

# **DAM REHABILITATION AND IMPROVEMENT PROJECT (DRIP)**

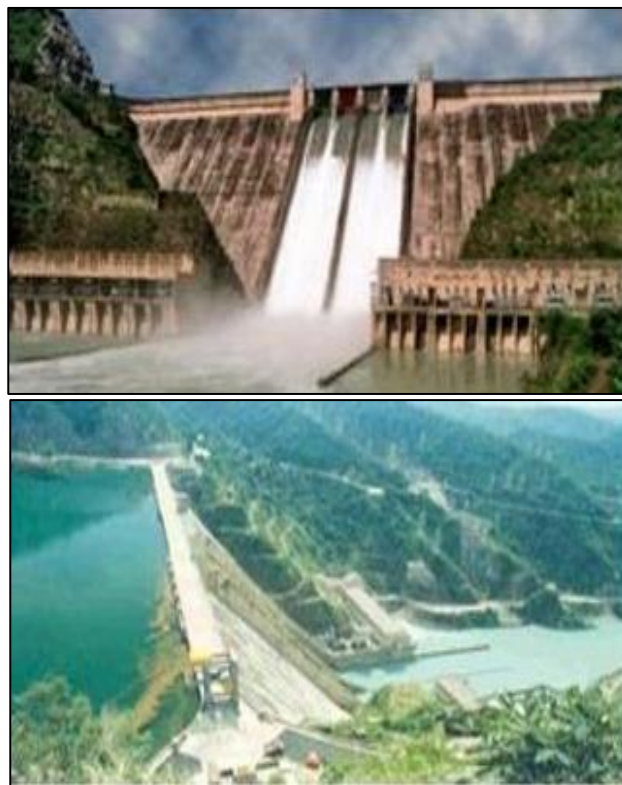
## **Phase II and Phase III**

(Funded by World Bank)

### **BHAKRA DAM**

## **ENVIRONMENT AND SOCIAL DUE DILIGENCE REPORT**

**(PIC: HP27VH0001)**



**AUGUST 2020**

---

**Office of Chief Engineer, Bhakra Dam  
BHAKRA BEAS MANAGEMENT BOARD**

Nangal-140124 Tel: 01887-223001, e-mail: [cebhd@bbmb.nic.in](mailto:cebhd@bbmb.nic.in)

# CONTENTS

---

	<b>Page No.</b>
<b>Executive Summary</b>	1
<b>CHAPTER 1: INTRODUCTION</b>	
1.1 PROJECT OVERVIEW	1
1.2 SUB-PROJECT DESCRIPTION – BHAKRA DAM PROJECT	2
1.3 IMPLEMENTATION ARRANGEMENT AND SCHEDULE	9
1.4 PURPOSE OF ESDD	10
1.5 APPROACH AND METHODOLOGY OF ESDD	10
<b>CHAPTER 2: INSTITUTIONAL FRAMEWORK AND CAPACITY ASSESSMENT</b>	
2.1 POLICY AND LEGAL FRAMEWORK	12
2.2 DESCRIPTION OF INSTITUTIONAL FRAMEWORK	12
<b>CHAPTER 3: ASSESSMENT OF ENVIRONMENTAL AND SOCIAL CONDITIONS</b>	
3.1 PHYSICAL ENVIRONMENT	16
3.2 PROTECTED AREA	18
3.3 SOCIAL ENVIRONMENT	18
3.4 CULTURAL ENVIRONMENT	19
<b>CHAPTER 4: ACTIVITY WISE ENVIRONMENT &amp; SOCIAL SCREENING, RISK AND IMPACTS IDENTIFICATION</b>	
4.1 SUB-PROJECT SCREENING	20
4.2 STAKEHOLDER CONSULTATION	23
4.3 DESCRIPTIVE SUMMARY OF RISKS AND IMPACTS FROM ACTIVITIES BASED ON SCREENING	28
<b>CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS</b>	
5.1 CONCLUSIONS	30
5.1.1 Risk Classification	30
5.1.2 National Legislation and WB ESS Applicability Screening	30
5.2 RECOMMENDATIONS	31
5.2.1 Mitigation and Management of Risks and Impacts	31
5.2.2 Institutional Management, Monitoring and Reporting	32

## **List of Tables**

---

Table 4.1: Summary of Identified Risks/Impacts in Form SF-3	22
Table 5.1: WB ESF Standards applicable to the sub-project	30
Table 5.2: List of Mitigation Plans with responsibility and timelines	31

## **List of Figures**

---

Figure 1.1: Selected Photographs of Improvement/Intervention area	7
Figure 1.2: Project Area showing major intervention locations	8
Figure 3.1: Land Use and Land Cover Map of 5 km radius around Dam site	16

## **List of Annexures**

---

Annexure I: Form SF1	33
Annexure II: Form SF2	35
Annexure III: List of Participants in Stakeholder Consultation	38

## ABBREVIATIONS AND ACRONYMS

---

AIDS	:	Acquired Immunodeficiency Syndrome
BBMB	:	Bhakra Beas Management Board
BCP	:	Biodiversity Conservation Plan
BOQ	:	Bill of Quantities
CA	:	Conservation Area
CCA	:	Culturable Command Area
CDSO	:	Central Dam Safety Organisation
CE	:	Chief Engineer
COVID	:	Coronavirus Disease
CPMU	:	Central Project Management Unit
CWC	:	Central Water Commission
DHARMA	:	Dam Health and Rehabilitation Monitoring Application
DRIP	:	Dam Rehabilitation and Improvement Project
DSRP	:	Dam Safety Review Panel
E&S	:	Environment & Social
EAP	:	Emergency Action Plan
ESCP	:	Environmental and Social Commitment Plan
ESDD	:	Environmental and Social Due Diligence
ESF	:	Environmental and Social Framework
ESIA	:	Environmental and Social Impact Assessment
ESMF	:	Environment and Social Management Framework
ESMP	:	Environment and Social Management Plan
ESS	:	Environmental and Social Standard
FEM	:	Finite Element Method
FRL	:	Full Reservoir Level
GBV	:	Gender Based Violence
GCA	:	Gross Command Area
GIS	:	Geographic Information System
GRM	:	Grievance Redressal Mechanism
HIV	:	Human Immunodeficiency Virus
IA	:	Implementation Agency
IPF	:	Investment Project Financing
IS	:	Indian Standard
LMP	:	Labour Management Procedure
MCM	:	Million Cubic Meter
MIS	:	Management Information System
MU	:	Million Units
MW	:	Mega watt
MWL	:	Maximum Water Level
NRSC	:	National Remote Sensing Centre
OHS	:	Occupational Health & Safety
PAP	:	Project Affected Person
PDO	:	Project Development Objective
PMC	:	Project Management Consultancy

PMF	:	Probable Maximum Flood
PPE	:	Personal Protective Equipment
PST	:	Project Screening Template
RET	:	Rare Endangered and Threatened
RFB	:	Request for Bids
SC	:	Scheduled Castes
SCADA	:	Supervisory Control and Data Acquisition
SDSO	:	State Dam Safety Organisation
SEA	:	Sexual Exploitation and Abuse
SEAH	:	Sexual Exploitation Abuse and Harassment
SEF	:	Stakeholder Engagement Framework
SEP	:	Stakeholder Engagement Plan
SF	:	Screening Format
SH	:	Sexual Harassment
SPMU	:	State Project Management Unit
ST	:	Scheduled Tribes
WB	:	World Bank
WQ	:	Water Quality

# EXECUTIVE SUMMARY

Bhakra multi-purpose Project, has proposed to undertake rehabilitation measures (structural, non-structural, instrumentation and basic facility enhancement) under the proposed Dam Rehabilitation and Improvement Project (DRIP II) with a view to increase the safety and to strengthen dam safety management.

The Environment and Social Due Diligence has been conducted for decision-making on the sub-project with a view to identify, evaluate and manage the environment and social risks and impacts in a manner consistent with the World Bank ESF. ESDD has been carried out by studying the sub-project information and proposed interventions, assessing the magnitude of E&S risk and impacts with respect to key baseline data in immediate vicinity area; and conducting preliminary stakeholder consultations. Detailed consultations with communities living downstream/vicinity of the dam, could not be held in the current circumstances due to COVID19 and these shall be held as soon as situation is conducive for holding such consultations.

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

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

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

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

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

## 1.1 PROJECT OVERVIEW

---

The Dam Rehabilitation and Improvement Project Phase II and Phase III (DRIP Phase II & Phase III) initiated by Ministry of Jal Shakti through Central Water Commission, with an objective to cover more States and more dams (after DRIP Phase I) across India to improve the safety and operational performance of these selected dams. This new Scheme will further strengthen the efforts of Government of India beyond ongoing DRIP Phase I. The project would continue to finance structural improvements along with dam safety institutional strengthening which shall break with the prevailing build-neglect-rebuild approach by giving greater emphasis to establishing innovative financing mechanism for regular O&M and dam rehabilitation, enhancing State capabilities to manage these critical assets through institutional strengthening, and introducing risk-informed dam safety management. The project development objective (PDO) is to increase the safety of selected dams and to strengthen institutional capacity for dam safety in participating States. The project components are as follows:

**Component 1:** *Rehabilitation and Improvement of Dams and Associated Appurtenances*, focusing on structural and non-structural measures at selected project dams. The proposed interventions will include, but not be limited to, around 35-40 kind of rehabilitation activities as done in ongoing DRIP. In addition, all important non-structural activities will also be taken up. In addition to these interventions, the project will require each rehabilitated dam to have basic instrumentation and could also support the development of additional systems to detect and respond to risks promptly, such as flood forecasting systems, early warning systems, data management and analysis software, and standardized dam safety instrumentation (i.e., Supervisory Control and Data Acquisition [SCADA]).

**Component 2:** *Dam Safety Institutional Strengthening*, focusing on regulatory and technical frameworks for dam safety assurance. The activities to be carried out will include, but not be limited to, targeted training nationally and internationally to all partner agencies, development of Management Information Systems (MIS) and other programs to capture and analyze data for long-term planning and guiding of dam operations; support to the further development within CWC of the Dam Health and Rehabilitation Monitoring Application (DHARMA) program, support to the revision of existing guidelines on dam safety and preparation of new guidelines, as needed; rapid risk screening of dams, stakeholders consultation meetings for dissemination of prepared emergency action plans, updating of seismic hazard mapping of country, capacity building of academic and central institutions, public outreach programs, construction supervision & quality assurance activities etc.

**Component 3:** *Incidental Revenue Generation for sustainable operation and maintenance of dams*; in order to ensure long term sustainability of operations & maintenance of existing dams, it is proposed to encourage the dam owners to explore the incidental revenue generation through innovative ideas i.e. Development of tourism, fisheries, secondary sources of power generation (hydel as well as solar), water recreation activities etc. and

divert some part of this generated revenue for O&M of a given dam. Few pilot dams can be selected to experiment this innovation.

**Component 4: Project Management;** the overall responsibility for project oversight and coordination will rest with the CDSO of CWC. This Organisation will act as the Central Project Management Unit (CPMU). The CPMU will be assisted by a management and engineering consulting firm. Each state and other agency will establish a Project Management Unit (SPMU) attached to the Chief Engineer's (CE) office in charge of the SDSO or any such similar arrangement in power utilities. This Unit will have direct responsibility for the coordination and management of the project at state level.

The primary beneficiaries of the project are the communities that live in dam breach flood inundation areas and the communities that depend on water, irrigation and electricity services provided by the dams that could be compromised by poor dam performance or failure. The Project will be taken up in 19 states covering 300 dams.

## **1.2 SUB-PROJECT DESCRIPTION – BHAKRA DAM PROJECT**

---

The Bhakra Dam, located near village Bhakra in District Bilaspur of Himachal Pradesh, is a 225.55 m high straight gravity concrete dam, built across river Satluj in a deep and narrow gorge of the lower Shiwalik hills. The dam has been founded on the rock formations comprising largely of calcareous sandstone. The length and width of the dam at the top is 518.16 m and 9.14 m respectively, with the width of dam at base being kept as 190.50 m. The width including apron and heel claystone plug is 402.34 m. A network of galleries with a total length of about 5 km for the purpose of drainage, inspection, checking of structural behaviour of dam and operation & maintenance of gates and other equipment, has also been provided in the body of the dam. The dam was designed as a gravity structure by gravity analysis. The joints of the blocks were grouted and the dam had been rechecked by the Trial Load Analysis also.

The lake created by the dam at maximum reservoir level of El. 515.24 m is 168.35 sq. km in area with gross storage capacity of 9621 MCM and a live storage of 7197 MCM.

For releasing surplus river inflows including high floods, a controlled overflow spillway with radial gates has been provided in the central portion of the dam. Sixteen number river outlets (in two tiers) have been provided in the spillway portion of the dam to cater irrigation demands more than the discharge passing through the power plants as well as for passing out flood and density currents. The spillway has been designed for maximum overall discharge of 8212 cumec including the flow through the river outlets, and can cater for a peak inflow of 11331 cumec.

Ten number steel penstocks have been installed in the non-overflow section of the dam, to convey water from the reservoir to the five generating units installed in each of the two (left and right bank) power plants located downstream of the dam toe on either side of the spillway.



The five generating units of the right bank power plant, with initial capacity of 120 MW each, have been updated to 132 MW each and further updated to 157 MW each by replacing and revamping the outlived/outmoded stator windings etc. The generating units of the left bank power plant with initial capacity of 90 MW each have been updated to 108 MW each unit. Further renovation of left power plant is in progress and three of the five units have been updated to 126 MW each by now thereby raising the total installed capacity of the two power plants from 1050 MW to 1379 MW.

Salient features of the project area are reported below:

<b>LOCATION</b>	
State	Himachal Pradesh
District	Bilaspur
River/ Basin	Satluj River
Nearest city and airport	Nangal Township; Chandigarh
Nearest railhead	Nangal Township
Lat/Long	31° 24' 40"/76° 26' 10"
Type of project	Multi-Purpose Project
Gross Command Area (GCA)	26,80,000 ha
Cultivable Command Area (CCA)	23,70,000 ha
Hydro power installed capacity	1379 MW
Average Annual Energy Generation	5500 MU
Water supply	NA
<b>Main Dam</b>	
Type	Straight Concrete Gravity Dam
Total length	518.16 m
Length of Embankment dam	NA
Length of Masonry/Concrete dam	518.16 m
Top width of Masonry/Concrete Dam	9.14 m
Elevation of top of Masonry/Concrete Dam	518.16 m
Elevation of top of Upstream Solid Parapet Wall	519.54 m
Height of Masonry/Concrete Dam above deepest foundation level	225.55 m
Lowest River Bed Elevation	350.52 m
Deepest Foundation Elevation	292.61 m
<b>Spillway</b>	
Type of Spillway	Central Spillway
Length of Spillway	79.25 m
Location of Spillway	Central
Spillway Crest Level	501.46 m
Number of Bays	4
Type of Spillway Gate	Radial
Size of Spillway Gate	15.24 m wide * 14.50 high
Total Discharging Capacity at MWL	5589 cumec
<b>Sluice arrangement</b>	
No. of Sluices & Sill Level	16 Nos. at 402.33 m & 432.80 m
Size of Sluice	2.64 m wide * 2.64 high
Discharging Capacity of Sluice at FRL	187.97 & 160.10 cumec
Type of Emergency Gate	Jet flow fixed wheel gate
Size of Emergency Gate	3.34 m wide * 3.34 high
Outlet works	
Location	402.33 m & 432.80 m
Number	8 No + 8 No =1
Discharging Capacity	115.56 cumec
<b>Reservoir</b>	
Catchment Area at Dam site	56,875 sq km
Maximum Water Level	515.24 m

Full Reservoir Level	515.24 m
Minimum Draw Down Level	445.73 m
Gross Storage Capacity	9621 MCM
Live Storage Capacity	7197 MCM
Reservoir Spread Area	168.35 sq km
Date of Starting the Construction	17/11/1955
Date of Completion	22/10/1963
Original Inflow Design Peak Flood	11331.44 cumec
Maximum observed flood peak	17234 cumec on 06/08/1971
Revised Inflow Design Peak Flood	22487 cumec

## **Proposed Interventions/ Activities and Intended Outcomes**

The Dam Safety Review Panel (DSRP), constituted for the purpose of inspection of the projects that the Bhakra Beas Management Board (BBMB) plans to undertake for the repair, rehabilitation and modernization work under World Bank aided DRIP-II & III schemes, made a visit to Bhakra Dam Project on 17<sup>th</sup> December, 2019 for inspection purpose and recommended measure to improve the safety and performance of dam and associated appurtenances in a sustainable manner, and also to strengthen the dam safety institutional set-up.

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

### **Civil works**

- Work No. 1: Strengthening of slopes surrounding Bhakra Dam Abutments, upstream & downstream areas.
- Work No. 2: Treatment of Highway and Dinky Tunnels.
- Work No.5: Preparation of DPR for treatment of hot spots and landslides around Bhakra reservoir by taking suitable measures

### **Instrumentation, SCADA, Surveillance system, etc.**

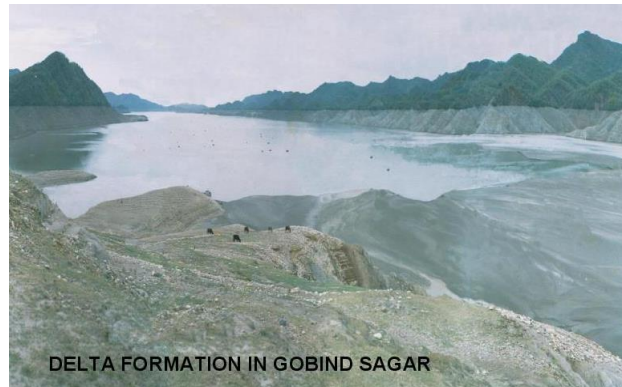
- Work No.3: Modernization, upgradation and automation of Instrumentation with Real Time Monitoring System
- Work No.4: SCADA Enabled Automation of Spillway radial gates and Outlet gates of Bhakra Dam

### **Others (Investigation, Design Studies, Consultancy)**

- Work No.6: Purpose Driven Study: Additional FEM Study for static deformation behaviour including elasto-plastic analysis (Creep Study) of Bhakra Dam including risk assessment studies.
- Work No.7: Purpose Driven Study: Seismic Analysis of Bhakra Dam to examine seismic safety under revised seismic parameter inputs

*\*This work for Reservoir area has been proposed in DRIP-III and no action as of now is proposed in DRIP-II. As & when this work is to be carried out, clearances from concerned departments of Himachal Pradesh will be obtained as this catchment work area falls under HP state jurisdiction. ESDD/ESIA will be carried out and proportionate mitigation measures will be proposed in accordance with ESMF. Therefore, it has not been considered in present ESDD.*

**Figures 1.1 and 1.2** provide photographs of key infrastructure proposed for rehabilitation works and major intervention's locations.



DELTA FORMATION IN GOBIND SAGAR

Delta Formation in Gobind Sagar



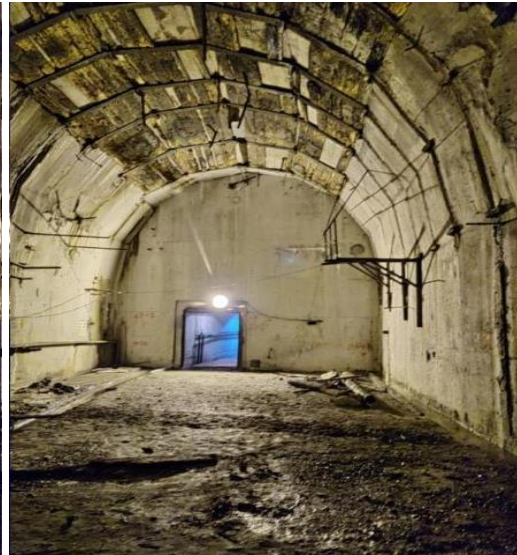
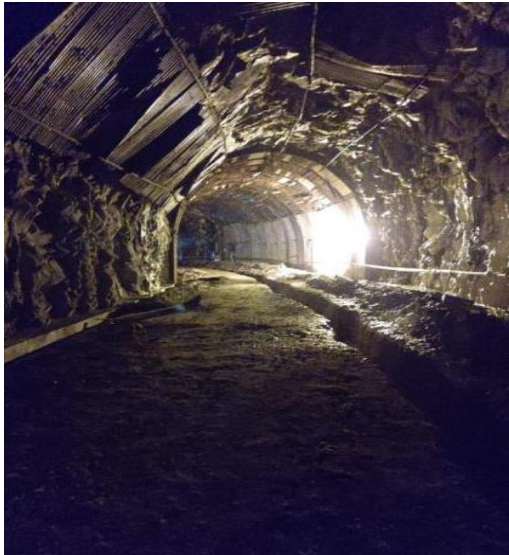
Rock Slide/Rock Fall Zones



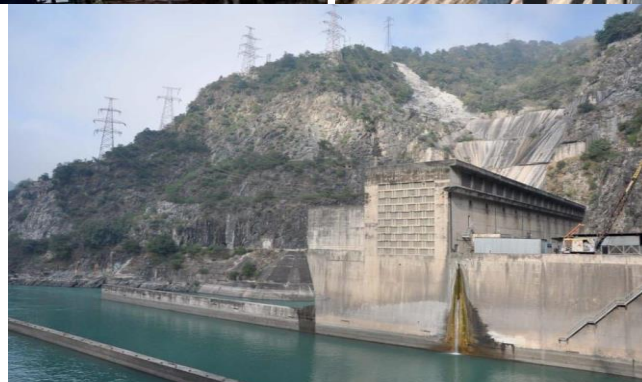
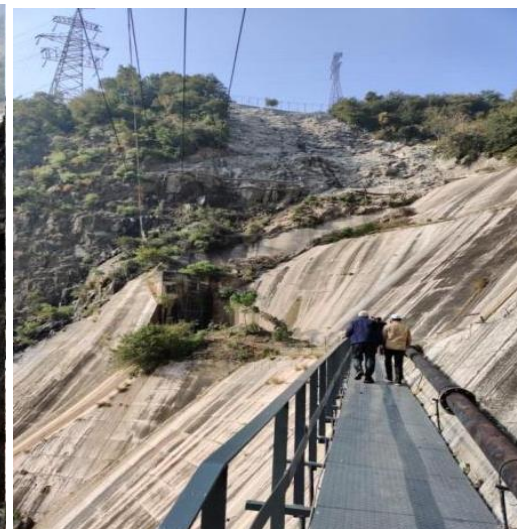
Disposition of Rock Joints near Left Bank Power House Road



Highway Tunnel near Right Abutment



Dinky Tunnel in Right Abutment of Bhakra Dam



Fractured/Joited Rockmass on Right Side Near Abutment



Active Landslide Near Left Abutment on Reservoir Rim

**Figure 1.1: Selected Photographs of Improvement/Intervention area**

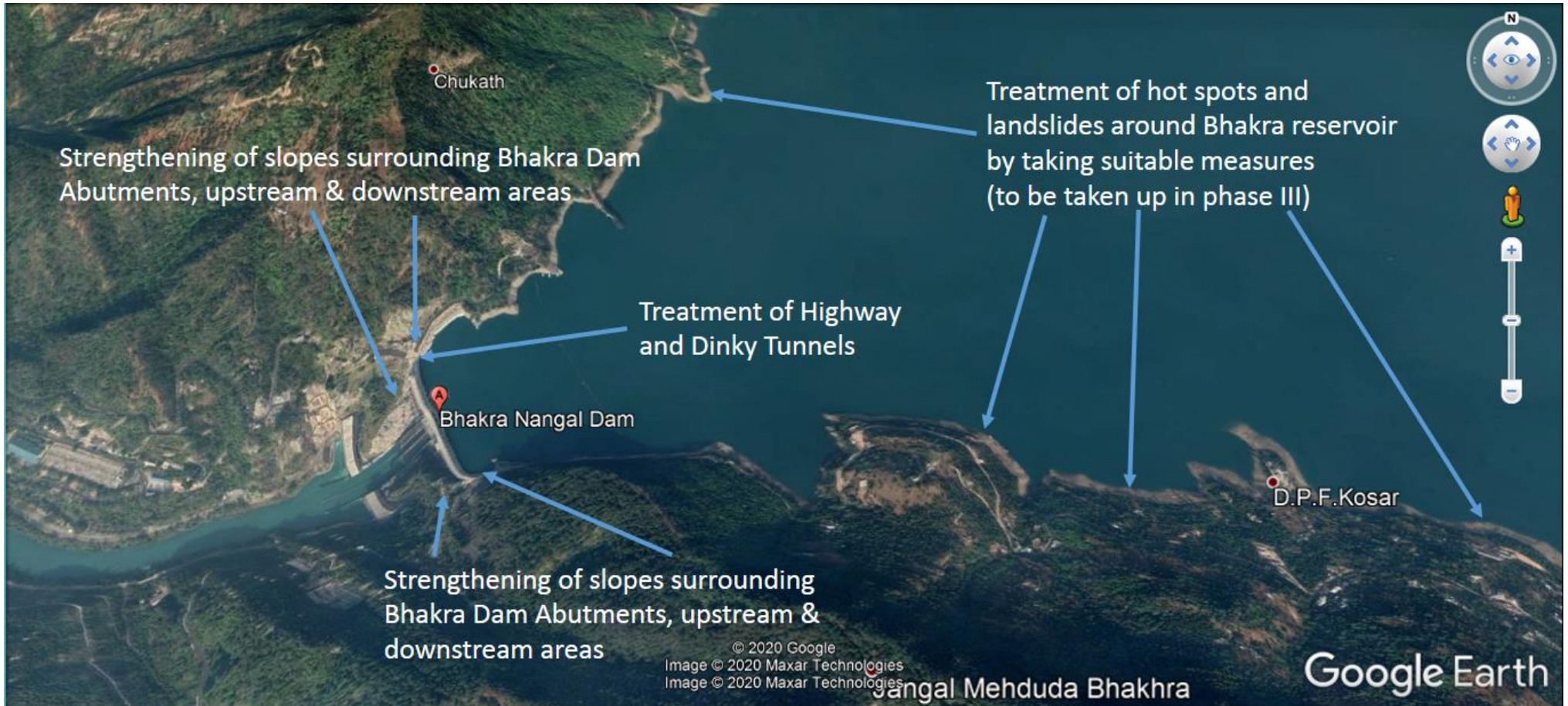


Figure 1.2: Project Area showing major intervention locations

### 1.3 IMPLEMENTATION ARRANGEMENT AND SCHEDULE

As can be seen from the list of activities proposed under dam rehabilitation project; these activities can be divided into civil work and instrumentation/investigation works with a view to improve dam safety. Civil work will be carried out by contractor(s) as these are labour intensive activities and would be completed over a period of 36 months. BBMB will hire contractor(s) based on national open competitive procurement using a Request for Bids (RFB) as specified in the World Bank 's —Procurement Regulations for IPF Borrowers, July 2016, \_Revised August 2018 Procurement Regulations), and is open to all Bidders as defined in the Procurement Regulations. Following is the overall implementation and procurement schedule:

**a) Overall Phasing of Project Implementation:**

Proposed Starting of implementation: 01/04/2020  
 Proposed Ending of implementation: 31/03/2023  
 Implementation Duration (months): 36 months

**b) Timeline phasing of implementation**

It is proposed in the Project Screening Template that, execution of all the works including the structural works as well as the other Items of works covering Instrumentation/ SCADA & Investigation, Design Studies, Consultancy shall be undertaken in DRIP Phase-II.

Sl. No.	Description	From (month/year)	To (month/year)	Status of procurement process
1	Civil Work – Main Package			
	Work No 1: Strengthening of slopes surrounding Bhakra Dam Abutments, upstream & downstream areas.	04/2020	03/2023	NCB
	Work No 2: Treatment of Highway and Dinky Tunnels.	10/2020	03/2023	NCB
	Work No 5: Preparation of DPR for treatment of hot spots and landslides around Bhakra reservoir by taking suitable measures	04/2022	03/2023	NCB
2	Instrumentation, SCADA, Surveillance system, etc.			
	Work No 3: Modernization, upgradation and automation of Instrumentation with Real Time Monitoring System	04/2020	09/2021	NCB
	Work No 4: SCADA Enabled Automation of Spillway radial gates and Outlet gates of Bhakra Dam	04/2020	09/2021	NCB
3	Others (Investigation, Design Studies, Consultancy)			
	Work No 6 : Purpose Driven Study: Additional FEM Study for static deformation behaviour including elasto-plastic analysis (Creep Study) of Bhakra Dam including risk assessment studies.	10/2020	03/2023	After finalization TOR by DSRP
	Work No 7: Purpose Driven Study: Seismic Analysis of Bhakra Dam to examine seismic safety under revised seismic parameter inputs	10/2020	03/2023	After finalization TOR by DSRP
2	Other Packages	Nil		
3	Procurement of Goods (a) Provision for Instrumentation (b) Provision for the inspection vehicles	Nil		

## **1.4 PURPOSE OF ESDD**

---

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

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

## **1.5 APPROACH AND METHODOLOGY OF ESDD**

---

The following approach has been adopted for ESDD:

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



- vii. Carry out activity wise environment and social screening and identify risks and impacts. Classify the sub-project based on risk level (low, moderate or substantial and high) and recommend commensurate plans/measures to meet identified risks and impacts.

**2.1 POLICY AND LEGAL FRAMEWORK**

---

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

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

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

Therefore, for the proposed dam rehabilitation activities at Bhakra Dam Project, regulatory clearances will not be applicable as the works do not trigger the regulatory provisions in respect of Indian regulations. Other applicable regulatory requirements are discussed in ESMF.

**2.2 DESCRIPTION OF INSTITUTIONAL FRAMEWORK**

---

The sub-project will be implemented by Bhakra Beas Management Board (BBMB).

On reorganisation of the erstwhile state of Punjab on 1st November, 1966, Bhakra Management Board (BMB) was constituted under section 79 of the Punjab Reorganisation Act, 1966 for the administration, maintenance, and operation of Bhakra Nangal Project on 1st October 1967. Construction of Beas Projects, a joint venture of States of Punjab, Haryana and Rajasthan was entrusted to Beas Construction Board according to Punjab Reorganisation Act. The Beas Project Works, on completion, were transferred by Government of India from Beas Construction Board (BCB) to Bhakra Management Board as per Section 80 of the Punjab

Reorganisation Act, 1966 and the Bhakra Management Board was renamed as Bhakra Beas Management Board (BBMB) w. e. f. 15th May 1976.

The functions of BBMB are:

- a) Administration, Operation & Maintenance of Bhakra-Beas Projects.
- b) The regulation of the supply of water from Bhakra-Beas Projects to the States of Punjab, Haryana, and Rajasthan.
- c) The regulation of the supply of power generated at Bhakra-Beas Projects.
- d) Any other function as the Central Government may assign after consultation with the Governments of States of Haryana, Punjab, and Rajasthan.
- e) The Govt. of India in the year 1999 has entrusted additional functions of providing & performing engineering and related technical consultancy services in fields of Hydro Electric Projects & Irrigation Projects.

BBMB is managed administratively, financially with secretarial support to top management to facilitate service realization through respective Chief Engineers of Irrigation and Power Wings. BBMB is custodian of the infrastructure of its Partner States who are the major beneficiaries of water and power generated from the projects. In addition, some part of the water and power generated from the projects are also released to Common Pool Consumers. The concerned Power and Irrigation organizations of the Partner States act as the co-ordinating organizations on their behalf and can be treated as customer for all intents and purposes of the Management system Standards along with Common Pool Consumers. In broader respect it is largely the public at large belonging to these states which is the ultimate beneficiary/customer of BBMB, although there is no direct interface of BBMB with them.

BBMB, as an organisation, is committed to provide services, fully meeting the stated and implied requirements of the Customers, to achieve their full satisfaction. BBMB take necessary action to determine existing and upcoming requirements of customers, create necessary processes, infrastructure & other resources to meet these requirements and develop awareness, concern, and systems to continuously meet these requirements.

BBMB is a structured organisation and has an established system to address Environmental & Social issues. Internal organisational system on various issues (Environmental and social aspects: identification, occurring, reporting, performance details and management review decisions, monitoring etc). Internal accomplishment within the organisation is achieved through various forums such as meetings, internal circulars, interactions, consultations, trainings, and awareness sessions which shall also be utilized for resolution. Means of communication such as wireless messages, electronic data transfer etc. have been established for speedy transfer of information to management and State Government authorities, as appropriate. In the field of core business operations, monthly meetings of Technical Committee are conducted to determine customer requirements and to review the performance of the previous month. These include issues not specifically stated by the partner states but necessary to meet the intended requirements Technical Committee has representation of all the participating states. In addition to the above, many other forums exist for review of performance, such as full Board meetings, Budget Meetings, Conferences of Chief Engineers with whole time Members & Chairman, Technical Committee Meetings,

Power Sub-Committee meetings, Periodical Performance Reviews on various relevant aspects including financial performance, physical performance to provide directions for improvements etc. Timely actions on decisions taken shall be ensured and followed up at suitable levels. BBMB has an established system for receiving, documenting of all communication from external sources which are reviewed and responded to, in view of the nature and severity of issues raised. All such communications/decisions thereon are well documented. The process of external communication, including responsibilities for communicating with external agencies such as State PCBs, Partner States, NGOs, Media etc have been established.

Under the Right to Information Act, 2005 BBMB has established a transparent mechanism to deal with public enquiries and accessibility of relevant information in public domain including information on significant aspects/ unacceptable risk of BBMB Activities & Facilities/emergencies, if any.

BBMB is implementing an Integrated Management System (IMS) by integrating the present Quality Management System IS/ISO 9001 & Environmental Management System IS/ISO 14001 with Occupational Health and Safety Management System IS 18001. An officer in the rank of Senior Executive Engineer has been designated as Environment officer at each project station and Board Office.

The major projects of BBMB are established in natural surroundings. BBMB is committed to preserve clean, green, and serene environment of the projects and their surroundings. It prevents environmental degradation in accordance with prevailing international/national standards, practices, technology, and laws. BBMB through its personnel and support of other stake holders is committed to prevention of injury, accident, and ill health of its employees at workplace by implementing and practising Occupational Health & Safety Management System. BBMB also provides community services in peripheral area of the Projects in environment, health, and education fields.

As far as DRIP is concerned, SPMU under Chief Engineer, Bhakra Dam and project Implementation Team is looking after these aspects.

A well-defined Grievance Redressal Mechanism exists in BBMB. Special Secretary, BBMB has been designated as Director/Grievances for Bhakra Beas Management Board as a whole. Everyone has a right to approach Special Secretary at address given below to settle grievances, if any:

Special Secretary BBMB,  
Madhya Marg, Sector -19-B,  
Chandigarh.  
Telephone No: 0172-5011761  
Fax No: 0172-5011761  
E-Mail: [spsecy@bbmb.nic.in](mailto:spsecy@bbmb.nic.in)

Further, BBMB has also appointed Grievance Officers of the rank of Superintending Engineer/Dy. Chief Accounts Officer at each Project station and Board office. As far as DRIP is concerned, the Grievance Redressal Cell of BBMB has been formed and Senior Design Engineer – II, Bhakra Beas Design Directorate, BBMB, Nangal Township is nominated as Grievance Redressal Officer at SPMU Level for implementation of DRIP Phase-II & III.

In addition, Chief Vigilance Officer (CVO) BBMB is appointed by Ministry of Power. CVO ensures compliance to the statutory guidelines of the Chief Vigilance Commissioner for maintaining the transparency in the commercial transactions. He ensures that fair play prevails in the organization.

BBMB has formulated internal complaint committee as per Sexual Harassment Act at organization level and at each project level. Such complaints can also be made to the head of the divisions/ department.

BBMB have a proper, adequately manned complaint centres at each project stations to promptly attend to the complaints/grievances of residents regarding electricity, water, sanitation, garbage related issues and continual improvement of the system thereof. The welfare services are rendered after review of the requirements of the beneficiaries. These reviews are made taking into consideration existing/available facilities, extant rules/regulation for availing these services/other legal / administrative requirements etc. Satisfaction for these services is determined through satisfaction surveys, meetings, feedbacks, grievances handling mechanism etc. Based on these, corrective actions are decided and implemented. Proactive efforts for maintaining good interaction/relations with local administration/ community are made by respective CEs through regular meetings with officers of concerned department/ surpanches / taluka, village level officers.

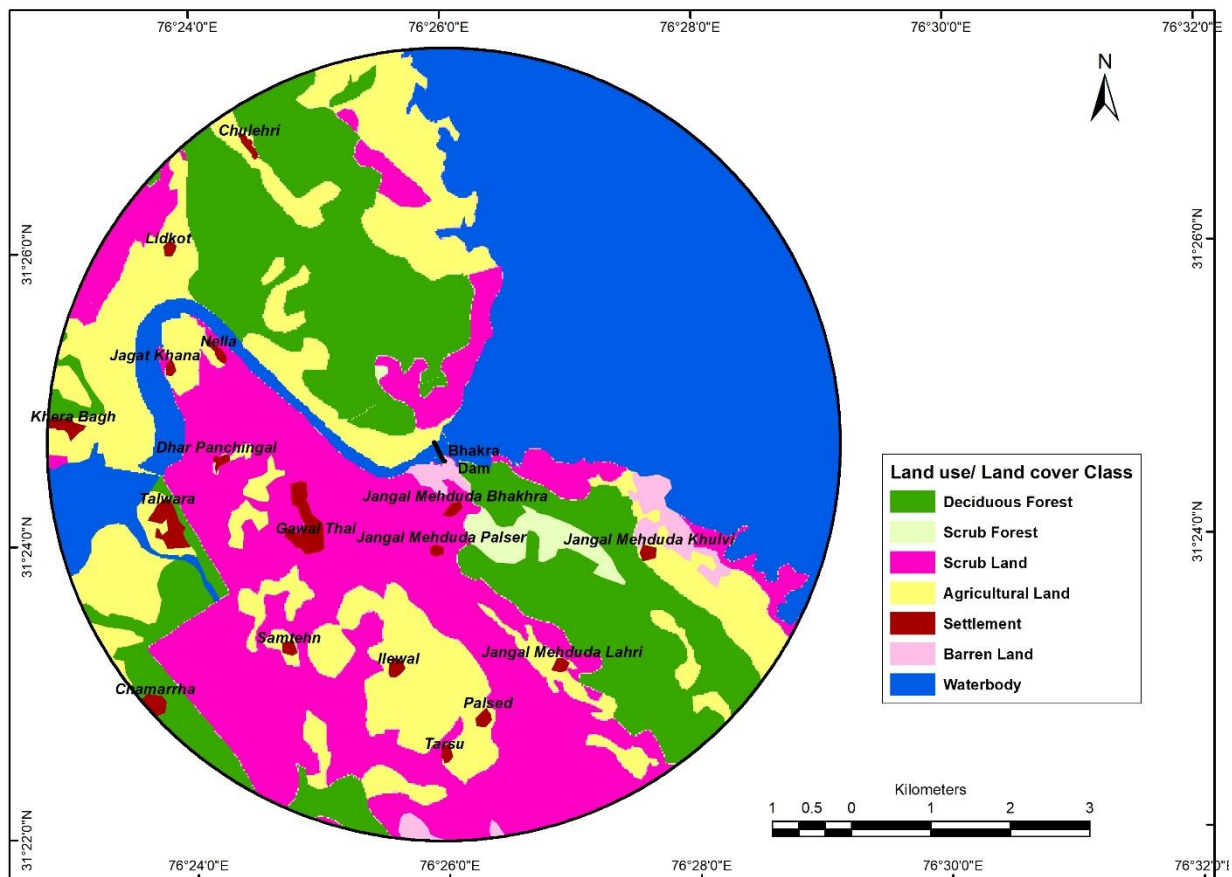
BBMB have designated Labour Welfare Officers at each Project Station to establish contacts and hold consultations with a view to maintaining harmonious relations between the site management and workers. They bring to the notice of site management, the grievances of workers, individual as well as collective, with a view to securing their expeditious redress and to act as a Liaison Officer between the management and labour. They help management to formulate labour policies and to interpret these policies to the workers in language they can understand and in general, promote well-being of workers.

Assessment of physical, ecological and socio-economic conditions at dam site and immediate surrounding has been carried out based on secondary information and site observations; as discussed below.

## 3.1 PHYSICAL ENVIRONMENT

### Land Use/ Land Cover

The project surrounding area's land use and environmental sensitivity was analyzed using GIS techniques. Land use/ land cover map within 5 km radius of dam is presented at **Figure 3.1**. As can be seen from the map, Deciduous Forest, Scrub land and water body (reservoir) dominate the land use in project surrounding area. There are small patches of Scrub Forest and Barren land. In addition, there are few patches of Agricultural land with scattered habitation on both the banks of river.



[(Source: Digital data on land use/land cover maps using bhuvan prepared by National Remote Sensing Centre (NRSC) along with further refinement using Google Earth]

**Figure 3.1: Land Use and Land Cover Map of 5 km radius around Dam site**

Proposed rehabilitation work will be confined to dam area and no structural interventions are proposed beyond existing dam boundaries. Seventeen major villages are identified in dam surrounding (within 5 km) viz. Jangal Mehduda Bhakhra, Jangal Mehduda Palser, Jangal Mehduda Khulvi, Jangal Mehduda Lahri, Palsed, Tarsu, llewal, Chamarrha, Samtehn, Gawal Thai, Talwara, Nella, Dhar Pachingal, Jagat Khana, Khera Bagh, Lidkot and Chulehri.

### **Natural Hazards**

---

Potential of natural hazards such as flooding and earthquake has been assessed.

Original design flood was 11331 cumec which has been revised to 22487 cumec as PMF as per Central Water Commission (CWC) report, January 2000 (finalised in 2014), which is almost 100% more. Non-structural measures such as lowering of FRL, modification in Operation Rule Curve and provision for Early Flood Warning System are under consideration with BBMB management. The studies with graphical presentation for flood routing of revised PMF value of 22592 Cumec have been submitted to BBMB Board Office for consideration and approval of Irrigation Sub-Committee (ISC) comprising of partner states. "As per minutes issued vide Secretary, BBMB, Chandigarh letter dated 05.09.2019 for 93rd meeting of Irrigation Sub Committee (ISC) held on 13.08.2019, the committee require sufficient time to study and deliberate on the issue and agreed that the item may be put up in the next meeting of ISC."

The matter is under consideration of competent authorities. Maximum observed flood so far in the history is 17234 cumec occurred on 6<sup>th</sup> August, 1971.

Project falls in earthquake zone IV and same was considered at the time of design, but Bhakra Dam was designed during late 1940s using the then prevalent pseudo-static method of analysis to ensure the static stability of the dam against sliding and overturning under the actions of hydrostatic load on the upstream face, uplift pressure at the base and the seismic loads approximated by static forces in terms seismic coefficients. This approach is at present considered outdated, the inadequacy of which to ensure seismic safety of gravity dams was first recognized worldwide after the 1967 Koyna earthquake and the resulting damage to the Koyna dam. The philosophy for a seismic design of gravity dam has subsequently changed from static stability to limiting stresses within the dam body induced by combined action of earthquake and other static forces to the strength of the dam concrete. Additional dynamic forces are experienced by a dam under earthquake loading due to interaction of the dam with the reservoir water and the foundation rock, which are purely the dynamic effect. The damping ratio also plays important role in the dynamic response of gravity dams, which increases significantly with increase in the intensity of the interaction forces with increase in the severity of ground shaking.

To assess the seismic safety of the Bhakra dam as per the current practice, it is necessary that a detailed dynamic response analysis is carried out with realistic modeling of hydrodynamic forces and the foundation interaction effects using site specific ground acceleration time histories of horizontal and vertical motions and the material properties of the dam and the foundation rock. The Bhakra dam is located in the Himalayan tectonic belt, which is characterized by very high seismic potential with earthquakes exceeding magnitude 8.0 on Richter scale.

The Dam Safety Review Panel of BBMB formulated under DRIP has recommended that the seismic safety of the Bhakra dam is required to be analyzed in the foregoing progressive manner using methods of dynamic response analysis with increasing sophistication and complexity. Studies will have to be repeated for at least three sets of site-specific uncorrelated design accelerograms of horizontal and vertical motions obtained for both MCE and DBE conditions by the site-specific studies. Extensive laboratory and in-situ testing studies have been already performed to obtain the input material properties for the dam and the foundation rock. *Bureau of Indian Standards [IS 1893 (Part I):2002], has grouped the country into four seismic zones, viz. Zone II, III, IV and V. Zone II is the least active and Zone V is the most active.*

### 3.2 PROTECTED AREA

---

Reservoir created by Bhakra dam is known as Gobind Sagar Lake, which was notified as Gobind Sagar Sanctuary by Government of Himachal Pradesh on 23<sup>rd</sup> October, 1999. The 100 sq Km area of the Gobind Sagar Lake situated between Bhakra Dam and Slapper Bridge along Satluj river inclusive of tributaries of both the banks, up to a reduced level of 1700 ft above sea level, is a protected area.

The Land for Gobind Sagar Reservoir of Bhakra Dam was acquired about 65 to 70 years back by BBMB up to an Elevation of 1700 ft and the reservoir area was declared protected area much later. BBMB is not planning any rehabilitation work item in periphery of reservoir in DRIP II, while the works are inside the dam boundary. The material movement etc through protected area and corresponding protection measures will be undertaken in such a way that there is no risk to natural habitat and biodiversity is conserved.

**There is no restriction on carrying out rehabilitation work at Bhakra dam due to proximity to sanctuary. No permission or clearance would be required from Wildlife angle to carry out any of the proposed rehabilitation works at Bhakra dam and ESS6 is not triggered.**

### 3.3 SOCIAL ENVIRONMENT

---

The Bhakra dam is located near village Bhakra in Naina Devi Tehsil in district Bilaspur of Himachal Pradesh. The proximity villages i.e. villages which fall within 5 km distance from dam on downstream side, these are Jangal Mehduda Bhakhra, Jangal Mehduda Palsar, Jangal Mehduda Khulvi, Jangal Mehduda Lahri, Palsed, Tarsu, Ilewai, Chamarrha, Samtehn, Gawal Thai, Talwara, Nella, Dhar Pachingal, Jagat Khana, Khera Bagh, Lidkot and Chulehri.

The project area does not fall within the Schedule V<sup>1</sup> areas of Himachal Pradesh.

The Bilaspur district is divided into two sub-divisions namely Bilaspur and Ghumarwin which is further divided into four tehsils namely Naina Devi, Ghumarwin, Jhanduta, Bilaspur Sadar and two sub-tehsils namely Bharari and Namhol. The economy of the district is mainly agrarian and majority of the population in the districts is engaged in cultivation. The brief demographic characteristic of the district is given in the table below:

---

<sup>1</sup> **Scheduled Areas** are areas in India with a preponderance of tribal population subject to a special governance mechanism wherein the central government plays a direct role in safeguarding cultural and economic interests of **scheduled** tribes in the **area**.



<b>No. of Households</b>	<b>80,323</b>	<b>Household Size</b>	<b>05</b>
<b>Total Population</b>	<b>381,956</b>	<b>Population (0-6 age)</b>	<b>41,956</b>
Male	192,764	Boys (0-6 age)	22,084
Female	189,192	Girls (0-6 age)	19,872
Sex Ratio	981	Sex Ratio (0-6)	900
<b>Population (SC)</b>	<b>98,989 (25.92%)</b>	<b>Population (ST)</b>	<b>10,693 (2.80%)</b>
Male	50,271	Male	5,485
Female	48,718	Female	5,208
<b>Literates</b>	<b>287,620</b>	<b>Literacy Rate (in %)</b>	<b>84.59</b>
Male	155,599	Male	91.16
Female	132,021	Female	77.97
<b>No. of Workers</b>	<b>205,871</b>	<b>Cultivators</b>	127,169 (61.77%)
Male	111,543	<b>Agricultural Labours</b>	4,138 (2.01%)
Female	94,328	<b>Household Industrial Workers</b>	2,561 (1.24%)
<b>No. of Main Workers</b>	<b>103,406</b>	<b>Other Workers</b>	72,003 (34.97%)
<b>No. of Marginal Workers</b>	<b>102,465</b>		

*Source: Census of India, 2011 (District Handbook)*

The project area does not fall within the Schedule V areas of the state. There is a small population (2.8%) of scheduled tribes and few may be present in the downstream area. The ST households in the district are mainstreamed in the area and do not possess any characteristics as outlined in ESS7. These areas and the ST households will be considered during the preparation/updation of Emergency Action Plan for Bhakra Dam. Emergency Action Plan was formulated in 2007 which would need to be updated as per the latest CWC guidelines and based on dam break analysis carried out in 2019.

### **3.4 CULTURAL ENVIRONMENT**

As per list of National Monuments in Himachal Pradesh and list of State Protected monuments in Himachal Pradesh; there are no protected monuments in and around dam site or in vicinity i.e. within 10 km radius of dam site.

#### **4.1 SUB-PROJECT SCREENING**

---

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

**Step I Screening (using Form SF-1):** Sub-Project Component, Construction Support Preparatory Intervention related vs Nature of Risk/Impact

Scoping exercise was carried out to select the applicability of each activity based on the interventions proposed in the sub-project PST. Applicable interventions were further classified based on the location i.e. within dam area or outside the dam area and for each applicable intervention likely nature of risks and impacts has been listed.

Screening indicated that all project components related activities are limited to within the dam area/premises. Due to nature of these activities, likely impacts will be on physical environment in terms of air pollution, noise pollution and waste generation. None of the proposed structural interventions involve acquisition of private land and/or private assets. These activities in no way cause restriction on access to land or use of resources by local communities and there is no economic displacement envisaged due to the sub-project.

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

Project will involve project managers and supervisors, contracted workers – these would also include migrant workers as all the required labour will not be fully supplied locally for a number of reasons, such as worker's unavailability and lack of technical skills and capacity. Construction contractors are expected to stay at/near dam, set up construction equipment and machinery near work location at pre-determined/approved sites. Influx of skilled

migrant labour, albeit few in numbers, for construction works is likely. The labour will stay outside the dam premises, hence risk of SEA/SH is likely, although Low.

Non-structural interventions such as Emergency Action Plan, Early Warning System and Flood Forecasting System, etc. has not been proposed in the PST. As per PST, Emergency Action Plan was formulated in 2007 which would need to be updated based on dam break analysis carried out in 2019. BBMB has established a Real Time Decision Support system (RTDSS) with the help of World Bank under Hydrology Project Phase-II for inflow forecasting (short, medium, and seasonal) for integrated operational management of its reservoirs for sustainable Water management. The BBMB has installed real time Data Acquisition System with installation of about 100 satellite-based telemetry stations in the Satluj and Beas Catchment areas.

Output of this screening is enclosed as **Annexure I**.

**Step II Screening (using Form SF-2):** All applicable activities identified as having potential risks/impacts that were identified through Step I screening, are further screened for associated sub-activity and evaluated for the extent of risk. Sub-activity's Risk/Impact intensity is further categorised as Low (L), Moderate (M), Substantial (S) or High (H) based on following criteria:

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

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

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

- Strengthening of slopes surrounding Dam Abutments, upstream & downstream areas
- Treatment of Highway and Dinky Tunnels
- Labour camp
- Muck/debris disposal

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

Based on consideration of all the above, summary of Risk/Impact (as per outcome of SF-2) is summarised for major sub-project activities under **Table 4.1 below**.

**Table 4.1: Summary of Identified Risks/Impacts in Form SF-3**

Project Activity	Environment Risks						Social Risks					
	Air, water, noise, land use, Soil, Resource use	Pollution downstream and upstream	General Ecology	Protected Area (Wild Life Sanctuaries, National Park and other natural habitat even if not protected)	Other RET species (flora and fauna) outside protected areas	Fish and Aquatic life within dam water body	Land	Tribal	Labour	Cultural heritage	SEA/SH	OH and Safety to Labour/Community
Civil (within Dam/Reservoir Boundary)	M	L	L	None	None	L	L	L	M	None	L	M
Instrumental SCADA, surveillance	L	L	L	None	None	L	L	L	L	None	L	L
Major debris disposal	M	L	L	None	None	L	M	L	L	None	L	M
Labour camps	M	L	L	None	None	L	M	L	L	None	L	M

**Criteria for Risk Evaluation :**

**Low :** Localized, temporary and Negligible

**Moderate :** temporary, or short term and reversible under control

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

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

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

## 4.2 STAKEHOLDER CONSULTATION

In light of the COVID 19 pandemic, Government of India has announced a country wide lockdown from March 23 till May 17, 2020, that constrained holding of consultation meetings; therefore, some selective stakeholder consultations with Engineers/staff working at dam, representatives of recognised unions, contractors etc. could only be carried out and participation of villagers could not be ensured.

Stakeholder consultation was conducted as part of environmental and social impact assessments, with a purpose to:

- a. provide initial information to the communities on the proposed project interventions and particularly the non-structural interventions, if any;
- b. help identify potential stakeholders who are involved at this stage and will be involved a later stage.
- c. assess their responses in understanding the potential risks and prepare mitigation plan to address their concerns

The output is summarised below and list of participants is enclosed as Annexure III.

### **Dam Engineers/Staff**

<b>Questions</b>	<b>Responses provided / Observations</b>
1. Please confirm whether all proposed structural rehabilitation activities for this dam are limited to dam compound only or any activities are proposed beyond dam complex like catchment area treatment plan, stabilization of reservoir rim area, slope stabilization, de-silting etc.? Please specify if any possibility of local community interference exist during the implementation of rehabilitation measures; including stakeholders consultation meetings planned for dissemination of emergency action plans which is a non-structural measure.	Proposed structural Rehabilitation activities for Bhakra Dam under DRIP-II are limited to Dam compound only. However work related to treatment of hot spots and landslides around Bhakra Dam complex is proposed under DRIP III and as such the required action in this regard will be taken at appropriate / due time.
2. Is there any unsettled issues (legacy) related to displacement or resettlement, pending since time of dam construction? If yes, please give a brief detail.	No
3. Any unauthorized encroachers or squatters living within the dam premise? If yes, are these not a threat for dam security and dam premise, any official action taken in the past, does the state government have	No

Questions	Responses provided / Observations
<p>legalized these squatters and these have full right in the property of dam authorities.</p>	
<p>4. What is the proposed institutional arrangement to deal the Environment and Social activities within the scheme i.e. in-house team of experts/hired agency or individual experts?</p>	<p>In house team of Environment expert and Social Expert may be nominated or individual experts may be engaged.</p>
<p>5. Who will be in charge of E&amp;S related activities at dam site and at SPMU level?</p>	<p>At Dam site – Project Implementation Team and At SPMU level -In house team of Environment expert and Social Expert may be nominated or individual experts may be engaged</p>
<p>6. How do communities contact dam officials? Is there any existing mechanism known to communities to contact dam officials (through telephone/mobile/e-mail/official website?</p>	<p>Any of the prescribed mode i.e. through telephone/mobile/e-mail/official website/postal in writing/ personal visit.</p>
<p>7. What is existing mechanism to communicate with downstream communities/public on unregulated releases of water during high flood time siren/written communication to district authorities/ telephone/mobile/text messages or any other mode of communication?</p>	<p>Any of the prescribed mode i.e. through telephone/mobile/e-mail/ official website/postal in writing/ personal visit/print media/social media (Official Facebook page &amp; Twitter page).</p> <p>Releases of water are made in regulated way even during high floods. Advance flood warning communication in writing is made to concerned Irrigation Department and concerned Civil Authorities of State Government before monsoon season for information of downstream community. Whenever release exceeding 50,000 Cusecs are made downstream of Nangal Dam in river Sutlej including escape through Nakkian and Lohand, Bhakra Beas Management Board would issue flood warning, through the police wireless station at Nangal Township) Punjab government central control room Chandigarh, Chief Engineer/Drainage, Punjab, Deputy Commissioner, Ropar &amp; Executive Engineer, Ropar Head works who will in turn to communicate the same to the concerned civil, irrigation, drainage &amp; flood control authorities in Punjab.</p>

<b>Questions</b>	<b>Responses provided / Observations</b>
8. How do you ensure that downstream community is fully aware of the above existing mechanism?	This practice is in vogue since past six decades and is successfully realized. BBMB conveys advance warning to concerned Civil Authority through written communications, Civil Authority then inform to D/S community as mentioned at Sr. No. 7 above.
9. Are there women employees at the dam site?	Yes
10. Is there any existing Grievance Redressal Mechanism (GRM) within the department to address any kind of grievance/complaints by general public?	Yes, Er. Sunil Kumar Aggarwal, Senior Design Engineer – II, Bhakra Beas Design Directorate, BBMB, Nangal Township has been nominated as Grievance Redressal Officer under DRIP-II.
11. Details of any grievances received lately related to this new Scheme?	Nil
12. Is dam premise a restricted area or has open access to general public?	Restricted and prohibited area.
13. Are there tribal's living in the surrounding area of dam complex? Which tribes are these? Please give brief detail.	No
14. Does the dam have any tourism/water recreation facilities? If yes, how many approximate tourist visits annually, annual revenue generated, whether any portion of this generated revenue is diverted to regular O&M of this dam.	No. However otherwise 4 to 5 lakh tourists visit Dam site, annually for site seeing on permits issued by Public Relation Office without any charges.
15. Do you engage any local labourers for routine dam maintenance work? If yes, what is the process of engaging these locals for work at dam, whether through Government approved contractor or hired individually?	Yes, Contractor's labour or departmentally on our own on Daily wage basis at D.C. rates.

### **Communities**

<b>Questions</b>	<b>Responses provided / Observations</b>
1. How many villages are in immediate downstream vicinity?	Downstream of Bhakra Dam, there is a Nangal Dam which is about 13 km downstream, Nangal Pond acts as balancing Reservoir for the releases for Canals. There are two villages namely Olinda and Neilla in immediate downstream vicinity of Bhakra Dam.

Questions	Responses provided / Observations
2. Are they dependent on dam in any way for their livelihood?	Drinking Water supply is from the downstream side of the dam.
3. Does any of these villages were displaced and rehabilitated during the construction of Dam. Is there any pending compensation issues?	No
4. Is there any R&R affected person known to you who is currently working with the dam authorities? If so, in what capacity (employee/direct worker/contractor)	No
5. Are you aware of any fishing communities living immediately downstream of dam whose livelihood are directly linked with the fishing activities of this dam?	No private fishing downstream between Bhakra Dam and Nangal Dam. However Fishing is permitted on contract basis in upstream by HP Fisheries Department in Gobind Sagar Reservoir area of Bhakra Dam.
6. Are you aware of fishing working seasons, revenue earning, any access to general public for fishing, any suggestion etc.	Yes, whole year except 2 months i.e June & July. Licences are issued to fishermen for fishing by HP Fisheries Department. Earning not Known as it is in the preview of HP Fisheries Department operating in upstream Reservoir area of Bhakra Dam through fishermen co-operatives with a membership of fishermen engaged in fishing activities
7. Are you aware of local women affected in any way by dam operations?	No such effect is reported as enquired from public
8. Are you aware of any early flood warning system for this dam, or any other system wherein downstream communities getting regular update during flood season for any uncontrolled release of water?	BBMB has established a web enabled Real Time Decision Support system (RTDSS) with the help of World Bank under Hydrology Project Phase-II for inflow forecasting (short, medium and seasonal) for integrated operational management of its reservoirs for sustainable Water management. The BBMB has installed real time Data Acquisition System with installation of about 55 satellite based telemetry stations in the Satluj Catchment area. Relates to other stake holders however, Telephonic communication, through local Panchayats, through sirens or through local administration, or through print media or through social media (official Facebook page or Twitter page), the flood information is disseminated.



Questions	Responses provided / Observations
9. Are you aware of any dam related incident happened in the past wherein some loss of life encountered? If yes, brief summary may be given	No
10. If you have to contact the dam authorities; how will you contact, through telephone/mobile/e mail/personally?	Dam authorities through Public Relation Office are generally contacted through telephone/mobile/Email or by personally.
11. In the past, on any occasion, did you contact dam authorities for any specific reason affecting public in general? If so, how did you contact and how was the response of dam authority?	Dam authorities through Public Relation Office are frequently contacted for want of any dam related information on telephone, mobile or personally and best possible effort is made to satisfy the public in general.
12. Give your views about Bhakra dam, how this dam is helping Country, State, district or local communities in meeting its objectives, any specific concern can also be given?	Relates to other stake holders. However, Bhakra Nangal Project ushered in green, white and orange revolution in Northern states catapulting them into becoming granaries of the nation, while transforming waste arid land of Southern Haryana and a huge part of Rajasthan desert into verdant agricultural fields. This Project epitomize in unleashing the virtuous cycle of irrigation, power availability, flood mitigation, industrialization and employment generation, thus invigorating the entire economy of the Nation.
13. (a) Are you aware of any document named Emergency Action Plan (EAP) of the dam?  (b) If yes, do dam authorities conduct any annual mock drill or consultation meeting on dam site and invite all stakeholders to inform about various protocols in place and consequences in case dam fails?  (c) In future, during stakeholder's consultation meeting, would you like to be a part of these consultation and mock drill activities to be conducted by dam authorities?  (d) If yes, how to contact you, please give the corresponding address along with all details to receive the official communication.	a) Yes, Emergency Action Plan (EAP) of the dam is in place.  b) Yes, annual mock drill is conducted  c) Yes stakeholders are part of these consultation and mock drill activities.  d) Yes, stakeholders contact local administration through telephone/mobile /Email or by personally..
14. Are you a regular follower of official website of dam authorities as a general public, in case you are a contractor, do you	Yes, stakeholders including contractors generally are frequent visitors to official website of BBMB.

Questions	Responses provided / Observations
follow various tenders notices being invited for various maintenance of this dam?	<a href="http://www.bbmb.gov.in">www.bbmb.gov.in</a>
15. Any suggestion to improve overall system by dam authorities in any way, please give in brief?	Every suggestion is most welcomed by BBMB. CSR activities may be enhanced for better facilities to villages in close vicinity of dam.

### 4.3 DESCRIPTIVE SUMMARY OF RISKS AND IMPACTS FROM ACTIVITIES BASED ON SCREENING

Based on the above screening analysis, potential impacts and risks from the sub-project are summarised below:

#### ***Environmental Impacts and Risks***

1. Environment risks and impacts, as assessed above, for various project activities under this sub-project are categorised as Low and Moderate due to localised nature of proposed activities i.e. activities remain limited to dam area except for labour camp and muck/debris disposal.
2. Execution of civil and hydro-mechanical work within dam body will generate localised impacts on physical environment and resource use; pose risk of exposure of workers requiring personal protective equipment (PPE) use.
3. Construction and demolition waste and debris require careful disposal at pre-identified and approved site (by E&S Experts of BBMB) to minimise the risk of pollution on this count.
4. No significant impact on general ecology is envisaged.
5. Rehabilitation work would require labour to work on various sections of dam involving working at height, working in confined spaces, working on reservoir side, etc; Further, workers will also be exposed to dust and noise and will have to handle chemicals/gases for some of the works; these will lead to occupational health and safety risks.

#### ***Social Impacts and Risks***

1. As the interventions are within the dam premises and on the dam structure, there shall be no adverse impacts on land and assets due to any sub-component or sub-activities
2. The dam is not located in the Schedule V area. Limited Scheduled Tribes households in the district are mainstreamed into the overall society and do not meet the characteristics outlined in ESS 7. There will be no physical interventions.
3. Influx of migrant labour will be low as these works require only little but very skilled labour. Also these workers will mostly operate from labour camps within the dam premises/proximity and hence there would be minimal interface with communities and therefore significantly lower SEAH/GBV risks.
4. Waste generation from labour colony can pollute drinking water sources of community, risk is low and can be mitigated by providing adequate sanitation facilities.

5. No impacts are envisaged on cultural heritage as works shall not be undertaken in their vicinity or result in any impact
6. Labour related risk would include:
  - Safety issues while at work like injuries/accidents/ fatalities leading to even death, while at work; Occupational health and safety risks due to exposure of workers to unsafe conditions while working at heights, working using lifts, handling of equipment and machinery, exposure to air and noise pollution etc. will be addressed through OHS guidelines.
  - Short terms effects due to exposure to dust and noise levels, while at work
  - Long term effects on life due to exposure to chemical /hazardous wastes
  - Inadequate accommodation facilities at work force camp, including inadequate sanitation and health facilities
  - Sexual harassment at work
  - Absence or inadequate or inaccessible emergency response system for rescue of labour/workforce in situations of natural calamities.
  - Health risks of labour relating to HIV/AIDS and other sexually transmitted diseases
  - Non-payment of wages
  - Discrimination in Employment (e.g. abrupt termination of the employment, working conditions, wages or benefits etc.)
  - Unclear terms and conditions of employment
  - Discrimination and denial of equal opportunity in hiring and promotions/incentives/training opportunities
  - Denial for workers' rights to form worker's organizations, etc.
  - Absence of a grievance mechanism for labour to seek redressal of their grievances/issues

## 5.1 CONCLUSIONS

### 5.1.1 Risk Classification

As per the ESDD exercise, risk/impacts that have been identified relate to Occupational Health, Physical Environment, labour and SEAH/GBV. The summarised environmental and social risks of identified activities with level of risk are presented in previous chapter. These risks are low to moderate and localised, short term and temporary in nature which can be managed with simple ESMP and guidelines. Environment risks of air, noise, land use, soil and resource use for most of the activities are Moderate as well as social risks of labour and OHS to labour/community. Environment risks of pollution downstream and upstream are categorised as Low for all the works. Environmental risk relating to Labour camp has been flagged as Moderate on environment and land.

Hence the overall risk of this sub-project Dam is categorized as Moderate. OHS is a substantial risk activity and is being treated separately through OHS plan in accordance with WB ESHS guidelines.

### 5.1.2 National Legislation and WB ESS Applicability Screening

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

Four ESS standards are found relevant to this sub-project as per reasons given in **Table 5.1** below:

**Table 5.1: WB ESF Standards applicable to the sub-project**

Relevant ESS	Reasons for Applicability of the standard
ESS1: Assessment and Management of Environmental and Social Risks and Impacts	Gender Based Violence or SEA/SH related actions
ESS2: Labour and Working Conditions	Direct workers, Contracted workers and Community workers (likely for non-structural interventions like EAP)
ESS3: Resource Efficiency, Pollution Prevention and Management	Civil and hydro-mechanical work including resource consumption requiring protection of physical environment and conservation of resources
ESS 4: Community Health and Safety	Transportation of material, labour camp near habitation; and accidental risk during repair /improvement work and also leading to SEA/SH GBV risk
ESS 10: Stakeholder Engagement Plan	For engagement of stakeholders in all structural and non-structural interventions e.g. Emergency Action Plan etc.

## 5.2 RECOMMENDATIONS

### 5.2.1 Mitigation and Management of Risks and Impacts

Since risks and impacts are low to moderate category, a standard guidance in accordance with the ESMF shall be followed. It shall cover the following aspects:

- a. BBMB shall prepare Environmental and Social Management plan (ESMP) that has been provided in the Environmental and Social Management Framework (ESMF) and make it part of bid document for effective adherence by contractors.
- b. ESMP shall provide due measures for protection of environment quality and resource conservation (during handling of resources) in line with ESF standard ESS3 requirements. Similarly, any impacts identified on fisheries have to be conserved. Likewise, due attention has to be given to Occupational Health and Safety of workers and community in line with the requirements of ESS4 and World Bank Group guidelines on Occupational Health and Safety (OHS). Hence BBMB shall prepare ESMP in line with outline provided in the ESMF and ensure its adherence by contractor. The ESMP will address the following:
  - Gender Based Violence or SEA/SH related actions (ESS1)
  - Labour Management Procedure (ESS2)
  - Resource Efficiency and Pollution Prevention (ESS3)
  - Community Health and Safety (ESS4)
  - Stakeholders Engagement Plan (ESS10)
- c. Contractor shall submit BOQ as per ESMP of the sub project and will also include environmental and social budget as part of bid submission.

Mitigation plans to meet requirements for relevant Standards with responsibility and stages are given in **Table 5.2** below:

**Table 5.2: List of Mitigation Plans with responsibility and timelines**

WB-ESS Triggered	Mitigation Instrument	Responsibility	Timelines
ESS2: Labour and Working Conditions	<ul style="list-style-type: none"> <li>• LMP</li> <li>• OHS MP</li> </ul>	IA	EAP, CHSMP, Before mobilization of contractor
ESS 4: Community Health and Safety	<ul style="list-style-type: none"> <li>• GBV/SEAH risk management plan</li> <li>•</li> </ul>	IA for GBV/SEAH	GBV/SEAH by appraisal
ESS3: Resource Efficiency, Pollution Prevention and Management	<ul style="list-style-type: none"> <li>• ESMP</li> <li>• Muck Management Plan</li> <li>• Resource Conservation Plan</li> </ul>	IA	EAP, CHSMP, Before mobilization of contractor
ESS 10: Stakeholder Engagement Plan	<ul style="list-style-type: none"> <li>• SEP in accordance with project SEF</li> </ul>	IA	By negotiation

ESDD, ESMP and other related plans will be placed on the [www.bbmb.gov.in](http://www.bbmb.gov.in) & [www.damsafety.in](http://www.damsafety.in) website as well as other accessible locations such as the office of Engineer in Charge at Dam site as well as SPMU for reference and record. These documents would be disclosed/disseminated through other appropriate means like project meetings, workshops etc. BBMB will translate these documents in their local language, if required, and will upload in their respective websites and also make available at other accessible locations.

### **5.2.2 Institutional Management, Monitoring and Reporting**

---

ESMP will be developed by BBMB and will be part of the bid document of the sub project and shall be shared with CWC by BBMB for their review/ endorsement and approval. BBMB shall designate a Nodal Officer to coordinate and supervise E&S activities. BBMB will hire the qualified staffs to support management of E&S risks including Environmental Expert, Social Expert for ensuring compliance with the Bank's ESF and ESS's and ensures that these activities shall be implemented as per the procedures. Specifically, as included in the ESCP, every SPMU/BBMB shall be strengthened from environmental and social risk perspective during implementation of the sub-projects. A dedicated Environmental and Social staff with requisite skill shall be placed in BBMB and will be utilised to enable (a) development/review of ESDD of each sub project either through an agency or in house, (b) E and S staff will coordinate to hire consultants where ESDDs suggest a high risk for undertaking detailed ESIA, (c) preparation of environmental and social management plans (ESMPs) based on type of risks as well subsequent implementation of mitigation measures during implementation. BBMB will hire experts from outside department with relevant experience. These E&S experts will work in coordination with Project Management Consultancy (PMC) contracted by CPMU – CWC.

BBMB shall advise contractors about applicable legislative requirements and ensure that contractors fully comply with applicable requirements and submit compliance reports to BBMB on quarterly basis. BBMB will share regular implementation status of ESMPs to CWC and The World Bank in line with Environmental Social Commitment Plan (ESCP) on quarterly basis.

BBMB shall establish and operationalize a grievance mechanism to receive and facilitate resolution of complaints and grievances, from the communities and other stakeholders including implementation partners. Grievance redress mechanism will be designed to address concerns and complaints promptly and transparently with no impacts (for any complaints made by project affected people (PAPs)). GRM will work within existing legal and cultural frameworks and shall comprise project level and respective State level redress mechanisms.

PMC for the project will have sufficient staff with skills on Environment and Social aspects. Awareness raising and capacity building on the new Environmental and Social Framework (ESF) need to be carried out for the environment and social staff engaged and this will be an area of continued focus, with a view to generate awareness at to dam level. Project Management Consultancy (PMC) shall coordinate with CWC for approval, documentation, disclosure and implementation of these ESMPs in line with project ESMF and ESCP.

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

### Annexure - I: Form SF1

Sl. No	Project Component	Applicable (A) , Not Applicable (NA)	Environment and Social Risk Associated within dam area (DI), Beyond Dam Area (DE)	Likely Nature of Risk/Impact Water Quality (WQ), Fisheries(F), Conservation area(CA), Protected Area (PA), Ecological (E), Occupational Health (OH), Physical Environment (PE), Cultural (C), Tribal presence (T), impact on private land/assets/encroachers/squatters (LA), Labour (L), GBV risks (G), (Write whichever is applicable)
1	2	3	4	5
<b>A</b>	<b>Nature of Project Component Related</b>			
1	Reservoir Desiltation	NA		
2	Major structural changes – Spillway construction (Improving ability to withstand higher floods including additional flood handling facilities as needed.)	NA		
3	Structural strengthening of dams to withstand higher earthquake loads	NA		
4	Structural Improvement/Repair work - upstream of Dam site (interfacing dam reservoir) (like Strengthening of slopes surrounding Dam Abutments in upstream etc.)	A	DI	OH, PE, L, G
5	Structural Improvement/Repair work - Downstream of Dam site (with no interfacing with dam reservoir) (like Strengthening of slopes surrounding Dam Abutments in downstream etc.)	A	DI	OH, PE, L, G
6	Remodeling earth dams to safe, stable cross sections	NA		
7	Hydro-mechanical activities with interface with dam reservoir	A	DI	OH, PE, L, G
8	Hydro-mechanical activities Downstream of Dam site (with no interfacing with dam reservoir)	NA		
9	Instrumentation, General lighting and SCADA systems	A	DI	PE, L, G
10	Basic Facilities (like construction of inspection roads at top and tow of dam, renovation works etc.)	NA		
11	Utility installation like standby generator, or setting up solar power systems	NA		
12	Painting Work	NA		
13	Water recreation activities	NA		
14	Tourism Development	NA		
15	Solar power/floating solar	NA		
16	List any other component not listed above			
i				
<b>B</b>	<b>Pre-construction and construction stage major auxiliary or preparatory intervention</b>			
1	Acquisition of forest land involved	NA		



Sl. No	Project Component	Applicable (A) , Not Applicable (NA)	Environment and Social Risk Associated within dam area (DI), Beyond Dam Area (DE)	Likely Nature of Risk/Impact Water Quality (WQ), Fisheries(F), Conservation area(CA), Protected Area (PA), Ecological (E), Occupational Health (OH), Physical Environment (PE), Cultural (C), Tribal presence (T), impact on private land/assets/encroachers/squatters (LA), Labour (L), GBV risks (G), (Write whichever is applicable)
1	2	3	4	5
2	Taking of private land (including physical or economic displacement, impact on livelihood; temporary loss of business)	NA		
3	Major Borrow materials requirement involved	NA		
4	Major Quarry materials requirement involved	NA		
5	Blasting involved	NA		
6	Resettlement and Rehabilitation	NA		
7	Types of project workers (Direct, Contracted, Community Workers (or Volunteers i.e. for EAP implementation)	A	DE	L, G
8	Labour Camp involved (location within dam premises or outside)	A	DE	WQ, PE, G, E
9	Migrant labour likely to be involved	A	DE	L, G
10	Heavy machinery to be deployed and related maintenance workshop set up involved	A	DI	OH, PE, L, G
11	Hot mix plant Requirement	NA		
12	Concrete mixture and heavy pumps to be deployed	A	DI	OH, PE, L, G
13	Temporary land acquisition involved	NA		
14	Temporary disruption to access, livelihoods	NA		
15	Tree felling/ vegetation clearance involved	A	DI	OH, E, L
16	Haulage of machinery involved	A	DI	OH, PE, L, G
17	Major Debris Disposal involved	A	DE	PE, L, G
18	Major Transport of materials involved	A	DE	PE, L, G
19	Utility shifting involved	NA		
20	Discharge of reservoir water ( lowering of reservoir water involved)	NA		
21	<b>List any other not listed above</b>			

## Annexure – II: Form SF2

Sl. No	Applicable Sub-Project Component/ Construction preparatory Work related Sub activity ( As per SF-1)	Nature of Risk (Conforming to Column 5 of SF-1) and nature of sub activity	Elaborate cause (risk) and its effect (Impact) on environment /social	Risk/Impact intensity for each type of risk/impact Low (L) , Moderate (M), Substantial (S), High (H)
1	2	3	4	5
<b>A</b>	<b>Project Component Related</b>			
<b>1.</b>	<b>Structural Strengthening/Improvement/Repair work -upstream of Dam site</b>			
a	Strengthening of slopes surrounding Bhakra Dam Abutments, upstream areas	<b>OH, PE, L, G</b>	Air pollution, noise pollution, generation of construction debris, Occupational health and safety risk due to working on upstream face of dam, Labour and GBV risk	<b>S, M, L, M</b>
<b>2.</b>	<b>Structural Improvement/Repair work -Downstream of Dam site (with no interfacing with dam reservoir) (like repair of parapet walls, damage spillway crest, downstream training walls, etc.)</b>			
a	Strengthening of slopes surrounding Bhakra Dam Abutments, downstream areas	<b>OH, PE, L, G</b>	Air pollution, noise pollution, generation of construction debris, Occupational health and safety risk due to working on downstream face of dam, Labour and GBV risk	<b>S,M, L, M</b>
b	Treatment of Highway and Dinky Tunnels	<b>OH, PE, L, G</b>	Air pollution, Noise pollution, waste material, Occupational health and safety risk, Labour and GBV risk	<b>S,M, L, M</b>
<b>3.</b>	<b>Instrumentation, General lighting and SCADA systems</b>			
a	Modernization, upgradation and automation of Instrumentation with Real Time Monitoring System	<b>NO IMPACT</b>		
b	SCADA Enabled Automation of Spillway radial gates and Outlet gates of Bhakra Dam	<b>NO IMPACT</b>		
<b>B.</b>	<b>Pre-construction and construction stage major auxiliary or preparatory intervention</b>			
1	Types of project workers (Direct, Contracted, Community Workers (or Volunteers i.e. for EAP implementation)	<b>L, G</b>	GBV risk due to involvement of workers, volunteers and local population	<b>L, M</b>
2	Labour Camp involved (location within dam premises or outside)	<b>WQ, PE, L, G</b>	Wastewater generation from domestic activities, waste generation, risk of tree cutting, GBV risk within labour and involving community.	<b>M, M, L, M</b>

Sl. No	Applicable Sub-Project Component/ Construction preparatory Work related Sub activity ( As per SF-1)	Nature of Risk (Conforming to Column 5 of SF-1) and nature of sub activity	Elaborate cause (risk) and its effect (Impact) on environment /social	Risk/Impact intensity for each type of risk/impact Low (L) , Moderate (M), Substantial (S), High (H)
1	2	3	4	5
3	Migrant labour likely to be involved	L, G	Migrant labour having low degree of interface with community	L, M
4	Likely interface of Workers with communities	L, G	Risk of GBV due to labour interaction with community	L, M
5	Heavy machinery to be deployed and related maintenance workshop set up involved	OH, PE, L, G	Heavy machinery will be deployed various activities - OH risk due to machine handling, waste, wastewater and air emissions from machines operations, hazardous waste generation from oil waste, labour and GBV risk	S, M, L, M
6	Concrete mixture and heavy pumps to be deployed	OH, PE, L, G	Concrete mixture and pumps will be deployed for road repair and other civil works and dewatering - OH risk due to machine handling, waste generation, wastewater and air emissions from operations, hazardous waste generation from oil waste, labour and GBV risk	S, M, L, M
7	Tree felling/ vegetation clearance involved	OH, E, L	This is localised activity confined to embankment area of Dam. Shrubs, small trees and unwanted bushes are to be removed and disposed for preparation of site; OHS risk during loading/unloading and air and noise pollution during transportation, labour	S, M, L
8	Haulage of machinery involved	OH, PE, L, G	Machines will be hauled from different location and brought to site; OHS risk during loading/unloading and air and noise pollution during transportation, labour and GBV risk	S, M, L, M
9	Major Debris Disposal involved	OH, PE, L, G	Debris will be generated from strengthening of slopes surrounding Dam Abutments, upstream and downstream areas. - OH risk during debris handling, air and noise emissions from debris handling and transportation, water pollution risk due to debris	S, M, L, M

Sl. No	Applicable Sub-Project Component/ Construction preparatory Work related Sub activity ( As per SF-1)	Nature of Risk (Conforming to Column 5 of SF-1) and nature of sub activity	Elaborate cause (risk) and its effect (Impact) on environment /social	Risk/Impact intensity for each type of risk/impact Low (L) , Moderate (M), Substantial (S), High (H)
1	2	3	4	5
			finding its way to water body, and GBV risk due to labour involvement	
10	Major Transport of materials involved	OH, PE, L, G	Material will be transported from various vendors and suppliers to site for civil and instrumentation works - OH risk during material handling, loading and unloading; air and noise emissions from transportation, Labour and GBV risk due to labour involvement	S,M, L, M

**Criteria for Risk Evaluation :**

**Low :** Localized, temporary and Negligible

**Moderate :** temporary, or short term and reversible under control

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

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

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

**Annexure III: List of Participants in Stakeholder Consultation**

<b>Sl. No.</b>	<b>Name</b>	<b>Relation with Dam – Staff, contractor, worker, full time/part time, local, NGO....</b>	<b>Mobile Number</b>	<b>Address (at least village name)</b>
1.	Harman Preet	J.E (Instrumentation Sub Division)	9803331656	House No 15 GG Nangal Town ship Distt. Ropar (P.B)
2.	Sukhwinder	J.E (Horticulture Sub Division)	9417657033	House No 15 T Nangal Town ship Distt. Ropar (P.B)
3.	Bharat Bhushan	Supervisor (S.O.S Sub Division)	8427889493	House No 19 T Nangal Town ship Distt. Ropar (P.B)
4.	Manoj Verma	Foreman (R&C Sub Division)	6280029712	House No 7 Y Nangal Town ship Distt. Ropar (P.B)
5.	Arjun Dev	Supervisor (R&C Sub Division)	7973718482	House No 21 Q Nangal Town ship Distt. Ropar (P.B)
6.	Sukhdev Singh	Nangal Bhakra Mazdoor Sangh (President)	9417456880	Vill. Nikku Nangal Distt. Ropar (P.B)
7.	Iqbal Singh	Bhakra Nangal Bhakra Mazdoor Sangh (Secretary General)	9417333163	House No 20 Q Nangal Town ship Distt. Ropar (P.B)
8.	YashPal	State Allocated Employee Union.(President)	9464257992	House No (0H- 1H) Nangal Town ship Distt. Ropar (P.B)
9.	Subhash kumar	Govt. Contractor	9815391770	Killen area Nangal Township Distt Ropar (p.b)
10.	Vinod Kumar	Govt. Contractor	9988510349	Killen area Nangal Township Distt Ropar (p.b)