, increase burden on local public services and utilities, the spread of communicable diseases, and GBV/SEA/SH risks. It therefore requires a strategy for managing labour influx particularly its engagement with the community especially the women and children. Secondly, the project involves resettlement of communities that have encroached in the project affected areas for creating commercial (shops, animal shelters) and residential structures as well as small religious structures along the canals and over the embankments. The resettlement process can create unequal power dynamics between the affected individuals and project staff and increase risks related to sexual exploitation of women, female-headed families, and adolescent girls. Thirdly, participation of women during training, on-site capacity development activities, and stakeholder consultations will be critical for participatory irrigation management and strengthening of Water User Associations. These activities may however increase SEA/SH risks due to travel to or residing in training locations, interaction with male facilitators/project staff and the resulting power differentials. These risks may be especially amplified for women from economically and socially marginalized sections. To manage these risks, the proposed mitigation measures will ensure preventions and management of SEA/SH:

- GBV requirements and expectations included in the procurement process (such as the procurement of IEC materials) and the signing of the Code of Conduct by all the project staff to cultivate an environment free from GBV, SEA/ SH.
- Orientation, sensitization and training of staff at PMU, PMTC and PIU

- Engaging an NGO/Support Organisation with adequate capacities to conduct sensitization and awareness on GBV/SEA-SH and create a common understanding on zero tolerance towards GBV.
- Materials developed for the stakeholders providing information, education, and communication to indicate that the project and/area is a GBV free zone
- Generate ample awareness with information on GBV response services (such as hotline numbers (181 and 112), and One Stop Centres).
- Develop an effective Grievance Redress Mechanism (GRM) with dedicated channels to manage GBV/SEA/SH-related complaints identified and integrated into the GM to enable reporting in a safe, confidential, and survivor-centric manner.

This ESMF includes a GBV Action Plan containing procedures for the implementation and management of preventing and addressing GBV/SEA/SH risks. This Action Plan is aimed to help prevent, report and address Gender Based Violence (GBV) at workplace, at work site, during rehabilitation and create common awareness about GBV. It will create a shared understanding that GBV has no place on the project; and, create a clear system for identifying, responding to, and sanctioning GBV incidents. For details see Annexure 5: Action Plan for Prevention of GBV under BWSIMP.

6.3 Occupational Health and Safety Measures

Occupational Health and Safety related risks may arise during the construction, modernization and restoration activities, under Components (1, 2 & 3) of the project during installation of contractor camps, deep excavations, fixing of gabion boxes and mega geo bags, installation of a batching plant, concrete pouring, movement of various heavy machines, manual handling during loading-unloading operation, bad housekeeping and improper management of hazardous and non-hazardous wastes etc. This impact may be moderate adverse in nature. In Bihar, the Occupational Safety, Health and Working Conditions Code, 2020[14] provides the framework for guiding construction activities and ensuring worker safety including medical examinations, safety committees, and accident reporting.

Requirements on Occupational Safety, Health and Working Conditions

- Employers must arrange for free annual medical examinations for workers who have completed 45 years of age, conducted by a qualified medical practitioner.
- Workers employed in "hazardous processes" must undergo pre-employment and periodic medical examinations.
- The details of medical examinations must be recorded in the Health Register.
- Establishment of safety committees with worker representatives to assist in achieving health and safety objectives.
- Safety committees have the right to seek information concerning health and safety, and to look into complaints of imminent danger.
- Employers must send a notice of any accident resulting in death to relevant authorities, including the Inspector-cum-facilitator, Chief Inspector-cum Facilitator, District Magistrate, Sub-divisional Officer, and the officer-in-charge of the nearest police station.
- The notice should be sent electronically and by telephone or mobile phone.
- Employers of establishments related to contract labor or building or other construction works must submit notices of commencement and cessation of operation electronically.

[14] https://dgfasli.gov.in/public/Admin/Cms/AllPdf/OSH_Gazette.pdf

- A certificate must be enclosed with the notice of cessation of operation, stating that all dues to workers have been paid and that the premises are free from hazardous chemicals.
- Maintenance of registers and records.
- Requirements for medical officers and occupational health centers.
- Employers must make information about health and safety hazards known to workers through booklets, leaflets, and cautionary notices.
- The information must be in a language understood by workers and explained to them.

To manage the above risks, the Contractor will prepare Site Specific Occupational Health and Safety Plan according to Occupational Safety, Health and Working Conditions Code, 2020 considering EHS General Guidelines[15] and Labor Management Procedure (LMP) and will submit it to the PIU for review and approval. When approved, the Contractor will implement the plan during the project implementation through dedicated staff. A generic Hazard Risk Identification and Assessment (HIRA) was carried out for the activities for BWSIMP Project for two major civil works. The proposed actions are generic in nature. During the Pre-Construction stage the Contractor would prepare a Work Methodology and OHS Plan. As part of the OHS Plan contractor will carry out the HIRA as per the Work Methodology. (See Annexure 6)

Apart from maintaining the provisions in regard to the above aspects, the contractor will be responsible to mitigate the risk related to Occupational Health & safety by adopting following mitigation measures:

Other Mitigation Measures

- Community liaison will be maintained during the construction stage and GRM will be established to address complaints related to safety hazards;
- Ensure compliance with the Worker's Code of Conduct;
- Ensure that the site will be restricted for the entry of irrelevant people particularly children, disabled and elderly peoples. Ensure the use of appropriate safety signs at the construction and rehabilitations sites;
- Ensure the provision of appropriate use PPEs to all workers and compliance with BEQs;
- All the occupational incidents, accidents and diseases will be recorded and reported;
- Ensure the provision of fire prevention and firefighting equipment;
- Ensure the training of workers in construction safety procedures, use of PPEs, fire safety, waste management, defensive driving, hygienic conditions, emergency prevention, preparedness and response arrangements, communicable diseases;
- The Contractor shall make available the first aid kit, snake bite kits and bandages at all times and all the sites. Moreover, paramedic staff will be available on-site and the cost of hiring will be a part of the BOQ item. The location of these kits shall be marked and shall be easy to access by all; and
- Identify and minimize, so far as reasonably practicable, the causes of potential hazards to workers, including communicable diseases such as HIV/AIDs and vector borne diseases.

6.4 Community Health and Safety Measures

A Community Health and Safety Plan (CHSP) outlines actions to protect local communities from incidents, hazards, diseases, and accidents caused by project activities, encompassing construction, operation, and decommissioning phases, with a focus on prevention and mitigation.

[15] https://www.ifc.org/content/dam/ifc/doc/2000/2007-general-ehs-guidelines-en.pdf

The work site is primarily located in rural areas with a few habitations. In addition, the Embankment side Road / Inspection Road is used by people for their commuting. During construction there will be chances of interaction between machinery and the local population especially near settlements. Since the Embankment Road/inspection road would also be used for staging the machinery thus there will be chances of pedestrian, school children, livestock or road user being struck by the machinery and the vehicles operate in the road condition increases the chances of collision with vehicles pedestrians or local road users and hence, it concerns their safety. Secondly, there will be movement of project vehicles along the embankment road/ inspection road. Since this road is also used by local population and other commuter to access their agriculture field. There are chances of collision but the probability of occurrence of such collisions are low because of the low traffic during the non-agricultural season. However, there are a few mitigations which are envisaged. Thirdly, there will be laborers from outside the project site. The proposed work zone passes through inhabitant areas. The migrated laborer may affect the project area in terms of social dynamics due to cultural differences. This may potentially lead to conflict with local people residing near project site. Fourth, the dust and gaseous pollutant generation during the construction work near habitation area will also adversely affect the health of people residing in the proximity. Finally, there is possibility that the area may experience some more unknown diseases that are brought by migrant workers and transporters. Thus, there could be negative health impacts on the local population during the construction phase. Provision of health checkups of the migrant labors and locals regularly is, therefore, necessary to understand the magnitude of health impacts due to the project activity. Mitigations which are to be implemented by the contractor during execution of work.

a. Since the worksites are mostly in rural areas with not much traffic hard barricading may not be possible. But is suggested that work site be demarcated with barricading tapes outside settlement areas. Inside settlement areas the barricading should be done by water filled New Jersey Barriers.
b. The Work zone safety signages shall be placed as per IRC: SP 55.
c. The Project Board shall be presented at the beginning /start of the package. The Project Board should provide the critical information about the project include the grievance mechanism.
d. The construction zone must be access controlled, and the workers must be provided valid identification cards to allow entry.
e. Construction material must be stored in the barricaded area. If temporary storage is required (for 1-2 days) outside the demarcated construction area, the same must be discussed with the community.
f. Retroreflective tapes shall be fitted on all sides of equipment
g. Reverse horns must be placed on all vehicle and equipment. In case of rotating equipment rotation alarm must also be fixed on the equipment.
h. If machinery is parked on / beside the embankment road the area should be barricaded water filled New Jersey barrier. Retroreflective tape must be fixed on the barrier for easy visibility. Solar LED blinkers shall be placed on the machinery for easy visibility.
i. To prevent the dust from the construction area affecting the sensitive receptor/ commuters' green screens may be used as per advice of safety officer.
j. Contractor should introduce/get signed by a Worker's Code of Conduct as part of the employment contract. Time to time orientation program on Code of conduct to be organized with the workers by the contractor.

k. To prevent the dust from the construction area affecting the sensitive receptor/ commuters' green screens should be used as per advice of safety officer.

6.5 Dolphin Program

The River Kosi and Bagmati are rivers in North Bihar that originate in Nepal. These rivers are habitats of dolphins and as per a MoEF&CC study sections of these rivers are considered as "critical areas" as they help maintain the link between the dolphin population of India and Nepal. Therefore, the Bank's ESS 6 is triggered. The project design is such that there will be no additional abstraction of water from the River Kosi. Given this premise there will be no / minimal impacts on river dolphins. However, the Project also has a component on flood embankments and riverbank protection under the flood protection component.

Most of the construction will occur during the dry season, thus construction impacts on aquatic life are envisaged to be low unless there are instances of underwater works, which will be minimal. During the high water flows these areas would be submerged in water, the cavities in the rocks/ boulders in the gabions and the edges of the spurs along the bank could serve as feeding grounds of dolphins. The project already includes embedded mitigation measures by adjusting the mesh size of the gabion wire cage (7 by 7) to minimize harm to dolphins. This will ensure no entanglement of the dolphin in the wire mesh net cage and fatalities. This will ensure "no net loss". However, some residual risks will remain until sedimentation in the infrastructure stabilizes and riparian habitats are established.

The ESMF has an overarching Dolphin Program which will guide development of site-specific mitigation measures and build awareness about dolphins in the river systems to protect dolphins. The ESIA will define the site-specific plans which will aim to i) minimize impacts on riparian habitats ii) undertake proactive steps to avoid damage to the riparian habitats; iii) implement precautionary measures during underwater works, if any to reduce mortality of dolphins. These mitigation measures will be implemented by the Contractor with expert support from PMTC as/if needed. The designs also use nature-based solutions to prevent erosion of embankments created thus enhancing the dolphin habitat. The draft ESIA also suggests conducting additional studies if design or project features change in a way that might impact the dolphin population, allowing for adaptive management. The interventions include:

I. **Minimize impacts on riparian habitats:** The construction of the spurs, gabions and any structure inside the habitat may lead to destruction of riparian areas due to construction activities. The extent of destruction needs to be reduced by careful construction planning and monitoring.
II. **Proactive steps to avoid damage to the riparian habitats:** Even though the works will be carried out in dry season there may be some underwater works which may cause disturbance/loss of riparian plants. To make up for the loss, some riparian areas need to be strengthened this will ensure "no net loss". This may involve planting of some riparian plant species. The location of planting, area of plantation, species of plants which can survive in the environment will be identified during the construction with expert support from PMTC as/if needed.
III. **Precautionary measures during underwater works**: in the unlikely case of underwater works, e.g. for placing of gabions, jumbo geobags etc, it is important to ensure that there is no direct conflict with aquatic life. These are not high sound energy emitting activities thus major habitat disturbances are not expected. It needs to be ensured that there are no dolphins in the habitat areas during the work. Once dolphin is sited in project areas, an ecologist will be mobilized.

IV. **Awareness and Training:** A multi-pronged approach will be used for raising awareness and different techniques are presented for different stakeholder groups. The stakeholder groups will be identified along the embankment in terms of their proximity, type of interaction and distance from the water course. These could be i) fisherfolk (which have direct interaction with dolphins), ii) people living along the embankment especially children

- Fisherfolk: In some part of the Ganga Basin in Bihar fisherfolks have understood that dolphins do not cause any harm to their catch. However, in some pockets the perception of fishermen runs to the contrary. Focus Group discussion would be carried out to educate these people. If required, the details of the awareness program would be developed in the first year and implemented over a period of 3 years with the support of the PMTC.
- Schools along the embankment: For raising awareness among children in areas near the vicinity of the Bagmati and Koshi embankment, wall painting/murals will be carried out. These will convey different messages on the dolphins
- Awareness of the General Public: To raise awareness among the public different methods would be adopted. Given the reach of electronic / social media radio jingles and short video snippets will be developed and broadcast/ disseminated. This material will be depicted in easy language the scientific facts about dolphins and its protection.

V. **Dissemination Workshops on Improvement of Dolphin Habitats**: To disseminate the learning of the initiatives taken during the implementation of the nature-based solution for the protection of banks to improve the habitats, workshop cum-conferences would be recommended towards the end of the project as necessary.

VI. Upscaling and long-term adoption

- Good Practice Note/ Code of Practice for Green Infrastructure: The WRD has been adopting different measures over the last two engagement to develop green – blue infrastructure which would be climate-resilient. In BWSIP there will innovation in design of the embankment and canal to make them resilient, use of nature-based solution (as pilot) etc. These will be collated as a Goo Practice Note / Code of Practice for Green Infrastructure to be used in the future projects.
- Good Practice Note/ Code of Practice for Ecologically Sensitive Embankment Design, Construction: The BWSIMP project is taking steps to integrate ecological consideration is planning, design and construction. The process and learning of this will be collated into the Good Practice Note / Code of Practice so that the department can refer it in the future

Even though sub-project level ESIA will contain a site-specific mitigation plan, the location of these measures can only be done where needed as part of the implementation plan of the Contractor. For developing an awareness program, within the footprint area of the project would require considerable effort, collaboration with different stakeholders, interaction with other initiatives undertaken by different department and agencies. WRD plans to carry out consultation with the academia, conservation organization and the Forest Department. The WRD would work with stakeholder in the first year of the implementation for the fine print of the awareness program. Considering that the implementation of the plan would require domain expertise which might be beyond the core domain of WRD expert support from by the EMC will be required through mobilization of the required expertise. A tentative budgetary allocation has been proposed as part of the ESMF budget which would be further detailed as required.

6.6 Dams and safety measures

The project does not involve any large dams. The Kosi, Gandak and Sone irrigation schemes are served by barrages. An assessment commissioned by the Water Resources Department has

indicated that the barrages are in good operational condition with no potential safety risks as stipulated in the National Dam Safety Act 2021. However, barrages need some minor electrical and mechanical works that will be financed under the Project. The project will: (i) include these works as part of the investments under subcomponent 1.1; (ii) update the Maintenance and Operation Manuals (MOM) for irrigation infrastructure, including these barrages.

7 Stakeholder Engagement Plan and GRM

The Stakeholder Engagement Plan for BWSIMP has been developed following the WB's ESF (Environmental and Social Framework) requirement under Environment and Social Standard (ESS) 10. The ESS 10 recognizes the importance of open and transparent engagement between the Borrower and project stakeholders as an essential element of good international practice. Stakeholders must be identified, and the SEP must be disclosed for public review and comments as early as possible before the project is appraised by the World Bank. ESS10 also requires the development and implementation of a grievance redress mechanism that allows project-affected parties and others to raise concerns and provide feedback related to the environmental and social performance of the project and to have those concerns addressed in a timely manner. This chapter provides a summary of the SEP prepared for BWSIMP.

7.1 Purpose of Stakeholder Engagement Plan (SEP)

Objective of the SEP is to effectively identify relevant stakeholders and engage with all stakeholders who have an interest in or may be affected by the project. The involvement of the local population, as well as all other interested parties, is essential to the success of the project, to ensure smooth collaboration between project staff and local communities, minimize and mitigate environmental and social risks related to the project, as well as expand project benefits to all targeted beneficiaries including those who may be traditionally vulnerable, disadvantaged, disproportionally affected or socially excluded by ensuring continuous engagement with them throughout the project life cycle. Specifically, this SEP serves the following purposes:

- Stakeholder identification and analysis
- Planning engagement modalities and effective communication for consultations and information disclosure
- Defining the role and responsibilities of different actors in implementing the SEP
- Defining the Project's Grievance Redress Mechanism (GRM)

Field visits and stakeholder consultations were conducted in all project districts as part of SEP preparation. The interaction with different stakeholders covered villagers, farmers of different social and economic categories, community-based organizations (CBOs), local service providers, state and district level line departments, including water resources, agriculture, rural development and the private sector in project districts to understand their perspectives and challenges. The information gathered during these consultations has been incorporated in this ESMF and ESIAs as appropriate.

7.2 Stakeholder's Identification and Engagement

The key stakeholders identified and consulted with during the project preparation include:

a. Project beneficiaries, and project affected persons
b. Elected representatives, community leaders, and representatives of community-based organizations, etc.,
c. Business and industrial associations, private ISPs, etc.,
d. Local NGOs/ CBOs
e. Local government and relevant government agencies, including the authorities responsible for land acquisition, protection and conservation of forests and environment, archaeological sites, religious sites, agriculture department, electricity department, rural development department and other relevant government departments (regulatory, administration and infrastructure services related)
f. Residents, shopkeepers, farmers, fisheries (owners and workers) who live and work alongside the canal embankment and near project sites where facilities will be built

g. Vulnerable groups, women groups etc.
h. Construction workers engaged in civil and construction works;
i. Contractual staff placed in the PMU and PIM cells
j. GBV service providers for GBV support and remedial

All these stakeholders will be meaningfully consulted and engaged with based on their engagement needs during the project implementation to a) inform them about the proposed project activity, b) to solicit their views and seek inputs for various activities planned under the project, and c) redress their grievances emerging from the project interventions. Based on the consultations with key stakeholders, the following strategy has been developed to guide the engagement with project stakeholders:

Table 28: Stakeholder Engagement Strategy

Information to be disclosed	**Target stakeholders**	**Tools of engagement & mode of disclosure**	**Frequency**	**Responsibility**
Provisions related to Canal	Contractor PMU staff Pollution control Board Farmers, Communities (affected/ other interested) at downstream of the Canal	Consultation meetings related ESIA and ESMP Minutes of the Consultation Meetings Web disclosure of related ESIAs and ESMP	Multiple Must before work starts During implementation ESMP, ESIA to remain on the WRD & WB websites and other disclosure locations throughout the project period.	PMU
Work opportunities for Structural works	Contractors Consultants	Website notifications Tender advertisements in newspaper	Multiple Continuous	PMU
Work opportunities for Petty contracts Labor	Communities (including disadvantaged persons) Petty contractor	Website notifications Meetings to inform Village heads or community representatives	Multiple Continuous	PMU and Contractor
GBV related provisions	WRD officials Contractor personnel Consultant personnel	Office circular and training events Website notifications Bid documents and Contract provisions	Multiple Continuous	PMU
Labor management procedure	WRD officials Contractor personnel Consultant personnel	Website notifications Bid documents and Contract provisions	Multiple Continuous	PMU
Flood and canal discharge/ release information and schedules	Individual farmers and members of WUAs WRD Officials	SMS based advisories and announcements Notice at Gram Panchayat Offices	Need based and Continuous	PMU
Powers and functions of WUAs	Members of new and existing WUAs WALMI, WRD Officials	Training workshops, refreshers and village level meetings	Multiple	PMU

Grievance mechanisms	Communities (affected/ other interested) Contractors (for procurement related) Labourers	Phone number or Toll free Helpline Display boards at site with GRM information Village/ Panchayat meetings/ Awareness Camps Website notifications Meetings to inform Village heads or community Representatives, representatives of WUAs, Trainings and outreach programs	Continuous Multiple To be disclosed at WRD & WB websites. Hard copies in local language at WRD district office, DM's office	PMU

All relevant stakeholders will be informed in advance about the timing and format of the consultations. During the consultations, information about the project, its rationale, scope, benefits, and costs, including potential environmental impacts and mitigation measures, will be presented by the project management unit of WRD. Comments and suggestions of all stakeholders will be noted, and their queries will be clarified. The signatures of all participants will be collected. Photographs of the consultations will be taken for the record. The comments and suggestions will be recorded and how these have been addressed will be detailed.

7.3 Information Disclosure

- Information Disclosure on ESMF: The draft and final versions of the ESMF will be disclosed for public knowledge through the website of WRD and the World Bank. The Executive Summary of the ESMF will also be disclosed in both local language (Hindi) and English language at select project locations and will be available at the SE/ EE Office of the circle under which the project area falls for interested parties to review.

- A state level consultation will be organized to share the E&S commitments and feedback will be incorporated to revise the ESMF and SEP.

- Information Disclosure Procedures: Project related information shall be disclosed through public consultations and making relevant documents available in the public domain, including WRD website. The Project management unit and associated line departments shall provide relevant information in a timely and accessible manner, and in a form and languages understandable by local communities and other stakeholders.

- The Resettlement Policy Framework will be disclosed along with the entitlement framework, though this is a part of the ESMF, in the WRD websites. This document shall also be translated into Hindi. The final version of Resettlement Policy Framework and Entitlement Matrix must be disclosed in all the District Collectors/Magistrates Offices and the local offices of the implementing agency.

7.4 Consultations Undertaken for SEP Preparation

Table 29: List of stakeholder consultations

Date	Venue / Location	Stakeholder Profile	Number of Participants	Key Issues discussed	Response Provided
From 22-06-24 to 28-02-25	Approximately 50 consultations / Focused group discussion, one on one interactions held across 20 villages, 10 blocks and 5 districts	• Citizens • PAPs • SHGs • Farmers • Elected Representatives • Water User Associations	500 plus citizens including Landless agriculture workers/ Tenant farmers, Smallholders/ marginal farmers/ women farmers/ non-title holders	Sharing about the project, possible short term and long-term impacts, asking their concerns. Status of WUAs, key bottlenecks affecting their effective functioning	Assuring that there will be compensation for any damages and mechanisms available to raise their concerns Greater institutional support from WRD is essential, particularly in terms of regular training on water management practices and in facilitating the timely and effective recovery of water charges
28-12-24	Teleconferencing	Office Bearers of WUA of Raghunathpur	5 including 3 WUA Office bearers	Land revenue receipt, certificate of updated irrigation water charge payment to be made a compulsory requirement for obtaining a 'No Objection Certificate' (NOC) for any land dealings.	It was emphasized that field-level WRD officials should hold at least one meeting per month with each WUA and actively support WUAs during the revenue collection process
21-06-24	Patna	Private Sector and irrigation service providers: International Rice Research Institute; Federation of Seed Industries, Jain Irrigation, Corteva, HUF, Intellecap, ACCESS Development Services, DeHAAT **NGO:** PRADAN	20 Including 11 representatives from Private firms and 2 from civil society organizations	From start ups to established private firms to NGOs, the Roundtable focussed how last mile support can be provided to farmers be it digital advisory, on ground capacity building, soil testing, access to quality seeds, fertilisers, nutrition; watershed management, strengthening community-based institutions and overall sustainability	Under the project, scope for knowledge exchange within Civil Society Organizations, Governments, Private Sector, Donors and Multilateral / Bilateral Agencies is envisaged

22-01-25	Patna	Water and Land management Institute, (WALMI), Patna	3 Team working on Participatory Irrigation management	Discussion on the project components	Capacity development will have major impetus and role of WALMI will be critical
22-01-25	Patna	Academic Institutions: Central Agricultural University (DrRPCAU) and Borlaug Institute for South Asia (BISA)	4 Faculty	Discussion on the project components	Involvement of Academic institutions in knowledge sharing
23-01-25	Patna	**NGO:** Bihar Rural Development Society	12 Including 9 representatives from BRDS	Discussion on the project components	Experience on technological innovations will be critical for project implementation
23-01-25	Patna	Think Tank: National Dolphin Research Institute	3	Risks related to dolphin habitats from project activities	Awareness generation and sensitization will be important to ensure no harm to dolphins. Site specific ESMP measures will be developed proportionate to the risks.
2-12-24	Teleconferencing	**NGO:** Development Support Centre, Ahmedabad, Gujarat; Indian Network on Participatory Irrigation Management, CSMRS Building, New Delhi	7 Including 5 representatives from two NGOs	Strategies to empower WUAs to sustainably undertake Operation & Maintenance (O&M) and equitable water distribution responsibilities. Subsidy to WUAs available under the Command Area Development and Water Management (CADWM) program should be made accessible to all WUAs, irrespective of whether they are covered by CADWM or not	Align the mission and activities of WUAs with various centrally and state-sponsored schemes and promote proactive efforts to connect WUAs with Corporate Social Responsibility (CSR)

12-12-24	Block level	Other Government Agencies	4 Officials of Department of Electricity	Nature of work to be executed, impact anticipated during implementation, Public utilities like lamp post, electric pole located on either side of embankment/canal may be affected. These should either be shifted before construction activity or re-established after construction activity. Electric supply will be discontinued during shifting of electric pole.	Creating awareness about the project Lamp/ electric post will be shifted by concerned electric department before or during construction Work, if required. Impact will be temporary in nature.
22-12-24	District level	Other Government Agencies	3 Officials of Pollution Control Board	Nature of work to be executed, impact on environment anticipated during implementation, obtain required permission for storage and handling of any hazardous material; management of construction and demolition waste etc.	Creating awareness about the project. Adverse environmental impact will be mitigated.

These apart a stakeholder consultation was held on Draft ESMF at Patna on 31st July.The details of this consultation is annexed in Annexure 10 & Annexure 11.

7.5 Grievance Redressal Mechanism

Description of the current GRM

A similar World Bank supported project, Bihar Kosi Basin Development Project (BKBD), due to close in March 2025, has followed three-tire grievance redressal mechanism, Tier I at the project site level, Tier II at District level and Tier III at State level (PMU level). In first-tier Sarpanch of local Gram Panchayat or a designated Project staff at project site is the focal point to record the complaint and address the issue or escalate to district level for mediation within 15 days of the submission of the compliant. The second tier at district level comprises a Grievance Redressal Committee (GRC) chaired by the District Collector and here GRC provides their view within 30 days of receiving the grievance. The aggrieved person if not satisfied with the verdict given by district level grievance cell, moves to the third tier, i.e. State level grievance committee which works under the Chairmanship of Secretary of concerned Department to get the complaint resolved within 45 days after receiving it.

However, the major challenge of Grievance redressal system of BKBDP was that each tier was being led by high powered officials of Govt. administration, because of which the redressal process became time consuming as GRC meetings could not be held with regularity. Based on this learning, an alternate system has been proposed for BWSMIP.

This system will be over and above the state based GRMs which are listed below:

Table 30: Existing GRM

Level	Name of mechanism	Link to the project Implementing Agency	Links to the Available systems	Designation & Contact of the Focal point in WRD
National	CPGRAMs	Accessible to all citizens. Citizens can register their grievances online and through Mobile App. Complainants track the status of the complaints with the unique registration ID generated at the time of complaint registration.	Contact no.: 06122215409, Email: publicgrievances-bih@gov.in	R.N Choudhary JS, General Administration Department, Patna Executive Engineer, office of Engineer in Chief (Headquarter), WRD
State	CM Portal/Helpline	Anyone can fill online form at any time by giving their personal details/contacts and feedback. Thus, Project beneficiaries can access the portal to register their grievances.	Contact no.: 18003456284 (Daily working hours between 09:30 am to 06:30 pm) Email: info-Lokshikayat-bih@gov.in	Superintending Engineer, Planning & Monitoring Circle-4, Patna cum Nodal Officer (e-dashboard), WRD, Bihar
Department	Departmental Grievance cell	At present WRD has public information officer and Grievance Redressal officer at the state level with whom complainants can register their complaints.	Toll free number: 1800 3456 145 #HelloWRD	Public Information Officer, WRD, Bihar, Patna Public Grievance Redressal Officer, WRD, Bihar, Patna
Department	Internal Complaint committee	At present WRD has an ICC	sepmc4@gmail.com jyotiptn@gmail.com	Superintending Engineer, Planning & Monitoring Circle-4, Patna-Chair man Assistant section-19-Member Secretary

Proposed Grievance Redress Mechanism under BWSIMP

For the BWSMIP, a unique system will be developed for general stakeholders, individual beneficiary, PAPs, laborers and complainants of GBV/SEA/SH. They may also access any of the existing grievance redressal platforms mentioned above to express their grievances and seek resolution.

Citizen/groups/stakeholders would be able to submit through various mediums - **i) Web-based, ii) Telephonic, iii) Mail Post iv) in person to concerned official/s**. At the PMU level, all grievances will be recorded and tracked through the project MIS. One Operator will be hired, and trained to receive,

record, categorize and forward all the grievances daily. He/She will do that based on a charter which contains a list of designated Officials who will be alerted, and their responsibility. In case of grievances received through web-based system or in person, screening and resolution of the same or communicating with the divisions/ department for resolution of the same will be done. There will be an internal escalation mechanism, alert generation, response and closure protocol developed for the same. A receipt or a unique number will be generated for all such complaints and communicated to the complainant within 24 hours. The complainant will follow up based on that unique number. If response is not received within 5 working days, the complaint will be escalated to the concerned official's superior.

Redress for SEA/ SH Related Grievances: An Internal Complaints Committee (ICC) for addressing any SEA/SH-related complaints at the workplace will be set up by the WRD under BWSMIP. The committee will be constituted as per the requirements of the Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013. The PMU will put in place necessary mechanisms and procedures for confidential reporting with safe and ethical documentation of SEA/SH issues at the project level. All employers including contractors as per the Act must ensure that the contact information of ICC is displayed in their respective offices and that regular trainings/orientation programs are organised for project staff and the workers of contractors. The PMU will identify and train GM operators and GBV/SEA/SH focal points within the GRM, who will be responsible for GBV/SEA cases and referrals as defined in the referral pathway. SEA/SH related processes will be overseen by the Social Development & Management Specialist within the PMU and monitored on the ground by the Environmental and Social experts within the PMTC with support from PIU focal points. Survivors and aggrieved persons can also register their complaints with existing channels such as Women Helpline (181), Emergency Helpline (112), CM Helpline, One Stop Centre, NGOs etc.

Labor Management: In addition, every office and worksite will also have complaint boxes and complaint registers that can be accessed by the direct and contracted workers to register their work-related grievances, as has been described in the Labor Management Procedures (LMP). In addition to these, the workers will also have the freedom to access any other channel for registering their grievances without fear of coercion or retribution.

Resettlement: The project Grievance Redressal Mechanism will be available for PAPs. The aggrieved person if not satisfied with the verdict given by State level grievance Committee, will have the right to approach the Judiciary. Project will help the aggrieved person in all respect if person wants to approach the judiciary. Targeted communications for awareness creation to women regarding potential SEA / GBV risks, their rights, and GRM especially for project affected people under resettlement will be organized.

Building Awareness about the Grievance Redress Mechanism: The PMU Social Development & Management Specialist will initially brief all staff, PMU, consultants, and contractors on the grievance mechanism and GBV/SEA/SH complaints mechanism of the project and explain to them the procedures for filing, reporting and documentation of public grievances. Awareness campaigns will be conducted targeting project stakeholders to inform them of the availability of the mechanism through various mediums. The GM will also be published on the WRD website. Construction sites under the project will also display the phone number, email, and address for filing public grievances.

7.6 Monitoring and Reporting on Stakeholders Engagement Activities

The Stakeholder Engagement Plan will be periodically revised and adapted as necessary during implementations to ensure that the plan and its engagement strategy remains relevant. The project

will also ensure that the identified methods of engagement remain appropriate and effective in line with the project context and specific phases of the project-cycle. Any major changes to the project-related activities and their schedule will be duly reflected in the SEP, including the entry of new stakeholders not anticipated during the preparation phase. To implement the SEP, annual plans and budgets will be allocated for stakeholder engagement related activities. Monthly summaries and internal reports on public grievances, inquiries, and related incidents, together with the status of implementation of associated corrective/preventative actions will be collated by the PMU and PMI social experts. The monthly summaries will provide a mechanism for tracking the status of complaints and also provide information on the stakeholder engagement activities undertaken by the Project during the reporting period.

8 Labor Management Procedure

8.1 Overview Of Labor Use under The Project

The project will be implemented by the Flood Management Improvement Support Centre (FMISC) and the Water Resource Department (WRD), Govt. Of Bihar. Labour needs will include the establishment of Project Management Unit (PMU), deploying direct workers- consultants, subject matter experts and contracted workers employed by a) consulting firms to undertake professional services for the preparation, development and implementation of the technical components and b) contractors to undertake civil and mechanical works.

The PMU will be responsible for the overall project implementation and coordination of activities, including compliance with environment and social requirements in line with the World Bank's ESF including ESS-2 on Labor and Working Conditions and ESS-4 on Community Health and Safety. The PMU will have its own team of experts in its Environmental and Social Unit and engage a Supervision Consultant with expertise in environmental, social, occupational health and safety issues throughout the project period.

Type of Workers

- **Direct Workers**: will comprise project staff hired by the FMISC, WRD and other implementing agencies (Agriculture and Rural Development department) as per requirement.
- **Contracted Workers**: contracted workers will be employed as deemed appropriate by contractors and sub-contractors under the project as project activities involve construction, refurbishment, and installation works. Given the scale of civil works expected under the project, skilled, semi-skilled and unskilled workers will be hired by the contractors for different durations.
- **Primary Suppliers:** The project may require the use of primary suppliers for the equipment and materials needed for civil works. The primary supply worker related provisions of ESS2 would apply to those primary suppliers with whom the project will have a significant and ongoing relationship with. However, the relevance of primary supply workers will be known through the scope of the DPRs.
- **Community Workers** are included in the project in several different circumstances, including where labor is provided by the community as a contribution to the project, or where projects are designed and conducted for the purpose of fostering community-driven development

Where government civil servants are working in connection with the project, whether full time or part time, they will remain subject to the terms and conditions of their existing public sector employment agreement or arrangement, unless there has been an effective legal transfer of their employment or engagement to the project. The project will invest in recruitment of key experts in PMU, PMTC, PIUs, and units at the District/Division level. They too will remain subject to the terms and conditions of their existing public sector employment agreement or arrangement. ESS2 will not apply to such workers, except for the provisions of Para 17 to 19 (Protecting the Work Force) and Para 24 to 30 (Occupational Health and Safety) under World Bank ESS-2 on Labor and Working Conditions.

8.2 Potential Labor Risks and Mitigation Measures

The labor risks of the project are mostly associated with the constructions related to renovation, rehabilitation and upgradation/modernization of canals and embankment. These risks and mitigation measures include:

Table 31: Labor Risks and Mitigation Measures

LABORO RELATED RISKS	PROPOSED MITIGATION
OHS Risks during construction works: The key OHS risks during construction works include injuries due to accidents arising out of poor work conditions and unsafe practices e.g., working at heights, fall into deep excavations, injuries due to heavy machinery impacts, transportation of materials and slip, trips and falls due to spills and poor housekeeping in workplaces etc. In addition, exposure to hazardous chemicals and gases e.g., diesel exhausts, silica dust, and paints, corrosives and solvents etc. may also happen.	Safe work practices, usage of engineering controls e.g., exhaust ventilation, isolation of hazardous work areas and administrative controls (e.g., access control, barricading the dangerous areas and work permit systems etc.) are key measures required to be implemented at the sites. Monitoring of compliances, awareness raising and training on OHS also need to be provided to workers prior to commencement of work, consistent with the national/state laws and World Bank Health and Safety (EHS) Guidelines
Labor influx: Tentative number of skilled, semi-skilled and unskilled labourers required for the construction works has been estimated. Preliminary assessment indicates that demand for skilled workforce is largely unmet locally and are thus brought in from outside the state, whereas for small and unskilled work, labour is mobilized locally, and some labourers are anticipated from other districts of Bihar. Labour influx might also increase risks of SEA/SH.	Priority will be to hire local labour; hence, risks associated with labour influx for this project are low-to-moderate. Labour influx may also pose infection risk from the community as well as to the community that also need to be managed through personal hygiene and workplace sanitation and hygienic practices during construction work. Signing and complying with codes of conduct and regular sensitization and trainings will be conducted to mitigate risks.
Labor influx: Tentative number of skilled, semi-skilled and unskilled labourers required for the construction works has been estimated. Preliminary assessment indicates that demand for skilled workforce is largely unmet locally and are thus brought in from outside the state, whereas for small and unskilled work, labour is mobilized locally, and some labourers are anticipated from other districts of Bihar.	Priority will be to hire local labour; hence, risks associated with labour influx for this project are low-to-moderate. Labour influx may also pose infection risk from the community as well as to the community that also need to be managed through personal hygiene and workplace sanitation and hygienic practices during construction work.
Child & Forced labour: The project will put in place mitigation measures to prevent and prohibited child and forced labour in accordance with Indian laws from getting involved in constructional activities.	Workers below the age of 18 will not be hired to work in sub-projects. To confirm that workers are below the age of 18 years, workers will need to provide legally recognized documents such as Aadhaar or Birth Certificate. The district monitoring unit and implementation unit shall keep strong vigilance to ensure cessation of such activity.
SEA/SH: (a) risks of SEA/SH to community members, particularly women and children by contractors' workers during construction period; (b) risks of workplace SH at all establishments by co-workers under the project.	All employers including contractors will be required to ensure all workers (including those of sub-contractors) sign a code of conduct (CoC) to mitigate the risks of SEA/SH, and workers receive awareness training on SEA/SH relates issues. There are some risks associated with community health such as exposure of communities and beneficiaries to communicable diseases, and SEA/SH. These will be managed by creating awareness through awareness and education programme for the worker as well as community on behavioural changes

8.3 Brief Overview of Labor Legislation and applicability

Table 32: Terms and Conditions as per Type of Labor

Type of Worker	Terms and Conditions
Direct Workers	The direct workers are governed by the employment terms and condition of existing norms, as defined by the PMU in the Terms of Reference and Contracts of personnel hired from the market based. The project will ensure that all direct workers have clear contracts and conditions of work, including terms of employment, wages, and entitlements, working hours, leave and benefits, mechanisms for handling grievances based on requirements under ESS2 and national/state labour laws.
Contracted workers	These will include (a) Construction and civil workers, their supervisors and managers hired by civil contractors; and (b) Consultancies hired for technical support such as infrastructure project management and third-party verification of results, including baseline and end line surveys. These contracts will be governed by all ESS2 requirements and applicable labour and employment laws/regulations set out in their contracts.
Primary Supply Workers	The project will need procurement of equipment and materials from suppliers for civil works. The primary suppliers of construction material to the project will be oriented to ensure that they don't engage child, forced or bonded labour and apply all measures to ensure workers safety, in line with provisions of ESS2.
Community Workers	The project will engage local labour and or SHGs members under Convergence for construction of field channels

The guidance on the terms and conditions of employment/ engagement for all categories of workers is presented below:

Table 33: Guidance as per Labor Legislation

S.No.	Legislation	Explanation	Relevance	Applicability
1	The Equal Remuneration Act, 1976; Employee Compensation Act, 1923; and Personal Injuries (Compensation Insurance) Act, 1963; The Minimum Wages Act, 1948, Payment of Wages Act, Maternity Benefit Act, 1961	Provide equal remuneration to men & women workers, prevent discrimination against women in matters of employment, employers to compensate workman's spouse / dependent sons, daughter in case of injury at workplace and mandatory worker insurance by employers against such liability.	Prevents gender discrimination in employment and provides for employee welfare, including social assistance against any incident/ accident.	Construction phase applicable to DIRECT WORKERS and CONTRACTED WORKERS
2	The Child Labour (Prohibition and Regulation) Act 1986, and Rules 1988; Children (Pledging of Labour) Act, 1933 (as amended in 2002); Contract Labour Act	These Acts mandate the employers of any establishment employing construction workers to provide basic amenities and welfare facilities. The laws also	Ensures safety, welfare, and other conditions of service to construction workers employed	Construction phase applicable to DIRECT WORKERS, CONTRACTED WORKERS, PRIMARY SUPPLY WORKERS AND COMMUNITY WORKERS.

	1970; The Bonded Labour System (Abolition) Act, 1976	prohibit employment of child and bonded labour.		
3	Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and	To regulate the employment and conditions of service of building and other construction workers.	Safe and healthy working environment. Responsiveness in case of mishaps and accidents.	Construction phase applicable to DIRECT WORKERS and CONTRACTED WORKERS
4	Inter-State Migrant Workmen's (Regulation of Employment and Conditions of Service) Act, 1979	To regulate the employment of inter-State migrant workmen and to provide for their conditions of service	Protects migrant and seasonal agricultural workers by establishing employment standards related to wages, housing, transportation, disclosures and recordkeeping	Construction phase to DIRECT WORKERS and CONTRACTED WORKERS
5	The Sexual Harassment of Women at Workplace (Prevention, Prohibition, and Redressal) Act 2013	Protects women workers from sexual harassment and abuse of power at their workplace and provides for constituting an Internal Complaints Committee in every organization employing 10 or more workers, including women, to look into complaints of sexual harassment. Provides guidance on redressal against such complaints, including its internal investigation in a time bound manner.	Recognizes the need for legal protection of women workers against abuse, exploitation in all government institutions.	Pre-construction, Construction and Operational phases (DIRECT WORKERS, CONTRACTED WORKERS AND COMMUNITY WORKERS)
6	Maternity Benefit Act, 1961	To regulate employers to provide paid maternity leave and offer on-site day care services	Relevant and applicable to all government institutions and management agencies/firms under the program.	Applicable to DIRECT WORKERS and CONTRACTED WORKERS

8.4 Responsible Staff

Table 34: Responsibilities for LMP

Key Issues	Direct Workers	Contract Workers	Primary Supply Workers	Community Workers
Hiring and managing individual project workers	PMU	PMU, Contractor /Subcontractor (Project Director, Site Manager and/or ESHS Officer)	Not Applicable (Outside the scope of ESS2)	PIU
Occupational Health and Safety	Direct workers will follow OHS measures when visiting construction sites)	PMU, Contractor /Subcontractor (Project Director, Site Manager and/or ESHS Officer)	Contractors require to identify primary supplier's issues on OHS specially in child labor/forced labor and serious safety risks. PMU shall review it.	PIU and PMU to review
Child labor and forced labor and sexual harassment at the workplace	Contract for direct workers does not allow child and forced labor Adequate measures by employers (PMU) to ensure prevention, protection and prohibition of sexual harassment at the workplace. SEA/SH incidents may be timely reported	PMU, Contractor /Subcontractor (Project Director, Site Manager and/or ESHS Officer) [Adequate measures to be taken by employers (Contractors) to ensure prevention, protection and prohibition of sexual harassment at the workplace.]	Contractor requires to identify primary supplier's engagement of child labor/forced labor and sexual exploitation of women PMU/ Engineer to monitor and review.	PIU and PMU to review
Training	WB and WRD E&S Specialists	Contractor /Subcontractor (Site Manager)	Not applicable (outside the scope of ESS2)	PIU
Code of conduct	Not applicable (the contract for direct workers will address relevant risks)	Contractor /Subcontractor (Site Manager)	Not applicable (outside the scope of ESS2)	PIU
Grievance mechanism	PMU Timely reporting of SEA/SH incidents and periodic review to ensure resolutions	Contractor -reviewed by PIUs and PMU And project GRM	Project GRM	Project GRM
Monitoring and reporting	PMU supported by PMTC	Contractor, Engineer, PMU, then report to World Bank	Contractor, Engineer, PMU, then report to World Bank	PIU and then PMU

The overall responsibility of LMP implementation rests with the PMU and PIUs, including the following:

- Ensure that civil works contractors comply with these labor management procedures and adhere to occupational health and safety measures.

- Ensure the responsibilities of the contractors are developed in line with the provisions of this LMP and the project's ESMF for OHS and certain environmental protection provisions e.g., hazardous and other wastes and emissions management.
- Monitor to verify that contractors are meeting labour and OHS obligations toward contracted (and sub-contracted) workers, including implementation of LMP.
- Monitor compliance with SEA/SH codes and report any violations
- Monitor and report incidents and accidents including SEA/SH injuries, illnesses, and accidental spills etc,
- Monitor and implement trainings and drills for all project workers direct and contracted.
- Ensure that the grievance redress mechanism for the project is established and workers are informed of its purpose and access.
- Ensure grievance redress mechanism channels for safely reporting SEA/SH incidents are functional and referral systems in place to provide immediate support (with survivor consent)
- Have a system for regular monitoring and reporting on labor and occupational health and safety performance.
- Have a system for regular review of SEA/SH incidents, process, resolution, and feedback received.
- Monitor implementation of the Code of Conduct applicable to all workers.
- Monitor effective implementation of SEA/SH action plan

The Contractors for civil works will be responsible for the following:
- Complying with the requirements of the national and state legislations, labor management procedures, including those by their sub-contractors.
- Maintaining records of recruitment and employment process of contracted workers.
- Clearly communicating the job description and employment conditions to the workers.
- Employ or appoint qualified environmental, social, occupational health and safety expert(s) to manage ESHS issues. Provide induction and regular training to contract workers on environmental, social and occupational health and safety compliances.
- Having a system for regular review and reporting on labor, OHS, and ESHS performance Report to the PMU on labor welfare and occupational health and safety performance. Setting up Internal Complaints Committees wherever applicable as prescribed under POSH Act.
- Ensure compliance with SEA/SH codes of conduct by labourers and report violations.

The standard clauses for inclusion in civil works contracts will include, (but not limited to):
- The general obligations of the contractor with respect to maintaining the health and safety of the workers.
- Preparation and implementation of a site-specific Action Plan for managing construction related workplace occupational health and safety
- Ensuring no child labour and/or forced-bonded labour for any works.
- Equal pay/wage for men and women labourers, including registration and insurance.
- All laborers engaged at construction site to be provided with the required Personal Protection Equipment (PPE) and regular health check-ups etc.
- The construction sites to be provided with adequate barricading and safety signages.
- Providing health and safety training/orientation on to all workers and staffs.
- Steps necessary to prevent worker harassment or discrimination, including sexual exploitation and abuse, sexual harassment SEA/SH), gender-based violence (GBV).
- Basic facilities at worksites segregated toilets, canteen, drinking water, creche facilities (if required), etc.
- Establishing Grievance Redress Mechanism (GRM) for workers for any complaint/grievance received from workers and ensuring workers' awareness about GRM with specific reference to reporting SEA/SH incidents

8.5 Policies And Procedures

1. **Policy and Procedure for Direct Workers:** The following procedures would be applicable for direct workers e.g., PMU staff in the office:

- For this project, the minimum age will be 18 years. This rule will apply for both national and international workers.
- A workstation with computer will be provided to all PMU staff. All software's essential for functioning of the assigned tasks will be provided to all project staff.
- Separate male and female toilet facilities will be provided at all project offices.
- Drinking water will be available at all project offices.
- All project offices will be free of pests. Where pests are detected pest control measures will be taken immediately.
- Fire detection and firefighting equipment will be available at all project offices.
  Emergency evacuation plan will be established for all project offices and staff will be made aware of the plan and periodic training exercises that needs to be implemented.
- Vehicles to be provided for project team to conduct site visits
- Equal training opportunity will be available to all staff working in the project without discrimination, based on gender or otherwise, as specified in the employment conditions.
- Provision of safe commute for female participants those traveling to training locations
- Orientation training on safety and health in Construction worksites including emergency procedures. Provision and training in the usage of Personal Protective Equipment during site visits. Safety of women from any sexual exploitation and abuse (SEA) and sexual harassment (SH) and mechanism to access redressal services.
- Equal remuneration, childcare, flexible work hours, creche facilities, segregated toilets and other amenities as mandated by law.

2. **Policy and Procedure for Contract Workers for Civil Work:** The key procedure at the construction site includes as follows:

- Equal pay/wage for men and women labors for equal work.
- No child labor and/or forced labor at construction site for all works
- All laborers to be provided with photo ID cards for accessing the construction site.
- Personal Protection Equipment (PPE) – safety helmet and shoes, secured harness when working at heights, electrical gloves, eye protection for welding etc., for all workers without which entry to the construction site shall not be allowed.
- Steps necessary to prevent SEA/SH and any discrimination based on religious, political and/or sexual orientation.
- Facilities to be provided at the labor camp (if setup):
    - Hygienic living conditions and safe drinking water
    - Segregated toilets for male and female workers
    - Creche facilities
    - Use of fireproof wiring and good quality electricals
    - Cooking gas and/or electric/induction plate for each labor household
    - Monthly/weekly health checkup to be organized at the camp for all labors/family.
    - Posters and signages at/around the site, with images and text in local languages relating to personal safety, hygiene and on COVID-19 symptoms and guidelines.
    - Security measures to be provided at the camps which may include fencing, locks, alarms, pass card systems, badge and pass system, access points, safe transport of personnel as appropriate.
    - Emergency response plan including availability of assembly points and mock drills.

- The measures proposed in a site-specific Action Plan for managing construction related workplace occupational health and safety
- Set up complaint boxes/registers for anonymous filing of SEA/SH related grievances

3. Other responsibilities

- The LMP includes OHS management/ mitigation provisions. The OHS measures take into account the World Bank Group's General Environment, Health and Safety Guidelines (EHSGs), the EHSGs for Health Care Facilities and other Good International Industry Practices (GIIP). OHS specifications will also be included in the procurement documents and contracts with contractors and supervising firms. The ESMF factors OHS requirements for contract workers that will be involved in civil works such as codes of conduct, safety trainings, gender and SEA/SH sensitization.
- Civil works contractors' workers will be managed by the contractors and their terms and conditions must be consistent with the WB ESF (ESS2), GoI laws and regulations. As a minimum standard for workers under civil works contracts (including subcontractors) the provisions and codes of conduct outlined in the Contractors- Environmental and Social Management Plan (C-ESMP) will provide the minimum standards required. OHS, GBV/SEA and SH and general worker behaviour will be managed through the C-ESMPs.
- Minor incidents will be reported directly to PMU on monthly basis and will be reflected in quarterly reports, and serious accidents and incidents will be reported immediately and will be flagged to the World Bank within stipulated timeframe in the ESCP. Given that most labour related risks and impacts results from actions of contractors, mitigation measures will be largely implemented by contractors. The PMU will **incorporate General and Specific Conditions into bidding documents and contracts, including measures in relation to SEA/SH prevention and risk mitigation and on codes of conduct, so that contractors are aware of their obligations and are contractually obligated to comply with them.** The PMC will enforce compliance with these clauses.

4. Sexual exploitation and abuse and sexual harassment (SEA/SH)

A Code of Conduct (CoC) applicable to (a) staff at health facilities, (b) construction workers, and (c) other project employees will be adopted and adhered to. The CoC will commit all personnel to acceptable standards of behavior. The CoC will include sanctions for non-compliance, including termination or even revoking of the contract. It should be written in plain language and signed by each worker. A copy of the CoC will be displayed in a location (hospital premise or construction sites) easily accessible to the community in the local language. Personnel will also receive awareness training on GBV/SEA/SH.

The project's GRM will also include a channel to allow SEA/SH-related grievances to be received and addressed. All establishments (employing more than 10 employees) are mandated by the Sexual Harassment at the Workplace (Prevention, Prohibition and Redressal) Act, 2013 (POSH Act) to form an Internal Complaints Committee (ICC) to address workplace related SEA/SH complaints. Thus, al lemployers including contractors as per the Act must ensure that the contact information of ICC is displayed in the office and that regular trainings/orientation programs are organised for staff and ICC members. Please see SEP for details related to GRM. SEA/SH related processes will be overseen by the Social Development Specialist within the SPMU and monitored on the ground by the Environmental and Social experts within the PMC. (See Annexure 5 of the ESMF for further details on SEA/SH prevention and response mechanism).

8.6 Age of employment

In accordance with the Constitution of India, no child below the age of fourteen years shall be engaged in any hazardous employment. Employment of children under 18 years of age will be strictly prohibited. Contractors will be required to verify and identify the minimum age of all workers through government identification documents, like birth certificate, ration card, Aadhar card and other national identification cards, passport and if in doubt clinical, anthropometric measurements will be taken to ascertain their age.

8.7 Terms and conditions of employment

The terms of employment of the direct project workers will be as per prevailing market procedures and rates based on expertise and experience. It would be ensured that all direct workers are provided clear terms of reference and contracts outlining their roles, responsibilities, and conditions of work and in all cases the principles of non-discrimination and equal opportunity apply. The terms of employment of the contracted workers at construction sites will be based on the terms of contract governed by 'The Building and Other Constructions Workers (Regulation of Employment and Conditions of Service) Act, 1996' and other labour laws and provisions of ESS2 for contracted workers.

8.8 Grievance Mechanism for Labor Engaged in Construction Work

The main objective of a Grievance Redress Mechanism (GRM) is to assist to resolve complaints and grievances in a timely, effective, and efficient manner that satisfies all parties involved. Construction-site specific Grievance Mechanism to be setup by the contractor/ sub-contractor. It shall include site specific grievance focal person assigned by the Contractor who will file the grievances and appeals of contracted workers and will be responsible to facilitate addressing them. If the issue cannot be resolved at contractor's level within 7 working days, then it will be escalated to the Principal Employer. The grievance focal person will register the grievances in a formal manner in register or in electronic format to be easily tracked for its resolution. The GRM will include the process of screening, investigation, resolution of grievances, documentation, and reporting of grievances as the steps mentioned below.

- ***Step 0*****:** Raising and registering the grievances using various mechanism including through written or verbal complaints and registered in grievance logbook at the construction site.
- ***Step 1***: Grievance raised is screened by the grievance focal person and based on its severity/ jurisdiction forwarded to respective contractor/ sub-contractor for redressing
- ***Step 2*****:** Grievance discussed at the grievance focal person / respective contractor/ sub-contractor level, and addressed
- ***Step 3*****:** If not addressed in stipulated period it is escalated to Principal Employer.
- ***Step 4*****:** Once addressed, feedback is given/ sent to the complainant and complaint closed upon verification from the complainant
- ***Step 5*****:** If not satisfied, appeal to the other public authorities

Once all possible redress has been proposed and if the complainant is still not satisfied then they should be advised of their right to legal recourse. Monthly report on the grievances received at each of the subproject is submitted to the PMU.

All contractors (employing more than 10 employees) are mandated under the POSH Act to set up an Internal Complaints Committee (ICC) in their organisation to address complaints of sexual harassment. A complainant facing sexual harassment working in an organization that has less than 10 employees, can file a complaint to the Local Complaints Committee (LCC) setup in each district by the district administration.

All requirements related to labor management, especially those related to management of contracted workers will be part of all the bidding documents prepared and commissioned by the project.

The GRM will include provisions for anonymously filing SEA/SH grievances through complaints boxes/registers, project GRM channels, and local uptake channels (Helplines – 181, 112, One Stop Centres, CM Helpline). Training and awareness sessions will be conducted about the SEA/SH reporting on GRM and resulting sanctions due to code violations periodically.

8.9 Model Code of Conduct for Contractor's Employees and Sub-contractors on Environmental, Social, Health and Safety (ESHS)

This Code of Conduct will oblige all Contractor's Personnel (including sub-contractors and day workers) to abide by following practices, as a minimum. Additional obligations may be imposed during project implementation to respond to concerns of the region, the location and the project sector, or specific project requirements. The contractor may also impose any additional or strengthen code of conduct on his workers/ staff.

The Code of Conduct should be written /translated in a language comprehensible by each worker signing it to indicate that they have:

- received a copy of the code;
- had the code explained to them;
- acknowledged that adherence to this Code of Conduct is a condition of employment; and understood that violations of the Code can result in serious consequences, up to and including dismissal, or referral to legal authorities.

A copy of the code of conduct will be displayed at prominent locations easily accessible to the community and project-affected people. The name and contact number of the authorized representative of the contractor competent to attend the grievances of the local community or project-affected persons should also be provided on the display board, in languages comprehensible to the local community, Employer's Engineer's Personnel, and Employer's Personnel.

Contractor's Personnel shall:

- carry out his/her duties competently and diligently;
- comply with this Code of Conduct and all applicable laws, regulations and other requirements, including requirements to protect the health, safety and well-being of other Contractor's Personnel and any other person;
- maintain a safe working environment including by:
    - ensuring that workplaces, machinery, equipment and processes under each person's control are safe and without risk to health;
    - wearing required personal protective equipment;
    - using appropriate measures relating to chemical, physical and biological substances and agents; and
    - following applicable emergency operating procedures.
- report work situations that he/she believes are not safe or healthy and remove himself/herself from a work situation which he/she reasonably believes presents an imminent and serious danger to his/her life or health;
- not burn waste or vegetation of any kind or remove any timber without authorization

- not store inflammable substances or harmful non-desired chemical/pesticide in labour camp or work site.
- not harm or disturb any culturally significant site.
- not dispose any solid or liquid wastes in river/canal, water bodies, streams etc.
- not practice open defecation
- not undertake any fishing practice at the worksite / riverbed, and also in local or community ponds
- not use illegal substances and consumption of intoxicating materials
- treat other people with respect, and not discriminate against specific groups such as women, people with disabilities, migrant workers or children;
- not engage in Sexual Harassment, which means unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature with other Contractor's or Employer's Personnel;
- not engage in Sexual Exploitation, which means any actual or attempted abuse of position of vulnerability, differential power or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially or politically from the sexual exploitation of another;
- not engage in Sexual Abuse, which means the actual or threatened physical intrusion of a sexual nature, whether by force or under unequal or coercive conditions;
- not engage in any form of sexual activity with individuals under the age of 18, except in case of pre-existing marriage;
- complete relevant training courses that will be provided related to the environmental and social aspects of the Contract, including on health and safety matters, and Sexual Exploitation, and Abuse (SEA)and Sexual Harassment (SH);
- report violations of this Code of Conduct; and
- not retaliate against any person who reports violations of this Code of Conduct, whether to us or the Employer, or who makes use of the grievance mechanism for Contractor's Personnel or the project's Grievance Redress Mechanism.

8.9.1 Required Conduct

Contractor's Personnel shall:

- carry out his/her duties competently and diligently
- comply with the Model Code of Conduct and all applicable laws, regulations and other requirements, including requirements to protect the health, safety and well-being of other Contractor's Personnel and any other person
- maintain a safe working environment including by ensuring that workplaces, machinery, equipment and processes under each person's control are safe and without risk to health
- wearing required personal protective equipment; using appropriate measures relating to chemical, physical and biological substances and agents; and following applicable emergency operating procedures
- report work situations that he/she believes are not safe or healthy and remove himself/herself from a work situation which he/she reasonably believes presents an imminent and serious danger to his/her life or health
- treat other people with respect, and not discriminate against specific groups such as women, people with disabilities, migrant workers or children
- complete relevant training courses that will be provided related to the environmental and social aspects of the Contract, including on health and safety matters, and Sexual

Exploitation, and Abuse (SEA) and Sexual Harassment (SH); report violations of this Code of Conduct; and not retaliate against any person who reports violations of this Code of Conduct, whether to us or the Employer, or who makes use of the grievance mechanism for Contractor's Personnel or the project's Grievance Redress Mechanism.

8.9.2 Raising Concerns

If any person observes behavior that he/she believes may represent a violation of this Code of Conduct, or that otherwise concerns him/her, he/she should raise the issue promptly. This can be done in either of the following ways:

- The person's identity will be kept confidential. Anonymous complaints or allegations may also be submitted and will be given all due and appropriate consideration. We take all possible misconduct reports seriously and will investigate and take appropriate action. We will provide warm referrals to service providers that may help support the person who experienced the alleged incident, as appropriate.
- There will be no retaliation against any person who raises a concern in good faith about any behavior prohibited by this Code of Conduct. Such retaliation would be a violation of this Code of Conduct.

8.9.3 Consequences of violating the Code of Conduct

Any violation of this Code of Conduct by Contractor's Personnel may result in serious consequences, up to and including termination and possible referral to legal authorities.

9 Resettlement Planning Framework

9.1 Introduction

The Resettlement Policy Framework will act as guide for mitigating the social impacts that would be triggered by the sub-projects under BWSMIP. The Framework for this project has been prepared based on the findings of ESIA that included the review of applicable legal and policy framework of GoI, GoB and ESF, 2016. It identifies and bridges the gaps between the national, state and WB ESS 5 to conform to the provisions of World Bank's ESS5. It lays down the principles and procedures for management of pre-construction adverse social impacts and guides the social impact assessment and preparation of Resettlement Action Plans. The framework has been developed based on the ESF requirements under ESS5 as well as the following national and state legislations:

Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (GoI)

- To ensure a just and fair compensation to the affected families whose land is acquired or proposed to be acquired or are affected by such acquisition through a transparent process. and provide for rehabilitation and resettlement of the affected families.
- Make sufficient provisions for such affected persons for their rehabilitation and resettlement; ensure that the affected persons become partners in development leading to an improvement in their post-acquisition social and economic status and for matters connected therewith
- For the proposed project Second schedule of the act is applicable which deals with Rehabilitation and Resettlement entitlements for all the affected families (both landowners and the families whose livelihood is primarily dependent on land acquired) in addition to those provided in the first schedule.
- A guideline has been provided in Second schedule towards cost associated with relocation of displaced families - Transportation cost, impact on livelihood/ loss of income, special assistance to vulnerable households.

Bihar Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Rule, 2014 (modified on 27-10-2014) (GoB): It is framed to implement the central Act within the state of Bihar, providing specific guidelines and procedures for land acquisition, compensation, rehabilitation, and resettlement.

Objective of RPF: The primary objective of this RPF is i) to identify adverse impacts and determine mitigation measures for all land acquisition and resettlement related impacts, ii) to provide measures that ensure better standard of living to the project affected persons, or at least restore their standard of living to that of before project, based on World Banks 'replacement cost' principle. Further, the RPF emphasizes on:

- avoiding or minimizing involuntary resettlement where feasible, exploring all viable alternative project designs;
- assisting displaced persons in improving their former living standards, income earning capacity, and production levels, or at least in restoring them;
- encouraging community participation in planning and implementing resettlement activities;
- providing assistance to affected people regardless of the legality of land tenure or ownership;

The following guidelines will be followed during implementation:

- Compensation and Rehabilitation assistance will be paid before actual, physical displacement;
- Compensation will be at replacement cost;

- No civil works will be initiated unless compensation for assets and rehabilitation assistance proposed under this RPF or identified under site specific RAPs is provided to all the eligible PAPs;

9.2 R & R Procedures for the Project

Based on the government provisions and World Bank policy, the following resettlement procedures are to be adopted for this Project:

1. Screen the project early on to identify past, present, and future involuntary resettlement impacts and risks.
2. Determine the scope of resettlement planning through a socio-economic survey and/or census of potentially affected persons, including a gender analysis, specifically related to resettlement impacts and risks.
3. Measures to avoid and minimize involuntary resettlement impacts include the following:
   (i) explore alternative alignments or locations which are less impacting,
   (ii) ensure the appropriate technology is used to reduce land requirements,
   (iii) modify the designs, cross sections, and geometrics of components to minimize the ROW and ensure involuntary resettlement is avoided or minimized.
4. Carry out meaningful consultations with displaced persons and host communities. Inform all displaced persons of the likely resettlement impacts on them, their entitlements to compensate for impacts and resettlement options. Ensure their participation in planning, implementation, and monitoring and evaluation of resettlement plans. Pay particular attention to the needs of vulnerable groups, especially those who are the landless, without legal title to land, the elderly, women and children, and people with disabilities, and ensure their participation in these consultations.
5. Establish a grievance redress mechanism to receive and facilitate resolution of the concerns of displaced persons. Support the rehabilitation of the social and cultural institutions of displaced persons and their host population.
6. Ensure that project affected persons without titles to land or any recognizable legal rights to land are eligible for relocation and rehabilitation measures, except land.
7. Improve, or at least restore, the livelihoods of all displaced persons, including those directly or indirectly dependent on that land, through; (i) prompt compensation at full replacement cost for assets that cannot be restored, moved or salvaged. (ii) compensation for production losses, and (iii) compensation for loss of profit and income.
8. Assess entitlements of project affected persons, the livelihood restoration strategy, institutional arrangements, monitoring and reporting framework, budget, and time-bound implementation schedule. This resettlement plan will be approved by WB prior to contract award.
9. Disclose a draft resettlement plan, including documentation of the consultation process, valuation procedure, planned entitlements before project appraisal, in an accessible place and a language(s) understandable to project affected persons and other stakeholders. Disclose the final resettlement plan and its updates to project affected persons and other stakeholders and make it available at a convenient location for review and reference.
10. Provide an advance notice of at least 6-month prior to relocation to Project Affected Persons (PAPs).
11. Pay the full compensation to the eligible persons / families during the period between their actual physical or economic displacement and its possession by the department, and definitely before the commencement of civil works.
12. Provide resettlement entitlements and other resettlement assistance under close supervision throughout the RAP implementation.
13. Monitor and assess resettlement outcomes, their impacts on the standard of living of project affected persons, and whether the objectives of the resettlement plan have been achieved or not.

9.3 Potential Resettlement Impacts

The likely resettlement impacts of BWSIMP include the following:

- Temporary or permanent physical displacement of informal occupants of the canal beds, embankments and the canal RoWs, due to headworks improvement, dredging, lining-desilting operations
- Permanent or temporary access restrictions, especially to the RoWs,
- Permanent or temporary economic displacement in the form of loss of livelihoods or income for vendors/ hawkers or home-based enterprises,
- Productivity related impacts of construction/ repair works on adjacent farmlands.
- Permanent loss of habitation, livelihood, farmland or animal sheds along some sections/ chainages of the embankments and canals that have been encroached
- Temporary restrictions on access during construction phase,
- Restricted access to water supply for irrigation during canal repair and river embankment strengthening.

9.4 Land Requirement Under the Project

All the activities under BWSMIP that require land, i.e., rehabilitation of dams and barrages, renovation and modernization of canal system, linking canals, and flood and erosion control will be taken up within the existing structures and within the right-of-way/riverbed of the lands owned by the Water Resource Department. No additional private land is required for the project purpose; hence no private land acquisition is proposed. However, over the years some chainages along the canals, river embankments, the right-of-way may have been encroached upon for creating commercial (shops, animal shelters) and residential structures as well as small religious structures. In case there is any encroachment in the canal beds, resettlement action plans will address them. These encroachers and squatters are likely to be impacted during the construction and post construction phase based on the location and the nature of works proposed for that site. As such, permanent acquisition of land where provisions of LARR Act, 2013 or direct purchase of land as per prevailing policy of the Government of Bihar will not be applied. Also, the project activities will be planned in such a manner to create the least obstruction / interference on the land commonly accessed by the local communities and other assets of people as well as various utility structures, lying in the vicinity of the working zone. Since most of the physical and construction works will take place within and along the canals (its headworks, hydraulic systems, access, lining and desilting) and the rivers (strengthening or raising the height of embankments) at pre-identified alignments, the immediate physical impact will be on these water bodies and their RoWs, which are owned by the department and maintained by them for undertaking O&M operations, but commonly accesses by communities for local commute. As a result, there are expected to be resettlement impacts depending on the duration for which the land is to be used by the project: Works within and along the canals, riverbeds as well as embankments which will permanently deny future, use of that land by informal occupants.

9.5 Permanent Use of Land and its Impact

- Settlers and encroachers using the former category of land will face permanent resettlement impacts, since they will not be able to use it once the construction is over, as that land or part of it would have been used for expansion of irrigation infrastructure - adding new structures/works, machines or systems or for creating access ramps to undertake repair and maintenance at a later stage. The actual scale of resettlement impact will become known once the DPRs along with the

technical design have been finalized and the extent of construction planned at a given site is known. Since the canals and their distributaries will become functional once the irrigation systems are modernized, the canal beds that were encroached and used for seasonal farming or keeping livestock will not be accessible post- construction.

- Resettlement support and assistance will be provided to such households based on Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (LARR Act, 2013), and ESS5, including a) transportation support, b) opportunity to salvage assets, c) compensation in case of immovable assets other than land and building/ structure/ sheds, d) compensation for any standing crops, based on the valuation provided by the agriculture department, e) compensation for any income losses for vendors using the land for business for an agreed period of time which will be required to reestablish business at another location.
- Listing of all assets, structures, income estimates will be captured by the line department, directly or through an agency, in consultation with the project affected. Valuation and its basis will be explained to the impacted at a later stage through a public consultation and they will be given an opportunity to seek clarifications.
- Advance, adequate and formal notices will be provided to those permanently impacted about the period within which the land has to be vacated, and the resettlement support being offered by the department and the implementing agency. In case of disagreement regarding the date for vacating the land-plot or the resettlement assistance to be provided, the project affected will have the option to seek the intervention of the Project Director BWSIMP directly or through the project GRM. In case of dis-satisfaction with the resolution, the project affected will have the freedom to access the statewide GRM or to go to court.
- A part of the resettlement support will be provided as advance to the project affected and the remaining amount will be transferred once the land has been vacated and all assets/ structures (that the PAP had undertaken to salvage) have been removed from site.

9.6 Temporary Use of Land and its Impact

- In certain cases, temporary occupation of additional land for project purposes may be required for staking of desilted materials, placing of machinery or establishment of work camps. For temporary impact on land and common resources, any land required by the project on a temporary basis will be compensated in consultation with landowners and will be restored to previous or better quality. Use of such land will be a measure of last resort, as the project will try to meet such requirements by using existing, neighboring government lands, vacant buildings for this purpose. Some of this land will also include the RoWs already owned by WRD but used for commutation by the local community. The extent of requirement of such lands will be determined by the working agencies, after issue of Award of Contract (AoC) and such requirement of lands will be intimated to the project officials of the WRD, by these agencies.
- For all other temporary impacts during the construction phase, listed above, the procedure detailed below will be adopted:
    a. Crop compensation as per scale and standard to be decided by the District Magistrate in consultation with Agriculture / Horticulture Departments will be paid by the working agencies to the affected persons for the period for which the land would be used for temporary storage of materials or haul roads together with deemed rental charges for the said period. In case land cannot be restored after the completion of project activities to its previous condition, additional compensation at prescribed rate of 25% of the original compensation would be payable.

b. The district administration, headed by the Collector / District Magistrate, shall thereupon give notice in writing to the owner of the identified land, based on the earlier discussion with the concerned person. The project will pay compensation to the concerned person, either in a gross sum of money or by monthly or other periodical payments, as per the written agreement of both the parties. For arable land, compensation will be provided for the crops for the period of occupancy. Such rate of compensation is to be decided by the Collector / District Magistrate in consultation with line departments of government. For non-arable land, compensation can be paid on a rental basis, as decided by the Collector / District Magistrate of the concerned district.
c. In case of disagreement on compensation amount, the matter will be referred to the Project Director of the BWSMIP for final decision.
d. On payment of such compensation or on execution of the agreement by both the parties, the land can be taken under possession and use or permit the use thereof in accordance with the agreement.
e. On the expiration of the term, compensation will be paid to the land holder for the damage, if any, done to the land and for the restoration of land. If the land needs development and restoration to its original position after its use for the project purpose, additional compensation will be paid to the land holder. For the restoration of land to its previous condition, additional compensation at prescribed rate of 25% of the original compensation would be payable.

9.7 Valuation of Building and Structure

The cost of buildings/structures will be estimated based on updated Basic Schedule of Rates (BSR) as on date without depreciation in line with the ESF requirement. For the affected structures belonging to non-titleholders, no Solatium will be added to the estimated market value of the structure as it is provided to only the titleholders under the provision of RFCT in LARR Act -2013/BLARR,2014.

Even after payment of compensation, PAPs would be allowed to take away the materials salvaged from their dismantled houses and shops and no charges will be levied upon them for the same. In case of any structures not removed by the PAPs in stipulated 60 days period, a notice to that effect will be issued intimating that PAPs can take away the materials so salvaged within 48 hours of their demolition; otherwise, the same will be disposed by the project authority without giving any further notice.

In case of Community structures / utilities / facilities that are in the public places and required to be demolished or relocated due to construction activities, compensation will be paid at the market price to the appropriate authority (Gram Panchayat/WARD, concerned department management committee etc.) or to be reconstructed / restored in current location or suitable place, to be identified by the local GP /WARD/ concerned committee / Concerned Govt. Department.

9.8 Valuation of Trees and Standing Crops

Compensation for trees will be based on their full replacement cost. The District Collector for the purpose of determining the market value of trees and plants attached to the land acquired, use the services of experienced persons/agencies in the field of agriculture, forestry, horticulture, sericulture, or any other field, as may be considered necessary.

Trees standing on the land owned by the government will be disposed off through open auction by the concerned Revenue Department/ Forest Department.

For any standing crops, if feasible, the project will take physical possession of the land once the cropping cycle is over, so that the project impact is minimized. In extreme cases where urgent acquisition is unavoidable, the estimation on productivity and total production and profits will be assessed by the officials of relevant line departments.

9.9 Eligibility

A person / household will be eligible for compensation / assistance (not for land as no private land is proposed for acquisition) in the following cases:

1. Encroachers/ Squatters/Non-titleholder project affected persons PAPs will not be eligible for compensation of land occupied by them. They will receive compensation for the investment made by them on the land such as replacement value of structures and other assets as per Right to Fair Compensation and Transparency in LARR 2013. Therefore, they will be eligible for compensation for non-land assets.
2. In case, a Project affected family could not be enumerated during the census because of non-availability during census or any other reasons, but they have reliable evidence to prove his/her presence before the cut-off date, shall be included in the list of PAPs after proper verification by the project authority.

9.10 Entitlements, Assistance and Benefits

In this project the PAPs are mainly those persons who lost the land they occupy in its entirety or in part who have neither formal legal rights nor recognized or recognizable claims to such land. The project does not involve land acquisition and therefore, legal titleholders will not be affected. The Resettlement Action Plan (RAP) will describe the provision for these PAPs and formulated the entitlement matrix.

Cut-off-Date for Entitlement

For non-titleholders, cut-off date will be the end of the census survey of the site (for ESIA) conducted for the said project. PAPs who settle in the affected areas after the cut-off date will not be eligible for compensation. The cut-off date for non-titleholders will be officially declared by the WRD, the Implementing Agency along with the disclosure of RAP. They, however, will be given sufficient advance notice, requested to vacate the premises and dismantle affected structures prior to project implementation. Their dismantled structures materials will not be taken for public use or seized.

Project Entitlement

In accordance with the R&R measures, all project affected households and persons will be entitled to resettlement assistance depending on the scope of the impacts including socio-economic vulnerability of the displaced persons and measures to support livelihood restoration if livelihood impacts are envisaged. The project affected persons will be entitled to the following five types of compensation and assistance packages:

- Compensation for structures (residential/ commercial) and other immovable assets at their replacement cost;
- Assistance in lieu of the loss of business/ wage income and income restoration assistance;
- Assistance for shifting and provision for the relocation site (if required), and
- Rebuilding and/ or restoration of community resources/facilities.

Loss of Structures will be compensated at replacement value with other assistance to the non-titleholders. The details of entitlement will be as:

- Compensation for structure at the replacement cost to be calculated as per latest prevailing basic schedules of rates (BSR) without depreciation.
- Right to salvage materials from structure and other assets with no deductions from replacement value.
- One-time Resettlement allowance of Rs. 50,000

- One-time financial assistance of Rs. 25,000 to the families losing cattle sheds for reconstruction
- One time shifting assistance of Rs. 50,000 towards transport costs for families losing houses.
- Monthly subsistence grant for displaced families for one year @ ₹3000/-

Loss of crops and trees will be compensated by cash compensation. The compensation for perennial crops will be determined in consultation with the Agriculture Department or Horticulture Department for crops and Forest department for trees.

Loss of livelihood due to loss of primary source of income will be compensated through rehabilitation assistances. There are non-titleholders in this project losing primary source of income. Details of entitlements for this category of project affected are as per below:

- One-time financial assistance of minimum Rs. 25,000.
- Skill up-gradation training to PAPs opted for (one member of the affected family) income restoration.
- Preference in employment under the project during construction and implementation.
- 6 months of average wage loss or estimated monthly profits for vendors and shops impacted, including their employees/ workers

Loss of community infrastructure/common property resources (CPR)will be compensated either by cash compensation at replacement cost to the community (registered trust, society or village committee as appropriate) or reconstruction of the community structure in consultation with the affected community. CPR clearing and reconstruction including any ceremonial/religious expenses to relocate such structures will be undertaken by civil works contractors, and the associated costs are incorporated in their contracts.

Additional assistance to vulnerable households (Vulnerable households includes below poverty level (BPL), SC, ST, women house hold (WHH), non–titleholders, disabled and elderly) will be paid with special assistance as detailed below. The following provision in addition to the compensation for lost assets will ensure that the vulnerable people affected under the Project will be able to improve their standard of living or attain at least national minimal level.

- One-time lump sum assistance of Rs. 25,000 to vulnerable households. This will be paid above and over the other entitlements.
- Receive preference in income restoration training program under the project.
- Preference in employment under the project during construction and implementation according to their existing or acquired skills.

Temporary Relocation refers to relocation to another site by the encroacher / squatter for a specific period of time, especially during the construction period. Temporary relocation does not require any demolition of structures (permanent / semi-permanent) but the space would be vacated for a specific period of time. In certain cases, small shops can be shifted to other places as protective measure and the encroacher /squatter can operate the shop from temporarily relocated place. In case of temporary relocation of families residing near the embankment / public sites identified for construction / rehabilitation, the project will adopt multiple strategies for the families to be relocated.

Any unanticipated impacts due to the project will be documented during the implementation phase and mitigated based on provision made in the Entitlement Matrix of this RAP.

Right to Salvage Affected Materials even after payment of compensation for structures, the PAFs / PAPs would be allowed to take away the materials salvaged from their dismantled houses and shops and no charges will be levied upon them for the same. A notice to this effect will be issued intimating that the PAFs / PAPs can take away the materials so salvaged within 15 days of their demolition; otherwise, the same will be disposed-off by the project authority without giving any further notice.

9.11 Entitlement Matrix

An Entitlement Matrix has been developed, that summarizes the types of losses and the corresponding nature and scope of entitlements; and is in compliance with National/ State Laws and World Bank's policies. Appropriate compensation and assistance will be fully paid prior to any physical or economic displacement.

All compensation and other assistances will be paid to all PAPs prior to commencement of the works. After payment of compensation, PAPs would be allowed to take away the materials salvaged from their dismantled houses and shops and no charges will be levied upon them for the same. The cost of salvaged materials will not be deducted from the overall compensation amount due to the PAPs. A notice to that effect will be issued intimating that PAPs can take away the materials. Details related to the entitlements are presented in the matrix below.

Impact Type	**Entitled Entity**	**Entitlement as per BLARRR 2014**	**Implementing Authority & period**
1. Loss of Land (Titleholders)			
1A. Loss of Agricultural Land	Affected Family (Titleholder)	• Cash compensation at replacement cost as determined according to BLARRR 2014 or replacement of land if available. Since the land value differs from place to place depending on location, use, fertility, water source, etc. the replacement value has to be market value as in open market on a willing seller and willing buyer basis. • If the residual plot is not viable and PAP becomes a marginal farmer, then any of the following three options are to be given to the PAP, subject to PAP's acceptance: ○ Acquire the required land and pay compensation and assistance for the same. ○ If PAP so wishes acquire the remaining portion of the plot and pay compensation and assistance for the entire plot including residual part. ○ If PAP is from vulnerable group, compensation for the	District Magistrate Process to be completed before the inception of the works

		entire land by means of land for-land will be provided, if PAP wants so, provided that land of equal productive value is available. All fees, stamp duties, taxes and other charges, as applicable under the relevant laws, incurred in the relocation and rehabilitation process, are to be borne by the IA.	
1B. Loss of Residential/ Commercial land	Affected Family (Titleholder)	• Cash compensation at replacement cost as determined according to BLARRR 2014 or replacement of land if available, only if the land acquired is a maximum of 5 Decimal. All fees, stamp duties, taxes and other charges, as applicable under the relevant laws, incurred in the relocation and rehabilitation process, are to be borne by the IA.	District Magistrate Process to be completed before the inception of the works
2. Loss of Structures (Titleholders)			
2A. Loss of Residential Structures	Affected Family (Titleholder)	• Compensation of structure will be paid at the replacement cost to be calculated as per latest prevailing Basic Scheduleof Rates (BSR) without depreciation. Assistance of Rs. 50,000/- towards temporary accommodation • Transportation assistance of Rs. 50000/- • One time financial assistance of Rs. 25,000 to the families losing cattle sheds for reconstruction. • Right to salvage material from demolished structure and frontage etc. • Rental assistance as per the prevalent rate in the form of grant to cover maximum three month rentals • Three months' notice to vacate structures.	District Magistrate Process to be completed before the inception of the works

		• Refund of stamp duty and registration charges for purchase of new alternative houses/shops at prevailing rates on the market value as determined in (a) above. Alternative houses/shops must be bought within a year from the date of payment of compensation. • In case of partially affected structures and the remaining structure remains viable, additional10% to restore the structure. In case of partially affected structures and the remaining structure becomes unviable additional 25% of compensation amount as severance allowance. Subsistence allowance equivalent to Rs. 36000 as one-time grant	
2B. Loss of Rental Accommodation (Residential/ Commercial	Tenants	• Rental assistance for both residential & commercial tenants as per the prevalent rate in the form of grant to cover maximum three month rentals. • Additional structures erected by tenants will also be compensated and deducted from owner's compensation amount. • Shifting assistance based on type of house and household assets. • Any advance deposited by the tenants will be refunded from owners total compensation package to the tenant onsubmission of documentary evidence. Right to salvage material from demolished structure and frontage etc. erected by tenants.	District Magistrate Process to be completed before the inception of the works

3.Loss of Structures Residential/ Commercial (Non-Titleholders)			
3A. Loss of Immovable Structures (Residential/ Commercial)	Squatters/ Encroachers	• Squatters and Encroachers will be notified and given one month time to remove their assets or harvest their crops • Compensation for loss of structure at replacement cost for Squatters • One time allowance for construction of cattle shed/ petty shop of Rs.25,000/- • Compensation for loss of structure at replacement cost for only the vulnerable households among Encroachers, Shifting assistance of Rs. 50,000/- for Squatters losing houses • Monthly subsistence grant for displaced families for one year @ ₹3000/- For Squatters and Encroachers right to salvage material from the demolished structure	District Magistrate RAP to be implemented before the inception of the works
3B. Loss of Primary Source of Income	Non-title holders Agriculture labourers Share cropper	Employment opportunity for PAPS in the sub-project construction work, if available and if so desired by them. National/State level job card under National Rural Employment Guarantee Program. Income generation skill upgrading vocational training of their choice at a rate of Rs. 25,000/- For Agricultural Labourers and Share Croppers an assistance of 200 days of wages at minimum wage rate	District Magistrate RAP to be implemented by district level project officials of the WRD in association with the District Administration set up, before commencement of field works
4. Common Property Resources			
Loss of Common Property Resources	Community	Reconstruction, Commissioning and handing over to concerned departments/ community of all affected community property resources with community consultation and participation	RAP to be implemented by district level project officials of the WRD in association with the Block Administration set up, before commencement of field works
5. Vulnerable PAPs	Women headed households, Widows, Landless, STs, Mahadalit, Chronically ill, Old-aged persons, person with disability etc.	One-time additional special assistance of Rs. 25,000/- over and above other entitlements. Handholding for ensured access to other government subsidies, schemes and services	District Magistrate RAP to be implemented before the inception of the works

6. Damage to private building, house or structure during construction period.	Legal title holder, family with traditional land right	The project shall either bear the cost of any damage / other impact on structures, due to movement of machinery, transport of materials, etc. or due to any other activities during construction or establishment of construction plant, as per mutual agreement between the impacted entity and the agency, or at such rates as may be decided by the Project Implementing Authority or the District Magistrate	RAP to be implemented by the working agencies, as per provision of the Contract and guidance / advice of the Project Officials of the WRD
7. Other Unforeseen/ Unanticipated Impacts			
Unforeseen/ Unanticipated Impacts		Any unforeseen/ unanticipated impacts due to the sub-projects will be documented and mitigated based on the spirit of the principle agreed upon in this framework.	RAP to be implemented by the implementing agencies

9.12 Grievance Redressal

The project Grievance Redressal Mechanism will be available for PAPs. *The aggrieved person if not satisfied with the verdict given by State level grievance* Committee*, will have the right to approach the Judiciary. Project will help the aggrieved person in all respect if person wants to approach the judiciary.*

10 Climate Resilient Agriculture: Integrated Pest Management and Integrated Nutrient Management

The Bihar Water Security and Irrigation Modernization Project (BWSIMP) aims to enhance climate resilience and productivity by implementing Climate Resilient Agriculture (CRA[16]) practices in the command areas. The focus is on rice and wheat, demonstrating improved practices and technologies to farmers. These are tested by local universities and research organizations and will be scaled to about 50,000 ha in the project areas.

Key Interventions Proposed

- Improved Soil Preparation: Adopting advanced soil preparation techniques, such as minimum tillage and organic amendments, enhances soil structure, water retention, and reduces erosion.
- Climate Resilient Mechanization: Introducing advanced tools like direct seeders, zero tillage equipment, and small harvesters through custom hiring centers optimizes resource use and boosts productivity.
- Climate Resilient Seeds: Promoting government-approved, climate-resilient seeds that withstand adverse conditions, ensuring stable food production and local food security.
- Direct Seeded Rice (DSR): DSR reduces water usage and labor costs by sowing seeds directly into the field, shortening the crop cycle for timely planting of subsequent crops.
- Alternate Wetting and Drying (AWD): AWD optimizes water use in rice cultivation by letting fields dry between irrigations, reducing water consumption and methane emissions.
- Improved Nursery for Rice: Establishing improved nurseries with healthy seedlings ensures better crop establishment and higher yields.
- Seed Treatment with Bio-inoculants: Using bio-inoculants enhances seedling vigor and resilience to pests, reducing the need for chemical inputs.
- Integrated Soil Nutrition Management (ISNM): Combining organic and inorganic nutrients optimizes soil fertility, improves nutrient availability, and promotes healthy plant growth.
- Integrated Pest Management (IPM): IPM strategies minimize chemical pesticide use through biological control, cultural practices, and resistant crop varieties.

The CRA interventions under BWSIMP aim to enhance agricultural sustainability and productivity in the face of climate change. These practices will help smallholders mitigate climate impacts, reduce methane emissions, and ensure local food security. BWSIMP serves as a model for promoting climate-resilient agriculture, offering valuable lessons for similar initiatives worldwide.

Additionally, inputs on safeguards measures to promote/ protect indigenous variety of crop, maintain soil health, promote integrated nutrient management and integrated pest management will be added in the Project Operational Manual. Project will strengthen the climate resilience of female cultivators by providing training and support. Progress on these actions will be tracked via number of Female farmers trained in climate resilient irrigation and agriculture.

[16] References

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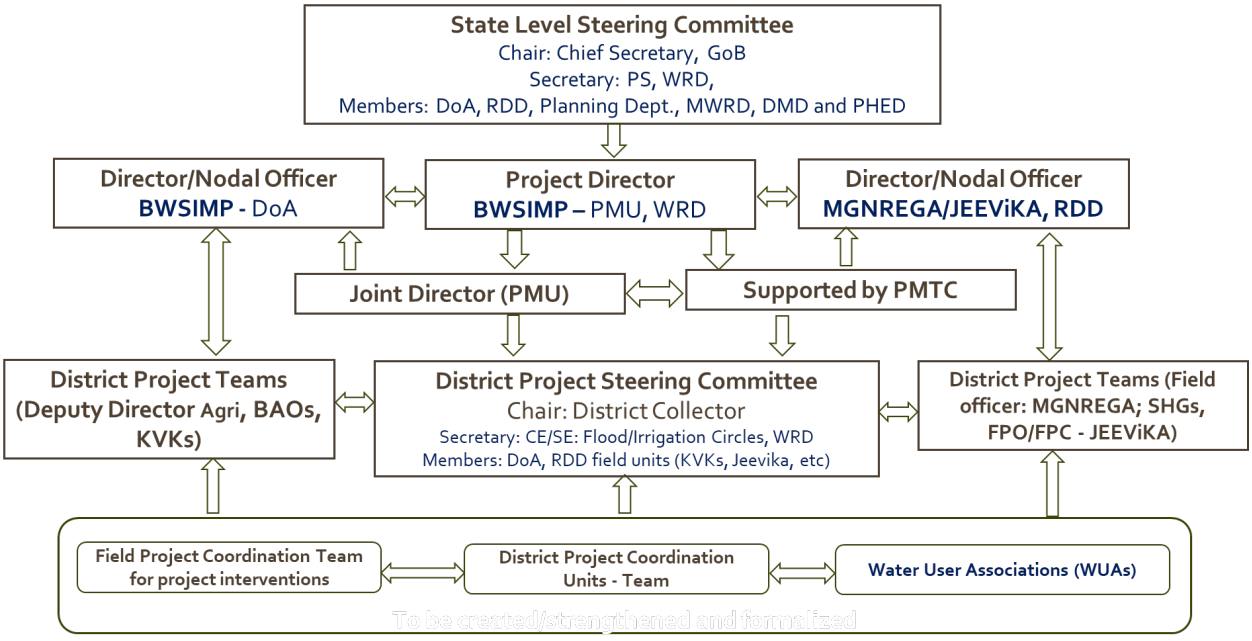
11 Institutional Arrangements for Implementation

The Water Resource Department has implemented World Bank-financed projects, such as the Bihar Kosi Basin Development Project (P127725) and Bihar Kosi Flood Recovery Project (P122096) through a PMU- Bihar Aapda Punarwas Evam Punarnirman Society (BAPEPS) that was set up to coordinate activities across all Implementing Agencies. E&S Project staff under BAPEPS were responsible for managing safeguards as per WB safeguard policies. This provided considerable experience to the WRD (Flood Protection Division) on WB procedures especially as the team managed complex issues on resettlement. Therefore, the existing capacities must be leveraged on time such that experienced personnel are on-boarded during the preparation stage and lessons from past projects are duly integrated. The project will now be implemented through the Irrigation Division within WRD. A PMU will be set up in WRD, and respective PIUs will be set up in the Department of Agriculture and Rural Development Department. A Project Management Technical Consultancy (PMTC) will also be formed to backstop the PMU on specific technical, institutional, and monitoring tasks. The PMU, PIUs and PMTC must be adequately staffed with competitively recruited E&S Specialists to support preparing site-specific ESIAs for DPRs and other E&S documents.

11.1 Governance and Overall Institutional structure of the Project

- **The implementation arrangements are aligned with the current institutional architecture of the GoB.** The WRD, responsible for overall surface water management, including irrigation and flood management, will be the project holder and Project Implementing Agency. The WRD will oversee overall project management and coordination through the Project Management Unit, which has already been established with officers experienced in World Bank procedures. The PMTC, a team of experts and consultants headed by a team leader, will provide technical support for project activities that exceed the skill set of the WRD. Additionally, the PMTC will assist in collating the information to document the achievement of PBCs. The project implementation structure is shown in Figure

Figure 11.1 Project Implementation Organogram



- **Chaired by the Chief Secretary to the GoB, a State Level Steering Committee (SLSC) has been established.** The process of establishing the SLSC has been completed under the Chairmainship of Chief Secretary, Govt. of Bihar and notified through an executive order. The SLSC will meet at least twice a year and will be responsible for overall strategic guidance and oversight and for ensuring collaboration and resolving inter-department and inter-agency issues**.** The Principal Secretary of the State Water Resources Department will be the Member Secretary of the SLSC. The Additional Chief Secretary, the Principal Secretary, or the Secretaries of the State Ministries/Departments of Agriculture, Rural Development, Minor Water Resources and Finance Department will be the executive members of the SLSC. District Level Project Steering Committees (DLPSCs) will be constituted in all the districts where the Project is implemented, with District Collectors as the chairpersons to provide guidance at the field level.

- **The PMU will be supported by two PIUs represented by DoA and RDD-JEEViKA, in the implementation of the Project.** The DoA is responsible for enhancing agricultural productivity, including climate adaptation, and will lead the implementation of Subcomponent 1.3 on CRA. As a key player in the GoB's JEEViKA program and in alignment with the Command Area Development and Water Management (CADWM), the RDD will spearhead the implementation of OFD in restored command areas. Its responsibilities will include financing field channel formation and O&M in the restored commands, including through accessing MGNREGS funds. The Project will provide technical support for preparation of DPRs, with technical specifications for implementation. The RDD will also support community mobilization and awareness-building processes needed for forming and/or strengthening of WUAs in restored commands. JEEViKA has already organized women's SHGs and FPOs in the state and will complete this process in restored commands, if not already done. Both the DoA and the RDD will support the implementation of PIM under Subcomponent 1.2 in restored commands.

- **The district/circle offices in the project districts will form District Project Teams (DPTs) with deputed staff from the WRD, DoA, and RDD.** The DPTs will report to and provide all necessary field-level information to the nodal officers of respective PIUs[17] and the Project Director of the BWSIMP, who will oversee the overall progress of the project implementation.

- **Implementation will be guided through a Project Operations Manual (POM).** POM will be prepared by the PMU-PMTC, with each implementing entity providing its respective inputs, within three months from the project effectiveness date. All implementing agencies will adopt the POM and follow its guidance on procedures for management, implementation, and M&E. The project's financial management arrangements will follow the extant systems of GoB/WRD.

11.2 Institutional arrangement for E&S management

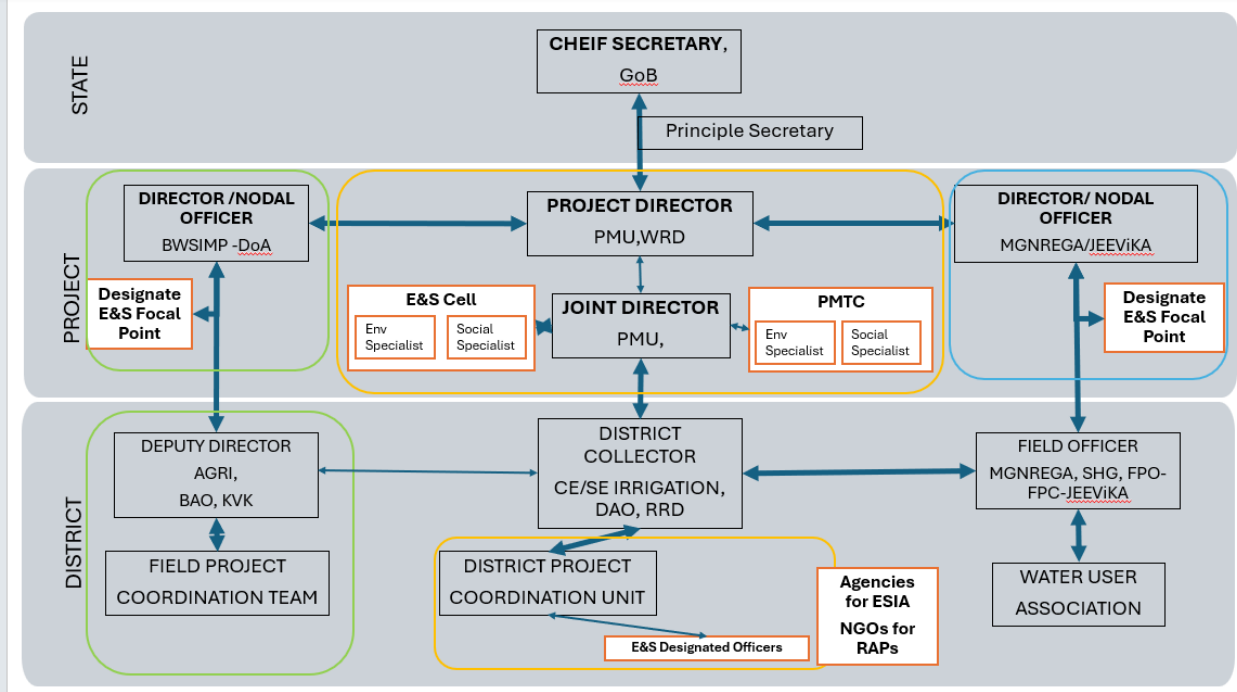
- **Project Management Unit (PMU).** WRD has constituted a PMU, drawing from the pool of officers that already have experience with the World Bank procedures. PMU will be is responsible for management and coordination of project implementation. The PMU has a dedicated Environment Specialist (ES) and Social Specialist (SS) responsible for the technical guidance to all PIU, and district level specialists in the projects so that the principle and processes, agreed in the ESMF is implemented. ES and SS would also be responsible for providing input on the environmental and social safeguards and the larger sustainability principles of the ESF.
- **Project Management Technical Consultant (PMTC).** The technical support for implementation of project activities that are beyond skill-set of WRD, will be brought in by the PMTC, with a team of experts/consultants, headed by the Team Leader (TL). PMTC will provide support on verification of the achievement of PBCs to inform the results achieved. The PMTC will have one Environmental and

[17] The project activities will be implemented through Project Implementation Units (PIU) established in WRD (field level units) each comprising of the Chief Engineer, the Superintendent Engineer and the Executive Engineer. About 20 divisions (out of 158 working divisions) of WRD are expected to be involved in project implementation. DoA and RDD will house the other PIUs

One Social Officer to support the PMU in the implementation of the ESMF for the project and the ESMP for each sub project. The Environment and Social Specialist will verify on site the implementation of the ESMP before each bill is submitted to PMU with recommendation for payment.

- **Project Implementation Units (PIUs).** WRD will be supported PIU's in the Agriculture Department, GoB and Rural Development Department, GoB. There will be Nodal Officer at E&S at Both the PIUs. The PIU's will have Nodal Officers with assigned charge for E&S. They will not only oversee the implementation of Environmental and Social Codes Practice during the construction but will also support in the integration of the environmental and social aspects into the agricultural interventions. Currently, there is no E&S staff in the PIUs – especially at DoA level such capacities are required (and client has agreed to mobilize them before implementation begins)
- **The implementation structure for the environmental and social management has been aligned to the institutional structure of the project.** The E&S institution would help integrate the sustainability principle in the ESMF into the construction of the irrigation and flood management systems, and the use of water in the agriculture, interventions planned under this project. The PMU, PIUs, PMTCs and the organization's supporting this project would ensure the effective engagement of stakeholders and handhold them through the project cycle to ensure that the project makes positive environmental and social benefits. The Institutional structure for implementation of the Environmental and Social Safeguard is presented in Figure 11-1.

Figure 11-1 :Organogram for E&S Safeguards Implementation



11.3 Roles and Responsibilities

The roles and responsibilities of the different staff members are presented in the section below:

Project Director	The Project Director / Deputy Project Director is responsible for the overall implementation of the ESMF. They would be supported by the SPMU and DPMU teams. The key responsibilities include: • Oversight of the ESMF process • Ensure staffing as per the Implementation arrangement agree • Review of the finding of the Internal and External Auditing • Reporting to all stakeholders, including the World Bank
Environment Specialist (SPMU)	The Environmental Officer at the PMU level will look after environmental issues in line with the ESMF. The Key responsibilities: • Guide the PMU and PIU on the process of Implementation of the ESMF • Guide the project team on the integration of environmental aspects in the project over the project cycle • Undertake screening of projects, • Oversee the process and finalise the Environmental Assessment of the different sub-projects • Verification of the adequacy of the E&S Assessment and the EMP measures for each scheme • Review the bidding documents and work order to ensure specific environmental measures mentioned in the EMP are integrated into the bid document and work order • Preparation and implementation of the specific management plans e.g. Dolphin Program • Guide the PMU and PIU to monitor the works of the Contractor and other agencies involved • Undertake Capacity Building of the team at PMU, PIU, and district-level Environmental Officer • Guide the District-Level Environmental and Social officers • Coordinate the design and development of the E&S tool for real-time reporting • Carry out the Reporting for the Implementation of the ESMF • Coordinate with the social specialist to collate the Environmental and Social Monitoring findings and present it to the Project Director • Coordinate the development of the Corrective Action Plan with the support of the Social Specialist (Social, Gender and Tribal issues), E&S Officer of Agriculture and Rural Development Department • Disclosure of the information: ESMF (including SEP and LMP), RPF, ESCP, ESIA, Corrective action plan prepared during project implementation (English), Semi-annual Environmental Monitoring Reports (English) • Preparation of the Report for the World Bank
Social Specialist (SPMU)	The Social Specialist at the PMU in addition to the roles will be responsible person to: • Guide the overall process related to social and gender aspects. • Provide guidance to the PMU and PIU to plan, execute and monitor the social / gender components • Undertake screening of subprojects for social aspects • Oversee and Finalize the Social Assessment and Resettlement Action Plan of different subprojects and ensure inclusivity with a gender perspective • Oversee the execution of the planned activities and realization of the social / gender inclusion parameters • Undertake Capacity Building of the team on the Gender and implementation of the social aspects • Guide the PMU and PIU in ensuring the effective involvement of Women in the functioning of WUA • Carry out the Internal Monitoring and Auditing for the Implementation of the ESMF

	• Support the District Level teams for effective implementation of the plans for social inclusion. • Coordinate with the Environment Specialist on the Disclosure of the documents • Reporting of the Social and gender aspect to the Bank
Project Team at PMU	The Project Team at the PMU will be responsible for: • Coordinate with the Environmental and Social Specialist and the Divisions/ district team to upstream the finding so the finding of the E&S Screening into the design • Authentication of the E&S Assessment and the EMP measures for each scheme • Ensure that the environment and social safeguard measures are included in the Tender Document • Coordinate with the Contractor and ensure the ESMP measures are implemented during the construction by the Contractor • Coordinate with the Environment and Social expert to collate the Environmental and Social Monitoring findings and work with the Division to address them.

Divisional Engineer at WRD

The Divisional Engineer is responsible for the overall implementation of the ESMF through the District Project Steering Coordination. The team at the PMU would support him at the in these aspects. They would extend all possible technical assistance in this regard. The Key responsibility would include the following:

- Oversight of the ESMF process in the district
- Coordinate with the Deputy Director (Agri) and the Rural development Department on the ESMF implementation
- Ensure adequate staffing and capacity as per the Implementation arrangement are present
- Ensure that the Contractor implements the EMP provisions
- Review of the finding of the Internal and External Auditing findings
- Coordinating the development of the Action Plan

Engineering Team at the district (WRD)

The Engineering Team at the district, would be responsible for preparation of DPR, tendering process, and construction of the irrigation structures. Thus, they would be responsible for

- Authenticate the Screening Questionnaire being prepared at beginning of the DPR preparation
- Authenticate the Scoping questionnaire prepared by the E&S Officer
- Carry out socio-economic surveys and help the E&S officer in carrying out Social Impact Assessment
- Authentication of the E&S Assessment and the EMP measures for each scheme
- Include the environment and social safeguard measures are included in the Tender Document
- Coordinate with the Contractor and ensure the ESMP measures are implemented during the construction by the Contractor
- Help the Environment and Social Specialist to collate the Environmental and Social Monitoring findings and present them to the Divisional Engineer
- Coordinate the development of the Corrective Action Plan with the support of the Social Specialist (Social, Gender and Tribal issues), Environment Specialist (construction related EMP)

E&S Officer at WRD

The Environmental & Social (E&S) Officer at the District level will look after the environmental and social issues, in line with the ESMF. The Key responsibilities:

- Guide the District team on the Implementation of the ESMF
- Guide the engineering teams in the integration of environmental and social aspects in the planning, designing and implementation

- With the assistance of the rest of the team, prepare the E&S Assessment and the EMP measures for each scheme
- Effectively plan the activities to include social / gender inclusion parameters
- Support in building environmental parameters in the bidding documents
- Guide the District team to monitor the implementation of the EMP by the Contractor
- Undertake Capacity Building of the team at the district
- With the other members of the team at the district ensure that the ESMP is implemented by the contractor
- Undertake real time Monitoring of the E&S issues during the construction phase of the project.
- With the help of Environmental and Social Specialist of PMTC certify the implementation of the ESMP by Contractor
- Carry out the Internal Monitoring and Auditing for the Implementation of the ESMF
- Collate the Environmental and Social Monitoring findings and present them to the Division and also E&S Cell
- Coordinate the development of the Corrective Action Plan
- Support in the preparation of the Report for the World Bank

PIU at Agriculture Department

The E&S Officer at PIU in DAO is responsible for coordinating the E&S aspects in the implementation of the interventions in agriculture and horticulture. His key responsibilities during the ESMF implementation would include:

- Ensure that the schemes developed integrate sustainable agricultural practices
- Ensure that the impacts from agricultural interventions and suitable mitigation measures commensurate with the ESMF are included. Validate these before they are sent to the PMU along with the DPR
- Motivate the farmers to adopt sustainable agricultural practices. Guide the E&S Officer at the district to help the farmers
- Providing handholding support to farmers, addressing their queries on sustainable agricultural practices. Finalize the modalities of communicating sustainable agriculture practices
- Coordinate with the Environmental Specialist (SPMU) for the development of the Real time monitoring tools
- Assist the E&S Officer at the district in monitoring the implementation of Sustainable Agricultural Practices
- Assist the E&S Officer in developing a Corrective Action Plan
- Monitor the implementation of the Corrective Action Plan

District Project Team at Agriculture Department

The Agriculture Department is responsible for implementing the interventions in agriculture and horticulture. His E&S Officer key responsibilities during the ESMF implementation would include:

- Ensure that the schemes developed integrate sustainable agricultural practices
- Include Sustainable Agricultural/ Horticultural practices in the planning of implementation
- Provide farmers with a business model to adopt sustainable agricultural practices
- Providing handholding support to farmers, addressing their queries on agricultural practices
- Assist the Environmental & Social Officer in monitoring the implementation of Sustainable Agricultural Practices
- Assist the Environment & Social Officer in developing a Corrective Action Plan

Contractor

1. Compliance with Legislation, adhere to national and state legislations, obtain necessary permits (see chapter 2).
    a. The Contractor needs to obtain CTE and CTO for the Camp and establishment of Plant and machinery and ensure that it meets the conditions specified in the permits.
    b. The contractor needs to ensure compliance to the rules and adhere to the norms in "Silence Zone" and "residential Zones"
    c. The Contractor needs to obtain Hazardous waste permits for waste oil and maintain records and returns as per the provisions of the Act.
    d. The Contractor should manage the municipal solid waste generated at the camp as per the provisions in the law
    e. The Contractor shall ensure maximum use of the construction waste and ensure that residual waste is handled as per the provisions of the rules. The Contractor shall have necessary insurance cover for such exigencies
    f. The Contractor needs to obtain labour license, permit and submit returns under the project
    g. The Contractor needs to apply to CGWA or local authority if tubewell are sunk during the construction / Submission of NoC of the source from which water is procured

2. Environmental and Social Management Plan (ESMP) (See Annexure 8 and 9):
    a. Requirement of skilled workers is expected to be limited (based on the current estimates provided in the DPRs) and will be staggered across the construction phase
    b. Bidding documents also defines the labour requirements, workers' camp preparation
    c. Approval of the method statement of the contractor has been made contingent to the approval Contractors Environmental and Social Management Plan (CESMP) and OHS plan.
    d. OHS plan would ensure that a risk proportionate hazard identification and risk assessment is carried out which will help in addressing the problem systematically.
    e. General guidance to prevent erosion of stockpiles and spillage of debris outside designated areas.
    f. The worksite safety plan (including traffic management) will be developed alongside the Contractors Method statement and implemented during the construction.
    g. The Ancient Monuments And Archaeological Sites And Remains Act, 1958 and the Antiquities And Art Treasures Act, 1972 provides a basis for the development of the Chance find procedures.
    h. The contractor will immediately collect any excess excavated soils for backfilling of borrow pits.
    i. The contractor will adopt efficient construction methods and re-use of construction material to minimize the waste to be generated from the construction works.
    j. When approved, the Contractor will implement the plan during the project implementation through dedicated staff.

3. GBV prevention: Provide induction and regular training to contract workers on SEA/SH compliances; Ensure CoC are signed and understood by all personnel; Ensure compliance with codes of conduct and timely report violations; Employ or appoint qualified environmental, social, occupational health and safety expert(s) to manage GBV/SEA/SH issues; Have a system for regular review and reporting on action plan performance and report to the PMU. (See Annexure 5)

4. Occupational Health and Safety (OHS): Develop and implement an OHS plan, including hazard identification, risk assessment, and related provisioning. OHS Plan for Civil works will be developed by the Contractor before the mobilization to site. Contractors must prepare and implement a Site-Specific Occupational Health and Safety Plan, including measures like community liaison, compliance with the Worker's Code of Conduct, and provision of PPEs. Additionally, contractors are responsible for training

workers in safety procedures, maintaining first aid kits, and minimizing potential hazards. (See Chapter 6.3 and Annexure 6)

5. Labour Management (See Chapter 8): Employ local and migrant labour, ensure compliance with labour laws, and maintain workers' accommodation standards. Follow the Model Code of Conduct for Contractor's Employees and Sub-contractors on Environmental, Social, Health and Safety (ESHS)**.** Under civil works, ensure:

a. Complying with the requirements of the national and state legislations, labor management procedures, including those by their sub-contractors.
b. Maintaining records of recruitment and employment process of contracted workers.
c. Clearly communicating the job description and employment conditions to the workers.
d. Employ or appoint qualified environmental, social, occupational health and safety expert(s) to manage ESHS issues.
e. Provide induction and regular training to contract workers on environmental, social and occupational health and safety compliances
f. Having a system for regular review and reporting on labor, OHS, and ESHS performance Report to the PMU on labor welfare and occupational health and safety performance. The participation of primary supply workers, facilities to be established for female workers and those with families and recommend mitigation are also mentioned. No forced or child labor will be permitted in the project activities
g. The Contractor shall make available the first aid kit, snake bite kits and bandages at all times and all the sites. Moreover, paramedic staff will be available on-site and the cost of hiring will be a part of the BOQ item.
h. All employers including contractors as per the Act must ensure that the contact information of ICC is displayed in their respective offices and that regular trainings/orientation programs are organized for project staff and the workers of contractors
i. Worksite Safety: Develop and implement a worksite safety plan, including traffic management and first aid provisions

6. Dolphin Program: Implement site-specific mitigation measures to protect dolphins, minimize habitat impacts, and restore damaged riparian habitats

7. Training and Reporting: Provide regular training to workers, maintain records, and report on labour, OHS, and ESHS performance

8. Contractor to hire a E&S Specialist at site to oversee the implementation

Note: In case of non-compliance of ES requirements, an additional 1% will be retained from each bill and the contractor will be required to comply with the ES requirements within the next two billing cycles. However, if any identified non-compliance is not addressed in the next two billing cycles, then the retained amount will be forfeited. If such incidences of forfeiture due to ES non-compliance happen more than 5 times during the contract period, the contract will be terminated, and the ES performance security (ES – Bank Guarantee) will be encashed.

12 Capacity Development

Training and capacity building on E&S issues under the BWSIMP will be done by the implementing agency, that is, the PMU under the Water Resource Department, as well as the participating departments while the institutional lead for all the trainings under subcomponent on climate resilient agriculture and component on Water Governance related to Participatory Irrigation Management (PIM) will be taken by the Water Land and Water Management Institute (WALMI) of the state. The WRD has implemented World bank supported projects like the Bihar Kosi Flood Recovery Project (P122096) and the Bihar Kosi Basin Development Project (P127725) in the past and therefore has some institutional understanding of the Bank's E&S policies. However, these projects were under the earlier Safeguards Policies, therefore, a reorientation is required on the ESF and its requirements. Also, the earlier projects were focused on the flood protection and the irrigation division of WRD was not involved in their implementation, thus there is a requirement for the improving the capacity of both the Irrigation and Flood Control divisions of the department on E&S risk management.

The training programs will include an orientation on the project concept and components for all project stakeholders, trainings on participatory water governance and on improved agricultural productivity, farming system resilience and improved food security for greater climate resilience targeting the community institutions and farmers to ensure inclusive planning and their active participation in implementation, apart from overall awareness and training on the ESMF of the project to be able to fully manage the E&S risks under the project. Several capacity building approaches will be adopted by BWSIMP for improving the E&S performance, including institutional strengthening of classroom trainings, exposure visits, farmers/ WUA workshops, participatory planning exercises, village / community meetings as well as group discussions with targeted stakeholders.

The capacity building support proposed to be provided to various project stakeholders will include, but not limited to the following E&S related key areas/ topics:

- Overall Orientation on the Project objectives and activities
- Training of the key staff of PMU, PMTC and PIM Cells on the World Bank ESF, the project ESMF and the E&S requirements for the project and their role in ESMP implementation
- Orientation trainings of officials of WRD and other participating departments in the project districts on the ESMF, the E&S documents prepared and their implementation responsibilities
- Training of implementing agencies on Monitoring and reporting responsibilities
- Training and exposure visits of farmers, farmers collectives (PACS/FPOs) on overall water governance and climate resilient agriculture practices being promoted under BWSIMP
- Trainings and exposure visits of WUAs and farmers on the concept of PIM, roles and responsibilities of members and executive committees for sustainable management of irrigation systems

Suggested Topics:

- E&S Risk and Impact Assessment and Management
- Labor and Working Conditions
- Occupational Health and Safety
- Resource Efficiency
- Pollution Prevention and Management
- Community Health and Safety
- Land Acquisition and Involuntary Resettlement
- Biodiversity Conservation
- Sustainable Management of Living Resources
- Stakeholder Engagement, participatory planning and implementation
- Grievance Mechanisms
- Sexual Exploitation and Abuse/Sexual Harassment
- Environment, Social and Governance
- Using Technology and AI for E&S Risk Management
- Social Inclusion
- Going beyond E&S Risk Management to E&S

- Trainings of field staff of departments and CSOs/NGOs/ Technical agencies engaged by the project on mobilization of farmers for participation in irrigation management and adoption of resilient farming practices
- Trainings of field staff and contractor personnel on fair working conditions for workers, including Occupational Health and Safety related risk management and incident reporting
- Orientation of field staff of departments and CSOs/NGOs/ Technical agencies on inclusive participation of women and vulnerable and marginalized groups in project activities and their representative in decision making bodies of WUAs/FPOs

The capacity building strategy of the project will have the following elements:

- ***Training of Direct workers***: Before the effectiveness of the project, the PMU and DPMU staff of WRD associated with the preparation and implementation of the ESMF and other E&S instruments would be trained on the ESF and project-related E&S requirements at the Administrative Staff College of India (ASCI), Hyderabad or other similar state-based institution and NGOs like PRADAN, AKRSP/AKF and Access Development Services. This will focus on activities to be taken during different stages of the operation.
- ***Training of Indirect Workers:*** Since the Environmental Specialist and the Social Specialist of the PMU are trained experts in their own discipline, they do not need to undergo basic training on E&S risk management, but would need specialized training, especially related to participatory approaches related to PIM, roles and functions of WUAs, adoption of resilient agricultural package of practices, biodiversity management, dam safety, etc., for which appropriate training institutions like the Wildlife Institute of India/ National Environmental Engineering Institute/ National Safety Council/ Administrative Staff College of India/ Development Support Centre/ Indian Network on Participatory Irrigation Management would be identified and participants sent for training under the project.
- ***Training of District and Division***: The District and Divisional staff other than the Nodal E&S Officer would be trained on the ESMP implementation, project GRM, monitoring and reporting requirements and other mitigation measures proposed by the different project E&S instruments. Such trainings will be carried out by the E&S Nodal Officers and the Environmental and Social Specialist at the PMU.
- ***Training of Contractor Staff***: All the Key personnel of Main Contractors will need to undergo training on the ESMP, the E&S precautions and diligence to be taken, the key actions related to E&S management under the project, the contractual obligations of the contractor related to works and labor management, including the Code of Conduct.

The stakeholder-wise and phase-wise key topics and issues to be taken up as part of capacity building support under BWSIMP are presented in the table below:

Table 35: E&S Capacity Development Plan

Project Phase	Elected Representatives	WUAs / FPOs/ Other Community Institutions (CIs)	Staff of Support Organizations	Project Functionaries
Pre-planning	• Social mobilization (GP) • Orientation on the project & its objectives (ZP / Block /GP) • Roles and responsibilities related to ensuring inclusion and participation (GP level), especially of vulnerable groups, including women and marginal farmers	• Project objectives & key components • Roles & responsibilities related to inclusion & participation in planning, management & monitoring • Elements of participatory Planning: Importance of CRA and judicious irrigation management	• Project objectives & components • Elements of Participatory Planning • Facilitating Participatory Planning • Data requirements & simplifying data for use by committee for facilitating inclusive plans	• Social objectives of the Program • Elements of Participatory Planning • Facilitating Participatory Planning • Sustainability practices in Irrigation and Flood • E&S management functions as defined through various E&S instruments- ESCP, ESMF, SEP, ESIA, RPF, LMP, INM/IPM & BMP
Planning	• Process of participatory planning • Mobilization of farmers and local communities for developing inclusive plans • Role of GPs in disseminating flood forecasts and other related information to the community • Encouraging farmers to adopt climate resilient practices • Features of the project GRM, GPs role in resolving grievances or escalating them to district GRC	• Process of participatory planning and inclusion of marginal groups & women's voices in the plans. • Ensuring decision making roles for women farmers and smallholders in the executive committees of WUA and FPOs. • Use of data by members to develop inclusive plans • Framing of inclusive and gender sensitive rules/ byelaws for groundwater conservation & abstraction for user-group/ WUAs	• Supporting the framing of gender sensitive and inclusive byelaws for the user groups • Devising simple and accessible mechanisms for sharing flood forecasts, irrigation schedules and other information to local community • Handholding of CIs to develop fair rules for water sharing	• Objectives & expected outcomes of participatory & inclusive planning • Devising simple and accessible mechanisms for sharing flood forecasts, irrigation schedules and other information to local community • Handholding of CIs to develop fair byelaws for equitable water sharing • SEA/ SH prevention and response, steps for setting up ICCs under the POSH Act • Management of critical habitats

				• Process for implementing site specific RAPs and role in facilitating resettlement of PAPs
Implementation and Monitoring	• Role of GPs in ensuring equitable collection of irrigation/ water tariffs, including disincentives to be created by GP for non-payments • Role of GPs in resolving conflicts among water users/ farmers • Role of JP/ ZP in inter-GP coordination and conflict resolution • Importance of community monitoring and communicating emerging issues to senior duty bearers	• Conduct of meetings of WUAs/FPOs, other CIs, ensuring participation • Importance of collective decision making & information sharing • Conflict resolution among members Awareness on access and use of projects GRM	• Facilitating the participatory conduct of meetings Tools for community monitoring & its facilitation	• Facilitating committee's and Gram Sabha's meetings on the project • Strategies for public sharing/ dissemination of plans and decisions • Facilitating community monitoring of the project

List of Agencies which are recommended for on-boarding for Capacity Development on E&S:

1. Administrative Staff College of India, Telangana: WB has developed extensive courses on E&S management for training of Direct Workers (PMU & PIU Nodal Officer and other recommended Officers)
2. Wildlife Institute of India for Critical Habitat and its Management
3. National Safety Council on Occupational Health and Safety in Construction
4. International Rice Research Institute (IRRI), Philippines: active in Bihar and worked with WB on Ajeevika and active in BWSIMP districts
5. Jain Irrigation, Maharashtra: can train the technical staff on holistic and integrated project planning and implementation on Watershed Development
6. DeHaat (an agri-business start-up), India: active in Bihar and offers support to over 1.7 Million farmers for sustainable farming and enhanced livelihood
7. Arghyam, Karnataka: developed partnerships with over 100 organizations, ranging from local and international nongovernmental on community-led approaches to water security in India
8. Sehbhagi Shikshan Kendra, Uttar Pradesh: training centre on adult learning and participatory approaches
9. Dolphin Research Centre (Patna University Campus) for support on ecology
10. Development Management Institute, Patna; PRADAN (Professional Assistance for Development Action) and AKRSP (Agha Khan Rural Support Program) both active in Bihar
11. World Bank water projects have partnered with several organization for trainings which can be relevant and useful for BWSIMP. For example., Advanced Center for Water Resources Development and Management (ACWADAM); Peoples' Science Institute (PSI); Watershed Support Services and Activities Network (WASSAN); MARVI etc.

13 Reporting and Monitoring

The M&E framework of ESMF is designed to assess the progress and achievements made in line with the identified risks and mitigation measures. The M&E will enable decision-makers to take up course corrections by providing a feedback loop.

- **The project Environmental and Social Commitment Plan (ESCP) will provide all the categories, timelines and responsibility of reporting.**
- As per Environment and Social Incident Response (ESIRT) 2003 guidelines of the World Bank, within 24 hours incident reporting followed by root cause analysis and corrective action plan. (See Annexure 7)
- **E&S Monitoring will be integrated under the Third-Party Quality Assurance terms of reference.**
- **In addition, an E&S mid-term and end-term evaluation is recommended to capture key challenges, key lessons, good practices, stories of change etc.- inputs on which will be provided in the Project Operations Manual.**

13.1 Frequency of reporting

Effective monitoring and supervision would require regular reporting of the implementation of the E&S aspects to the decision makers. While the Environmental & Social Officers at the District Level and Environmental Specialist and Social Specialists at the PMU and PIU would be operating system the Project Director at PMU and Director/ Nodal Officer at PIU should also be aware of the concerns which are being highlighted. The reporting protocol and the primary focus areas of each of these are presented below:

- Incident reporting within 24 hours (See Annexure 7 on ESIRT)
- ***Daily reporting***: Contractor E&S Officer would report the performance during the construction to the Contractors Management. These will essentially include the progress and performance of the different elements of the EMP. The E&S Officer of the District at WRD would also receive notification of the critical elements which needs attention. Similarly, the daily activities of R&R will be reported by the Division/ District and the will be collated by the E&S Officer to be sent to the E&S Officer at the respective District/ Division. The key parameters will be monitored by the Social Specialist.
- **Weekly Reporting:** The E&S Officer or the officials on the site will visit each site shall provide his observations on of EMP Implementation real-time on an app to designed under the project.
- **Monthly Report:** The Contractor's E&S Officer shall compile the status of implementation activities to the PMU monthly.
- **Six Monthly Report:** The Six Monthly report should highlight a) status of the implementation of the ESMP, b) Status of implementation of RAP c) Key areas of concern which have been identified in the Monthly report d) training carried out, e) outstanding area of concern, f) Accident and incident report, g) key parameters of OHS implementation including number of non-compliances reported f) areas where additional support is required. This report will be compiled and submitted to the Bank before the mission or within 15 days of the closure of six month from the date of effectiveness.

All reporting formats will be detailed out in the Project Operational Manual.

13.2 Responsibilities for reporting

The key environmental and social aspects that have significance for the project in irrigation, flood protection and agriculture will be monitored periodically internally by the PMU and respective PIU's. It will help the project identify compliance to national / state benchmarks / safeguards' measures identified in the ESMF.

Table 36: Monitoring responsibilities

Type of Monitoring	**Contractor's Monitoring**	**District level Monitoring**		**PMU Monitoring**	
Responsibility	Contractors E&S Personnel	E&S Nodal Officer * E&S Specialist PMTC)	Non-E&S Specialist	E&S Specialist PMU	Non E&S Members
Frequency	Daily	Weekly (minimum)		Monthly (one site minimum)	
Areas to be Covered: ESMP	ESMP Implementation OHS Issues on Site CHS Issues Labour Conditions	ESMP non-conformance OHS Noncompliance CHS non-compliances Labour Working Conditions Contractor Camps	OHS risk CHS risk	ESMP violations OHS and CHS violations Labour Working conditions Violations	OHS and CHS risks
Areas to be Covered ESMF		Safety Process non-conformance ESMP process Non-conformance Implementation of Specialized Plan		Safety Process violations ESMP process violations Implementation of Specialized Plan	
Reports	Dashboard for E&S Nodal Officer of District	Dashboard of E&S Specialist of PMU		Dashboard of Project Director	

E&S Officer at the PMU would be responsible for monitoring the implementation of the process. Deviation in the process would be made known to the Project Director for immediate action. District E&S Office and the PMTC E&S specialist who would also travel to site on a regular basis will also review the project activities

13.3 Mechanisms for reporting

Monitoring will be technology driven so that real-time information is available to, District/ division and the PMU/ PIU. An app-based E&S Monitoring and Evaluation system will be used for the project.

14. Indicative Budget for ESMF

This is an indicative draft budget which will be revised prior to Negotiations. Many of the expenses enlisted below are already covered in the project budget and will be reconciled.

	Budget Head	Total Amount
A	**HUMAN RESOURCE**	
1	PMU Specialist (included in project budget)	
2	ESIA Agency (tbc - E-Kosi, Saran etc)	10,000,000
3	Specialized Staff	1,580,000
	Sub-Total (A)	**1,580,000**
B	**TRAINING & CAPACITY BUILDING**	
4	Training of Direct Workers	6264000
5	Training of Indirect Workers	700,000
6	Training of Division/ District workers	585,000
7	Training of Contractor Staff	141,680
8	Refresher Training	1,575,000
9	Specialized Training	2,009,000
10	WUA Training	tbc
	Sub-Total B	**11,274,680**
C	**INFORMATION AWARENESS**	
11	Dolphin Awareness Program	2135000
12	GRM	2470000
13	GBV SEA/SH Plan	3200000
14	Stakeholder Engagement	**2,250,000**
15	Public Consultation and Disclosure	1,725,000
16	Community Health Safety	317,000
	Sub-Total C	**7,805,000**
D	**REPORTING**	
17	App based Field Reporting	**1948000**
18	R&R	**53788000**
19	LMP	**500000**
	Sub-Total D	**56236000**
E	**STUDIES & IMPLEMENTATION SUPPORT**	
20	Mid-term E&S Audit	2200000
21	End term E&S Audit	2500000
22	Good Practice Guidance or Code of Practice	1000000
	Sub-Total E	**5700000**
F	**SPECIALISED STUDIES (if required)**	
23	DOLPHIN Site Specific Plan	10,160,000
24	Green Infrastructure Development	1000000
25	Cumulative Impact Assessment	5000000
	Sub-Total F	**16,160,000**
	Total	**98,755,680**
	Contingency	4,937,784
	G. TOTAL	**103,693,464**

Annexure 1: E&S Screening Checklist

Environment

Sensitivity Identification

Question	Yes	No	Details
1. Is the sub-project located in whole or part within a radius of 1 km from any of the following environmentally sensitive areas?			
a. Biosphere Reserve			If yes, mention name and distance.
b. National Park			If yes, mention name and distance.
c. Wildlife/Bird Sanctuary			If yes, mention name and distance.
d. Game Reserve			If yes, mention name and distance.
e. Tiger Reserve/Elephant Reserve			If yes, mention name and distance.
f. Wetland			If yes, mention name and distance.
g. Natural Lake			If yes, mention name and distance.
h. Swamps/Mudflats			If yes, mention name and distance.
i. World Heritage Sites			If yes, mention name and distance.
j. Archaeological monuments/sites (under ASI's central/state list)			If yes, mention name and distance.
k. Reservoirs/Dams			If yes, mention name and distance.
2. Is the sub-project located in whole or part within a radius of 500 m from the following features?			
a. Reserved/Protected Forest			If yes, mention name and distance
b. Migratory Route of Wild Animals/Birds			If yes, mention name and distance
c. Area with threatened/rare/ endangered fauna (outside protected areas)			If yes, mention name and distance
d. Area with threatened/rare/ endangered flora (outside protected areas)			If yes, mention name and distance
e. Habitat of migratory birds (outside protected areas)			If yes, mention name and distance
f. Historic Places (not listed under ASI – central or state list)			If yes, mention name and distance
g. Regionally Important Religious Places			If yes, mention name and distance
h. Public Water Supply Areas from Rivers/Surface Water Bodies/ Ground Water Sources			If yes, mention name and distance
Other			
1. Are there any areas around the project location which are used by protected, important or sensitive species of fauna or flora e.g. for breeding, nesting, foraging, resting, overwintering, migration, which could be affected by the sub-project?			If yes, give full details.
2. Any other impacts?			If yes, give full details.

D. Result/Outcome of Environmental Screening Exercise: Please include the outcome of the screening exercise in the ESIA report.

SOCIAL

A. Social Socreening – Social Impacts Information

1. **Land Requirement for the proposed sub-project :**

Details	Unit	Quantity
Government Land	Acres	
Private Land	Acres	
Title Holders by Caste	Number	Gen/SC/ST
Non-Titleholders – Encroachers / Squatters by Caste	Number	Gen/SC/ST

2. **Agricultural Land affected due to sub-project:**

Details	Unit	Quantity
Total Affected by Caste	Number	Gen/SC/ST
Title Holders by Caste	Number	Gen/SC/ST
Non-Titleholders – Encroachers/ Squatters by Caste	Number	Gen/SC/ST
BPL Families losing Agricultural Land	Number	

3. **Dwellings/Residence structure affected due to sub-project:**

Details	Unit	Quantity
Total Affected by Caste	Number	Gen/SC/ST
Title Holders by Caste	Number	Gen/SC/ST
Non-Titleholders – Encroachers/ Squatters by Caste	Number	Gen/SC/ST
BPL Families losing Dwellings	Number	

4. **Commercial structure/properties (shop, cow shed etc.) affected due to sub-project:**

Details	Unit	Quantity
Total Affected by Caste	Number	Gen/SC/ST
Title Holders by Caste	Number	Gen/SC/ST
Non-Titleholders – Encroachers/ Squatters by Caste	Number	Gen/SC/ST
BPL Families losing Dwellings	Number	

5. **Loss of Livelihood affected due to sub-project:**

Details	Unit	Quantity
Total Affected by Caste	Number	Gen/SC/ST
Title Holders by Caste	Number	Gen/SC/ST
Non-Titleholders by Caste	Number	Gen/SC/ST
Agriculture labourers	Number	

6. **Common Property Resources Affected on which near-by residents/local population is dependent for domestic or other needs : (Please give each type by number)**

Type	Unit	Quantity
	Number/Area in acre	
	Number/Area in acre	
	Number/Area in acre	
	Number/Area in acre	
	Number/Area in acre	

7. WUA

If there is any WUA in operation – Yes/ No; If Yes,

Particular	Details
Name of the WUA in operation	
Year of Formation	
Total No. of members in WUA	
Type of activities performed by the WUA	

B. Summary of Social Impact

S No	Items	Results
1.	Total no of HH affected due to proposed project activity (Single or multiple impacts)	
2.	Total no of vulnerable (SC/ST/Women Headed) HH affected due to proposed project activity (Single or multiple impacts)	

C. Result/Outcome of Social Screening Exercise

1.	If all answers are "0"	No SA / RAP Required
2.	If the proposed activity does not affect more than 200 people (i.e. either complete or partial loss of land/assets and/or livelihood)	Abbreviated RAP is required
3.	If the proposed activity affects more than 200 people*(i.e. either complete or partial loss of land/assets and/or livelihood)*	SIA/RAP is needed

Annexure 2: Format for preparation of RAP

1. **Introduction**
   a. Brief Introduction of the sub-project
   b. Description of Component(s) that cause land acquisition/alienation and resettlement
   c. Estimation of the R&R Impacts
2. **Measures to Minimize Resettlement**
   a. Description of Efforts Made for Minimizing Displacement
   b. Description of the Results of these Efforts
   c. Description of Mechanisms to Minimize Displacement and Loss of Livelihood/Income during Implementation
3. **Census and Socio-Economic Surveys**
   a. Provide the results of the census and socio-economic surveys
   b. Identify all categories of impacts and the extent of impact on each affected household
4. **Consultation with PAPs**
   a. Describe various Stakeholders
   b. Summarize process of consultation on the results of socio-economic surveys
   c. Describe the need and mechanisms to conduct updates to socio-economic surveys
   d. Describe how this process of consultation would be continued through implementation and monitoring
   e. Feedback and suggestions received regarding the resettlement plan, the compensation packages and the timing of resettlement
   f. Describe the plan for formally sharing information with the Project Affected Persons, including notification
5. **Entitlement Framework**
   a. Provide a definition of PAFs and PAPs together with their categorization based on impacts
   b. Describe R&R entitlements for each category of impact
   c. Describe method of valuation used for affected structures and other assets
   d. Using Entitlement Matrix, present table of all PAFs/PAPs and their losses/ impacts and entitlements
6. **Income and Livelihoods Restoration**
   a. Are the compensation entitlements sufficient to restore income streams for each category of impact? If not, what additional economic rehabilitation measures are necessary?
   b. Briefly spell out the restoration strategies for each category of impacts, and describe institutional, financial and technical arrangements/aspects involved, including leveraging of other government schemes and programmes.
   c. If income restoration involves change in livelihoods or other economic activities allow substantial amount of time for capacity building, accessing institutional funds/credits/markets, preparation and implementation. Work out the rate of returns for each of the economic activities opted by the entitled person.
   d. Explain the main institutional and other risks for effective implementation of plans for restoration of livelihood
   e. Describe the process for monitoring the effectiveness of income restoration activities
7. **Institutional Arrangements**
   a. Describe institution(s) responsible for: (a) delivery of each item/activity in the entitlement policy; (b) implementation of resettlement and rehabilitation programs and (c) coordination of all other activities and their specific roles
   b. State how coordination issues will be addressed in cases where resettlement and rehabilitation are spread over a number of institutional/departmental jurisdictions
   c. Describe the external (non-Project) institutions/departments involved in the process of resettlement and restoration of income such as land development, land allocation, credit,

training for capacity building and the mechanisms in place to ensure adequate cooperation and performance of these institutions/departments

d. Discuss institutional capacity for, and commitment to, resettlement and rehabilitation and any capacity building support on R&R required before RAP implementation.

8. Monitoring and Evaluation

a. Describe the internal monitoring process
b. Define key monitoring indicators for resettlement, rehabilitation and participation and provide a list of these indicators which would be used for internal monitoring
c. Describe institutional (including financial) arrangement
d. Describe frequency of reporting and contents of reports
e. Describe frequency of external reporting and its contents

9. Redressal of Grievances

a. Describe the structure and process of grievances mechanisms at various levels including step-by-step process for registering and addressing grievances and provide specific details regarding registering complaints, discussing them with PAPs, response time, communication modes etc.

10. Implementation Schedule

a. A month-wise implementation schedule (Gantt chart) of activities to be taken as part of R&R Action Plan

11. Costs and Budgets

a. List the sources of funds for R&R and describe the flow of funds
b. Provide a cost-wise, item-wise budget estimate for the entire R&R costs including administrative expenses, monitoring and evaluation and contingencies
c. Describe the specific mechanisms to adjust cost estimates by *inflation* factor

12. Consultations: Participants and Photographs

Date	
Village	
Participants with signature	
Minutes	
Photograph of consultation	

Annexure 3: ToR for Agency to finalize and execute RAP

Scope of work: The Agency shall be responsible for assisting WRD, PMU for BWSIMP in the finalization and process of implementation of RAP/RAPs.

Tasks:

I. Verification of information in ESIAs on R&R: undertake joint verification of the Project Affected Persons (PAP) to identify Project Affected Family (PAF) eligible as per the cut-off date for Rehabilitation & Resettlement entitlement, with the District Authority/Project Authority. Verify the information already contained in RAP and the losses of the individual PAPs and validate the same and suggest suitable changes if required.

II. Prepare and putup updated data base on individual losses required. Display the list of eligible PAF/PAP in the affected villages for the PAF/PAPs to verify as per instruction of the PMTC. The PAF/PAPs will be provided 7day time period to verify the list. This process will enable the eligible PAF/PAPs to be included in the list. NGOs will accordingly update and finalize the list, in consultation with PMTC.

III. Dissemination of Information to the PAPs on R&R policy, provisions, approach to R&R, transfer of benefits to the PAPs and grievance redress mechanism.

IV. Regular Consultation on their rights, entitlements and obligations under RAP; the need for relocation and rehabilitation, the provisions of the policy and entitlements under the RAP; the timeframe for removal and relocation. Conduct consultation with the women within the PAFs including women headed households.

V. Facilitate PAPs in Rehabilitation and Relocation process up to receipt of compensation cheques in consultation with Officials associated with implementation of RAP.

VI. Support the PAPs to complete the required documents to access compensation cheques/payment

VII. Facilitate disbursement of compensation cheques in line with the extant Government procedures.

VIII. Identify and verify the community assets that is likely to be affected by the project.

IX. Assist the RAP implementing Authority in ensuring all the PAPs obtain their entitlements as defined in RAP before being relocated as well as after relocation; to ensure benefits due to the PAFs, under the Resettlement Policy Framework [RFP] as described in RAP are provided to the PAPs.

X. Assist PAPs in opening bank account as necessary, explaining the implications, the rules and the obligations of a joint account and how she/he can access the resources she/he is entitled to.

XI. Assist PAPs in relocation process and advice the PAPs on utilization of the Resettlement & Rehabilitation benefits to create appropriate productive assets.

XII. Depute a staff as member of GRC and make PAPs aware of the grievance mechanism set out in the project and shall assist them to resolve the grievances.

XIII. Record the grievances and bring the same to the notice of the Grievance Redressal Committee [GRC]. Submit a draft resolution with respect to the grievances of the PAPs Grievance Redressal Mechanism is to be linked with Management of Information System (MIS).

XIV. Conducting awareness on GBV/SEA-SH and create a common understanding on zero tolerance towards GBV.

Reporting and Timelines:

I. Total timeframe: 3-6 months
II. Finalization of RAPs: One month
III. Facilitate Rehabilitation process: 2-4 months (Document in full details, the consultation/counseling processes, and a full description of the training imparted)
IV. Monthly Progress Report against all the tasks listed in the ToR
V. Final Progress Report in month five: rehabilitation and resettlement as per entitlements shall be documented and shall be submitted to the Project Authority

Team Composition:

I. Project Coordinator: Masters degree with minimum 10 years of experience in R&R.
II. Rural Development Specialist: Masters degree with 5 years of experience in rural development works & clear understanding on R&R policies
III. Relocation and Rehabilitation Facilitator: retired revenue/ survey/ settlement officer of the State Govt./ other Govt. Organizations officer having knowledge of prevailing relocation activity and process, prevailing R&R policies including WB's R&R policies and its mode of implementation
IV. Team of 3 Community Development Specialists with excellent communication skills, understanding on issues of vulnerability, participatory processes and documentation

PMU to provide formats for reporting.

Annexure 4: Definitions for R&R

1. ***Agricultural land*** *means lands being used for the purpose of :(i) agriculture or horticulture; (ii) raising of crops, grass or garden produce; and (iii) land used by an agriculturist for the grazing of cattle, but does not include land used for cutting of wood only;*
2. ***Assistance*** *refers to the support provided to PAPs in the form of ex-gratia payments, loans, asset services, etc. in order to improve the standard of living and reduce the negative impacts of the project.*
3. ***Compensation*** *refers to the amount paid for private property, structures and other assets acquired for the project.*
4. ***Cut off Date:*** *the date of Notification will be the cut-off date where the land acquisition will be required. In case of squatters and encroachers and unauthorized occupants the date of socio-economic survey will be considered as the cut-off date for entitlements under the project.*
5. ***Encroachers*** *are those persons who have extended their building, business premises or work places into government lands. Assistance will be provided to these persons, based on their loss.*
6. ***Family*** *includes a person, his or her spouse, minor sons, unmarried daughters, minor brothers, unmarried sisters, father, mother and other relatives residing with him or her and dependent on him or her for their livelihood; and includes "nuclear family" consisting of a person, his or her spouse and minor children;*
7. ***Government*** *refers to the Government of Bihar*
8. ***Land acquisition or acquisition of land*** *means acquisition of land under theRight to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013(GoI) or Bihar Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Rule,2014 (GoB)*
9. ***Marginal farmer*** *means a cultivator with an unirrigated land holding up to one hectare or irrigated land holding up to half hectare;*
10. ***Major Impacts****are those where persons lose their total house or livelihood, or become marginal farmers*
11. ***Minor Impacts*** *areall other impacts which will belimited to one-time payment of cash or giving advance notice.*
12. ***Minimum Wages*** *isthe wage of a person for his/her services/labour as fixed by the Labour Bureau, Department of Labour, GoB.*
13. ***Non-Perennial Crop*** *is any plant species, either grown naturally or through cultivation that lives for a season and perishes with harvesting of its yields. For example, paddy, sugarcane, groundnut, etc.*
14. ***Notification*** *means a notification published in the Gazette of India, or as the case may be, the Gazette of State;*
15. ***Perennial Crop*** *isany plant species that live for years and yields its products after a certain age of maturity. Generally trees, either grown naturally or by horticultural and yield fruits or timber have been considered as perennial crop in the project. For example, tamarind, coconut, mango, teak, neem etc. are perennial crops.*
16. ***Project Affected Family (PAFs)*** *means (i) a family whose primary place of residence or other property or source of livelihood is adversely affected by the acquisition of land for a project or involuntary displacement due to any other reason; (ii) any tenure holder, tenant, lessee or owner of other property, who on account of acquisition of land (including bagarHukum or other*

property) in the affected area of otherwise, has been involuntary displaced from such land or other property; (iii) any agricultural of non-agricultural labourer, landless person (not having homestead land, agricultural land, or either homestead or agricultural land), rural artisan, small trader or self-employed person; who has been residing or engaged in any trade, business, occupation or vocation continuously in the affected area, and who has been deprived of earning his livelihood or alienated wholly or substantially from the main source of his trade, business, occupation or vocation because of the acquisition of land in the affected area or being involuntarily displaced for any other reason;

17. ***Project-Affected Persons (PAPs),*** *include those displaced, those losing commercial or residential structures in whole or part, those losing agricultural land or homesteads in whole or part, and those losing income sources as a result of project action.*
18. ***Replacement Cost*** *of the acquired assets and property is the amount required for the affected house hold to replace/reconstruct the lost assets through purchase in the open market. Replacement cost will be calculated at PWDs current Schedule of Rates without depreciation. Replacement cost will be in line with the provisions of the Entitlement Matrix of the project.*
19. ***Small farmer*** *means a cultivator with an un-irrigated land holding up to two hectares or with an irrigated land holding up to one hectare, but more than the holding of a marginal farmer.*
20. ***Squatter*** *means those persons who have illegally occupied government lands for residential, business and or other purposes. They are not eligible for compensation but will qualify for assistance from the project.*
21. ***Tenants*** *are those persons having bonafide tenancy agreements, written or unwritten, with a private property owner with clear property titles, to occupy a structure or land for residence, business or other purposes. They are eligible for certain compensation or assistance as per the existing norms and practice.*
22. ***Vulnerable groups****: persons such as disabled, widows, or persons above sixty years of age, who are not provided or cannot immediately be provided with alternative livelihood and who are not otherwise covered as part of a family.*
23. ***Women Headed Household:*** *A household that is headed by a woman and does not have a male earning member is a Woman Headed Household. This woman may be a widowed, separated or deserted person.*

Annexure 5: Action Plan for Prevention of GBV

The **GBV/SEA/SH risks under the project are Substantial** owing to civil works (local labor, labor influx and labor camps), resettlement and extensive capacity development activities. This GBV Action Plan details the necessary operational measures and protocols that will be put in place to address GBV/SEA/SH that are project related, and how they will be integrated over the life of the project. It includes activities that implement procedures for preventing and addressing SEA/SH, roles and responsibilities of key stakeholders for its implementation and monitoring.

A. Project-wide risk mitigation

Measures for mitigating GBV/SEA/SH risks will be integrated into different components along the project cycle to safeguard women and children and those of vulnerable sections. Such GBV considerations have been incorporated across key project systems as follows:

Mitigation Tool	Key risk-mitigation measures in-built in the tool
Policy and procedures (ref to main document)	• Various policies and procedures would be applicable for direct workers e.g., PMU staff in the office, and contract workers for civil works • Orientation training on safety of women from any sexual exploitation and abuse (SEA) and sexual harassment (SH) and mechanism to access redressal services will be provided • Key procedures at the construction sites will include steps necessary to prevent SEA/SH and any discrimination based on religious, political and/or sexual orientation • Internal Complaint Committees will be established as prescribed under POSH Act at all administrative levels to address workplace harassment incidents safely and confidentially
Labour Management Procedures ref	• Labour-related risks of SEA/SH may arise for community members, particularly women and children by contract workers during construction period; and risks of workplace SH at all establishments by co-workers under the project • All employers including contractors will be required to ensure all workers (including those of sub-contractors) sign a code of conduct (CoC) to mitigate the risks of SEA/SH, and workers receive awareness training on SEA/SH relates issues • The overall responsibility of LMP implementation rests with the PMU and PIUs, including monitoring and reporting SEA/SH incidents
Stakeholder Engagement Plan (ref to main document)	• PMU will disclose GBV related considerations to WRD officials, Contractor personnel, Consultant personnel through office circulars, training events, website notifications, bid documents and contract provisions periodically • For BWSMIP, a unique GRM will be developed for general stakeholders, individual beneficiary, PAPs, laborers and complainants of GBV/SEA/SH. They may also access any of the existing grievance redressal platforms such as CPGRAMS, CM Helpline, Women Helpline (181), Emergency Helpline (112), Departmental Grievance Cell, Internal Complaints Committee to express their grievances and seek resolution • Stakeholder consultations will be undertaken to build awareness about gender and GBV/SEA/SH concepts and provisions made under the project
Grievance Redressal Mechanism for SEA/SH	• The project's GRM will also include a channel to allow SEA/SH-related grievances to be received and addressed • Redress for SEA/ SH related Grievances will be done through ICCs (constituted as per POSH Act)

	• SEA/SH related processes will be overseen by the Social Development & Management Specialist within the PMU and monitored on the ground by the Environmental and Social experts within the PIU • Every office and worksite will have complaint boxes and complaint registers that can be accessed by the direct and contracted workers to register their work-related grievances • Periodic awareness building sessions about the GRM will be conducted throughout the project cycle • Incidents will be reported as per World Bank ESIRT Guidelines 2023 (see Annexure 7)
Capacity development	• The capacity building strategy will include training of direct workers, indirect workers, district and divisional staff, and contract staff. Training and capacity building on E&S issues under the BWSIMP will be done by the PMU under the Water Resource Department across the project cycle: pre-planning, planning, implementation and monitoring • The Social Specialist at the PMU in addition to the roles will be responsible person to undertake Capacity Building of the team on the Gender and implementation of the social aspects • The Environmental & Social (E&S) Officer at the District level will look after the environmental and social issues, in line with the ESMF including undertaking Capacity Building of the team at the district • The capacity building support proposed to be provided to various project stakeholders will include awareness sessions on Sexual Exploitation and Abuse/Sexual Harassment • Safe travel provisions will be made for female participants requiring to travel to training/project locations to manage SEA/SH risks
Monitoring and reporting	• The M&E framework of ESMF is designed to assess the progress and achievements made in line with the identified risks and mitigation measures. The M&E will enable decision-makers to take up course corrections by providing a feedback loop • The M&E framework will monitor and report the implementation of GBV action plan and its activities, reporting and redressal of SEA/SH grievances, and compliance with codes of conduct, mandatory training programs, and SEA/SH provisions along all project components

B. Activity mapping and Action Plan

The following table outlines activities that implement procedures for preventing and SEA/SH and address any SEA/SH allegations that may arise:

	Activity to Address SEA/SH risk	**Steps to be taken**	**Timelines**	**Collaborating actors/relevant ministries**	**Output indicators**
Review and enhance IA's capacity to prevent and address GBV risks					
1	Codes of Conduct signed and understood.	• Review CoC for provisions/clauses that guard against GBV/SEA/SH • Have CoCs signed by all personnel • Train all project-related staff on the behavior	Within three months of project effectiveness	WB and WRD E&S Specialists, Contractor /Subcontractor (Site Manager)	Percentage of workers that have signed a CoC *Target: 100% sign off where workers have read and understood the*

		obligations under the CoCs • Display CoC in project sites and translated into the local language(s)			*CoC. Monthly CoC (refresher) trainings*
2	Develop and conduct GBV/SEA orientation training for all project staff, including PIUs	• Develop a training plan • Develop training materials for respective sectors and civil servants • Conduct training for project staff/PIU	Within three months of project inception Regularly throughout project implementation	PMU E&S Specialist, PMTC E&S Specialist	• Number of trainings conducted for project staff • Number of staff trained
As a part of Project GRM					
3	*Identify and train GM operators and GBV/SEA/SH focal points within the GRM, who will be responsible for GBV/SEA cases and referrals s as defined in the referral pathway*	• *Identify and select GBV/SEA focal persons within the GRM to manage SEA/SH/GBV related complaints* • *Clarify the role of the GM operators and focal points in GBV/SEA as referral points* • *Train the focal points and all GRM operators on GBV/SEA basics, survivor-centered approach and the referral pathways*	*Within three months of project inception*	*WB and WRD E&S Specialists, training (NGO) partner, Contractor/ Subcontractor*	*GM operators and GBV focal points identified and trained*
Mapping of GBV service providers for GBV/SEA prevention and response					
4	GBV service providers will be identified and mapped to address SEA/SH issues	• Identify and map GBV service providers and establish robust referral pathways at state/district/ project level • On the basis of mapped GBV/SEA prevention and response service providers, develop/update a GBV/SEA referral list of preferred service providers *(& linked with project GRM)*	Within three months of project inception	PMU E&S Specialist, PMTC E&S Specialist	• Referral pathway developed/updated • Number/type of GBV/SEA preventive and response services available.

5	Develop and finalise database of service providers	• Database of focal point contacts, GRM orientation, consultation meetings	Within six months of project inception	PMU E&S Specialist, PMTC E&S Specialist	Number of GBV service providers in the database
Sensitization of project stakeholders about GBV/SEA/SH risks					
6	Outreach programs for community and workers through skilled trainers/ service providers	• Develop relevant IEC materials for community engagements • Targeted communications and awareness to women regarding potential SEA / GBV risks, their rights, and GRM especially for project affected people under resettlement	Within six months of project inception Regularly throughout project implementation	PMU E&S Specialist, PMTC E&S Specialist, NGO partners	Number of awareness/outreach sessions conducted on SEA/SH
7	Regular capacity building for project stakeholders	• Identify training participant groups • Prepare training plan and modules with the help of subject experts • Sensitization of staff (e.g. team responsible for implementation of Resettlement Action to ensure zero tolerance towards ant acts of GBV against the squatters). • Sensitization of labor and or all project staff about the civil, social, and legal rights of women and vulnerable groups and about the actions taken in the event of GBV and SEA/SH	Within three months of project inception Regularly throughout project implementation	WB and WRD E&S Specialists Contractor /Subcontractor (Site Manager)	• Number of training sessions conducted • Number of stakeholders trained
GBV/SEA/SH incident reporting in GRM					
8	GBV/SEA/SH GRM is prepared for the Project and same will be implemented	• Identify and Integrate GBV/SEA entry points within the GRM with clear procedures and tools for management of related complaints	Within three months of project inception	WB and WRD E&S Specialists	GRM with GBV/SEA procedure integrated In the GRM *(SOP provided in the Project*

		• Develop an Accountability and Response Framework, detailing how allegations of SEA/SH will be handled and disciplinary action for violation of the Code of Conduct (CoC) by workers. • Create reporting pathways that include support systems and accountability mechanisms including how to handle SEA/SH allegations properly			*Operation manual)*
9	Review GRM reports/logs for GBV/SEA sensitivity	• Review logs for GBV/SEA documentation to ensure it follows standards for documenting GBV/SEA cases	Throughout project implementation	PMU, PMTC	Number of GBV/SEA cases documented Number of referrals of SEA/SH incidents to the project GRM/ by other service providers
Monitoring GBV/SEA/SH action plan					
10	Develop M&E programme	• Develop an M&E plan to monitor GBV action plan implementation • Identify key stakeholders and reporting channels • Regular monitoring and course correction	Throughout project implementation	PMU, PMTC, PIU, Contractor/ Subcontractor	M&E framework in place

C. Roles and responsibilities of key stakeholders

1. Project Management Unit (E&S Specialists)
    a. Mapping of GBV Service Providers
    b. Prepare training plan for sensitization of stakeholders on SEA/SH
    c. Prepare outreach plan for awareness generation among community and laborers
    d. Monitor overall implementation of SEA/SH Action Plan
    e. Compile reporting documents to be submitted with WRD, Bihar
2. PMTC WRD (E&S Specialists)
    a. Support PMU E&S Specialist in activities mentioned above
    b. Support PMU in the overall monitoring and supervision of SEA/SH Action Plan

    c. Prepare periodic reports by compiling information gathered from PIUs
3. PIUs at Division Offices of WRD (and PIUs at Agriculture, Rural Development Depts)
    a. Should have list of service providers
    b. Should be alert and report incidents timely and securely
    c. Should promote the culture of zero tolerance for SEA/SH
4. Contractors
    a. Provide induction and regular training to contract workers on SEA/SH compliances
    b. Ensure CoC are signed and understood by all personnel
    c. Ensure compliance with codes of conduct and timely report violations
    d. Employ or appoint qualified environmental, social, occupational health and safety expert(s) to manage GBV/SEA/SH issues
    e. Have a system for regular review and reporting on action plan performance and report to the PMU
5. Experts/Agencies on boarded/empaneled
    a. Provide support services related to GBV case management and referrals
    b. Conduct sensitization programs for stakeholders
    c. Conduct Training of Trainers and build a sustainable format of decentralized training
    d. Should have adequate capacity to provide remedial action in cases of SEA/SH incidents and CoC violations

Annexure 6: Occupational Health & Safety Plan (including Hazard Risk Identification & Assessment)

A generic Hazard Risk Identification and Assessment (HIRA) was carried out for the activities for BWSIMP Project for two major civil works and the sub-activities:

- Renovation and modification of the Irrigation system
- Strengthening and Raising of Embankment

The HIRA does not include the works to be carried out in dams. This would be included as part of the Dam Safety Plan being carried out separately under the program.

The steps undertaken for developing the generic HIRA is based on the typical activities which are undertaken during the construction activities. This HIRA is carried out to develop an understanding of the precautions which need to be planned during the construction. The Proposed Actions are generic in nature. During the Pre-Construction stage the Contractor would prepare a Work Methodology and OHS Plan. As part of the OHS Plan contractor will carry out the HIRA as per the Work Methodology. The Control Action in the HIRA submitted with the Work Methodology will supplement the actions proposed in this Generic HIRA. The present risk identification also does not present the roles and responsibilities for implementation, the control points for monitoring implementation. These will also be included in the HIRA submitted by the Contractor in the OHS Plan developed as part of the method statement. Steps of the generic HIRA review is summarized as follows:

- Classify work/assessment units or work activities during construction phase (based on generic understanding of works to be carried out)
- Identify the hazards associated with work activities
- List out the Consequence of the hazard involved in the activity
- List out controls (preventive and recovery)

Sr. No	Sub-activity	Routine activity	Potential hazard	Consequence	Proposed control
	A. Transportation of workers				
1	Transportation of workers	R	1. Accidents	1. Fatality / severe injury due to accident	1. Use only vehicle authorized by RTO for transport of workers 2. Use Tractors, tractor trolley Excavator, dumpers for the transport of workers is strictly prohibited and lead to contractual consequences 3. Passenger vehicle used for transporting workers should have seat belts as mandated by law. The driver should ensure that the all passengers use seatbelt at all times
	B. Survey and preparation				
2	Surveying	R	Presence of poisonous reptiles/insects/snakes	Loss of consciousness / Heart attack / fatal	1. Ensuring proper supervisor & using safety stick (wooden) 2. Ensuring use of appropriate PPE's (high ankle safety shoes) & avoiding loose clothing 3. Ensure proper housekeeping/ use of protective tools 4. Create awareness among the workforce and staff/ monitoring. 5. Ensure availability of emergency vehicle and contact details/ tie up with local hospitals 6. The Contractor shall make available the first aid kit, snake bite kits and bandages at all times and all the

Sr. No	Sub-activity	Routine activity	Potential hazard	Consequence	Proposed control
					sites.
3	Surveying	R	Improper Access / working on uneven ground surface;	Slip / trip/ fall may result injury to the personnel.	1. Ensuring general levelling of surface for vehicle movement 2. Deployment of flagman 3. Ensuring barricades to the work location at valley / steep access / ramps are existing. 4. Ensure proper access to work locations
4	Surveying	R	Working near to the moving vehicles / construction vehicles	Hit by the vehicles.	1. Ensuring competent driver. 2. Displaying sign boards / caution boards. 3. Providing training / awareness & close monitoring 4. Using high visibility clothing. 5. Provide rigid barricades for defining the vehicle movement & pedestrian walkways separately
5	Surveying	R	Presence of live electrical cables near survey work.	Cardiac arrest / burns due to electric shock.	1. Using Insulated tools and keeping minimum distance of 3 meters. 2. Using rubber gloves. 3. Tie-up with local hospitals. 4. Providing Tool Box Talks (explaining HIRA)to the workforce before start of work. 5. Use wooden / fibre levelling staffs wherever electrical lines are existing. 6. Ensure emergency vehicle availability till the completion of job
6	Surveying	R	Working in extreme climatic conditions	1. Sun stroke due to de-hydration. 2. Injuries / fell in sick due to adverse weather.	1. Ensure availability of drinking water 2. Provide temporary rest sheds 3. Avoiding the work during extreme climatic conditions e.g. Excessive cold/hot.
7	Surveying	R	Manual handling of survey instruments while shifting manually.	Hit by the survey instruments while shifting manually and may receive injury.	1. Ensuring supervision for safe execution of work. 2. Creating awareness on manual material handling by imparting training before start of work. 3. Using appropriate PPE in the form of safety shoes & hand gloves.
C. Clearing and grubbing					
8	Removal / cleaning of Surface encumbrances i.e. Electrical lines, trees, heap of soil, existing structure, existing roads and	R	1. Work near to the moving Vehicles / equipment. 2. Manual cutting & material handling Fall from height 4. Electrocution while using power tools	1. Fatality / severe injury due to hit by the moving vehicles / equipment. 2. Fall from height and may result into multiple njuries / fatality.	1. Barricading the work area(Hard/ soft as is decided by the Safety Officer) 2. Engaging the competent operators. 3. Taking approval from relevant authorities and ensure Permit to Work. 4. Imparting the Tool Box Talks (explaining the HIRA) before start of work. Recording the messages delivered at the Tool Box Talk 5. Avoiding the manual material handling as much as possible and introducing mechanical material handling for the removal of surface encumbrances. 6. Engage competent / experienced personnel for

Sr. No	Sub-activity	Routine activity	Potential hazard	Consequence	Proposed control
	other encumberances		5. Presence of overhead services / utilities; 6. Use of sharp hand tools.	3. Cut injuries while doing manual material handling. Shifting / pulling / pushing. 4. Electrical urn/ fatality	handling /operating hand tools / power tools during tree cutting.
9	Surface levelling (general Cutting /filling)	R	1. Work near to the moving Vehicles / equipment. 2. Topple of vehicle due to uneven ground surface. 3. Presence of overhead / underground utilities	1. Fatal / severe injury due to hit by the moving vehicles / equipment.	1. Barricading the vehicle movement area and define pedestrian movement area separately. 2. Ensuring that vehicle movement area is levelled and well compacted. 3. Prior information to the concern departments of utility services and ensure de-energize / isolation of source. 4. Administrative control measures are to be developed for vehicle fitness and engagement of competent operators.
	D. Excavation				
10	Cutting / digging the soil mechanically (Pit Excavation up to 3.0 M		1. Earth Collapse 2. Presence of buried electric cables 3. Presence of Overhead electrical cables 4. Movement / working of equipment in steep access / egress / valley conditions.	1. Toppling of equipment due to earth collapse and personnel may receive severe injury / fatal.	1. Screening of workforce before induction training 2. Medical examination as per Legal Requirement 3. Safety Induction; Issue of ID Card 4. Imparting daily Tool Box Talks (explaining HIRA) 5. Use of PPE (Both Mandatory and work related) 6. Behavioural Safety Training 7. If any unsafe act found then - council them & if done knowingly. 8. Motivate them by suitably rewarding them. 9. Do not allow any unauthorized to person to enter the pit 10. Awareness towards safety by displaying safety postures & slogan. 11. Relocating/ removing the overhead electrical lines. 12. Deploying competent operators for equipment use / operation. 13. Maintain the slope as per the types of soil. 14. Develop Site Specific Standard Operating Procedure for "Excavation" and submit it along with Method Statement / Work Plan and implement it through out the project 15. Avoid collapse of soil provide shoring/shuttering/sheet piling.

Sr. No	Sub-activity	Routine activity	Potential hazard	Consequence	Proposed control
11	Pit Excavation beyond 3.0m (*During excavation / cutting*	R	*Same as above plus* 1. Flooding due to excessive rain / underground water 2. Digging in the vicinity of existing Building / Structure 3. Movement of vehicles / equipment's close to the edge of cut.	Injury / fatal due to: 1. Drowning 2. Building / Structure collapse due to cave- in or slides. 3. Electrocution	1. In addition to the above mentioned in 1.10 follow 2. Preventing ingress of water by providing temporary bunds / diverting the catchment water. 3. Obtaining prior approval of excavation method from local authorities; if required / needed. 4. Relocating / removing the surcharge loads such as buildings / structures from the edge of excavation before mechanical digging / cutting operation. 5. Impart training on Excavation to all operators. 6. Separate entry & exit path for man and machinery must be maintained

Sr. No	Sub-activity	Routine activity	Potential hazard	Consequence	Proposed control
12	Working inside deep excavation (*After cutting/excavati on*)	R	1. Formation of tension cracks on the edge of excavation 2. Formation of cave-in on the sides of excavation 3. Water seepage 4. Rain-cut 5. Presence of steep access / egress/ ramp 6. Manual shifting of materials / portable equipment 7. Presence of unprotected vertical trench/ excavation walls 8. Vehicle movement near to the excavation 9. Presence of toxic gases 10. Presence of surcharge loads such as stacking of excavated soil on the edge of excavation	Injury / fatal due to: 1. Soil collapse 2. slip/ trip while Manual material handling 3. Fall of person 4. Fall of material 5. Fall of equipment	1. Performing regular inspections as per checklist for tension cracks/cave-ins/dewatering / rain-cut. 2. Continuous de-watering system in case of seepage of water 3. Provide safe access/ egress by providing gentle ramps / standard ladders / modular stairways. 4. Providing Sloping / benching / shoring / sheet piling to restrict the soil collapse as per the type of soil. 5. Avoiding vehicle movement near to the excavation. 6. Providing rigid barricades, signage's & illumination to avoid fall of person inside excavation. 7. Regular Tool Box Talks (explaining HIRA)are being imparted to workforce on daily basis. 8. Checking the oxygen levels & other toxic gases with gas detector. 9. Develop Standard Operating Procedure for "Excavation" & assign duties, responsibilities & authorities to the concern execution team.
13	Heavy Vehicle movement	R	Speed, Hit, slip, trip & fall.	Collision Overturn Topple Fire	Following DOs & DON'Ts as listed below: 1. Don't leave the keys in the cabin. 2. Don't allow any other person / cleaner to drive the vehicle. 3. Don't use Mobile phone while driving the vehicle. 4. Parking of vehicles near the excavated area is strictly prohibited and also not in the access path 5. Minimum of 3 meters' distance to be maintained from the excavation with parking light and display signage. 6. Avoid unnecessary parking. 7. Bank man or helper to deploy.

Sr. No	Sub-activity	Routine activity	Potential hazard	Consequence	Proposed control
					8. First aid box and fire extinguisher must bekept inside the cabin. 9. Maintenance to be carried out by an experience mechanic. 10. Other than construction vehicles should not take into the work locations. 11. Develop a daily Vehicle Inspection checklist and ensure compliance
14	Removal of Soil	R	Entanglement, & slip or trip	Hit by bucket	1. The radius where the Bucket is operated should be barricaded. 2. Signal man should be made available to guide the operator 3. Ensuring restriction of unauthorized personnel to enter in the excavation area. 4. Ensuring all the personnel must wear reflective jacket. 5. Ensuring by that JCB / excavator operator must aware of the surrounding area. 6. Operator should not use mobile phone or hear music by inserting the head phone in the ear. 7. While swinging / reversing - indication horn should be ON. 8. Develop Daily Equipment Inspection Checklist and ensure compliance 9. Ensure dynamic HIRA precautionary measures are in place
15	Loading / Unloading of soil	R	Workmen close to the moving equipment / machinery.	Physical injury/fatal due to hit by machinery.	1. Engaging trained personnel 2. Engaging a signal person wherever loading / unloading in progress. 3. No personnel should come in the approach / radius of the JCB bucket while loading sand in the truck. 4. Ensure that no personnel should stand in the vicinity of loading activity. 5. Signal man should communicate once the loading has been completed in the truck & he should simultaneously inform the truck driver & JCB operator. 6. Ensure that there must be a clearunderstanding 7. / communication between operator & signalmen. 8. Not overload the trucks since there ispossibility of skidding while travelling on the ramp. 9. Ensuring no personnel movement on ramps whereas trucks are plying on the ramp. 10. Providing signal men, caution boards & barricading.
16	Backfilling, Grading & Dumping	R	Including plying of vehicles on the uneven ground surface/ loose soil.	Injury to personnel / fatal due to toppling of vehicle / equipment / stuck in loose soil.	1. Vehicle movement area must be demarcated. 2. Soil strengthening of vehicle movement area / road being done. 3. Impart Tool Box Talks (explaining HIRA).

Sr. No	Sub-activity	Routine activity	Potential hazard	Consequence	Proposed control
E. Operation of batching plant					
17	Concreting: Manual / Mechanical Loading or unloading of : a) Raw material at material stack yards of Batching plant/ local concrete plant. b) Mechanical Loading / feeding of cement in silo unit. c) Manual handling of cement bags at cement store	R	1. Vehicle Movement. 2. Stack plies of raw material. 3. Men movement on or near to stack piling area & Men movement near to the equipment. 4. Auto functioning of material. Grabber to feed the material on feeder unit. 5. Men movement or manual material handling near to the conveyor/ rotating parts.	1. Hit by the moving vehicles/ equipment may result fatality / severe injuries. 2. Fall from height / hit by the grabber while working on piling area which may result fatality or severe injuries. 3. Injuries due to toppling of vehicles while moving on uneven ground surfaces / heaps. 4. Injuries due to collision of vehicles while working at congested / unsafe areas of Batching plant.	1. Men and vehicle movement area must be separated, and barricades shall be provided. 2. Deploy competent and trained operators. 3. Avoid manual material handling andinvolve mechanical lading / unloading. 4. Stop the movement of vehicles why manual handling in progress. 5. Stack pile separators / retaining structures are designed based on considering all load to withstand the stack piles. 6. Daily HIRA Talk talks are to be imparted to bring the awareness amongst all workforce at batching plant. 7. Signage and caution boards shall be displayed at vehicle movement area. Engage flagmen's to guide the movement of vehicles. 8. Pull card / guarding / covers shall be provided to all rotating parts such as conveyor belts /covers on feeding hoppers. 9. All personnel shall be adhered with appropriate PPE. 10. Heavy /unwanted vehicle movement shall be restricted in and around batching plant. No parking shall be allowed near the vehicle movement area. 11. Ensure dynamic HIRA precautionary measures are in place 12. To ensure safety checklist compliance
			6. Emission of cement particles while feeding the cement. 7. Failure / collapse of stack pile separators / retaining walls / structure due to excessive	5. Fatality / multiple injuries due to entrapment of body parts in the moving conveyor/rotating parts of batching plant.	1. Use and maintain filters bags at cement hopper to avoid the emission of cement particles. 2. Concern to establish and operate to be obtained from regulatory authorities.

Sr. No	Sub-activity	Routine activity	Potential hazard	Consequence	Proposed control
			stack of raw material.		
18	Batch preparation and loading of mortar on to millers.	R	1. Movement of feeding bins 2. Movement of vehicles. 3. Noise 4. Electrical operation. 5. Personnel working at / movement to height .i.e. access to the control panel room.	1. Entrapment of body parts 2. Hit by the moving vehicles 3. Loss of hearing 4. Electric shock 5. Collision / toppling of vehicles. 6. Fall from height.	1. Avoid personnel / manual intervention while batch preparation in progress. 2. Men / vehicle movement shall be separated. 3. Use Ear muffs while it's in operation. 4. Use RCCBs/ ELCBs and standard industrial plugs. 5. Vehicle movement area must be PCC laid to avoid the stocking of vehicles in the mud. 6. All gangways / access must be constructed with standard material and railings shall be provided to avoid the fall of personnel while working at height. 7. The Miller will be fitted with reverse alarms 8. Flagman will be deployed along the route of movement of the millers 9. Ensure dynamic HIRA precautionary measures are in place 10. To ensure safety checklist compliance
19	Maintenance operation of Batching plant.	NR	1.Electrical operation / work during maintenance 1. Unauthorized operation during plant is in maintenance 2. Working at height.	1. Electrical Shock 2.Entrapment of body parts / fatality due to unauthorized operation. 3. Fall from height.	1. Use ELCBs / RCCBs and regular inspection of all electrical devices / cables by an electrical. 2. Adopt LOTO system when maintenance in progress. 3. All the electrical equipment shall be grounded properly. 4. Use appropriate PPE while work in progress. Railing system shall be in place. 5. Restrict the movement and presence of unauthorized personnel while maintenance in progress. 6. Ensure availability of licensed electrician 7. Develop i) Daily Inspection Checklist and ii) Maintenance safety checklist compliance
	F. Concreting				
20	Concreting	R	Air Pollution by cement	May affect Respiratory System	1. Wear respirators or cover mouth and nose with wet cloth. 2. Develop Standard Operating Procedure for Handling of Cement & Concrete 3. Prepare a pre task checklist for concreting and implement it through the life of the project.
21	Concreting	R	Handling of ingredients	Hands injury	1. Use gloves and appropriate PPE. 2. Develop Standard Operating Procedure for Handling of Cement & Concrete 3. Prepare a pre task checklist for concreting and implement it through the life of the project..

Sr. No	Sub-activity	Routine activity	Potential hazard	Consequence	Proposed control
22	Concreting	R	Protruding reinforcement rods.	Feet may get injured	1. Use Safety shoes; Provide platform above reinforcement for movement of workers. 2. Use rebar caps on the ends 3. Develop Standard Operating Procedure for Handling of Cement & Concrete 4. Prepare a pre task checklist for concreting and implement it through the life of the project.
23	Concreting	R	Earthing of electrical mixers, vibrators, etc. not done.	Can cause electrocution / asphyxiation	1. Ensure earthing of equipment's and proper functioning of electrical circuit before commencement of work. 2. Develop Standard Operating Procedure for Handling of Cement & Concrete to include electrical safety 3. Prepare a pre task checklist for concreting and implement it through the life of the project.
24	Concreting	R	Falling of materials from height.	Persons may get injured	1. Use hard hats; 2. Remove surplus material immediately from work place. 3. Develop Standard Operating Procedure for Handling of Cement & Concrete to include falling material 4. Prepare a pre task checklist for concreting and implement it through the life of the project.
25	Concreting	R	Continuous pouring by same gang	Cause tiredness of workers and may lead to accident.	1. Insist on shift pattern. 2. Ensure lighting arrangements during night hours. 3. Develop Standard Operating Procedure for Handling of Cement & Concrete to include Night work, Fatigue 4. Prepare a pre task checklist for concreting and implement it through the life of the project.
26	Concreting	R	Revolving of concrete mixer / vibrators	Parts of body of clothes may get entrapped	1. Allow only mixers with hoper. 2. Provide safety cages around moving motors; Ensure proper mechanical locking of vibrator. 3. Use of appropriate clothing. 4. Develop Standard Operating Procedure for Handling of Cement & Concrete to include PPE and Cloting 5. Prepare a pre task checklist for concreting and implement it through the life of the project.
G. Operation of vehicle and equipment					
27	Unauthorized operator operating Plant Equipment's Heavy Vehicles the plant		Incompetent Operator Non-Compliant Vehicle and Equipment	Injury or Multiple sever injury	1. Authorized operator with valid driving license only allowed to operate the plant equipment's/ Heavy vehicles allowed after the medical induction. 2. To ensure screening of operator. 3. Operator should have minimum 05 Yrs. Experience with Construction Equipment Operating Driving License. 4. To organize periodical training. 5. Operator should maintain daily checklist of equipment. 6. To check Alcoholic by tester of operator and

Sr. No	Sub-activity	Routine activity	Potential hazard	Consequence	Proposed control
					health condition. 7. Develop Standard Operating Procedure for Mechanical equipment's handling 8. Vehicle should have a valid fitness Certificate 9. All equipment in the project should be compliant with the emission standards for off- road equipment published by MoRTH. The Plant Machinery and Vehicle should be selected that they meet the existing emission requirement else they would be a source of pollution. The Ministry of Road Transport and Highways has notified that emission standard for construction equipment[18]:
28	Unloading of Soil	NR	Toppling of heavy vehicle during unloading of Soil.	Injury or Multiple sever injury	1. After ensuring the Pin and proper opening of back door the bucket should be lifted for unloading the materials. 2. Develop Standard Operating Procedure for Mechanical equipment's handling and implement the same. Include Vehicle Maintenance and Regular checkup procedures 3. Develop and implement Tipper Inspection Safety checklist. The Checklist should be completed before commencing of work.
29	Tipper movement without repositioning of back bucket	NR	Hit with overhead cables/structures / may lead to toppling of vehicle during Tipper movement without repositioning of back bucket.	Injury or Multiple sever injury	1. Trained operator only allowed to move the vehicle inside the plant. 2. Install goal post where ever OHE crossing are there. 3. Develop Standard Operating Procedure for Mechanical equipment's handling and implement the same. Have a special section on : working Hazardous Environment 1. Electrical Safety , ii) Water logged / Slipper surfaces etc.
30	Failing to pull the parking brake.	NR	Hit of person due to failing the parking brake.	Injury or Multiple sever injury	Ensure parking brake prior to getting down from vehicle. Develop and Implement Standard Operating Procedure for: Mechanical equipment's handling. Have Do's and Do Not's for Vehicle and Equipment.
	H. Operation of lifting equipment				
31	Material Handling	R	Slip, trip and falling of material	Injury due to unsafe load handling.	1. Trained Riggers crew shall be engaged and the workforce shall be trained for safe handling. 2. Tag line shall be used to control the swinging load. 3. Develop and Implement Standard Operating Procedure: Lifting appliances & lifting gears control.

[18] https://morth.nic.in/sites/default/files/notifications_document/GSR%20598%20%28E%29%20dated%2030%20September%202020%20Seperate%20emission%20norms%20for%20agriculture%20tractors%20and%20CEV.pdf

Sr. No	Sub-activity	Routine activity	Potential hazard	Consequence	Proposed control
32	Material Handling	R	Failure of lifting gear, improper rigging.	Fall of material from height, Damages to material, man power etc.	1. Periodic testing & inspection. 2. Pre use testing of lifting equipment's, lifting tools like Shackles, ropes, slings, pulley, etc. 3. Periodic maintenance of lifting equipment's & tools. Special training to the Riggers. 4. Do not allow overloading of the lifting equipment's. 5. Barricading the area with signage to avoid unwanted visitors to the area. 6. Develop and Implement Standard Operating Procedure: Lifting appliances & lifting gears control.
33	Placement of Cranes	R	Due to uneven ground imbalance or toppling of mobile cranes	Injury	1. A trained work crew shall be deployed, 2. Crane working area shall be cordoned with indicative tapes, 3. Third party certified crane shall be used, 4. Outriggers shall be fully extended and prior to use of crane 5. A general inspection shall be carried out by TPL Team with checklist. 6. Lifting shall be avoided where overhead electrical lines are crossing. 7. Compaction of the ground to be ensured. 8. Develop and Implement Standard Operating Procedure: Lifting appliances & lifting gears control
34	Placement and Removal of Slings & D-Shackles	R	Hit by object due with rapid speed of lowering hoist/hook.	Injuries with head & hand/shoulder	1. A trained gang shall be deployed, 2. Adequate height of platform or ladder shall be used for placement and removal of slings and D- shackles, 3. Third party certified tools shall be used, 4. Prior to use physical inspections shall be carried out by mechanical department.
35	Material handling	NR	Material slip and fall	Injury or Multiple sever injury	1. All hooks will be provided with hook latch. 2. All tools and tackles should be tested and certified for the load. 3. Develop and Implement Standard Operating Procedure for: Mechanical equipment's handling. Including Tools a tackles Inspection Checklist.
36	Shifting Equipment and machine with hydra crane	NR	Failure of lifting appliance by poor rigging methods.	Severe injury	1. Use proper rigging method for lifting the materials. 2. Use experienced riggers for lifting. 3. Use appropriate Lifting devices (within the capacity) for the lift. 4. All hooks will be provided with hook latch. 5. All tools and tackles should be tested and certified for the load. 6. Develop and Implement Standard Operating Procedure for: Mechanical equipment's handling. Include Specific section on Shifting of Machinery.

Sr. No	Sub-activity	Routine activity	Potential hazard	Consequence	Proposed control
37	Use of mobile crane for material lifting and marching	NR	Chances of personal fall under wheel, chances of toppling.	Severe injury	1. Provide wheel guard for mobile crane avoid personal fall under the mobile crane wheel, over dimension or overload materials should not be lifted. 2. All Cranes to be fitted with overload indicators. 3. All Crans deployed should contain load certification 4. All tools and tackles used shall be load certified.
I. Waterside works					
38	Working over or adjacent to water (depth above 4 ft)	NR	Falls of person into water	Drowning	1. Edge protection will be provided where practicable. 2. Safety lines and harnesses will be worn where edge protection cannot be provided. 3. Where there is fast flowing water, make provision of grab lines downstream. 4. Gangways and areas near water will be kept clear of obstructions. 5. Suitable lighting (54 lux) will be provided at edges adjacent to water. 6. A rescue boat or other means of prompt rescue will be available when necessary. 7. Life jacket shall be provided to all those working over the water. 8. Activities at edges shall not be performed on rough wind times / dark hours. 9. Caution board must be displayed with proper information. 10. Emergency Rescue team should be designated 11. Develop and Implement a Standard Operating Procedure s: Waterside Works with dynamic HIRA precautionary measures are in place. 12. Develop and implement a safety checklist before commencing of work.
39	Working over or adjacent to water (depth above 4 feet)	NR	Sinking of floating vessel/barg e	Risk of drowning, serious injuries and fatal due to stuck between objects in the water	1. Check the condition of vessels against corrosion, ensure sufficient anticorrosion measure taken. 2. Mark the Safe Working Load on every barge taking the dead weight of vessel and fill water into account. Also mark the appropriate allowable dip with respect to SWL. 3. A rescue boat or other means of prompt rescue shall be available when necessary. 4. Life jacket shall be provided to all those working over the water. 5. Railing should be provided on the sides of the barge/ Allow place for hooking of safety line. 6. Develop and Implement a Standard Operating Procedure s: Waterside Works with dynamic HIRA precautionary measures are in place. 7. Develop and Implement a safety checklist before commencing of work.
40	Working over or adjacent to water	NR	Flash flood	Drowning and washing away	1. Regular update to be taken from meteorological 2. / local department to reach flood alerts. 3. Erect warning signage's.

Sr. No	Sub-activity	Routine activity	Potential hazard	Consequence	Proposed control
	(depth above 4 feet)				4. Establish Emergency Siren system for quick evacuation. 5. Conduct frequency drills. 6. Develop and Implement a Standard Operating Procedure s: Waterside Works with dynamic HIRA precautionary measures are in place 7. Develop and implement a safety checklist before commencing of work
41	Working over or adjacent to water (depth above 4 feet)	NR	Oil spillage into water body	Water pollution	1. Never keep the drums/barrels/containers in open condition, always ensure lid on. 2. Employee suitable re-fuelling methods to avoid oil spillages. 3. Promptly remove the empty containers away from workplace. 4. Use spill trays, maintain equipment oil leak free
J. Roadworks					
42	Removal / cleaning of Surface encumbrances i.e. electrical lines, trees, heap, existing buildings, existing roads and other existing structures	Refer HIRA for B. EXCAVATION			
43	Surface levelling (general cutting / filling)	Refer HIRA for B. EXCAVATION			
44	Loading / Unloading of soil	R	Vehicle / equipment movement inside / near working location	Injury due to hit by the machinery	1. Trained personnel only to be deployed for loading & unloading activity. 2. Signal man to be present at the loading / unloading site. 3. No personnel should come in the approach / radius of the JCB Bucket while loading sand in the truck. 4. No personnel should be standing in the truck when the loading activity is in process. 5. Signal man should communicate once the loading has been completed in the truck & he should simultaneously inform the truck driver & JCB operator. 6. Only after the instruction he should startthe truck. 7. Do not overload the truck, as there would be every possibility of skidding while travelling onthe ramp. 8. When loaded truck is travelling then no other 9. truck / machine / personnel should be approaching through the ramp.

Sr. No	Sub-activity	Routine activity	Potential hazard	Consequence	Proposed control
					10. Prepare and Implement a Standard Operating Procedure: Roadworks with dynamic HIRA precautionary measures is in place. Develop Inspection Safety Checklist: Borrow Areas Operations and Earthwork.
45	Laying & compaction of GSB layer	R	1. Vehicle / equipment movement inside / near working location 2. Emission of dust 3. Work near to the live carriage way (widening project)	Injury / fatal (public / workmen) due to: Hit by the moving equipment / public vehicles. Ill health due to work in dust area.	1. Provide nose mask to workmen while working near to dust emission areas. 2. All personnel must wear high visibility clothing 3. Engage competent operators and flagmen to control the traffic. Ensure fitness for vehicle and display the inspection tags. 4. Follow IRC Specifications-SP 55 for signage's, making diversion, providing buffer zone for widening projects. 5. Prepare and implement dynamic HIRA precautionary measures are in place. Develop Inspection Safety Checklist: Safety During Roadworks
46	Laying of DBM / BC & compaction of Layer	R	1. Handling and work near to the hot bitumen work near to the equipment such as paver, vibro rollers, PTR, etc.	All the consequence and above incidents plus* Burns / de-hydration	All the above control measures plus 1. Use appropriate clothing and hand gloves 2. Ensure availably of drinking water all the time near to the work location. 3. Avoid manual handling as much as possible and introduce mechanical handling.
47	Spray of Bitumen/ Emulsion	R	Handling the chemical & Hot condition of tar / bitumen / tar	Dehydration throat irritation/ lung diseases	1. Correct PPE in accordance with PPE procedure including sun hat, long sleeved shirt & sunscreen 2. Provide cool water on site and drink regularly. 3. All personnel on site to wear approved high visibility clothing. For night works and Vic Roads works approved reflective vests must be worn. 4. Develop and Implement Standard Operating Procedure: Roadworks with dynamic HIRA and precautionary measures are in place. Implement a Permit to Work. 5. Deploy traffic controller.
48	Other miscellaneous activities for road widening project as below: 1. Kerb laying 2. Drainage	R	1. Work near to the live traffic 2. Working near to the excavation/ trench areas Working at height.	Physical injury/fatal	1. Provide buffer zones and speed limit control system by providing flagmen / caution boards. 2. Deploy trained & experienced operators. 3. Follow IRC specifications-SP 55 for signage's, making diversion, providing buffer zone for widening projects. 4. Carry out Toolbox Talk to inform the HIRA.

Sr. No	Sub-activity	Routine activity	Potential hazard	Consequence	Proposed control
	constructi on 3.Road marking 4. Median preparation 5.Culvert / minor bridge / major bridge construction				
K. Electrical safety/ portable electic device					
49	Use portable electric power tools and electrical equipment	R	Short circuit due to electricity	Electric shock & burn injury	1. All tools shall be fitted with adequate fuse protect 2. Close supervision is required. 3. To ensure the PTW system compliance. 4. To implement safety checklist before commencing of work. 5. Monthly tagging system to be followed. 6. Develop and Implement Standard Operating Procedure : Electrical Work. . Develop Inspection Safety Checklist: Portable Electric Equipment
50	Use portable electric power tools and electrical equipment	R	Use of incorrect power tools	Electric shock & burn injury	1. All tools shall be class 2 double insulated Or have reinforced insulation throughout 2. Connection of electrical tools to be routed through ELCB 3. Develop and Implement Standard Operating Procedure: Electrical Work. . Develop Inspection Safety Checklist: Portable Electric Equipment.
51	Use portable electric power tools and electrical equipment	R	Inexperienc ed personnel using tools	Electric shock & burn injury	1. Only trained and experienced person are allowed
52	Use portable electric power tools and electrical equipment	R	Laceration & Abrasion due to use of faulty tools	Electric shock & burn injury	1. Tools shall be inspected on monthly basis. 2. Disc/wheel/tool kit are changed after disconnected. 3. Face shield/goggle shall be worn while working 4. All equipment will be routed through 30 mA ELCB
K. Gabion Box Preparation					
53	Movement of Boulder	R	Trips and falls	Fractures Head injuries Sprains and strains Back injuries Cuts and lacerations	1. Maintain a clean and well-organized work area. 2. Use stable and level ground for basket assembly and installation. 3. Provide and enforce the use of appropriate personal protective equipment, such as safety boots and high-visibility vests. 4. Use barricades and warning signs to mark any potential tripping hazards. 5. Implement a regular inspection and maintenance program for tools and equipment to ensure their safety and proper functioning. 6. Provide adequate lighting to ensure clear visibility of the work area.

Sr. No	Sub-activity	Routine activity	Potential hazard	Consequence	Proposed control
54	Handling of Boulders	R	Manual handling injuries	Back injuries Strains and sprains Musculoskeletal disorders (MSDs) Hernias Fractures	1. Provide manual handling training to all workers. 2. Use mechanical aids, such as cranes or forklifts, to lift and move heavy gabion baskets. 3. Ensure that workers use proper lifting techniques, including bending at the knees and keeping the back straight. 4. Conduct regular risk assessments to identify and address potential hazards related to manual handling. 5. Provide adequate rest breaks to prevent overexertion and fatigue. 6. Implement a buddy system or team lifting approach for heavier gabion baskets.
			Struck by Objects	Head injury Fractures Contusions Cuts and lacerations Traumatic brain injury	1. Use barrier systems (e.g., fencing) to prevent uncontrolled access to the work area. 2. Prevent workers from throwing/rolling boulders to pass them around. 3. Ensure proper storage and stacking of materials to prevent them from falling. 4. Conduct regular inspections of the work area to identify and remove any potential hazards. 5. Require personal protective equipment (PPE) such as hard hats to be worn at all times. 6. Provide adequate and ongoing training to workers on the risks associated with falling objects and how to properly mitigate them.
55	Lifting of Boulders/ Manual Handling of Boulders		Musculoskeletal disorders	Back strain Tendonitis Carpal tunnel syndrome Rotator cuff injury	1. Provide manual handling training to workers. 2. Use mechanical aids (e.g., trolleys, hoists) to assist with lifting and moving heavy objects. 3. Ensure that workers have access to suitable ergonomic tools and equipment. 4. Implement regular rest breaks to alleviate fatigue and muscle strain. 5. Encourage proper body mechanics and lifting techniques. 6. Conduct regular risk assessments to identify and address ergonomic hazards.
			Hand injuries	Lacerations Crush injuries Fractures Amputations Tendon or nerve damage	1. Provide suitable hand protection such as gloves. 2. Ensure proper training and education on safe handling techniques. 3. Encourage regular breaks to prevent fatigue and maintain focus. 4. Maintain a clean and organized work area to minimize the risk of hand injuries. 5. Use appropriate tools and equipment with safety features to reduce hand injury hazards. 6. Implement a thorough inspection and maintenance program for tools and equipment to ensure they are in safe working condition.
			Crush Injuries	Fractures Traumatic amputations Crush syndrome	1. Ensure proper training on safe work practices and procedures for handling and installing gabion baskets. 2. Provide and enforce the use of appropriate personal protective equipment (PPE) such as

Sr. No	Sub-activity	Routine activity	Potential hazard	Consequence	Proposed control
				Internal organ injuries	safety boots, gloves, and high visibility vests. 3. Conduct regular inspections and maintenance of machinery and equipment used in the installation process to ensure they are in safe working condition. 4. Implement safe work procedures for lifting and moving gabion baskets to prevent crush injuries, including the use of mechanical lifting aids when necessary. 5. Establish clear exclusion zones around areas where gabion baskets are being installed to prevent workers from being near or underneath falling baskets or materials. 6. Promote open communication and a strong safety culture, encouraging workers to report any potential hazards or near-miss incidents related to crush injuries.

Annexure 7: Form B as per World Bank ESIRT Guidelines 2023

To be completed by Borrower within 24 hours

B1: Incident Details			
Date of Incident:	**Time:**	**Date Reported to PIU:**	**Date Reported to WB:**
Reported to PIU by:	**Reported to WB by**:	**Notification Type**: Email/'phone call/media notice/other	
Full Name of Main Contractor:		**Full Name of Subcontractor**:	

B2: Type of incident (please check all that apply)[1]

Fatality ☐ Lost Time Injury ☐ Displacement Without Due Process ☐ Child Labor ☐ Acts of Violence/Protest ☐ Disease Outbreaks ☐ Forced Labor ☐ Unexpected Impacts on heritage resources ☐ Unexpected impacts on biodiversity resources ☐
Environmental pollution incident ☐ Dam failure ☐ Other ☐

[1]See Annex 1 for definitions

B3: Description/Narrative of Incident

Please replace text in italics with brief description, noting for example:

I. *What is the incident?*
II. *What were the conditions or circumstances under which the incident occurred (if known)?*
III. *Are the basic facts of the incident clear and uncontested, or are there conflicting versions? What are those versions?*
IV. *Is the incident still ongoing or is it contained?*
V. *Have any relevant authorities been informed?*

B4: Actions taken to contain the incident			
Short Description of Action	**Responsible Party**	**Expected Date**	**Status**

For incidents involving a contractor:
Have the works been suspended (for example, under GCC8.9 of Works Contract)? Yes ☐; No ☐;
Trading name of Contractor (if different from B1):
Please attach a copy of the instruction suspending the works.

B5: What support has been provided to affected people

Incident Types

The following are incident types to be reported using the environmental and social incident response process:

Fatality: Death of a person(s) that occurs within one year of an accident/incident, including from occupational disease/illness (e.g., from exposure to chemicals/toxins).

Lost Time Injury: Injury or occupational disease/illness (e.g., from exposure to chemicals/toxins) that results in a worker requiring 3 or more days off work, or an injury or release of substance (e.g., /toxins) that results in a member of the community needing medical treatment.

Acts of Violence/Protest: Any intentional use of physical force, threatened or actual, against oneself, another person, or against a group or community, that either results in or has a high likelihood of resultin in injury, death, psychological harm, deprivation to workers or project beneficiaries, or negatively affects the safe operation of a project worksite.

Disease Outbreaks: The occurrence of a disease in excess of normal expectancy of number of cases. Disease may be communicable or may be the result of unknown etiology.

Displacement Without Due Process: The permanent or temporary displacement against the will of individuals, families, and/or communities from the homes and/or land which they occupy without the provision of, and access to, appropriate forms of legal and other protection and/or in a manner that does not comply with an approved resettlement action plan.

Child Labor: An incident of child labor occurs: (i) when a child under the age of 14 (or a higher age for employment specified by national law) is employed or engaged in connection with a project, and/or (ii) when a child over the minimum age specified in (i) and under the age of 18 is employed or engaged in connection with a project in a manner that is likely to be hazardous or interfere with the child's education or be harmful to the child's health or physical, mental, spiritual, moral or social development.

Forced Labor: An incident of forced labor occurs when any work or service not voluntarily performed is Exacted from an individual under threat of force or penalty in connection with a project, including any kind of involuntary or compulsory labor, such as indentured labor, bonded labor, or similar labor-contracting arrangements. This also includes incidents when trafficked persons are employed in connection with a project.

Unexpected Impacts on heritage resources: An impact that occurs to a legally protected and/or Internationally recognized area of cultural heritage or archaeological value, including world heritage sites or nationally protected areas not foreseen or predicted as part of project design or the environmental or social assessment.

Unexpected impacts on biodiversity resources: An impact that occurs to a legally protected and/or internationally recognized area of high biodiversity value, to a Critical Habitat, or to a Critically Endangered or Endangered species (as listed in IUCN Red List of threatened species or equivalent national approaches) that was not foreseen or predicted as part of the project design or the environmental and social assessment. This includes poaching or trafficking of Critically Endangered or Endangered species.

Environmental pollution incident: Exceedances of emission standards to land, water, or air (e.g., from chemicals/toxins) that have persisted for more than 24 hrs or have resulted in harm to the environment.

Dam failure: A sudden, rapid, and uncontrolled release of impounded water or material through overtopping or breakthrough of dam structures.

Other: Any other incident or accident that may have a significant adverse effect on the environment, the affected communities, the public, or the workers, irrespective of whether harm had occurred on that occasion. Any repeated non-compliance or recurrent minor incidents which suggest systematic failures that the task team deems needing the attention of Bank management

Annexure 8: Format for ESMP (Irrigation sub-projects)

This is a generic ESMP, developed based on the understanding of the activities which will be undertaken in case of irrigation modernization projects. The key activities which are envisaged are: Dismantling of Tile brick Lining; Lining of the canal: (i. Preparation of subgrade, ii. Ploughing of Existing Canal, iii. Lip cutting for Earthwork Excavation, iv. Laying of Sand Layer under Bed, v. Laying of LDPE Film above the sand layer, vi. Under Drainage work, vii. Concreting); Improving water regulation mechanism to ensure that the discharge meets the designed capacity requirements to minimize wastage: (i. Renovation of structure, ii. Instrumentation of the gate and regulating structures); Resection of the Collapsed section of the canal. The ESMP deals with two phases of the project namely: A: Design and Pre-Construction Phase; B: Construction Phase.

A. Design and Pre-Construction

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicator	Responsibility	
				Frequency	Supervision
A. **Design and Pre-Construction**					
Finalization of Work Methodology	Occupational health, safety, and community health impact	• To manage Environmental & Social issues of the project prepare a **Contractor Environment Health Safety Management Plan** (C-ESMP) in line with the ESMP included in the ESIA. The CESMP should be proportionate and align with Work Methodology proposed; define Roles & Responsibilities, Resources available and monitoring & review mechanisms for E & S issues. • Prepare **Occupational Health and Safety Plan** (OHS Plan). OHS plan for construction work site safety will be prepared[19] • Conduct **Hazard Identification and Risk Assessment** (HIRA) for all tasks presented in the Method Statement[20]	CESMP OHS Plan (including HIRA) along with work methodology	Contractor to submit CESMP, OHS, CHS, Traffic plan along with the construction methodology and Work Plan. The PMU/PMTC shall review this comprehensively (within one week), address any comments, and resubmit for approval.	E&S Specialist PMU and WRD Officials / Environmental Expert and Social Expert of PMTC

[19] See Occupational Safety, Health and Working Conditions Code, 2020 considering EHS General Guidelines https://www.ifc.org/content/dam/ifc/doc/2000/2007-general-ehs-guidelines-en.pdf

[20] Classify work/assessment units or work activities during construction phase (based on generic understanding of works to be carried out); Identify the hazards associated with work activities; List out the Consequence of the hazard involved in the activity; List out controls (preventive and recovery)

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicator	Responsibility	
				Frequency	Supervision
		• **Community Health and Safety (CHS) Plan** will be prepared which includes a **Traffic management plan** for movement of equipment and materials as well as emergency and hauling of material during the construction period will be prepared by the contractor; Management of distance and safety to ensure that the community members are segregated from the work site. Safety standards will be applied during all phase of project activities. The personnel should be periodically undergoing medical check to identify anybody suffering from occupational health hazard.	CHS Plan (including traffic safety) along with work methodology Method Statement only to be approved once the CESMP, OHS, CHS, Traffic plan is approved		
Resettlement	Residential and livelihood impact	If any habitants or occupants (squatters/encroachers) are to be displaced, they will be relocated with prior approval of the concerned agencies.	Entitlement matrix, Resettlement Action Plan	Local administration, District administration, District/ Divisional unit, PMU, PMTC	PMU / PMTC, Divisional Office of WRD NGO/Support organization
Setting up of Office and Construction Camp, rest places /shed/ Labour Camp	Air pollution, noise levels and vibration	In case workers accommodation (temporary/ permanent) are constructed by the Contractor it should conform to the World Bank Group Guidance on Labour Accommodation (Workers' accommodation: processes and standards (https://www.ifc.org/content/dam/ifc/doc/mgrt/workers-accomodation.pdf) and local laws which ever is stringent. The Contractor needs to obtain CTE and CTO for setting of Camp. No sites should be considered for stockpiling areas that may promote instability and result in damage of property,	Labour Accommodation Plan / Rest Areas Plan (as Applicable) submitted and approved Site Plan submitted and approved.	Contractor to submit along with the construction methodology and Work Plan The PMU/PMTC shall review this comprehensively (within one week), address any	E&S Specialist PMU and WRD Officials / Environmental Expert and Social Expert of PMTC

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicator	Responsibility	
				Frequency	Supervision
		hindrance to access road, vegetation, nearby land (without written permission of the owner). No spoils disposals or material shall flow into agricultural land adjoining the project areas. No waste, debris/ scrap / unused machinery shall be stored outside the construction areas. A labour accommodation/ rest area, a Labour accommodation / Rest Area Plan and Construction Yard Layout Plan must submitted along with the Work methodology.		comments, and resubmit for approval. The labor camp cannot be setup without the approval. If done on the contrary the Contractor has to carry out changes suggested by Client to bring the accommodation to satisfactory levels before the same can be used	
Selection of Site for Disposal of excavated material, Camp, Storage of Material, Temporary parking	The works would be located in rural areas with rich agricultural land. Unplanned disposal or setting up of construction camp can impact the soil	The locations should be selected with following considerations: • Unproductive/wastelands/Chart land shall be selected. • These should be away from residential areas and located at least 500 m downwind side of these locations, • These sites shall be finalized such that they do not lie within any designed forest or other eco-sensitive areas, do not affect natural drainage courses and no endangered/rare flora is impacted by such disposal. • The lowlands, natural depressions which are natural sinks will not be used for dumping as these are natural sinks. • Drainage channels shall not be used for dumping • Local Authorities such as Gram Panchayat members, Ward member	Approval of the Dumping site by the E&S Specialist, PMU and E&S Officer PMTC.	Contractor before selection of site. The selected dumping site should be approved by the dedicated Focal Person for E & S at concerned divisional office of WRD, E & S Specialist of the PMU or Environmental & Social experts of PMTC.	E&S Specialist PMU and WRD Officials / Environmental Expert and Social Expert of PMTC

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicator	Responsibility	
				Frequency	Supervision
		should be consulted about the location of debris disposal sites before finalizing the locations. • Dumping sites should not contaminate water sources. • Dumping sites should have adequate capacity for the amount of debris generated			
Assessment of Impacts Due to Changes/ Additions/ Final Designs/ Work Methodology in the Project	Additional Impacts or work Methodology related impacts	• In case of any event of changes/ revisions (including addition or deletion) in the project's scope of work or change in the site condition, the impacts as a result of the changes need to be assessed. Site-specific ESMP should be prepared and approved by the Bank before the commencement of construction. • The Contractor will also prepare CESMP for additional impacts. The CESMP must be submitted to the PMU for approval. A comprehensive review of the CESMP will be carried out by PMU/PMTC within one week's time and the rectified document will be submitted for approval before construction.	The Site Specific EMP/ to be submitted along with the Method Statement Construction should not be carried out unless the EMP is approved.	PMU Contractor, to be submitted along with the revised construction methodology and Work Plan	E&S Specialist PMU and WRD Officials / Environmental Expert and Social Expert of PMTC
Labour Requirements and labour influx	Increased illicit behavior and crime, increased burden on local public services and utilities, the spread of communicable diseases, and GBV/SEA/SH risks	• The contractor will use labour drawn from local communities preferably to avoid any additional stress on resources and communities. In case of non-availability of skilled labour locally, the contractor will bring them from outside the project area	• Registers – gender segregated (muster roll) • Labor returns • Approvals • Display Boards • ID Cards • Availability of Model Code of Conduct	Contractor, throughout Construction & operational phase	Divisional Office of WRD and PMTC.

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicator	Responsibility	
				Frequency	Supervision
		• All guidelines in the Labour Management Procedures for labour influx to be followed by the Contractor. • Ensure compliance with Labour laws - national and state • All labour licence, insurance, registrations and compliance with any statutory requirements to date must be complied with. • Screening of age based Aadhar Card. • Display Board (Wages, labour rights etc). • Contractor to maintain recruitment records and employment process of labourer • Job description and employment condition should be clearly communicated to the labourers by the contractor.	signed by supervisors and sub-contractors • Availability of Gender specific facilities at labour camp & worksite		
Disclosure and Public Display of Information	Stakeholder engagement for ensuring inclusiveness	• Copy of C-ESMP to be kept at project site and on the website of WRD. • Project information boards showing the name of work, project cost, duration, date of commencement, date of completion, executing agency and contact details (including telephone numbers) shall be displayed both sides of the road packages in both in English and Hindi. • Prior to construction activity, information dissemination will be undertaken by contractor at the project site. • Information boards containing Code of Conduct, SEA/SH plan, GBV plan in local	ESMF/ESMP available to public Project Information Board Camp Information Board Grievance Boards on Site	PMU Contractor Contractor Contractor throughout Construction & operational phase	PMU, PMTC

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicator	Responsibility	
				Frequency	Supervision
		languages, telephone numbers of GRM cell will be setup at the sites of construction camps and labour camps and stockyard site.			
Site clearance and site preparation	Loss of green cover, Impact on terrestrial ecology	No trees will be felled without the permission of the Forest Department. Provision of project design / bid document to align the Restoration and rehabilitation of all such locations occupied or used for construction purposes immediately after the given task(s) is over. No hunting/trapping/poaching of wildlife, migratory birds by workers shall be permitted while working or residing on-site. The Contractor should provide training to his staff with support from the PMU.	Site inspection through visual survey Code of Conduct to be signed by all workers Code of Conduct explained to all workers	Contractor	PMTC and PMU
Selection and Deployment of construction vehicles, equipment and machineries	Increase air pollution, noise and vibration	All Construction equipment[21] and machinery to be used in the project will conform to standards adopted by the Ministry of Road Transport and Highways. The emission and discharge standards promulgated under the Environment Protection Act, 1986, will be strictly adhered to. Noise limits for construction equipment to be procured, such as compactors, rollers, front loaders, concrete mixers, cranes (moveable), vibrators and saws, will not	Certification by Manufacturer of emission and noise levels/ Pollution under Control Certificates, Insurance and Driving License of the driver to be submitted for all vehicles	Contractor Once before deployment of all vehicles	PMU and PMTC

- [21] Every agricultural tractor, construction equipment vehicle and combine harvester shall be so manufactured that it complies with the following standards of gaseous pollutants as per rule 115A, after sub-rule (8), of the Central Motor Vehicle Rules, 1989.The Plant Machinery and Vehicle should be selected that they meet the existing emission requirement else they would be a source of pollution. The Ministry of Road Transport and Highways has notified that emission standard for construction equipment: [21]https://morth.nic.in/sites/default/files/notifications_document/GSR%20598%20%28E%29%20dated%2030%20September%202020%20Seperate%20emission%20norms%20for%20agriculture%20tractors%20and%20CEV.pdf

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicator	Responsibility	
				Frequency	Supervision
		exceed 75 dB(A)22, measured at one meter from the edge of the equipment in free field, as specified in the Environment (Protection) Rules, 1986. The Contractor will submit a record of PUC for all vehicles and machinery to be mobilized in the project.	Contractor		
Material sourcing	Unsustainable mining operation	Contractor will finalize the quarry for procurement of construction materials after assessment of the availability of sufficient materials and other logistic arrangements. They will submit a copy of EC/ CTE/ CTO along with the recent compliance report to the PMU before any such quarry is engaged. All consent and permits to remain valid at all times. Borrow area permission should be in line with the MoEFCC notification dated 02.08.2024 (S.O 3099)[23]	Permission for mining/ quarrying of materials from the Mining Department, District Administration and District Level Environment Appraisal Committee	Contractor Once before the start of construction activities	PMTC and PMU
Compensation, rehabilitation & resettlement (R&R) provisions	Impact on local squatters/ encroachers	Documents will be verified and endorsed for the list of families eligible to get appropriate compensation and assistance as per entitlement matrix.	Prior to inception of construction activity.	Contractor, Divisional Office of WRD, PMU & PMTC	PMU & PMTC
Shifting of Utilities	Disruption of Services	Prior permission shall be taken from concerned department officials, for shifting of utility. Utility shifting shall be undertaken by concerned Department and the corresponding Divisional units shall coordinate the same. All Occupational Health Safety and Community Health Safety requirements shall apply to the respective department.	OHS and CHS requirement shall be included in the work Order and shall be communicated to the concerned departments	PMU before awarding the contract.	PMU

- [22] As per Noise limits notified under EPA, 1986 and other provisions of Noise Rules, 2000: Noise rules for Domestic Appliances and Construction Equipment at the manufacturing stage.
- [23] https://parivesh.nic.in/publicdocument/UPLOAD_OM_NOTIFICATION/IA_DOCS/256042.pdf

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicator	Responsibility	
				Frequency	Supervision
Identification of water source for construction	Impact on ground and surface water resource	Groundwater will be the most preferred option for construction. In case of abstraction of ground water, permission from CGWB to be obtained and same should be submitted to environment specialist of PMU. The permit conditions shall be implemented and always maintained. Incase Water is procured form Third parties the permission for borewell shall also be maintained by Contractor. Quality of surface & ground water wrt parameters such as, pH, Temperature DO, BOD, COD, Oil & Grease, Total Suspended Solid, turbidity, Total Hardness, Chlorine, Iron, TSS, TDS, Total hardness, Iron, Sulphate, Nitrate, heavy metals, etc. will be monitored on regular basis	Permission from CGWB for abstraction of water Water quality as per IS 10500	Contractor Once before the start of construction activities On regular interval	PMTC and PMU
Setting up of Plant and Machinery (Batching Plants or concrete mixer location)	Potential source of pollution (air quality, water quality, soil)	Use of Ready-Mix Concrete will be encouraged by the contractor. In case the concrete is procured from a third party, a valid consent will be submitted to the PMU before the procurement of any material. In case a Batching plant is setup the necessary consents are required from BSPCB. The Wash Water from the Batching Plant shall be collected in settling tanks, and the supernatant shall be reused. No discharge including run off from the Batching Plant is allowed into the river.	In case of Batching Plant / Ready mix Concrete the CTO of the Plant shall be submitted to the PMU as part of the CEMP. For Standalone Mixing machine the Pollution under control certificate is required.	Contractor Once before functioning/operation of plant & machinery	Divisional Office of WRD, PMU and PMTC

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicator	Responsibility	
				Frequency	Supervision
		The waste from the Batching Plant shall be considered as part of the Waste Management Section of the CEMP. Stand-alone mixing machines are not allowed unless they meet the conform to Ministry of Road Transport and Highways stated above. Regular monitoring of air quality in line with National Ambient Air Quality Standards for the parameters such as, PM10, PM2.5, SO2, NOX and CO.			
Restriction in access to religious properties	Impact on religious properties	There are religious properties at the project site. During construction necessary measures to be taken to extend respect to the property.	Prior to inception of construction activity.	A. Contractor PMU, PMTC & Divisional Office	Social & Envt Specialist, PMU and PMTC/ Concern division of WRD
Legal compliance	Non-compliance may attract penalty issues; court stay order etc.	Obtain all consents, clearances (CTE/CTO from BSPCB), permits NOCs etc., before start of construction works. Ensure that all necessary approvals for construction to be obtained by contractor are in place before start of construction. In case of any legal noncompliance, resulting in financial penalties or specific remedial actions, the Contractor shall be responsible for getting the remedial actions executed and bear the financial burden of the same. The Half yearly Progress Report to update the information and provide assurance that the conditions are being met.	Copy of the Permit/ Consent to be submitted before the construction activities start.	Contractor Before the start of construction and to be maintained during the course of the contract/ activity, whichever is later.	Divisional Offices of WRD, PMTC and PMU
ESMP Implementation Training	Lack of awareness of ESMP can lead to irresponsible behavior resulting	Contractor's Project manager and all key workers will be required to undergo training on CESMP implementation, including pollution prevention, spoils management,	Certificate of Completion (Safeguards Compliance Orientation)	Contractor Induction/ Orientation Once before initiating construction activities	PMC and PMU

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicator	Responsibility	
				Frequency	Supervision
	in an Irreversible impact to the environment, workers, and community.	Standard operating procedures (SOP) for construction works; occupational health and safety (OH&S), core labour laws, applicable environmental laws etc. Additional modules for Dolphin Protection will be included. All new personnel joining the work need to undergo induction training on ESMP. All personnel joining work after a break of more than 15 days need to undergo refresher induction training. Based on the observation of the PMTC and the Client refresher training has to be carried out every year (July – August). Skill Based / Job based training to be carried out for personnel involved in special activities as per the instruction of PMTC.	Posting of EMP at worksites. Refresher training every year Skill Based training as request by PMTC/ Client	Refresher Training: As required Skill Based training: As and when required Maintaining Records of training, induction, refresher and skill-based training. Submission of the Training records to the PMTC every month	

B. Construction Stage

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicators	Responsibility	
				Frequency	Supervision
B. CONSTRUCTION PHASE					
Demolition of the Canal Lining	Impact on Land Use from C&D Waste	• The C&D waste (especially Broken Brick Lining) is a reusable resource. • The Excavated material should only be dumped / temporarily stored at the Site certified as “Fit for Dumping”. • The contractor should adopt efficient construction methods and re-use of construction material to minimize the waste to be generated from the construction works in the strengthening of the road adjoining the canal.	Reporting location of Disposal along with site photographs	Contractor	Divisional Office of WRD, PMU & PMTC

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicators	Responsibility	
				Frequency	Supervision
		• In the case of the Storage / temporary storing of the C&D debris the following precautions should be maintained: ○ The height of the dump at any location shall not exceed 3m ○ The 1:2 slopes of the dump should be maintained ○ Peripheral drains should be developed to top and bottom of dump to collect the water. Chute drains should be developed along the sides at regular intervals to collect the water. ○ The Contractor shall have necessary insurance cover to cover for such exigencies e.g. protection against property damage, liability for injuries, and other unforeseen events.			
Excavation of the Sediment/ Silt	Impact on Land Environment due to dumping of excavated material	The Excavated silt would be disposed on land with the following precautions: ○ The height of the dump at any location shall not exceed 3m ○ The 1:2 slopes of the dump should be maintained, and the slopes should be maintained ○ The slopes and top should be covered with vegetation e.g. local variety of grasses to prevent erosion. ○ Peripheral drains should be developed to top and bottom of dump to collect the water. Chute drains should be developed along the sides at regular intervals to collect the water.	Reporting location of Disposal along with site photographs	Contractor	Divisional Office of WRD, PMU & PMTC

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicators	Responsibility	
				Frequency	Supervision
Transport of Excavated Material, C&D Waste and Construction Material	Impact of Air due to exhaust from vehicles and fugitive emission	• All vehicles delivering fine materials to the site will be covered to avoid spillage of materials or being blown away during the transportation. Empty Vehicle also needs to be covered to prevent dust • Contractor will arrange for regular water sprinkling for dust suppression of all roads and surfaces. The records of sprinkling shall be maintained. • The unloading of materials at construction sites in/close to settlements will be done with proper barricade made by the contractor. • All stockpiles will be covered/protected to prevent dust generation • The contractor will take every precaution to reduce the level of dust construction sites involving earthwork by a sprinkling of water, encapsulation of dust source and by the erection of screens/barriers. • The contractor will provide necessary certificates to confirm that all Plants, equipment, machinery and vehicle used in construction conform to relevant dust emission control legislation. • The Contractor will submit PUC certificates for all vehicles/ equipment/machinery used for the project.	Covering of Vehicle transporting material Sprinkling records Records of the Dust pollution along the roads No. of Compliant received form the Public on dust. No. of observation by PMU/PIU / Project staff on Dust Cooking Fuel used Maintenance of Stockpile PUC of the Vehicle, equipment and machinery as per the MoRTH Standards for On-Road and Off-Road machinery Visual observation of dust and smoke	Contractor	Divisional Office of WRD & PMTC

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicators	Responsibility	
				Frequency	Supervision
Lining of the Canal a. Grading of sides b. Preparation of subgrade c. Ploughing of Existing Canal d. Lip cutting for Earthwork Excavation e. Laying of Sand Layer under Bed f. Laying of LDPE Film above the sand layer g. Under Drainage work	Impact of Air pollution from Plant and Machinery	• Location of DG sets and other emission generating equipment should be decided keeping in view the predominant wind direction so that emissions do not affect nearby residential areas. • Stack height of DG sets to be kept in accordance with CPCB norms, which prescribes the minimum height of stack to be provided with each generator set to be calculated using the following formula: H = h+0.2x √KVA H = Total height of stack in meter h = Height of the building in meters where the generator set is installed KVA = Total generator capacity of the set in KVA Obtain, CTE and CTO for batching plant, crushers and DG set etc. if specifically established for this project. If contractor procures any material (such as ready-mix concrete, asphalt/macadam, aggregates etc.), from third party agencies, contractor shall ensure that such agencies have all necessary clearances/permissions as required under the law; these include CTE/CTO from BSPCB, environmental clearance, etc.; contractor shall collect the copy of these certificates and submit to PIU; PIU will approve the source only after all the certificates are submitted;	DG stack height Monitoring of DG sets Maintenance of DG sets CTO/CTE for plant and machinery Maintenance of CTO conditions	Contractor	Divisional Office of WRD & PMTC

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicators	Responsibility	
				Frequency	Supervision
		Batching Plant /Concrete equipment should meet the emission standards of Conduct air quality monitoring according to the EMP.			
	Impact on Surface and Ground water form Wastewater/ Wash Water generated form Plant & Machinery	Pollution from Construction activities The wash water from the concrete mixer/ batching plant/ miller should only be disposed at a pit developed in construction camp.		Contractor	Divisional Office of WRD, PMU & PMTC
	Deterioration of the Noise quality and impact on sensitive receptors	• Staging of construction equipment and unnecessary idling of equipment within noise sensitive areas to be avoided whenever possible. • All plants and equipment used in construction (including third-party plants and equipment) must conform to the MoEF&CC/ CPCB noise standards. • DG sets should conform to the CPCB standards • All vehicles and equipment used in construction will be fitted with exhaust silencers. • Servicing of all construction vehicles and machinery will be done regularly and during routine servicing operations, the effectiveness of exhaust silencers will be checked, and if found defective will be replaced. • The activities must be carried out during the daytime. Night-time activities may be carried out in an	Adherence to measures suggested for : a. Plant and machinery b. Vehicle and equipment c. DG sets d. Sensitive Receptors Complaints from Community Results of the Noise Monitoring	Contractor	Divisional Office of WRD, PMTC

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicators	Responsibility	
				Frequency	Supervision
		emergency, but all measures mentioned in the mitigation measures for night work must be strictly adhered to. • Restriction on unnecessary honking at the project site • Barricading (Temporary noise barrier) around sensitive receptors adjacent to the construction site if construction works are carried for more than 7 days to minimize the noise level especially for sensitive receptors. Preferably no construction shall be carried out during the school hours. • The contractor needs to ensure compliance to the rules and adhere to the norms in "Silence Zone[24]" and "residential Zones[25]". This includes adhering to noise level standards and other regulations applicable to these areas. • Monitoring must be carried out at the construction sites as per the monitoring schedule, and results will be submitted to PMTC and PMU.			

- [24] These are areas designated for peace and quiet, such as hospitals, schools, and residential areas where heightened noise levels are detrimental to public health and well-being. Contractors need to be aware of these zones and take steps to minimize noise during construction and operations within them.
- [25] These are areas where housing is the primary land use, and noise pollution can disrupt residents' daily lives and negatively impact their health and quality of life. Contractors must comply with noise level regulations and other rules applicable to residential zones to ensure minimal disruption to residents.

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicators	Responsibility	
				Frequency	Supervision
	Community Health and Safety during the operation of machinery because of use of shared space	• It is suggested that work site be demarcated with barricading tapes outside settlement areas. Inside settlement areas the barricading should done by waterfilled New Jersy Barriers. •The Work zone safety signages shall be placed as per IRC: SP 55. •The Project Board shall be presented at the beginning /start of the package. The Project Board should provide the critical information about the project include the grievance mechanism. •The construction zone must be access controlled, and the workers must be provided valid identification cards to allow entry. •Retroreflective tapes shall be fitted on all sides of equipment •Reverse horns must be placed on all vehicle and equipment. In case of rotating equipment rotation alarm must also be fixed on the equipment. •If machineries are parked on / beside the canal road the area should be barricaded with water filled New Jersey barriers. Retroreflective tape must be fixed on the barrier for easy visibility. Solar LED blinkers shall be placed on the machinery for easy visibility.	Barricading inside the settlement and outside the settlements Safety Signages Reverse Horns and Alarms on vehicle, equipment and machinery Presence of Retro-reflective tape on Vehicle, Equipment etc	Contractor During all construction or civil works stage	Divisional Office of WRD, PMU PMTC
Operation of the Labour Camp/ Construction Yard	Impact on Air pollution form domestic sources	**Air Pollution from domestic sources in Construction Camp**	As per format provided in Bid Document.	Contractor	Divisional Office of WRD, PMU, PMTC

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicators	Responsibility	
				Frequency	Supervision
	Impact on water form domestic sources	•No burning of firewood is allowed in the construction camp. The Contractor must make provisions for LPG cylinders. • No burning of solid waste or plastic at the Camp site or project site. **Pollution from sewage disposal** •The Contractor will take all precautionary measures to prevent the wastewater generated during construction from entering river or any other nearby water bodies by passing waste water to sedimentation tank to be considered as part of the EM plan and Contractor's responsibility. •Stagnation of water should not be allowed at any place near the camp site as a precaution against vector-borne disease. •Provision of STP/septic tank should be provided at site/labour camp for onsite treatment of sewage. •No Solid waste should be discharged into any waterbody •Municipal solid waste generated at the camp should be managed as per the provisions in the law (Municipal Solid Waste management Rules 2016). •Mobile Bio-toilets should be provided at the worksite.			
Labour management including labour influx	Increased illicit behavior and crime, increased burden on local public services and	• Ensure labor camps are away from settlement areas; • Ensure that every worker working in the project has been given an orientation on the Worker's Code of Conduct, especially	Reporting against: Labour Management Procedures	Contractor with support of PIU and PMTC	PMU

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicators	Responsibility	
				Frequency	Supervision
	utilities, the spread of communicable diseases, and GBV/SEA/SH risks	on GBV and SEA, and has signed the code of conduct. • Maintain updated records of workers and their families living in the labor camps • Conduct periodic awareness programs targeted at women laborers and wives / partners / children of male laborers residing in the labor camps and women and children of communities residing close to the work sites for reporting incidents of GBV / SEA • Ensure complaints of GBV / SEA are recorded and addressed with urgency. Ensure that name(s) of complainant(s) are kept in confidence and enable anonymous reporting of complaints. • Activate GBV Grievance Redressal Committee immediately on receipt of any GBV / SEA complaint. Investigate complaint within 7 calendar days of receipt of complaint. Take action on recommendation of the GBV Grievance Redressal Committee within 24 hours of submission of the report	Labor related grievances GBV action plan		
Storage of Material	Impact on Drainage due blocking of drainage channels	The following mitigation measures should be implemented: •Prioritize re-use of excess spoils and materials in the construction works. C&D waste and excavated silt/ soil can be used for the strengthening or raising of canal road / Inspection Road embankment.	Fugitive measures Blockage of drainage Blockage of Access and encroachment to private property.	Contractor	Divisional Office of WRD, PMU, PMTC

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicators	Responsibility	
				Frequency	Supervision
		•The contractor will immediately collect any excess excavated soils for backfilling of borrow pits. •Spoils will be disposed, at site which has been identified as" Fit for Dumping" only after the completion of all mitigation measures suggested by the Environmental Specialist (PMU)/ Environmental Expert (PMTC). •Inspect all the drainage at construction site/construction camp/labor camp/ dumping site etc. and clear all the drainage lines so that no water stagnation/flooding may occur during heavy rainfall.			
Storage of Fuel and Waste Oil	Chances of Contamination of groundwater and surface water	**Water pollution from Fuel and Lubricant** •Contractor will ensure that all vehicle/machinery and equipment operation, maintenance and re-fuelling will be carried out in such a way that spillage of fuels and lubricants does not contaminate the ground. Only fuel pumps will be used for the transfer of fuel during re-fuelling. •Oil interceptors will be provided for vehicle parking, wash down and refueling areas as per the design provided. Hazardous waste, including waste oil, must obtain necessary permits, maintain records, and adhere to the provisions of the Hazardous Wastes (Management and Handling) Rules. These rules are established under the Environment Protection Act of 1986.	Construction of the Oil storage areas Upkeep and Maintenance of the Oil Storage areas Maintain records and returns as per the provisions of the Act.	Contractor	Divisional Office of WRD, PMU, PMTC

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicators	Responsibility	
				Frequency	Supervision
Safety of Workmen	Occupational Health and safety of workmen during the construction period	Please Refer Occupational Health and Safety Plan (including Hazard Risk Identification and Assessment) which is elaborated after ESMP Table.			
Protection of Agriculture Land near stud and Embankment	Impact on agricultural land	The contractor makes proper adequate mitigation measures like sprinkling of water and provision of dust screen guard around cultivated crop near stud and embankment. If impacted, adequate compensation as per entitlement matrix will be provided.	Prior to inception of construction activity.	Contractor PMU, PMTC & Divisional Office	Social Specialist PMU / Social Expert PMTC/ Concern division of WRD
Chance Find	Chance Find of archeological remains[26]	- Stop the construction activities in the area of the chance find; - Notify the Project Environmental Officer and Project Engineer / and the PMU who in turn will notify the responsible Archeological Survey of India / State Department/ Directorate of Archaeology immediately (within 24 hours or less); - Delineate the discovered site or area; - Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the Archeological Survey of India or the State Department/ Directorate of Archeology take over; - Construction work could resume only after permission is given from the responsible	Notification of the chance Find	Contractor	- Responsible ASI or the related State Department would oversee protecting and preserving the site before deciding on subsequent appropriate procedures. - Implementation Support for the ASI or the related State Department decision concerning the management of the finding shall be communicated in

- [26] The Ancient Monuments and Archaeological Sites And Remains Act, 1958 and the Antiquities And Art Treasures Act, 1972 provides a basis for the development of the Chance find procedures.

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicators	Responsibility	
				Frequency	Supervision
		Archeological Survey of India or the State Department/ Directorate of Archeology concerning safeguard of the heritage.			writing by relevant local authorities

Annexure 9: Format for ESMP (Flood control sub-projects)

This is generic ESMP developed based on the understanding of the activities which will be undertaken in case of Embankment Strengthening projects. The key activities which are envisaged are: Development and Strengthening of the Studs and Spars (Placing of the Jumbo Geobags and Gabions underwater); Earth Work and Blacktopping of the Embankment (Earthwork to raise Embankment height and Development of the road on the embankment). The ESMP deals with two phases of the project namely: A: Design and Pre-Construction Phase; B: Construction Phase

A. Design and Pre-Construction

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicator	Responsibility	
				Frequency	Supervision
A. **Design and Pre-Construction**					
Orientation of implementation agency and contractors	Lack of awareness of ESMP can lead to irresponsible behavior resulting in an Irreversible impact to the environment, workers, and community.	• Contractor's Project manager and all key workers will be required to undergo CESMP implementation, including pollution prevention, spoils management, Standard operating procedures (SOP) for construction works; occupational health and safety (OH&S), core labour laws, applicable environmental laws etc. Additional modules for Dolphin Protection will be included. • All new personnel joining the work need to undergo induction training on ESMP. • All personnel joining work after a break of more than 15 days need to undergo refresher induction training. • Based on the observation of the PMTC and the Client refresher training has to be carried out every year (July – August). • Skill Based / Job based training has to be carried out for personnel involved in	Certificate of Completion (Safeguards Compliance Orientation) Posting of EMP at worksites. Refresher training every year Skill Based training as request by PMTC/ Client	Contractor Induction/ Orientation Once before initiating construction activities Refresher Training: As required Skill Based training: As and when required	PMC and PMU

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicator	Responsibility	
				Frequency	Supervision
		special activities as per the instruction of PMTC/ Client. • Maintaining Records of training, induction, refresher and skill-based training. • Submission of the Training records to the PMTC every month			
Disclosure and Public Display of Information	Stakeholder engagement for ensuring inclusiveness	• The ESMP needs to be kept at project site and on the website of WRD. • Project information boards showing the name of work, project cost, duration, date of commencement, date of completion, executing agency and contact details (including telephone numbers) shall be displayed both sides of the road packages in both in English and Hindi. • Prior to construction activity, information dissemination will be undertaken by contractor at the project site. • GRM cell will be setup at the sites of construction camps and labour camps and stockyard site	ESMF/ESMP available to public Project Information Board Camp Information Board Grievance Boards on Site (Information boards containing Code of Conduct, SEA/SH plan, GBV plan in local languages, telephone numbers of Contractors)	PMU Contractor Contractor Contractor	PMU, PMTC PMU, PMTC PMU, PMTC
Finalization of Work Methodology	Occupational health, safety, and community health impact	• To manage Environmental & Social issues of the project prepare a **Contractor Environment Health Safety Management Plan** (C-ESMP) in line with the ESMP included in the ESIA. The CESMP should be proportionate and align with Work Methodology proposed; define Roles & Responsibilities,	CESMP	Contractor to submit CESMP, OHS, CHS, Traffic plan along with the construction methodology and Work Plan.	E&S Specialist PMU and WRD Officials / Environmental Expert and Social Expert of PMTC

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicator	Responsibility	
				Frequency	Supervision
		Resources available and monitoring & review mechanisms for E & S issues. • Prepare **Occupational Health and Safety Plan** (OHS Plan). OHS plan for construction work site safety will be prepared[27] • Conduct **Hazard Identification and Risk Assessment** (HIRA) for all tasks presented in the Method Statement[28] • **Community Health and Safety (CHS) Plan** will be prepared which includes a **Traffic management plan** for movement of equipment and materials as well as emergency and hauling of material during the construction period will be prepared by the contractor; Management of distance and safety to ensure that the community members are segregated from the work site. Safety standards will be applied during all phase of project activities. The personnel should be periodically undergoing medical check to identify anybody suffering from occupational health hazard.	OHS Plan (including HIRA) along with work methodology CHS Plan (including traffic safety) along with work methodology Method Statement only to be approved once the CESMP, OHS, CHS, Traffic plan is approved	The PMU/PMTC shall review this comprehensively (within one week), address any comments, and resubmit for approval.	
Resettlement	Residential and livelihood impact	If any habitants or occupants (squatters/encroachers) are to be displaced, they will be relocated with prior approval of the concerned agencies.	Entitlement matrix, Resettlement Action Plan	Local administration, District administration, District/ Divisional unit, PMU, PMTC	PMU / PMTC, Divisional Office of WRD NGO/Support organization

[27] See Occupational Safety, Health and Working Conditions Code, 2020 considering EHS General Guidelines https://www.ifc.org/content/dam/ifc/doc/2000/2007-general-ehs-guidelines-en.pdf

[28] Classify work/assessment units or work activities during construction phase (based on generic understanding of works to be carried out); Identify the hazards associated with work activities; List out the Consequence of the hazard involved in the activity; List out controls (preventive and recovery)

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicator	Responsibility	
				Frequency	Supervision
Compensation, rehabilitation & resettlement (R&R) provisions	Impact on local squatters/ encroachers	Documents will be verified and endorsed for the list of families eligible to get appropriate compensation and assistance as per entitlement matrix.	Prior to inception of construction activity.	Contractor, Divisional Office of WRD, PMU & PMTC	PMU & PMTC
Shifting of Utilities including Common Property	Disruption of Services	• Prior permission shall be taken from concerned department officials, for shifting of utility • Utility shifting shall be undertaken by concerned Department and the corresponding Divisional units shall coordinate the same. • All Occupational Health Safety and Community Health Safety requirements shall apply to the respective department.	OHS and CHS requirement shall be included in the work Order and shall be communicated to the concerned departments	PMU before awarding the contract.	PMU
Setting up of Office and Construction Camp, rest places /shed/ Labour Camp	Impact air pollution, noise and vibration	• In case workers accommodation (temporary/ permanent) are constructed by the Contractor it should conform to the World Bank Group Guidance on Labour Accommodation (Workers' accommodation: processes and standards (https://www.ifc.org/content/dam/ifc/doc/mgrt/workers-accomodation.pdf) and local laws which ever is stringent. • The Contractor needs to obtain CTE and CTO for setting of Camp. • No sites should be considered for stockpiling areas that may promote instability and result in damage of property, hindrance to access road,	Labour Accommodation Plan / Rest Areas Plan (as Applicable) submitted and approved Site Plan submitted and approved.	Contractor to submit along with the construction methodology and Work Plan	E&S Specialist PMU and WRD Officials / Environmental Expert and Social Expert of PMTC

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicator	Responsibility	
				Frequency	Supervision
		vegetation, nearby land (without written permission of the owner). • No spoils disposals or material shall flow into agricultural land adjoining the project areas. • No waste, debris/ scrap / unused machinery shall be stored outside the construction areas. • A labour accommodation/ rest area, a Labour accommodation / Rest Area Plan and Construction Yard Layout Plan must submitted along with the Work methodology. The PMU/PMTC shall review this comprehensively (within one week), address any comments, and resubmit for approval. The labour camp cannot be setup without the approval. If done on the contrary the Contractor has to carry out changes suggested by Client to bring the accommodation to satisfactory levels before the same can be used.			
Restriction in access to religious properties	Impact on religious properties	There are religious properties at the project site. During construction necessary measures to be taken to extend respect to the property.	Prior to inception of construction activity.	C. Contractor PMU, PMTC & Divisional Office	E&S Specialist at PMU and PMTC Concern division of WRD
Selection of Site for Disposal of excavated material, Camp, Storage of Material,	The works would be located in rural areas with rich agricultural land. Unplanned disposal or setting up of	The locations should be selected with following considerations: • Unproductive/wastelands/Chart land shall be selected.	Approval of the Dumping site by the E&S Specialist, PMU and E&S Officer PMTC.	Contractor before selection of site.	E&S Specialist PMU and WRD Officials / Environmental Expert and Social Expert of PMTC

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicator	Responsibility	
				Frequency	Supervision
Temporary parking	construction camp can impact the soil	• These should be away from residential areas and located at least 500 m downwind side of these locations, • These sites shall be finalized such that they do not lie within any designed forest or other eco-sensitive areas, do not affect natural drainage courses and no endangered/rare flora is impacted by such disposal. • The lowlands, natural depressions which are natural sinks will not be used for dumping as these are natural sinks. • Drainage channels shall not be used for dumping • Local Authorities such as Gram Panchayat members, Ward member should be consulted about the location of debris disposal sites before finalizing the locations. • Dumping sites should not contaminate water sources. • Dumping sites should have adequate capacity for the amount of debris generated			
Assessment of Impacts Due to Changes/ Additions/ Final Designs/ Work	Additional Impacts or work Methodology related impacts	In case of any event of changes/ revisions (including addition or deletion) in the project's scope of work or change in the site condition, the impacts as a result of the changes need to be assessed. Site-specific	The Site Specific EMP/ to be submitted along with the Method Statement	PMU	E&S Specialist PMU and WRD Officials / Environmental

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicator	Responsibility	
				Frequency	Supervision
Methodology in the Project		ESMP should be prepared and approved by the Bank before the commencement of construction. The Contractor will also prepare CESMP for additional impacts. The CESMP must be submitted to the PMU for approval. A comprehensive review of the CESMP will be carried out by PMU/PMTC within one week's time and the rectified document will be submitted for approval before construction.	Construction should not be carried out unless the EMP is approved.	Contractor, to be submitted along with the revised construction methodology and Work Plan	Expert and Social Expert of PMTC
Labour Requirements and labour influx	Increased illicit behavior and crime, increased burden on local public services and utilities, the spread of communicable diseases, and GBV/SEA/SH risks	• The contractor will use labour drawn from local communities preferably to avoid any additional stress on resources and communities. In case of non-availability of skilled labour locally, the contractor will bring them from outside the project area • All guidelines in the Labour Management Procedures for labour influx to be followed by the Contractor. • Ensure compliance with Labour laws - national and state • All labour licence, insurance, registrations and compliance with any statutory requirements to date must be complied with. • Screening of age based Aadhar Card. • Display Board (Wages, labour rights etc). • Contractor to maintain recruitment records and employment process of labourer • Job description and employment condition should be clearly	• Registers - gender segregated (muster roll) • Labor returns • Approvals • Display Boards • ID Cards • Availability of Model Code of Conduct signed by supervisors and sub-contractors • Availability of Gender specific facilities at labour camp & worksite	Contractor, throughout Construction & operational phase	Divisional Office of WRD and PMTC.

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicator	Responsibility	
				Frequency	Supervision
		communicated to the labourers by the contractor.			
Site clearance and site preparation	Loss of green cover, Impact on terrestrial ecology	No trees will be felled without the permission of the Forest Department. Provision of project design / bid document to align the Restoration and rehabilitation of all such locations occupied or used for construction purposes immediately after the given task(s) is over. No hunting/trapping/poaching of wildlife, migratory birds by workers shall be permitted while working or residing on-site. The Contractor should provide training to his staff with support from the PMU.	Site inspection through visual survey Code of Conduct to be signed by all workers Code of Conduct explained to all workers	Contractor	PMTC and PMU
Selection and Deployment of construction vehicles, equipment and machineries	Increase air pollution, noise and vibration	All Construction equipment[29] and machinery to be used in the project will conform to standards adopted by the Ministry of Road Transport and Highways. The emission and discharge standards promulgated under the Environment Protection Act, 1986, will be strictly adhered to. Noise limits for construction equipment to be procured, such as compactors, rollers, front loaders, concrete mixers, cranes (moveable), vibrators and saws, will not	Certification by Manufacturer of emission and noise levels/ Pollution under Control Certificates, Insurance and Driving License of the driver to be submitted for all vehicles The Contractor will submit a record of PUC	Contractor Once before deployment of all vehicles	PMU and PMTC

- [29] Every agricultural tractor, construction equipment vehicle and combine harvester shall be so manufactured that it complies with the following standards of gaseous pollutants as per rule 115A, after sub-rule (8), of the Central Motor Vehicle Rules, 1989.The Plant Machinery and Vehicle should be selected that they meet the existing emission requirement else they would be a source of pollution. The Ministry of Road Transport and Highways has notified that emission standard for construction equipment: [29]https://morth.nic.in/sites/default/files/notifications_document/GSR%20598%20%28E%29%20dated%2030%20September%202020%20Seperate%20emission%20norms%20for%20agriculture%20tractors%20and%20CEV.pdf

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicator	Responsibility	
				Frequency	Supervision
		exceed 75 dB(A)30, measured at one meter from the edge of the equipment in free field, as specified in the Environment (Protection) Rules, 1986.	for all vehicles and machinery to be mobilized in the project.		
Material sourcing	Unsustainable mining operation	Contractor will finalize the quarry for procurement of construction materials after assessment of the availability of sufficient materials and other logistic arrangements. They will submit a copy of EC/ CTE/ CTO along with the recent compliance report to the PMU before any such quarry is engaged. All consent and permits to remain valid at all times. Borrow area permission should be in line with the MoEFCC notification dated 02.08.2024 (S.O 3099)[31]	Permission for mining/ quarrying of materials from the Mining Department, District Administration and District Level Environment Appraisal Committee	Contractor Once before the start of construction activities	PMTC and PMU
Identification of water source for construction	Impact on ground and surface water resource	Groundwater will be the most preferred option for construction. In case of abstraction of ground water, permission from CGWB to be obtained and same should be submitted to environment specialist of PMU. The permit conditions shall be implemented and always maintained. Incase Water is procured form Third parties the permission for borewell shall also be maintained by Contractor. Quality of surface & ground water wrt parameters such as, pH, Temperature DO, BOD, COD, Oil & Grease, Total Suspended	Permission from CGWB for abstraction of water Water quality as per IS 10500	Contractor Once before the start of construction activities On regular interval	PMTC and PMU

- [30] As per Noise limits notified under EPA, 1986 and other provisions of Noise Rules, 2000: Noise rules for Domestic Appliances and Construction Equipment at the manufacturing stage.
- [31] https://parivesh.nic.in/publicdocument/UPLOAD_OM_NOTIFICATION/IA_DOCS/256042.pdf

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicator	Responsibility	
				Frequency	Supervision
		Solid, turbidity, Total Hardness, Chlorine, Iron, TSS, TDS, Total hardness, Iron, Sulphate, Nitrate, heavy metals, etc. will be monitored on regular basis			
Setting up of Plant and Machinery (Batching Plants or concrete mixer location)	Potential source of pollution (air quality, water quality, soil)	Use of Ready-Mix Concrete will be encouraged by the contractor. In case the concrete is procured from a third party, a valid consent will be submitted to the PMU before the procurement of any material. In case a Batching plant or Hot Mix Plant is setup the necessary consents are required from BSPCB. The Wash Water from the Batching Plant shall be collected in settling tanks, and the supernatant shall be reused. No discharge including run off from the Batching Plant is allowed into the river. The waste from the Batching Plant shall be considered as part of the Waste Management Section of the CEMP. Stand alone mixing machines are not allowed unless they meet the conform to Ministry of Road Transport and Highways stated above. Regular monitoring of air quality in line with National Ambient Air Quality Standards for the parameters such as, PM10, PM2.5, SO2, NOX and CO.	In case of Batching Plant / Ready mix Concrete the CTO of the Plant shall be submitted to the PMU as part of the CEMP. For Standalone Mixing machine the Pollution under control certificate is required.	Contractor Once before functioning/operation of plant & machinery	Divisional Office of WRD, PMU and PMTC
Legal compliance	Non-compliance may attract penalty	Obtain all consents, clearances (CTE/CTO from BSPCB), permits NOCs etc., before start of construction works.	Copy of the Permit/ Consent to be submitted	Contractor Before the start of construction and to be	Divisional Offices of WRD, PMTC and PMU

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicator	Responsibility	
				Frequency	Supervision
	issues; court stay order etc.	Ensure that all necessary approvals for construction to be obtained by contractor are in place before start of construction. In case of any legal noncompliance, resulting in financial penalties or specific remedial actions, the Contractor shall be responsible for getting the remedial actions executed and bear the financial burden of the same. The Half yearly Progress Report to update the information and provide assurance that the conditions are being met.	before the construction activities start.	maintained during the course of the contract/ activity, whichever is later.	
ESMP Implementation Training	Lack of awareness of ESMP can lead to irresponsible behaviour resulting in an Irreversible impact to the environment, workers, and community.	Contractor's Project manager and all key workers will be required to undergo training for CESMP implementation, including pollution prevention, spoils management, Standard operating procedures (SOP) for construction works; occupational health and safety (OH&S), core labour laws, applicable environmental laws etc. Additional modules for Dolphin Protection will be included. All new personnel joining the work need to undergo induction training on ESMP. All personnel joining work after a break of more than 15 days need to undergo refresher induction training. Based on the observation of the PMTC and the Client refresher training has to be carried out every year (July – August). Skill Based / Job based training has to be carried out for personnel involved in special activities as per the instruction of PMTC/ Client.	Certificate of Completion (Safeguards Compliance Orientation) Posting of EMP at worksites. Refresher training every year Skill Based training as request by PMTC/ Client	Contractor Induction/ Orientation Once before initiating construction activities Refresher Training: As required Skill Based training: As and when required	PMTC and PMU

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicator	Responsibility	
				Frequency	Supervision
		Maintaining Records of training, induction, refresher and skill-based training. Submission of the Training records to the PMTC every month			

B. Construction Stage

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicators	Responsibility	
				Frequency	Supervisions
CONSTRUCTION PHASE					
Excavation of the Sediment/ Silt from the river (if needed)	Impact on Land Environment due to dumping of excavated material	The Excavated silt would be disposed on land with the following precautions: ○ The height of the dump at any location shall not exceed 3m ○ The 1:2 slopes of the dump should be maintained, and the slopes should be maintained ○ The slopes and top should be covered with vegetation e.g. local variety of grasses to prevent erosion. ○ Peripheral drains should be developed to top and bottom of dump to collect the water. Chute drains should be developed along the sides at regular intervals to collect the water.	Reporting location of Disposal along with site photographs	Contractor	Divisional Office of WRD, PMU & PMTC
Transport of Excavated Material, C&D Waste and	Impact of Air due to exhaust from vehicles and fugitive emission	• All vehicles delivering fine materials to the site will be covered to avoid spillage of materials or being blown away during the transportation. Empty	Covering of Vehicle transporting material Sprinkling records	Contractor	Divisional Office of WRD & PMTC

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicators	Responsibility	
				Frequency	Supervisions
Construction Material		Vehicle also needs to be covered to prevent dust • Contractor will arrange for regular water sprinkling for dust suppression of all roads and surfaces. The records of sprinkling shall be maintained. • The unloading of materials at construction sites in/close to settlements will be done with proper barricade made by the contractor. • All stockpiles will be covered/protected to prevent dust generation • The contractor will take every precaution to reduce the level of dust construction sites involving earthwork by a sprinkling of water, encapsulation of dust source and by the erection of screens/barriers. • The contractor will provide necessary certificates to confirm that all Plants, equipment, machinery and vehicle used in construction conform to relevant dust emission control legislation. • The Contractor will submit PUC certificates for all vehicles/ equipment/machinery used for the project. ○ The Contractor shall have necessary insurance cover to cover for such exigencies e.g. protection against property damage, liability for injuries, and other unforeseen events.	Records of the Dust pollution along the roads No. of Compliant received form the Public on dust. No. of observation by PMU/PIU / Project staff on Dust Cooking Fuel used Maintenance of Stockpile PUC of the Vehicle, equipment and machinery as per the MoRTH Standards for On-Road and Off-Road machinery Visual observation of dust and smoke		

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicators	Responsibility	
				Frequency	Supervisions
Protection of Embankment (ESML, Bagmati etc) a. Grading of sides b. Preparation of subgrade c. Lip cutting for Earthwork Excavation d. Laying of Sand Layer under Bed e. Laying of LDPE Film above the sand layer f. Under Drainage work	Impact of Air pollution from Plant and Machinery	•Location of DG sets and other emission generating equipment should be decided keeping in view the predominant wind direction so that emissions do not affect nearby residential areas. •Stack height of DG sets to be kept in accordance with CPCB norms, which prescribes the minimum height of stack to be provided with each generator set to be calculated using the following formula: H = h+0.2x √KVA H = Total height of stack in meter h = Height of the building in meters where the generator set is installed KVA = Total generator capacity of the set in KVA •Obtain, CTE and CTO for batching plant, crushers and DG set etc. if specifically established for this project. •If contractor procures any material (such as ready-mix concrete, asphalt/macadam, aggregates etc.), from third party agencies, contractor shall ensure that such agencies have all necessary clearances/permissions as required under the law; these include CTE/CTO from BSPCB, environmental clearance, etc.; contractor shall collect the copy of these certificates and submit to PIU; PIU will approve the source only after all the certificates are submitted; and` •Conduct air quality monitoring according to the EMP.	DG stack height Monitoring of DG sets Maintenance of DG sets CTO/CTE for plant and machinery Maintenance of CTO conditions	Contractor	Divisional Office of WRD & PMTC

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicators	Responsibility	
				Frequency	Supervisions
	Impact on Surface and Ground water form Wastewater/ Wash Water generated form Plant and Machinery	**Pollution from Construction activities**The wash water from the concrete mixer/ batching plant/ miller should only be disposed at a pit developed in construction camp.		Contractor	Divisional Office of WRD, PMU & PMTC
	Deterioration of the Noise quality and impact on sensitive receptors	• Staging of construction equipment and unnecessary idling of equipment within noise sensitive areas to be avoided whenever possible. • All plants and equipment used in construction (including third-party plants and equipment) must conform to the MoEF&CC/ CPCB noise standards. • DG sets should conform to the CPCB standards • All vehicles and equipment used in construction will be fitted with exhaust silencers. • Servicing of all construction vehicles and machinery will be done regularly and during routine servicing operations, the effectiveness of exhaust silencers will be checked, and if found defective will be replaced. • The activities must be carried out during the daytime. Night-time activities may be carried out in an emergency, but all measures mentioned in the mitigation measures	Adherence to measures suggested for : e. Plant and machinery f. Vehicle and equipment g. DG sets h. Sensitive Receptors Complaints from Community Results of the Noise Monitoring	Contractor	Divisional Office of WRD, PMTC

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicators	Responsibility	
				Frequency	Supervisions
		for night work must be strictly adhered to. • Restriction on unnecessary honking at the project site • Barricading (Temporary noise barrier) around sensitive receptors adjacent to the construction site if construction works are carried for more than 7 days to minimize the noise level especially for sensitive receptors. Preferably no construction shall be carried out during the school hours. • The contractor needs to ensure compliance to the rules and adhere to the norms in "Silence Zone[32]" and "residential Zones[33]". This includes adhering to noise level standards and other regulations applicable to these areas. • Monitoring must be carried out at the construction sites as per the monitoring schedule, and results will be submitted to PMTC and PMU.			
	Community Health and Safety during the operation of machinery because	• It is suggested that work site be demarcated with barricading tapes outside settlement areas. Inside settlement areas	Barricading inside the settlement and outside the settlements	Contractor	Divisional Office of WRD, PMU PMTC

[32] These are areas designated for peace and quiet, such as hospitals, schools, and residential areas where heightened noise levels are detrimental to public health and well-being. Contractors need to be aware of these zones and take steps to minimize noise during construction and operations within them.

[33] These are areas where housing is the primary land use, and noise pollution can disrupt residents' daily lives and negatively impact their health and quality of life. Contractors must comply with noise level regulations and other rules applicable to residential zones to ensure minimal disruption to residents.

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicators	Responsibility	
				Frequency	Supervisions
	of use of shared space	the barricading should done by waterfilled New Jersy Barriers. •The Work zone safety signages shall be placed as per IRC: SP 55. •The Project Board shall be presented at the beginning /start of the package. The Project Board should provide the critical information about the project include the grievance mechanism. •The construction zone must be access controlled, and the workers must be provided valid identification cards to allow entry. •Retroreflective tapes shall be fitted on all sides of equipment •Reverse horns must be placed on all vehicle and equipment. In case of rotating equipment rotation alarm must also be fixed on the equipment. •If machineries are parked on / beside the canal road the area should be barricaded with water filled New Jersey barriers. Retroreflective tape must be fixed on the barrier for easy visibility. Solar LED blinkers shall be placed on the machinery for easy visibility.	Safety Signages Reverse Horns and Alarms on vehicle, equipment and machinery Presence of Retro-reflective tape on Vehicle, Equipment etc		
Operation of the Labour Camp/ Construction Yard	Impact on Air pollution form domestic sources Impact on water form domestic sources	**Air Pollution from domestic sources in Construction Camp** •No burning of firewood is allowed in the construction camp. The Contractor must make provisions for LPG cylinders. • No burning of solid waste or plastic at the Camp site or project site.		Contractor	Divisional Office of WRD, PMU, PMTC

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicators	Responsibility	
				Frequency	Supervisions
		Pollution from sewage disposal •The Contractor will take all precautionary measures to prevent the wastewater generated during construction from entering river or any other nearby water bodies by passing waste water to sedimentation tank to be considered as part of the EM plan and Contractor's responsibility. •Stagnation of water should not be allowed at any place near the camp site as a precaution against vector-borne disease. •Provision of STP/septic tank should be provided at site/labour camp for onsite treatment of sewage. •No Solid waste should be discharged into any waterbody •Municipal solid waste generated at the camp should be managed as per the provisions in the law (Municipal Solid Waste management Rules 2016). •Mobile Bio-toilets should be provided at the worksite.			
Labour influx	GBV risks due to labor influx	• Ensure labor camps are away from settlement areas; • Ensure that every worker working in the project has been given an orientation on the Worker's Code of Conduct, especially on GBV and SEA, and has signed the code of conduct. • Maintain updated records of workers and their families living in the labor camps	LMP, GRM	Contractor, PIU, PMTC	PMU

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicators	Responsibility	
				Frequency	Supervisions
		• Conduct periodic awareness programs targeted at women laborers and wives / partners / children of male laborers residing in the labor camps and women and children of communities residing close to the work sites for reporting incidents of GBV / SEA • Ensure complaints of GBV / SEA are recorded and addressed with urgency. Ensure that name(s) of complainant(s) are kept in confidence and enable anonymous reporting of complaints. • Activate GBV Grievance Redressal Committee immediately on receipt of any GBV / SEA complaint. Investigate complaint within 7 calendar days of receipt of complaint. Take action on recommendation of the GBV Grievance Redressal Committee within 24 hours of submission of the report			
Storage of Material	Impact on Drainage due blocking of drainage channels	The following mitigation measures should be implemented: •Prioritize re-use of excess spoils and materials in the construction works. C&D waste and excavated silt/ soil can be used for the strengthening or raising of canal road / Inspection Road embankment. •The contractor will immediately collect any excess excavated soils for backfilling of borrow pits. •Spoils will be disposed, at site which has been identified as" Fit for Dumping" only after the completion of all mitigation	Fugitive measures Blockage of drainage Blockage of Access and encroachment to private property.	Contractor	Divisional Office of WRD, PMU, PMTC

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicators	Responsibility	
				Frequency	Supervisions
		measures suggested by the Environmental Specialist (PMU)/ Environmental Expert (PMTC). •Inspect all the drainage at construction site/construction camp/labor camp/ dumping site etc. and clear all the drainage lines so that no water stagnation/flooding may occur during heavy rainfall.			
Storage of Fuel and Waste Oil	Chances of Contamination of groundwater and surface water	**Water pollution from Fuel and Lubricant** •Contractor will ensure that all vehicle/machinery and equipment operation, maintenance and refuelling will be carried out in such a way that spillage of fuels and lubricants does not contaminate the ground. Only fuel pumps will be used for the transfer of fuel during re-fuelling. •Oil interceptors will be provided for vehicle parking, wash down and refueling areas as per the design provided. Hazardous waste, including waste oil, must obtain necessary permits, maintain records, and adhere to the provisions of the Hazardous Wastes (Management and Handling) Rules. These rules are established under the Environment Protection Act of 1986.	Construction of the Oil storage areas Upkeep and Maintenance of the Oil Storage areas Maintain records and returns as per the provisions of the Act.	Contractor	Divisional Office of WRD, PMU, PMTC
Safety of Workmen	Occupational Health and safety of workmen during the construction period	Please Refer Occupational Health and Safety Plan (including Hazard Risk Identification and Assessment) which is elaborated after ESMP Table.			

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicators	Responsibility	
				Frequency	Supervisions
Protection of Agriculture Land near stud and Embankment	Impact on agricultural land	A. The contractor makes proper adequate mitigation measures like sprinkling of water and provision of dust screen guard around cultivated crop near stud and embankment. B. If impacted, adequate compensation as per entitlement matrix will be provided.	Prior to inception of construction activity.	A. Contractor B. PMU, PMTC & Divisional Office	Social Specialist PMU / Social Expert PMTC/ Concern division of WRD
Chance Find	Chance Find of archeological remains[34]	- Stop the construction activities in the area of the chance find; - Notify the Project Environmental Officer and Project Engineer / and the PMU who in turn will notify the responsible Archeological Survey of India / State Department/ Directorate of Archaeology immediately (within 24 hours or less); - Delineate the discovered site or area; - Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the Archeological Survey of India or the State Department/ Directorate of Archeology take over; - Construction work could resume only after permission is given from the responsible	Notification of the chance Find	Contractor	- Responsible ASI or the related State Department would oversee protecting and preserving the site before deciding on subsequent appropriate procedures. - Implementation Support for the ASI or the related State Department decision concerning the management of the finding shall be communicated in writing by relevant local authorities

- [34] The Ancient Monuments and Archaeological Sites And Remains Act, 1958 and the Antiquities And Art Treasures Act, 1972 provides a basis for the development of the Chance find procedures.

Activities	Potential Impacts	Mitigation Measures	Monitoring Indicators	Responsibility	
				Frequency	Supervisions
		Archeological Survey of India or the State Department/ Directorate of Archeology concerning safeguard of the heritage.			

Annexure 10: Summary of Stakeholder Consultation on Draft ESMF for Bihar Water Security and Irrigation Modernization Project (BWSIMP)

Summary of Stakeholder Consultation on Draft ESMF for Bihar Water Security and Irrigation Modernization Project (BWSIMP)

The Water Resources Department (WRD), Government of Bihar, in collaboration with the World Bank, has prepared a Draft Environmental and Social Management Framework (ESMF) for the proposed Bihar Water Security and Irrigation Modernization Project (BWSIMP). The framework outlines strategies to manage risks, mitigate impacts, and optimize project benefits. To seek feedback, a stakeholder consultation was organized on **31st July 2025** in hybrid mode at Ashoka Hall, Maurya Hotel, Patna, involving project beneficiaries, project affected people, community leaders, CBOs / NGOs, women's groups, and government officials. Total number of participants in the consultation was 118 (Male-98 & Female-20). Details of participants attached in Annexure 11.
The presentations focused on the project's rationale, scope, benefits, and potential impacts. Queries from participants were addressed, and proceedings were documented.
Key Highlights of Discussions:

- **Principal Secretary, WRD** (Sri Santosh Kumar Mall)**:** Stressed the need to strengthen irrigation and flood management, improve water governance, and ensure active participation of Water User Associations.
- **Engineer-in-Chief** (Sri Sharad Kumar)**:** Described that the ₹4,415 crore BWSIMP project (70% World Bank funded) will focus on irrigation modernization, flood protection, climate-resilient agriculture, and creation of a Hydrological & Agricultural Information Center.
- Joint Director, FMISC (Smt. Amita Singh): Highlighted the significance of safeguarding environmental and social aspects, noting that ESMF ensures sustainability across the project lifecycle.
- World Bank Specialist (Mrs. Swati Dogra): Provided an overview of the Bank's Environmental and Social Framework (ESF) and its 10 Environmental and Social Standards (ESS), explaining how these guide risk management.
- Project Management Advisor (Mr. Sunil Kumar Singh): Shared insights on differences in planning approaches of World Bank and State funded projects. He distinguished that World Bank emphasizes outcome-focused, multi-departmental execution, while state projects are often department-specific.
- Environmental Safeguard Specialist (Mr. Raj Verma): Explained ESMF's methodology, baseline data collection, and site-specific Environmental & Social Impact Assessments (ESIAs). He detailed mitigation tools such as Contractor's ESMP, Occupational Health & Safety Plans, and Community Health & Safety Plans, with strong monitoring provisions.
- Social Development Expert (Ms. Debalina Ray Chaudhuri): Described social risk management measures under the ESMF, including Resettlement Policy Framework – Resettlement Action Plan, Stakeholder Engagement Plan, Labour Management Procedures, GBV Action Plan, and Grievance Redressal Mechanism. She highlighted that inclusive participation and capacity building are core to the framework.

Stakeholder Queries and Clarifications:

Stakeholder Queries covered sensitive issues such as managing religious sites, impacts of canal lining on groundwater, role of Agriculture and Rural Developments, construction-related impacts such as dust/noise/safety, cattle safety during excavation, scope of intervention of Drought prone area and inclusion of women and farmers.

Clarifications emphasized on the following aspects.

- **Religious Sites**: Avoidance is prioritized; if relocation is necessary, it will be managed with community consultation.
- **Canal Lining and Groundwater:** While seepage reduces, canal water availability increases, reducing groundwater dependence overall.
- **Role of Departments:** Agriculture Department will focus on climate-resilient agriculture and WUA mobilization, while the Rural Development Department will handle on-farm development.
- **Construction Impacts:** Dust, noise, and safety issues will be managed through ESMP measures, equipment standards, and monitoring.
- **Cattle Safety:** Barricading and Community Health & Safety Plans will prevent accidents.
- **Drought and Livelihoods:** Though not directly targeting drought areas, the project will support forecasting, stakeholder micro-engagement, and women's inclusion in livelihood activities.

The consultation concluded with general consensus on the importance of ESMF in guiding BWSIMP's effective, inclusive, and sustainable implementation.

Annexure 11: List of Participants & Photographs in Stakeholder Consultation on Draft ESMF held on 31st July 2025

S. No.	Name	Designation	Gender
1.	Mr. Santosh Kumar Mall, IAS	Principal Secretary W.R.D. Bihar	Male
2.	Mr. Yash Pal Meena, IAS	Additional Secretary, WRR, Bihar, Patna	Male
3.	Mr. Kumar Devendra Projjwal	Additional Secretary, WRR, Bihar, Patna	Male
4.	Mr. Sharad Kumar	EIC Headquarter, WRD	Male
5.	Mr. Brajesh Mohan	Chief Engineer,P&M,WRD	Male
6.	Mr. I.C Thakur	Advisor,WRD	Male
7.	Mr. Manoj Raman	Advisor,WRD	Male
8.	Mr. Sunil Kumar Singh	Project Management Advisor,BWSIMP	Male
9.	Ms. Amita Singh	Joint Director,WRD	Female
10.	Mr. Ajay Kumar Singh	Chief Engineer, Dehri, WRD	Male
11.	Mr. Raj Verma	Env. Safeguard Specialist, Individual Consultant, BWSIMP	Male
12.	Ms. Debalina Ray Chaudhary	SDME, Individual Consultant, BWSIMP	Female
13.	Mohammad Zakaullah	Hydrology Directorate,Patna,WRD	Male
14.	Mr. Nawal Kishor Bharti	Chief Engineer, FCD, Samastipur , WRD	Male
15.	Mr. Shams Parwez	Chief Engineer,Darbhanga,WRD	Male
16.	Mr. Shambhu Kumar	SE, Jhanjharpur, WRD	Male
17.	Mr. Asif Iqbal	Executive Engineer, Dehri, WRD	Male
18.	Mr. Krishna Rajak	Assistant Engineer, WRD	Male
19.	Mr. Abhay Kumar Chaudhary	Executive Engineer,PP cell Div-2, WRD	Male
20.	Mr. Sheo Bachan Kumar	Executive Engineer, PP cell Div-1, WRD	Male
21.	Ms. Swati Dogra	Social Development Specialist,World Bank	Male
22.	Mr. Narotam Thakur	Executive Engineer,WRD	Male
23.	Mr. Alok Kumar	Chief Engineer,FCD,Patna,WRD	Male
24.	Mr. A.K. Sinha	S.E,PM-4,WRD	Male
25.	Mr. Purendra Kumar	S.E ,WRD	Male

S. No.	Name	Designation	Gender
26.	Mr. Aviijit Ghosh	Senior Environmental Specialist, World Bank	Male
27.	Mr. Vinod Kumar	Executive Engineer,Indrapuri,WRD	Male
28.	Mr. Ram Pravesh Singh	BRDS	Male
29.	Mr. Subodh Kumar Sunhala	S.E,Dehri,WRD	Male
30.	Mr. Om Prakash	WRD	Male
31.	Mr. Ashok Kumar	WRD	Male
32.	Md Asif Eqbal	E.E,WRD	Male
33.	Mr. Manoj Chauhan	FMISC,WRD	Male
34.	Dr. S.P Singh	PMTC,Consultant	Male
35.	Ms. Deep Lakshmi	Assistant Director,MMC	Female
36.	Ms. Sneha Sinha	Assistant Director,Agriculture Department	Female
37.	Mr. Rakesh Kumar	Junior Engineer,Dehri,WRD	Male
38.	Mr. Abrar Arshad	S.E,FCD,Darbhanga,WRD	Male
39.	Mr. Deepak Singh	World Bank	Male
40.	Dr. Sujeet Singh	PMTC,Consultant	Male
41.	MD. Zilani	Executive Engineer,FCD,Darbhanga	Male
42.	Ms. Swati Sagar	Assistant Director, Agriculture Department	Male
43.	Mr. Amrendra Kumar	S.E,WRD	Male
44.	Mr. Satya Priya	Team Leader, World Bank	Female
45.	Mr. Yogendra Pandit	Executive Engineer,Hydrology Div-1,WRD	Male
46.	Mr. Bhupendra Prasad	S.E Madhubani,WRD	Male
47.	Mr. Subhash Chandra Bhatt	S.E Flying Squade,WRD	Male
48.	Ms. Aaisha	Social Media Manager,WRD	Female
49.	Ms. Sahana Nashim	Integrator Pradan, Patna	Female
50.	Mr. Jawed Ali	SPO, BRDS,RDD	Male
51.	Mr. Prashant Kumar	S.E,PMC-2,WRD	Male

S. No.	Name	Designation	Gender
52.	Mr. Kumud Ranjan	Joint Secretary Management,WRD	Male
53.	Mr. Kumar Anand V Pushan	Executive Engineer R & T Div-1 Khagaul,WRD	Male
54.	Ms. Seema Kumari	Director Walmi,WRD	Female
55.	Ms. Vibha Rani	Executive Engineer,WRD	Female
56.	Ms. Akansha Kumari	Assistant Director,WRD	Female
57.	Ms. Ankita Singh	Assistant Director,WRD	Female
58.	Mr. Abhishek Ranjan	Assistant Director,WRD	Male
59.	Mr. Rajat Prakash Singh	Assistant Director,WRD	Male
60.	Ms. Renu Rani	Executive Engineer,WRD	Female
61.	Mr. Dhiraj Kumar	Assistant Director,WRD	Male
62.	Mr. Manish Kumar	Executive Engineer,WRD	Male
63.	Ms. Ranjita Kumari	Executive Engineer,WRD	Female
64.	Mr. Somesh Kumar	Data Entry Operator,WRD	Male
65.	Mr. Binod Kumar Vimal	Junior Engineer,WRD	Male
66.	Mr. Akhlesh Kumar	Junior Engineer,WRD	Male
67.	Ms. Pallavi Priya	Data Entry Operator,WRD	Female
68.	Mr. Dharmendra Kumar	Data Entry Operator,WRD	Male
69.	Mr. Sanjay Kumar	FMISC,WRD	Male
70.	Ms. Puja Kumari	Assistant Director,WRD	Female
71.	Mr. Navin Kumar	S.E Jaynagar,WRD	Male
72.	Mr. Naseeb Naz Akhtar	Irrigation Div Dehri,WRD	Male
73.	Mr. Vikash Singh	Media, WRD	Male
74.	Mr. Sudhendu Raman	Social media, WRD	Male
75.	Mr. Ajay Kumar	Joint Secretary, WRD	Male
76.	Mr. Shashi Ranjan Kumar	BRDS,RDD	Male
77.	Mr. Ravi Kumar	WRD	Male

S. No.	Name	Designation	Gender
78.	Mr. Amit Kumar	Executive Engineer, Khutauna, WRD	Male
79.	Mr. Maheshhwar Baitha	Data Entry Operator, WRD	Male
80.	Mr. Manoj Kumar	S.E Mon-1, WRD	Male
81.	Ms. Pratima Kumari	Assistant Director, WRD	Female
82.	Mr. G.K Gunjan	Director DPT, WRD	Male
83.	Mr. Sunil Kumar	S.E,BRDS,RDD	Male
84.	Mr. Alok Kumar	JS (Eng), WRD	Male
85.	Mr. Utkarsh Sharma	Under Secretary, WRD	Male
86.	Mr. Mayank Raj	RDD (BRDS)	Male
87.	Mr. Firoz Ahmad Azad	Reader Environment, WRD	Male
88.	Mr. Ranjit Kumar	WRD	Male
89.	Mr. Rakesh Kumar	WRD	Male
90.	Mr. Sanjeet Kumar	WRD	Male
91.	Mr. Sanjeet Kumar	WRD	Male
92.	Mr. Jitendra Kumar	WRD	Male
93.	Mr. Mehmood Alam	Chief Engineer,WRD	Male
94.	Mr. Rajeev Ranjan Kumar	PMTC,Consultant	Male
95.	Ms. Mauli shri	DD, SDSO,WRD	Female
96.	Ms. Pratibha Kumari	DD, SDSO,WRD	Female
97.	Mr. Abhishek Kumar	Assistant Director,WRD	Male
98.	Mr. Gaurav Veer	Assistant Director,WRD	Male
99.	Mr. Amit Kumar Singh	Assistant Director,WRD	Male
100.	Mr. Dheeraj Kumar Singh	WRD	Male
101.	Mr. Indrajeet Singh	Executive Engineer,WRD	Male
102.	Mr. Raj Kumar Mishra	Data Entry Operator,WRD	Male
103.	Mr. Kumar Mukesh Ranjan	WRD	Male

S. No.	Name	Designation	Gender
104.	Ms. Bindiya Gupta	Executive Engineer,WRD	Female
105.	Ms. Niharika Swaraj	S.E, WRD	Female
106.	Mr. Kunal Kumar	Executive Engineer,WRD	Male
107.	Mr. Vivek Mishra	Assistant Engineer,WRD	Male
108.	Mr. Ravi Prakash	Executive Engineer,WRD	Male
109.	Mr. Ajay Kumar	Director,WRD	Male
110.	Mr. Prem Kumar	WRD	Male
111.	Mr. Piyush Kumar	WRD	Male
112.	Mr. Simanshu	WRD	Male
113.	Mr. Sandeep Kumar	WRD	Male
114.	Mr. Anil Kumar	WRD	Male
115.	Mr. Vinay Kumar Gupta	WRD	Male
116.	Mr. Sanjay Kumar Singh	WRD	Male
117.	Mr. Dhanera Vishwakaram	WRD	Male
118.	Mr. Sudeep Kumar Mukerjee	WRD	Male

Photographs of Stakeholder Consultation on Draft ESMF