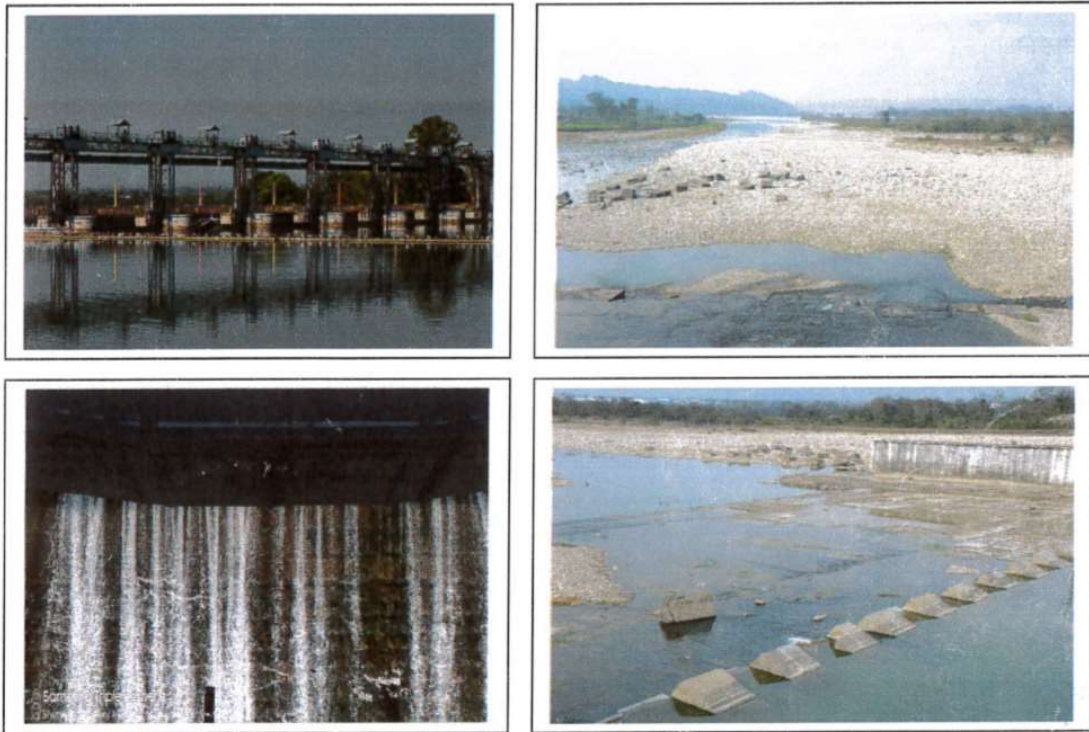


**DAM REHABILITATION AND IMPROVEMENT PROJECT (DRIP)**  
**Phase II**  
(Funded by World Bank)

**ASAN BARRAGE**  
**(PIC: GENUAWA001)**

**ENVIRONMENT AND SOCIAL DUE DILIGENCE REPORT**



**JANUARY 2021**

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## **CONTENTS**

<b>EXECUTIVE SUMMARY .....</b>	<b>4</b>
<b>INTRODUCTION .....</b>	<b>6</b>
1.1 PROJECT OVERVIEW .....	6
1.2 SUB-PROJECT DESCRIPTION – ASAN BARRAGE .....	6
1.3 PROPOSED INTERVENTIONS/ACTIVITIES AND INTENDED OUTCOMES .....	8
1.4 IMPLEMENTATION ARRANGEMENT AND SCHEDULE .....	13
1.5 PURPOSE OF ESDD .....	13
1.6 APPROACH AND METHODOLOGY OF ESDD .....	14
<b>INSTITUTIONAL FRAMEWORK AND CAPACITY ASSESSMENT .....</b>	<b>15</b>
2.1 POLICY AND LEGAL FRAMEWORK .....	15
2.2 DESCRIPTION OF INSTITUTIONAL FRAMEWORK .....	16
<b>ASSESSMENT OF ENVIRONMENTAL AND SOCIAL CONDITIONS .....</b>	<b>17</b>
3.1 PHYSICAL ENVIRONMENT .....	17
3.2 PROTECTED AREA .....	18
3.3 SOCIAL ENVIRONMENT .....	19
3.4 CULTURAL ENVIRONMENT .....	21
<b>ACTIVITY WISE ENVIRONMENT &amp; SOCIAL SCREENING, RISK AND IMPACTS IDENTIFICATION .....</b>	<b>22</b>
4.1 SUB-PROJECT SCREENING .....	22
4.2 STAKEHOLDER CONSULTATION .....	26
4.3 DESCRIPTIVE SUMMARY OF RISKS AND IMPACTS FROM ACTIVITIES BASED ON SCREENING .....	26
<b>CONCLUSIONS AND RECOMMENDATIONS .....</b>	<b>28</b>
5.1 CONCLUSIONS .....	28
5.1.1 <i>Risk Classification</i> .....	28
5.1.2 <i>National Legislation and WB ESS Applicability Screening</i> .....	28
5.2 RECOMMENDATIONS .....	29
5.2.1 <i>Mitigation and Management of Risks and Impacts</i> .....	29
5.2.2 <i>Institutional Management, Monitoring and Reporting</i> .....	30

## **TABLES**

TABLE 4.1: SUMMARY OF IDENTIFIED RISKS/IMPACTS IN FORM SF-3 .....	25
TABLE 5.1: WB ESF STANDARDS APPLICABLE TO THE SUB-PROJECT .....	28
TABLE 5.2: LIST OF MITIGATION PLANS WITH RESPONSIBILITY AND TIMELINES .....	30

## **FIGURES**

FIGURE 1.1: SELECTED PHOTOGRAPHS OF IMPROVEMENT/INTERVENTION AREA .....	11
FIGURE 1.2: PROJECT AREA SHOWING MAJOR INTERVENTION LOCATIONS .....	12
FIGURE 3.1: LAND USE AND LAND COVER MAP OF 5 KM RADIUS AROUND BARRAGE SITE .....	17
FIGURE 3.2: PROTECTED AREAS AROUND BARRAGE LOCATION .....	19

## **ANNEXURES**

ANNEXURE I: FORM SF1 .....	33
ANNEXURE II: FORM SF2 .....	35

## ABBREVIATIONS AND ACRONYMS

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AIDS	:	Acquired Immunodeficiency Syndrome
CA	:	Conservation Area
CCA	:	Culturable Command Area
COVID	:	Coronavirus Disease
CWC	:	Central Water Commission
DRIP	:	Dam Rehabilitation and Improvement Project
DSRP	:	Dam Safety Review Panel
E&S	:	Environment & Social
EAP	:	Emergency Action 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
GBV	:	Gender Based Violence
GIS	:	Geographic Information System
GRM	:	Grievance Redressal Mechanism
HIV	:	Human Immunodeficiency Virus
HR	:	Head regulator
IA	:	Implementation Agency
IPF	:	Investment Project Financing
MCM	:	Million Cubic Meters
OHS	:	Occupational Health & Safety
PA	:	Protected Area
PDO	:	Project Development Objective
PPE	:	Personal Protective Equipment
PST	:	Project Screening Template
RET	:	Rare Endangered and Threatened
SC	:	Scheduled Castes
SCADA	:	Supervisory Control and Data Acquisition
SEA	:	Sexual Exploitation and Abuse
SEAH	:	Sexual Exploitation Abuse and Harassment
SEP	:	Stakeholder Engagement Plan
SF	:	Screening Format
SH	:	Sexual Harassment
SITC	:	Supply, installation, testing & commissioning
SPF	:	Standard Project Flood
SPMU	:	State Project Management Unit
ST	:	Scheduled Tribes
WB	:	World Bank
WQ	:	Water Quality

## EXECUTIVE SUMMARY

Asan barrage has been built across river Asan, a major tributary of River Yamuna in Dehradun District of Uttarakhand. It is located on the confluence of River Asan and tail race of Dhalipur Power House. The Asan barrage diverts 270 cumec of water through a 4 km long power channel. Out of this discharge, 70.8 cumec passes through the silt ejector tunnel and 199.2 cumec is used for power generation at Kulhal HEP.

It has been proposed to undertake rehabilitation measures (structural civil & hydro-mechanical remedial works, electrical works 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. Stakeholder consultations with communities living downstream/vicinity of the barrage, 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, Physical Environment, labour and SEAH/GBV. The summarised environmental and social risks of identified activities with level of risk is presented in the report. Environment risks of air, water, noise, land use, soil and resource use for special rehabilitation work of Asan barrage and other associated structures, construction of bridge across power channel near existing head regulator, repair and overhauling of hoisting arrangement of gates, protective coating (cold galvanized/polypoxy coating) on barrage & head regulator gates, are considered moderate. Similarly, environment and social risk of labour camp and disposal of debris has also been identified as moderate. Due to location of barrage in "Asan Conservation Reserve", which is also declared as Ramsar Site lately; impact of rehabilitation work on protected area has also been considered moderate. Risk of all other activities has been identified as Low. These risks are low to moderate and localised, short term and temporary in nature which can be managed with standard ESMP and guidelines. 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, 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)
- Bio-diversity Conservation Plan (ESS6)
- Stakeholders Engagement Plan (ESS10)

Overall, the proposed activities within this barrage sub-project have low to moderate risks resulting in the 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 proposed Dam Rehabilitation and Improvement Project (DRIP II) would complement the suite of ongoing and pipeline operations supporting India's dam safety program. The project development objective (PDO) is to increase the safety of selected dams in participating States and to strengthen dam safety management in India. Project Components include:

Component 1: Rehabilitation and Improvement of Dams and Associated Appurtenances (US\$ 577.14 million);

Component 2: Dam Safety Institutional Strengthening (US\$45.74 million);

Component 3: Incidental Revenue Generation for sustainable operation and maintenance of dams (US\$26.84million);

Component 4: Project Management (US\$68.13 million).

Component 5: Contingency Emergency Response Component (US\$0 million).

The project is likely to be implemented for 300 dams in 18 states across the country. 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. In addition to saving lives, improved dam safety will avoid potential flood damage to houses, farm areas, infrastructure (roads, bridges, other public and private infrastructure) and industrial and commercial facilities. Improved dam safety will also reduce the likelihood of service interruptions due to dam failure as well as potentially improving dam service provision, overall efficiency and storage capacity, including during drought periods.

**1.2 SUB-PROJECT DESCRIPTION – ASAN BARRAGE**

---

Asan barrage has been built across river Asan, a major tributary of River Yamuna in Dehradun District of Uttarakhand. The catchment area of Asan river upto the barrage site is 685sq km.

Asan barrage was constructed during the period from 1965 to 1967 by the UP Irrigation Department. It is named after Asan river. The Asan barrage is located on the confluence of River Asan and tail race of Dhalipur Power House. The Asan barrage is designed to divert 270 cumec of water through a 4 km long power channel. Out of this discharge, 70.8 cumec passes through the silt ejector tunnel and 199.2 cumec is used for power generation at Kulhal HEP. Thereafter, it is continued to Khara HEP at Saharanpur. The project was taken over and being operated by UJVNL since 2010. Following are the main structures under this project:

- Asan barrage and head regulator
- Power channel , 4 km long

- Silt ejector channel , 620 m long
- Power house of 30 MW installed capacity at Kulhal
- Tail race channel

Salient features of the Asan barrage project are reported below:

<b>Project Name</b>	Asan Barrage
River Basin	Yamuna
River/Stream	Asan
District	Dehradun
Latitude/Longitude	30 <sup>0</sup> 26' 9.56" / 77 <sup>0</sup> 39' 56.84"
Type of Project	Run off the river hydro project
Gross Command Area (GCA)	NA
Cultivable Command Area (CCA)	NA
Hydro Power Installed Capacity	30 MW
Average Annual Energy Generation (MU):	164 MU
Domestic/Municipal/Industrial Water Supply (Annual)	NA
<b>Dam</b>	
Type	Concrete barrage
Total length of the Main dam	NA
Length of Embankment dam	NA
Length of Masonry/Concrete dam	288 m
Top width of Embankment Dam	NA
Top width of Masonry/Concrete Dam	NA
Elevation of top of Embankment Dam	NA
Elevation of top of Masonry/Concrete Dam	403 m
Elevation of top of Upstream Solid Parapet Wall	NA
Height of Embankment Dam above Lowest River Bed Level	NA
Height of Masonry/Concrete Dam above deepest foundation level	19.80
Lowest River Bed Elevation	395.95m
Deepest Foundation Elevation	383.20m
<b>Saddle Dam</b>	NA
<b>Spillway</b>	
Type of Spillway	Ogee spillway
Length of Spillway	200.88 m
Location of Spillway	Main barrage on right of under sluices
Spillway Crest Level	395.95m
Number of bays	10
Total Discharging Capacity at MWL	3214cumec
Spillway Gate	Vertical lift
Spillway gate size	18.288 m width & 5.55 m height
Type of Hoist for Spillway Gates	Rope drum
Type of Energy Dissipation Arrangement	Slotted roller bucket
<b>Sluice Arrangement</b>	NA
<b>Under sluice arrangement</b>	
No of sluices & sill level	4; 395.95 m

Size of service gates	18.288 m width & 5.55 m height
Discharge capacity	1286 cumec
Type of service gates	Vertical lift
<b>Reservoir</b>	
Catchment Area at barrage site	685 sq km
Maximum Water Level	401.50 m
Full Reservoir Level	401.30 m
Minimum Draw Down Level	400.23 m
Gross Storage Capacity at FRL	160 MCM
Live Storage Capacity	160 MCM
Date of Starting the Construction	Dec 1965
Date of Completion	June 1967
Date of first full impoundment	June 1967
Original Inflow Design Peak Flood	4500 cumec
Maximum observed flood peak and date	3129 cumec on 16/06/2013
Revised Inflow Design Peak Flood	8056 cumec

### 1.3 PROPOSED INTERVENTIONS/ACTIVITIES AND INTENDED OUTCOMES

The Dam Safety Review Panel (DSRP), constituted by CWC, Government of India for the purpose of inspection of the those projects which are planned to be undertaken for the repair, rehabilitation and modernization work under World Bank funded DRIP-II schemes, made a visit to Asan barrage on 14/01/2020 for inspection purpose and recommended measure to improve the safety and performance of barrage 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 barrage operations, management and maintenance, with accompanying institutional reforms. The project will improve the safety and operational performance of barrage and mitigate risks to ensure safety of downstream population and property. The following rehabilitation 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.

#### **PART A:**

##### **Structural Rehabilitation Works**

- Special rehabilitation work of Asan barrage and other associated structures
- Construction of bridge (35 m span, steel girder bridge over land owned by UJVN Ltd) across power channel & parallel to HR bridge of Asan barrage

##### **Structural Measures for ensuring hydrological safety**

- Repair and overhauling of hoisting arrangement of barrage gates
- Major repair/refurbishment of hoisting arrangement of HR gates of barrage
- Providing and fixing of chequered plates at Hoist Bridge of barrage gates & HR gates including miscellaneous fabrication works
- Protective coating (cold galvanized/polypoxy coating) on barrage & head regulator gates at Asan barrage



**Basic Facilities Improvement**

- Providing fencing and caution / warning sign board around barrage, power channel and its associated structures
- Repair of syphons
- Construction of four no of each type III (80 sqm each) & type IV (138 sqm each) residential quarters at Dhakrani (on land owned by UJVN Ltd) for O&M staff of Asan Barrage

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

- SITC of gate position sensor with display for 9 no of gates integration with existing SCADA system
- Installation of discharge measurement system
- Supply, installation, testing & commissioning of online silt monitoring system at Asan barrage
- Procurement of vehicles for O & M staff
- Hiring of vehicle

**Tourism/Fisheries/Hydropower Development**

- Development of the area around the barrage

**Others**

- Hydrographic survey in reservoir area of barrage
- Study of petrographic and water quality analysis
- Safety audit of bridges located on the barrage and head regulator & power channel
- Consultancy for rehabilitation and other civil works

**PART B:****Basic facilities improvement**

- Repair of damaged roads associated with barrage and power channel and its appurtenant structures
- Reconstruction of damaged catch water drain parallel to service road and power channel
- Repair of the damaged portions of power channel
- Repair of pitching on both banks of power channel
- Development of training center at Dhakrani, Dehradun
- Special strengthening of various bridges across power channel

*The above "Tourism Fisheries and Hydropower Development" component are not considered as part of present ESDD as feasibility studies including various options and their possible impacts on environment and social are yet to be carried out. ESDD on these sub-components will be conducted separately once the planning/design and feasibility studies have been completed.*

Similarly, Basic Facilities Improvement items listed under Part B, are not being taken up at the present time and therefore are not considered as part of the ESDD.

**Figures 1.1 and 1.2** provide photographs of key infrastructure proposed for rehabilitation works and also major interventions locations.



Damage Energy Dissipation System of Asan Barrage



Eroded Apron on Barrage



Damaged railing Barrage



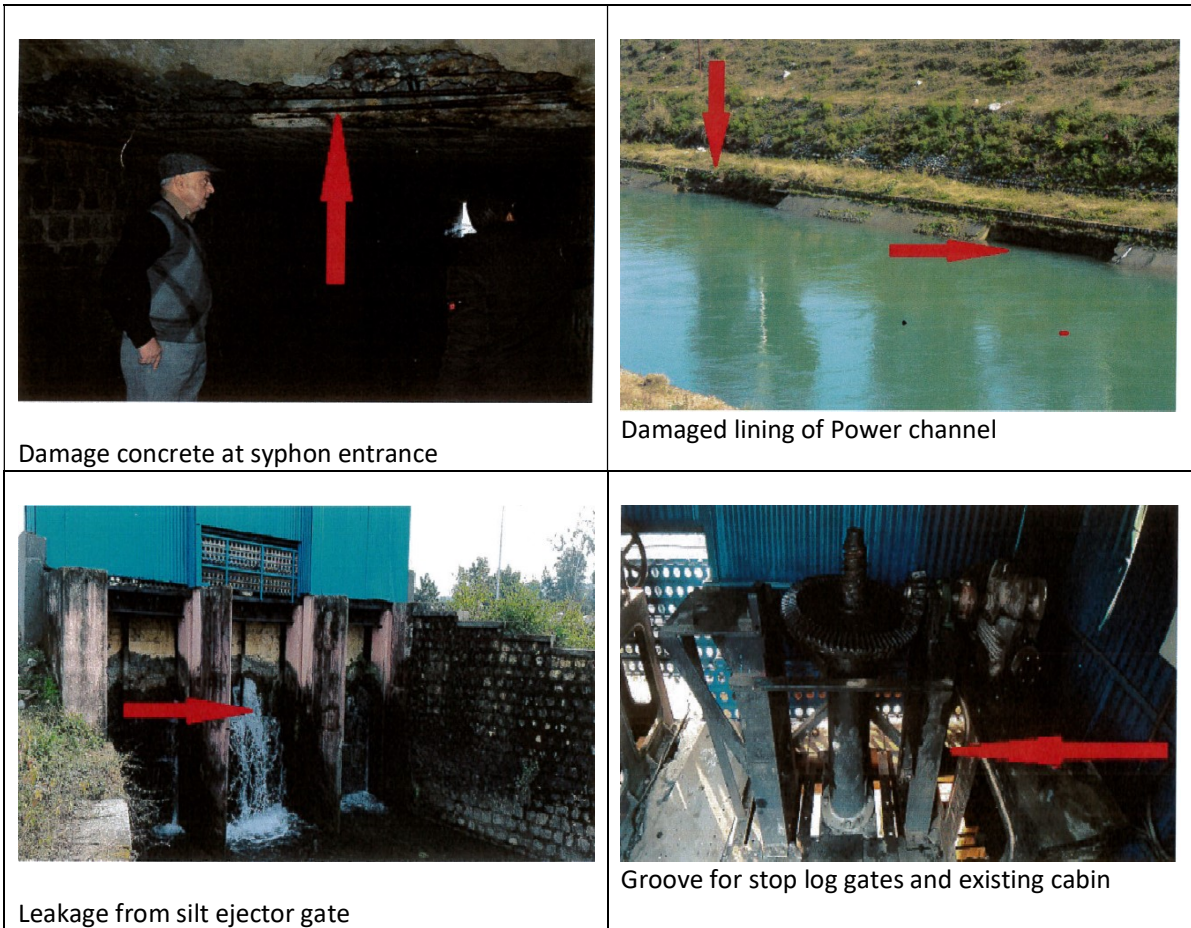
Silt deposit in Front of bay on 8 to 14 down steam of barrage



Damaged shoe of hoist bridge column of HR



Damaged service road on right bank of power channel



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



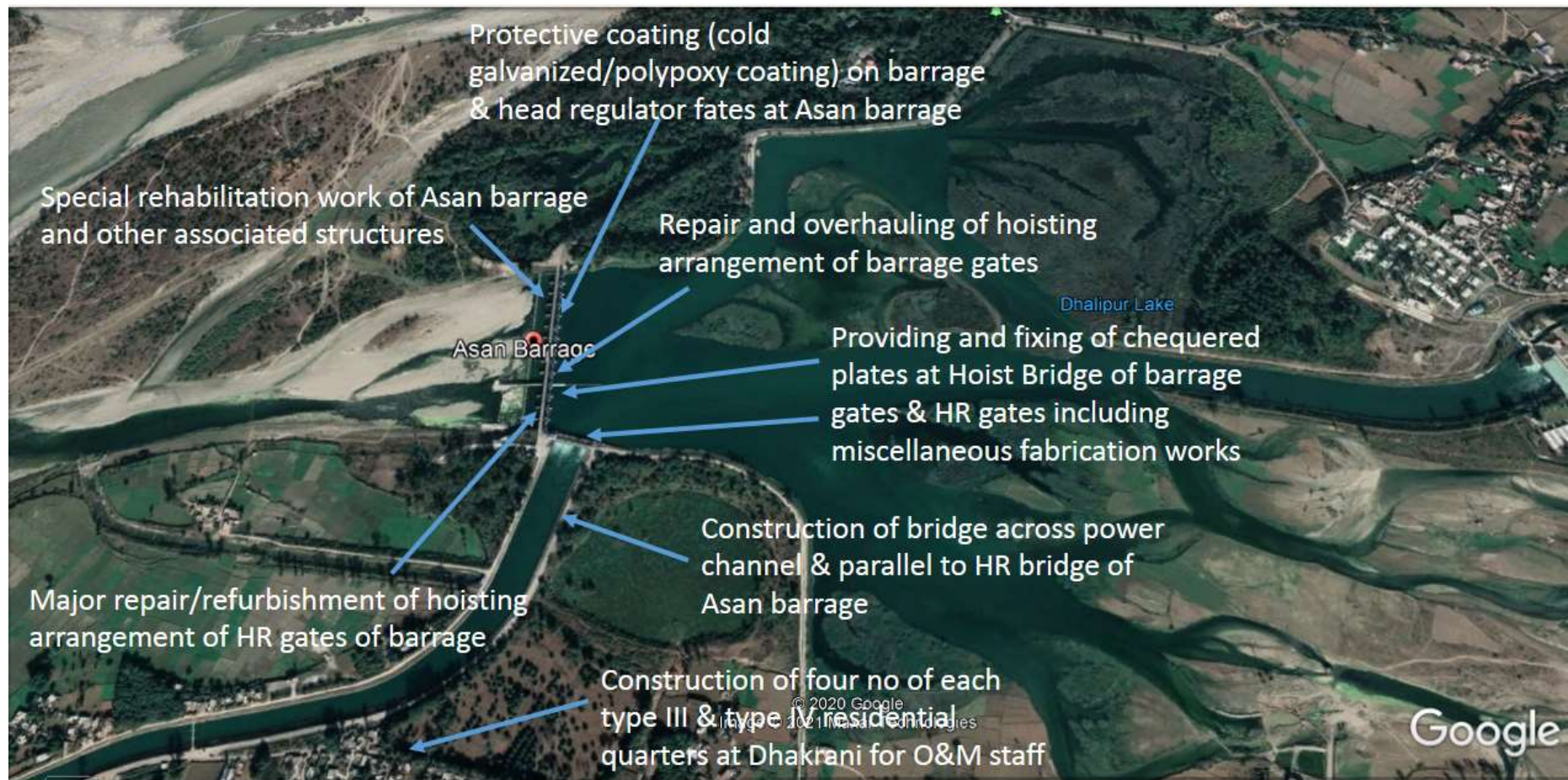


Figure 1.2: Project Area showing major intervention locations

## 1.4 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 works main package, other package and instrumentation. Civil work will be carried out by contractor(s) as these are labour intensive activities and would be completed over a period of 36months. Project Authority 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 (MM/DD/YYYY) : 01/08/2021

Proposed Ending of implementation (MM/DD/YYYY) : 31/07/2024

Implementation Duration (months) (MM) : 36months

**b) Timeline phasing of implementation:**

Sl. No.	Description	From (month/year)	To (month/year)	Status of Procurement Process
1	Civil Work – Main Package	01/08/2021	31/07/2024	Procurement process will beinitiated after obtaining approval of the PST from World Bank.
2	Other Packages	01/08/2021	31/07/2023	
3	Procurement – instrumentation, goods, inspection vehicles	01/12/2022 – 31/03/2024		

## 1.5 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:

- To identify, evaluate and manage the environment and social risks and impacts of the sub-project in a manner consistent with the ESSs;
- 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;
- To help identify differentiated impacts on the disadvantaged or vulnerable, if any, and to identify differentiated measures to mitigate such impacts, wherever applicable;

- iv. To assess the relevance and applicability of environmental and social institutions, systems, laws, regulations and procedures in the assessment, development and implementation of projects, whenever appropriate; identify gaps, if any exist, and
- v. To assess borrower's existing capacity, gaps therein, and identify areas for enhanced capacity towards management of E&S risks.
- vi. Based on the categorization of Environment and Social risks and impacts of the barrage sub-project, to determine whether ESIA is to be carried out using independent third- party agency or a standard ESMP customized to mitigate E&S risks and impacts will suffice.

## **1.6 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.

Stakeholder consultations with communities living downstream/vicinity of the barrage, could not be held in the current circumstances due to COVID and these shall held as soon as situation is conducive for holding such consultations.

**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 has 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" and is under publication 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 areas (PA).

For the proposed rehabilitation activities at Asan barrage, regulatory clearances will not be applicable as neither it is a new barrage project nor any forest land required for the rehabilitation work. The barrage is located within Asan Conservation Reserve and only rehabilitation work is proposed on the existing structures, therefore wildlife clearance will not be applicable. Project authorities will intimate the wildlife department before start of rehabilitation work and follow their guidelines for transportation of man and material on the routes passing through the conservation reserve. Other applicable regulatory requirements are discussed in ESMF.

## **2.2 DESCRIPTION OF INSTITUTIONAL FRAMEWORK**

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The sub-project will be implemented by Uttarakhand Jal Vidyut Nigam Limited (UJVNL). UJVNL have in-house expertise to address E&S issues. As per the suggestions of CPMU/CWC, if required consultancy services of Environmental and Social experts to assist the department in resolving specific E & S issues shall be outsourced

A formal GRM system has also been established for dealing with external complaint at head office level and the same is connected to project site level. There is also an internal complaint committee as per Sexual Harassment Act at head office level and the same has used as platform for dam level also.

As committed in ESCP, a Grievance Redress Mechanism (GRM) will be established and operated by the contracted agencies to address Project workers workplace concerns before start of work. SPMU will have oversight responsibility on the functioning of the GRM.

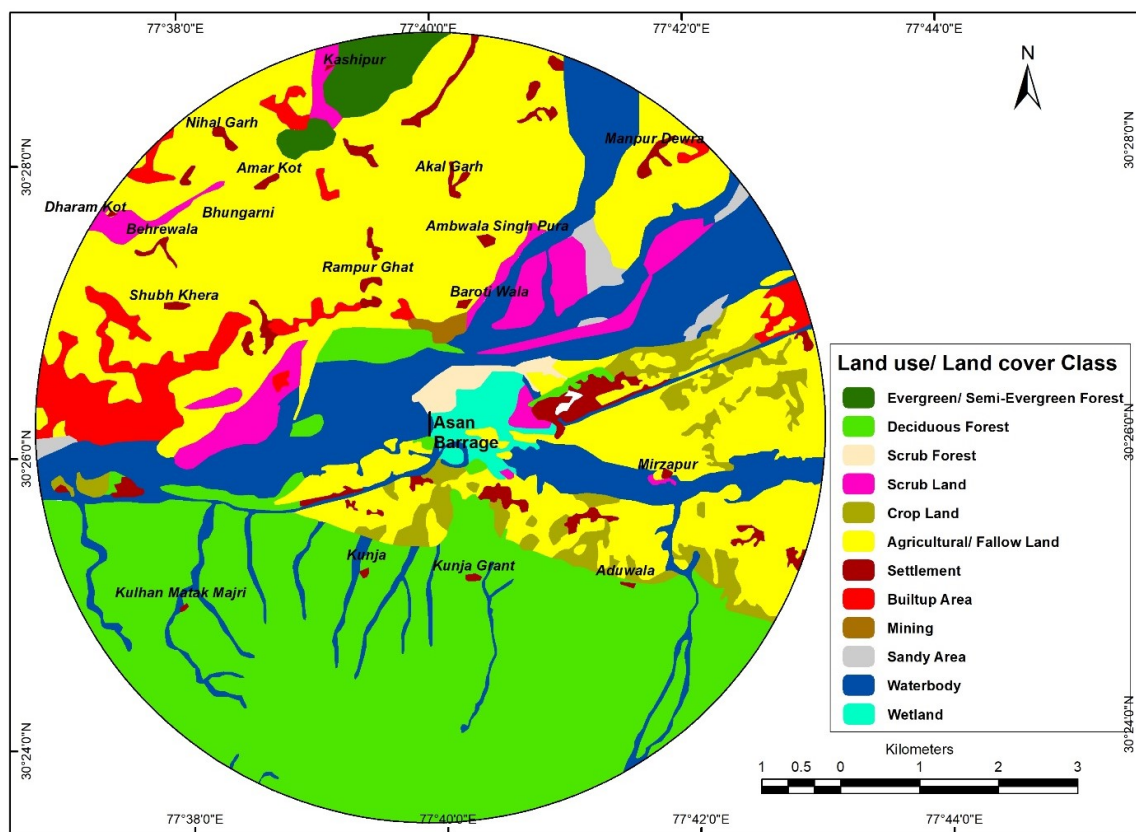


Assessment of physical, ecological and socio-economic conditions at barrage site and immediate surrounding has been carried out based on secondary information and site observations; as discussed below.

## 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 barrage is presented at **Figure 3.1**. Present land use is mainly deciduous forest and agriculture followed by scrub land and scrub forest, water bodies (mainly river and reservoir), wetland, settlement, evergreen/semi-evergreen forest, mining and sandy areas. There are 17 habitations or village falling in 5 km of radius of the Asan barrage; they are Kulhal Matak Majri, Kunja, Kunja Grant, Aduwala, Mirzapur, Baroti Wala, Rampur Ghat, Ambwala Singh Pura, Manpur Dewra, Akal Garh, Kashipur, Nihal Garh, Amarkot, Bhungarni, Dharam Kot, Behrewala and Shubh Khera.



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

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

## Natural Hazards

---

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

The maximum height and storage capacity of barrage are 19.8 m and 1.6 MCM respectively. As per BIS: 11223 – 1985 criteria, the barrage qualifies for 100 year return period flood as design flood and SPF as check flood. Project has been designed for a flood of 4500 cumec. The peak value of 100 year return period flood works out as 4442 cumec and SPF has been worked out as 8056 cumec. Hence, project has been advised by CWC to adopt 4500 cumec as design flood and 8056 cumec as check flood. It is proposed to carry out a detailed study of revised flood and remedial work to be proposed as per recommendation of the study during concurrency of DRIP II.

Project falls in earthquake zone IV, and same was considered at the time of design and there is no need for seismic design review. The 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

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Asan Barrage was commissioned in 1967; Asan Barrage and upstream area was declared as a Conservation Reserve in 2005 under Section 36A of Wildlife (Protection) Act, 1972 (see **Figure 3.2**). The reserve spread over an area of 444.4 ha.

Asan Conservation Reserve is home to many rare and endangered species and a significant wintering ground for migratory birds. Reserve has also been declared as first Ramsar Wetland site in Uttarakhand on 21/07/2020, under the Ramsar Convention, an international treaty for the conservation and sustainable utilization of wetlands, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value.

The damming of the River by the Asan Barrage in 1967 resulted in siltation above the dam wall, which helped to create bird-friendly habitats. These habitats support 330 species of birds including the critically endangered red-headed vulture (*Sarcogyps calvus*), white-rumped vulture (*Gyps bengalensis*) and Baer's pochard (*Aythya baeri*). More than 1% of the biogeographical populations of two waterbird species have been recorded, these being red-crested pochard (*Nettarufina*) and ruddy shelduck (*Tadorna ferruginea*). Other non-avian species present include 49 fish species, one of these being the endangered *Tor putitora*. Fish use the site for feeding, migration and spawning.

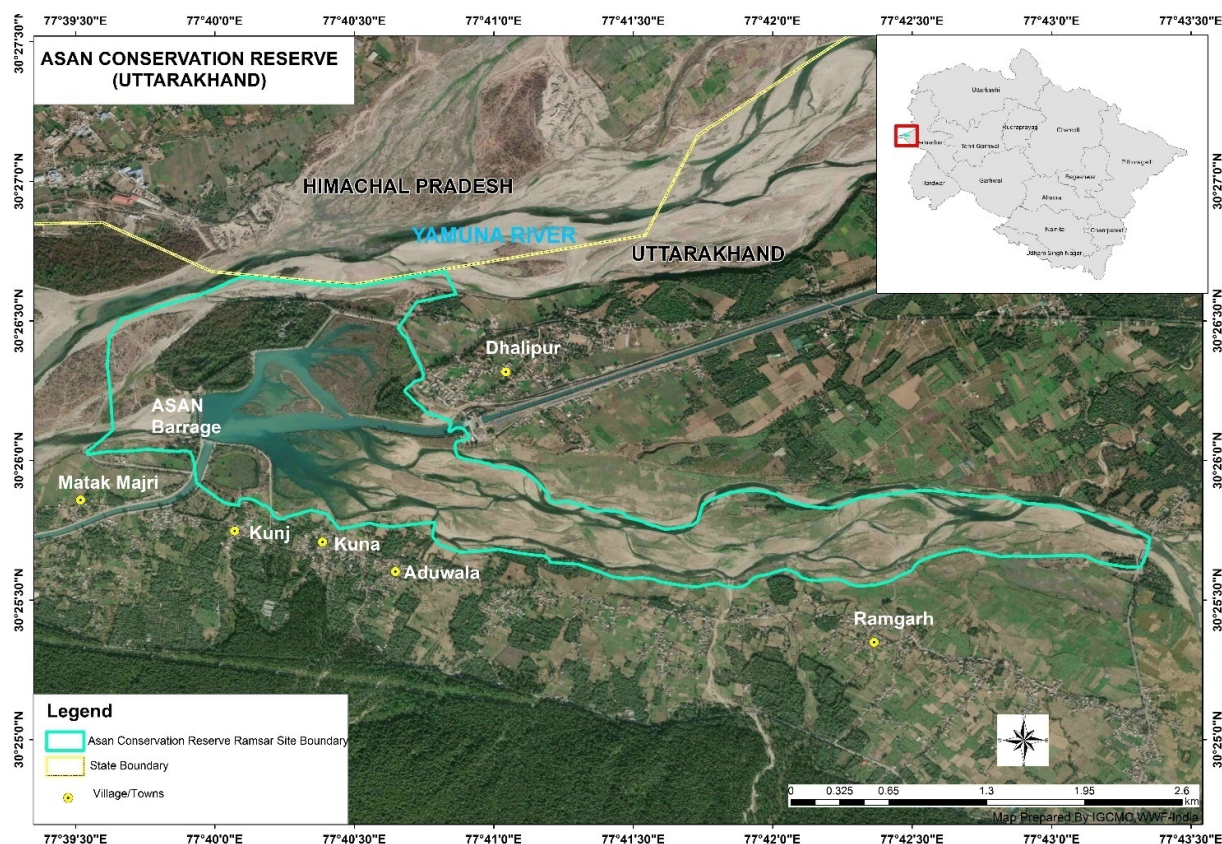


Figure 3.2: Protected areas around barrage location

### 3.3 SOCIAL ENVIRONMENT

The Asan Barrage project is located on the river Asan, which is a tributary of River Yamuna in district Dehradun in the state of Uttarakhand. Uttarakhand state does not have any Schedule V<sup>1</sup> areas.

The district is located in the Shivalik range of Himalayas on the western border of the state. The district consists of six tehsils and six community development blocks for implementation and monitoring of development schemes at rural level. As per census 2011, there are 748 revenue villages, out of which 731 villages are inhabited and 17 villages are un-inhabited.

There are three sectors of the economy i.e., primary, secondary and tertiary which reflect the direction of growth of any region. In Dehradun district, the tertiary (services) sector contributed the maximum share of 69.38 percent to Gross District Domestic Product (GDDP) which is much higher than that of Uttarakhand's share of 51.9 percent to Gross State Domestic Product (GSDP) in 2013-14. The district's primary (agricultural) sector

<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.

contributes just about 4.32 percent to GDDP while the secondary sector's contribution is 26.29 percent.

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

Description	Number	Respective %	Description	Number	Respective %
No. of Households	3,47,001	--	Household Size	5	--
Total Population	16,96,694	--	Population (0-6 age)	2,01,652	11.88
Male	8,92,199	52.58	Boys (0-6 age)	1,06,746	52.94
Female	8,04,495	47.42	Girls (0-6 age)	94,906	47.06
Sex Ratio	902		Sex Ratio (0-6)	889	
Population (SC)	2,28,901	13.49	Population (ST)	1,11,663	6.58
Male	1,20,430	52.61	Male	58,264	52.18
Female	1,08,471	47.39	Female	53,399	47.82
Literates	12,59,506	74.23	Literacy Rate (in %)	--	84.25
Male	7,02,216	55.75	Male	--	89.40
Female	5,57,290	44.25	Female	--	78.54
No. of Workers	5,82,768	34.35	Cultivators	77,176	13.24
Male	4,58,834	78.73	Agricultural Labours	38,195	6.55
Female	1,23,934	21.27	Household Industrial Workers	22,992	3.95
No. of Main Workers	4,88,161	83.77	Other Workers	4,44,405	76.26
No. of Marginal Workers	94,607	16.23			
Source: Census of India, 2011 (District Handbook)					

According to Census 2011, total population of the district is 16,96,694, out of which 52.58% are males and 47.42% are females with the sex ratio of 902. The population density is 549 persons per sqkm in the district. There are 11.88% population belongs to 0-6 age group, out of which 52.94% are boys and 47.06% are girls in the same age group with the sex ratio of 889.

The district has literacy rate of 84.25%. The male literacy rate in the district is 89.40% and that of female is 78.54%, thus a gender gap in literacy rate of 10.86% in the district.

In the district, the Scheduled Caste and Scheduled Tribe population is 13.49% and 6.58% respectively to the total population. The ST households will be taken into account during the preparation of Emergency Action Plan for the *Asan Barrage* Project.

Work participation rate of the district has observed about 34.35%, out of which 78.73% are male workers and only 21.27% are female workers, thus a significant gender gap in work participation rate of 57.46%.

Among the total work force in the district, 83.77% are Main Workers and 16.23% are Marginal Workers. About 13.24% workers are cultivators and 6.55% are agricultural

labourers. About 76.26% of work force is engaged in other than agricultural activities including 3.95% household industrial workers.

### **3.4 CULTURAL ENVIRONMENT**

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List of National Monuments in Uttarakhand and list of State Protected monuments in Uttarakhand have been reviewed. There are protected monuments identified by Archaeological Survey of India however none of them are in the vicinity of the project.

## 4.1 SUB-PROJECT SCREENING

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The subproject screening is undertaken following a three step screening methodology as described in ESMF. Process of risk /impacts identification is done using screening process considering the proposed interventions at each dam as provided in the Project Screening Template using first screening format (SF-1). Applicable interventions are further classified based on their location i.e. within dam area or outside the dam area. Each activity is reviewed for the applicability under-sub project, location of applicable activity and likely risks and impacts. The SF-1 format is used to ascertain the types of E&S risks for each of the proposed rehabilitation activity e.g. Risk/Impact on Water Quality, Fisheries, Conservation Area, Protected Area, Ecology, Physical Environment, Cultural Environment, Tribal Presence, Private Land/Assets/Encroachers/Squatters, Labour, Migrant Labour and GBV risks – each of these corresponding to the ESS 2-8.

The second format (SF-2) is used to assess the extent of risk/impact intensity for each of the identified E&S risk and is used to categorize the risk level as Low/Moderate/Substantial/High. Finally, using a third E&S risk summary format (SF-3), the risk categories for all different types of E&S risk and impacts is summarized and the highest of the risk categories is assigned as overall risk category for the given Dam sub-project. Based on the above findings, the ESDD report recommends Risk category of the Dam sub-project – whether it is Low/Moderate/Substantial/High and types of instruments that need to be prepared as part of the ESMP along with the responsibilities and timelines.

Outcome of three stage screening exercise is discussed below.

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

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



Pre-construction and construction stage major auxiliary or preparatory intervention are within barrage area. Deployment and haulage of heavy machinery, setting up of workshop, operation of concrete mixture and heavy pumps will be within barrage area. Other activities such as labour camp and debris disposal will also be kept within the barrage area due to its location falling within the conservation reserve. Activities involving machinery and equipment will have impacts on physical environment. Transportation of material, debris disposal and labour camp are likely to generate pollution and impact on physical environment. Due to its location within the conservation reserve, risk of outside labour, transportation of man and material and noisy civil and hydro-mechanical works will have the potential to impact the habitat of avian fauna.

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 barrage, set up construction equipment and machinery near work location at pre-determined/approved sites without impacting conservation reserve area. Influx of skilled migrant labour, albeit few in numbers, for construction works is likely. The labour will stay within the barrage premises; hence risk of SEA/SH is unlikely.

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

Each activity may have different type of risks/impacts and magnitude of separate risk may vary, as analysed under SF2. In SF2, each proposed rehabilitation activity is assessed for the nature of risk on various components of environment and social (based on SF1, Column 5) and then each one of these is separately evaluated for level of risk as Low, Moderate, Substantial or High; the highest risk level is recorded in column 5 of SF2 for each activity.

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 following activities as having Moderate Risks/impacts.

- Special rehabilitation work of Asan barrage and other associated structures (civil work)
- Construction of bridge across power channel & parallel to HR bridge of Asan barrage
- Repair and overhauling of hoisting arrangement of barrage gates
- Protective coating (cold galvanized/polypoxy coating) on barrage & head regulator gates at Asan barrage
- Labour Camps involved
- Major Debris Disposal involved

All other activities are categorized as low risk activities. E&S risks of none of the sub-activities for this sub-project is categorized as either 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 barrage water body	Land	Tribal	Labour	Cultural heritage	GBV/SEAH
Civil (within barrage Boundary)	M	M	L	M	None	L	M	L	M	None	L
Hydro Mechanical	M	M	L	M	None	L	L	L	M	None	L
Instrumental SCADA, surveillance	L	L	L	L	None	L	L	L	L	None	L
Painting	M	M	L	M	None	M	L	L	M	None	L
Road work	M	M	L	M	None	L	M	L	M	None	L
Safety measures (Siren, Lighting)	L	L	L	L	None	L	L	L	L	None	L
Major Civil Work like Additional Spill Way	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Major Hydraulic Structure (tunnelling)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Major Civil Work extending beyond barrage Area Like training Structure	M	L	L	L	None	L	M	L	M	None	L
Additional activities for Tourism /Solar/Fisheries/ Water recreation enhancement	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

**Criteria for Risk Evaluation:**

**Low:** Localized, temporary and Negligible

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

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

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

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

## 4.2 STAKEHOLDER CONSULTATION

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In light of the COVID 19 pandemic, that constrained holding of consultation meetings; stakeholder consultations could not be carried out. As soon as the situation becomes conducive, stakeholder consultations will be organized and report updated.

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

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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 barrage area except for labour camp and muck/debris disposal.
2. Execution of civil and hydro-mechanical work within barrage body will generate localised impacts on physical environment and resource use; pose risk of exposure of workers requiring personal protective equipment (PPE) use.
3. Civil works interfaced with water body especially like special rehabilitation work of Asan barrage and other associated structures, major repair/refurbishment of hoisting arrangement of HR gates of barrage etc may pose risk of water pollution and impact on fish fauna as well as impacts on land environment due to disposal of same on ground.
4. Construction waste, muck etc from above and Repair of syphons, Construction of four no of each type III & type IV residential quarters at Dhakrani for O&M staff etc require careful disposal at pre-identified and approved site to minimise the risk of pollution on this count.
5. Since the project is within conservation reserve which is home to several bird and fish species, there is risk of impact on ecology especially avi-fauna due to civil and hydro-mechanical works. Therefore, there is a need to control noise generation from rehabilitation work, plan waste disposal sites outside the conservation area and control the waste water discharge from construction sites.
6. Rehabilitation work would require labour to work on various sections of barrage involving working at height, working in confined spaces, working on reservoir side, etc; Further, workers will also be exposed to dust and noise and will have to handle chemicals/gases for some of the works; these will lead to occupational health and safety risks.

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

1. As the interventions are within the barrage premises and on the barrage structure, there shall be no adverse impacts on land and assets due to any sub-component or sub-activities
2. The barrage is not located in the Schedule V area, though, there is about 6.58% scheduled tribe population in the district and there are scheduled tribe households in vicinity and downstream areas. These households shall not be directly impacted by

project in any manner. These ST households will be taken into account during the implementation of Emergency Action Plan.

3. Influx of migrant labour will be low as these works require only few but very skilled labour. Also, these workers will mostly operate from labour camps within the barrage premises/proximity and hence there would be minimal interface with communities and therefore significantly lower SEAH/GBV risks.
4. Waste generation from labour colony can pollute drinking water sources of community, risk is low and can be mitigated by providing adequate sanitation facilities.
5. No impacts are envisaged on cultural heritage as no such sites are identified in project vicinity.
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 term 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 Water Quality, Physical Environment, labour and SEAH/GBV. The summarised environmental and social risks of identified activities with level of risk is presented in previous chapter. Environment risks of air, water, noise, land use, soil and resource use for special rehabilitation work of Asan barrage and other associated structures, construction of bridge across power channel, repair and overhauling of hoisting arrangement of gates, protective coating (cold galvanized/polypoxy coating) on barrage & head regulator gates, are considered moderate. Similarly, environment and social risk of labour camp and disposal of debris has also been identified as moderate. Due to location of barrage in “Asan Conservation Reserve”, impact of rehabilitation work on protected area has also been considered moderate. Risk of all other activities has been identified as Low. These risks are low to moderate and localised, short term and temporary in nature which can be managed with standard ESMP and guidelines.

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

### 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.

In addition to overarching ESS1, four ESS standards are found relevant to this sub-project as per reasons given in **Table 5.1** below:

**Table 5.2: WB ESF Standards applicable to the sub-project**

Relevant ESS	Reasons for Applicability of the standard
ESS2: Labour and Working Conditions	Due to engagement of Direct worker, Contracted workers and Community workers (likely for EAP and other non-structural interventions) for rehabilitation work
ESS3: Resource Efficiency, Pollution Prevention and Management	Civil and hydro-mechanical work including resource consumption; requiring protection of physical environment and conservation of resources

Relevant ESS	Reasons for Applicability of the standard
ESS 4: Community Health and Safety	Rehabilitation work, although limited to barrage complex, can increase community exposure to risk and impacts; directly or indirectly.
ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural resources	Asan barrage falls within Asan Conservation Reserve which has recently been declared as Ramsar Wetland site also. All interventions are planned on barrage and head regulator only, therefore no direct impacts have been identified on natural habitat, however, to eliminate risks of indirect impacts due to rehabilitation works especially because of waste and noise generation, Biodiversity Conservation Plan will be prepared.
ESS 10: Stakeholder Engagement Plan	For engagement of stakeholders in all structural and non-structural measures e.g. implementation of Early flood Warning system, siren systems, broadcasting facilities, 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 ESMP customised to sub-project will be prepared in accordance with the ESMF. It shall cover the following aspects:

- a. SPMU shall customise the standard Environmental and Social Management plan (ESMP) that has been provided in the Environmental and Social Management Framework (ESMF) and make it part of bid document for effective adherence by contractors.
- b. ESMP will provide due measures for labour management and protection of environment quality and resource conservation (during handling of resources) in line with ESF standard ESS2 and ESS3 respectively. Likewise, due attention will be given to Occupational Health and Safety of workers and community in line with the requirements of ESS4 and World Bank Group guidelines on Occupational Health and Safety (OHS). SPMU/IA shall customise the standard ESMP in line with outline provided in the ESMF and ensure its adherence by contractor. 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)
  - Bio-diversity Conservation Plan (ESS6)
  - Stakeholders Engagement Plan (ESS10)
- c. Contractor shall submit BOQ as per ESMP of the sub project.

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

**Table 5.3: List of Mitigation Plans with responsibility and timelines**

<b>WB-ESS Triggered</b>	<b>Mitigation Instrument</b>	<b>Responsibility</b>	<b>Timelines</b>
ESS1: Assessment and Management of Environmental and Social Risks and Impacts	<ul style="list-style-type: none"> <li>Gender Based Violence or SEA/SH related actions</li> </ul>	SPMU/IA	Before mobilization of contractor
ESS2: Labour and Working Conditions	<ul style="list-style-type: none"> <li>Labour Management Procedure (LMP) including OHS management plan</li> </ul>	SPMU/IA	Before mobilization of contractor
ESS3: Resource Efficiency, Pollution Prevention and Management	<ul style="list-style-type: none"> <li>Pollution Prevention and Environment Quality Management Plan (PPEQMP)</li> </ul>	SPMU/IA	Before mobilization of contractor
ESS 4: Community Health and Safety	<ul style="list-style-type: none"> <li>Community Health and Safety Management Plan (CHSMP)</li> </ul>	SPMU/IA	Before mobilization of contractor
ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural resources	<ul style="list-style-type: none"> <li>Biodiversity Conservation Plan</li> </ul>	SPMU/IA	Before mobilization of contractor
ESS 10: Stakeholder Engagement Plan	<ul style="list-style-type: none"> <li>Stakeholder Engagement Plan</li> </ul>	SPMU/IA	By negotiation

ESDD and ESMP will be placed on the [www.damsafety.in](http://www.damsafety.in) website as well as other accessible locations such as the office of Engineer in Charge at barrage site as well at SPMU for reference and record. These documents would be disclosed/disseminated through other appropriate means like project meetings, workshops etc. Each IA 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 customized for the sub project by SPMU/IA from standard ESMP included in ESMF and shall be shared with CWC by SPMU for their review/endorsement and approval before including in the bid document.

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

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

SPMU/IA shall establish and operationalize a grievance mechanism to receive and facilitate resolution of complaints and grievances, from the communities and other stakeholders including implementation partners. GRM works within existing legal and cultural frameworks and shall comprise project level and respective State level redressal mechanisms. Most Project related grievances could be minor and site-specific.

EMC (Engineering and Management Consultant) 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 barrage level. EMC will develop formats for regular supervision and monitoring on E&S issues and undertake site visits/ inspections of the dam sites to monitor for compliance; collate and review QPRs and set up a monitoring and reporting system on E&S issues.

Overall, the proposed activities within this barrage sub-project have low to moderate risks resulting in the 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.





## 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), 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 and related sub activity 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 u/s face treatment etc.)	A	DI	WQ, F, PE, L, G
5	Structural Improvement/Repair work -Downstream of Dam site (with no interfacing with dam reservoir)	A	DI	PE, L, G
6	Re-sectioning earth dams to safe, stable cross sections	NA		
7	Hydro-mechanical activities with interface with dam reservoir	A	DI	WQ, 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
10	Basic Facilities (like access road improvement, renovation of office, etc)	A	DI	PE, L, G
11	Utility installation like standby generator, or setting up solar power systems	NA		
12	Painting of dam u/s or d/s or both faces	A	DI	PE, L
13	Water recreation activities	NA		
14	Tourism Development	NA		
15	Installation of Solar power/floating solar	NA		
16	List any other component not listed above			
<b>B</b>	<b>Pre-construction and construction stage major auxiliary or preparatory intervention</b>			
1	Acquisition (diversion of forests land for non-forest purposes) of forest land	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), 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	Acquisition of private land Resettlement and Rehabilitation (including physical or economic displacement/impact on livelihood;	NA		
3	Temporary loss of business or Damages to crops or trees or structures outside the ROW during Construction activities by Contractor	NA		
4	Borrowing earth to meet Borrow materials requirement	NA		
5	Sourcing of Quarry materials	NA		
6	Blasting	NA		
7	Setting up Labour Camps (location within dam premises or outside)	A	DI	WQ, PE, L, G
8	Heavy machinery deployment and setting up maintenance workshop	A	DI	PE, L, G
9	Setting up Hot mix plant	NA		
10	Deployment of Concrete mixture and heavy pumps	A	DI	PE, L, G
11	Temporary land acquisition	NA		
12	Need of Tree felling/ vegetation clearance	NA		
13	Disposal of large amount of Debris	A	DI/DE	PE, L
14	Transport of large construction material	A	DE	PE, L
15	Utility shifting	NA		
16	Discharge of reservoir water (lowering of reservoir water involved)	NA		

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

## Annexure II: Form SF2

Sl. No	Applicable Sub-Project Component/ Construction preparatory Work-related Sub activity (As per SF-1)	Nature of Risk (Conforming to Column 5 of SF-1) and nature of sub activity	Elaborate cause (risk) and its effect (Impact) on environment /social	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>StructuralStrengthening/Improvement/Repair work -upstream of Dam site</b>			
a	Special rehabilitation work of Asan barrage and other associated structures	WQ, F, PE, L, G	Air and noise pollution, Risk of increase in reservoir water turbidity, Impacts on fish, Impacts on birds (conservation reserve) due to works/noise, Land contamination due to disposal of waste, Labour and GBV risk	<b>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	Construction of bridge across power channel & parallel to HR bridge of Asan barrage	PE, L, G	Air and noise pollution, Land contamination due to disposal of waste, Impacts on birds (conservation reserve) due to works/noiseLabour and GBV risk	<b>M</b>
b	Approach road for the proposed bridge across Power Channel parallel to HR bridge of Asan Barrage.	PE, L, G	Air and noise pollution, Impacts on birds (conservation reserve) due to works/noise labour and GBV risk	<b>L</b>
<b>3.</b>	<b>Hydro-Mechanical activities Down - stream of Dam Site (with no interfacing with dam reservoir)</b>			
a	Repair and overhauling of hoisting arrangement of barrage gates	WQ,PE, L, G	Water pollution, noise pollution, Generation of construction waste/debris, Impacts on birds (conservation reserve) due to works/noise, Labour & GBV risk	<b>M</b>
b	Major repair/refurbishment of hoisting arrangement of HR gates of barrage	WQ,PE, L, G	Water pollution, noise pollution, Impacts on birds (conservation reserve) due to works/noise, Labour & GBV risk	<b>L</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
c	Providing and fixing of chequered plates at Hoist Bridge of barrage gates & HR gates including miscellaneous fabrication works	PE, L	Noise pollution, Generation of waste material from packaging etc, Impacts on birds (conservation reserve) due to works/noise, Labour risk	L
d	Protective coating (cold galvanized/polypoxy coating) on barrage & head regulator gates at Asan barrage	WQ, L	Water pollution, , Labour risk	M
4	<b>Basic Facilities Improvement</b>			
a	Proving fencing and caution / warning sign board around barrage, power channel and its associated structures	PE, L, G	Air and noise pollution, Generation of muck and construction debris, Generation of waste material from packaging etc, Labour and GBV risk	L
b	Construction of four no of each type III & type IV residential quarters at Dhakrani for O&M staff	PE, L, G	Air and noise pollution, Generation of muck and construction debris, Generation of waste material from packaging etc, Labour and GBV risk	L
c	Improvement of existing stores and guard rooms at Asan Barrage.	L, G	Air and noise pollution, Generation of muck and construction debris, Generation of waste material from packaging etc, Labour and GBV risk	L
d	Refurbishment of left bank inspection road of Asan Barrage reservoir.	PL, G	Air and noise pollution, Generation of muck and construction debris, Generation of waste material from packaging etc, Labour and GBV risk	L
e	Safety audit of Bridges located on the Barrage and Head Regulator	L, G	Air and noise pollution, Labour and GBV risk	L
f	Special strengthening of bridges as per safety audit report	L, G	Air and noise pollution, Generation of muck and construction debris, Generation of waste material from packaging etc, Labour and GBV risk	L
5.	<b>Instrumentation, SCADA, Surveillance system, etc.</b>			
a	SITC of gate position sensor with display for 9 no	PE, L	Generation of waste material from packaging	L

Sl. No	Applicable Sub-Project Component/ Construction preparatory Work-related Sub activity (As per SF-1)	Nature of Risk (Conforming to Column 5 of SF-1) and nature of sub activity	Elaborate cause (risk) and its effect (Impact) on environment /social	Risk/Impact intensity for each type of risk/impact Low (L) , Moderate (M), Substantial (S), High (H)
1	2	3	4	5
	of gates integration with existing SCADA system		etc, Labour risk	
b	Installation of discharge measurement system	PE, L	Generation of waste material from packaging etc, Labour risk	L
c	Supply , installation, testing & commissioning of online silt monitoring system at Asan barrage	PE, L	Generation of waste material from packaging etc, Labour risk	L
<b>B.</b>	<b>Pre-construction and construction stage major auxiliary or preparatory intervention</b>			
1	Setting up Labour Camps (location within barrage premises or outside)	WQ, PE, G	Wastewater generation from domestic activities, waste generation, GBV risk within labour and involving community.	M
2	Heavy machinery deployment and setting up maintenance workshop	PE	Heavy machinery will be deployed for repair and maintenance of hoists and for other activities - risk due to machine handling, waste, wastewater and air emissions from machines operations, hazardous waste generation from oil waste	L
3	Deployment of concrete mixture and heavy pumps	PE	Concrete mixture and pumps will be deployed for road repair and other civil works and dewatering - risk due to machine handling, waste generation, wastewater and air emissions from operations, hazardous waste generation from oil waste	L
4	Disposal of large amount of Debris	PE	Debris will be generated from various repair activities, risk during debris handling, air and noise emissions from debris handling and transportation, water pollution risk due to debris finding its way to water body	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
5	Transport of large construction material	PE, L	Material will be transported from various vendors and suppliers to site for civil, hydro-mechanical work and instrumentation, air and noise emissions from transportation	L

**Criteria for Risk Evaluation:**

**Low:** Localized, temporary and Negligible

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

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

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

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