DAM REHABILITATION AND IMPROVEMENT PROJECT (DRIP)
Phase II

(Funded by World Bank)

KANJHARI DAM
(PIC:OR10MH0119)

ENVIRONMENT AND SOCIAL DUE DILIGENCEREPORT

OCTOBER 2020

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ABBREVIATIONS AND ACRONYMS

AIDS	:	Acquired Immunodeficiency Syndrome
CA	:	Conservation Area
COVID	:	Coronavirus Disease
CPMU	:	Central Project Management Unit
CWC	:	Central Water Commission
DPR	:	Detailed Project Report
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
GRM	:	Grievance Redressal Mechanism
HIV	:	Human Immunodeficiency Virus
IA	:	Implementation Agency
IPF	:	Investment Project Financing
LMP	:	Labour Management Procedure
MCM	:	Million Cubic Meters
MDDL	:	Minimum Draw Down Level
MWL	:	Maximum Water Level
OHS	:	Occupational Health & Safety
PA	:	Protected Area
PDO	:	Project Development Objective
PE	:	Physical Environment
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
SEA	:	Sexual Exploitation and Abuse
SEAH	:	Sexual Exploitation Abuse and Harassment
SF	:	Screening Format
SH	:	Sexual Harassment
SPMU	:	State Project Management Unit
ST	:	Scheduled Tribes
WB	:	World Bank
WQ	:	Water Quality

EXECUTIVE SUMMARY

The Kanjhari Irrigation sub-project is a medium category irrigation scheme in Baitarani Basin across the river Kanjhari near village Keonjhargarh, Keonjhar District with an earthen dam and distribution (canals) system providing irrigation to three tribal and backward blocks of the Keonjhar District. The reservoir has been created across Kanjhari river by constructing two homogeneous rolled fill earthen dam; left earthen dam and right earthen dam, of the total length of 1135 m with a maximum height of 29.50m. There are two head regulators; one on the left and the other on the right having design discharge of 5.74 and 6.75 cumec respectively. It has been proposed to undertake rehabilitation measures (structural, mon-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. Limited stakeholder consultations with communities living downstream/vicinity of the dam, has been carried out keeping in view COVID19 restrictions.

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. Environment risks of air, water, noise, land use, soil and resource use for Improvement of approach road from NH20 to Dam site, Construction of bridge on D/s of the spillway are Moderate. Similarly, environment and social risk of labour camp and disposal of debris has been identified as 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 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)
- Tribal Development Plan (ESS7)
- Stakeholders Engagement Plan (ESS10)

Overall, the proposed activities within this dam 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.

Chapter 1 INTRODUCTION

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 – KANJHARI DAM

The Kanjhari Irrigation sub-project is a medium category irrigation scheme in Baitarani Basin with an earthen dam and distribution (canals) system. It has been constructed across the river Kanjhari, a tributary of the Baitarani Basin near revenue village of Keonjhargarh, Keonjhar District. The Kanjhari subproject was started under World Bank assistance in the year 1978-79 and completed in the year 1990-91. Since 1991, the project has been providing irrigation to three tribal and backward blocks of the Keonjhar District, i.e.Ghatagaon, Keonjhar and Patna.

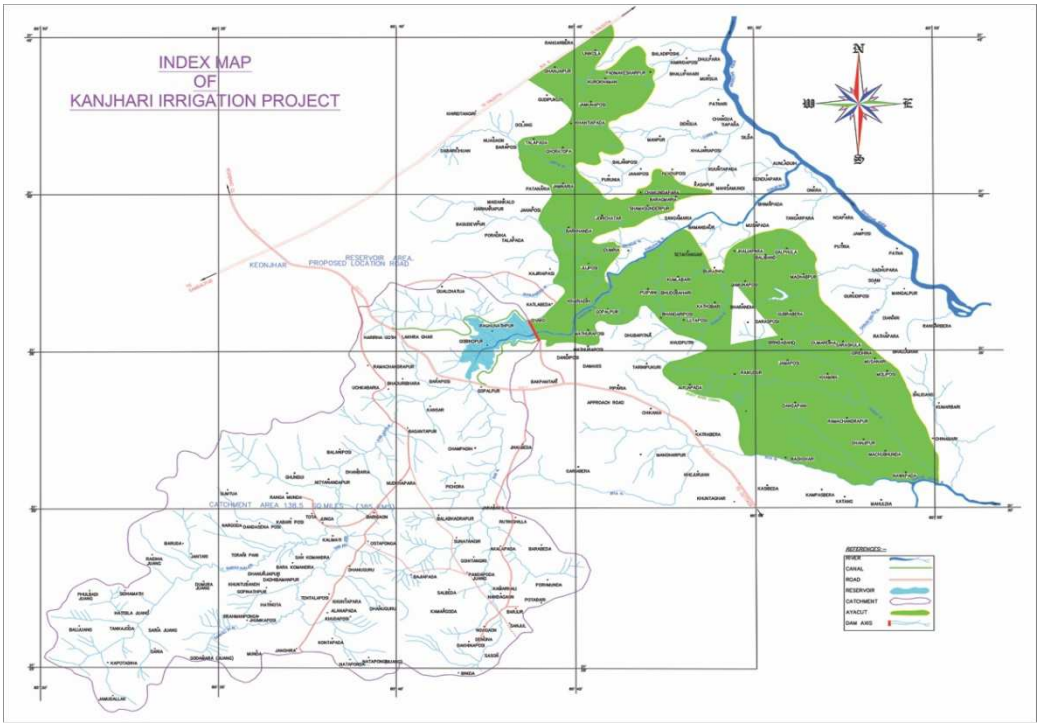


Figure 1.1: Map Showing Kanjhari Dam Project Area

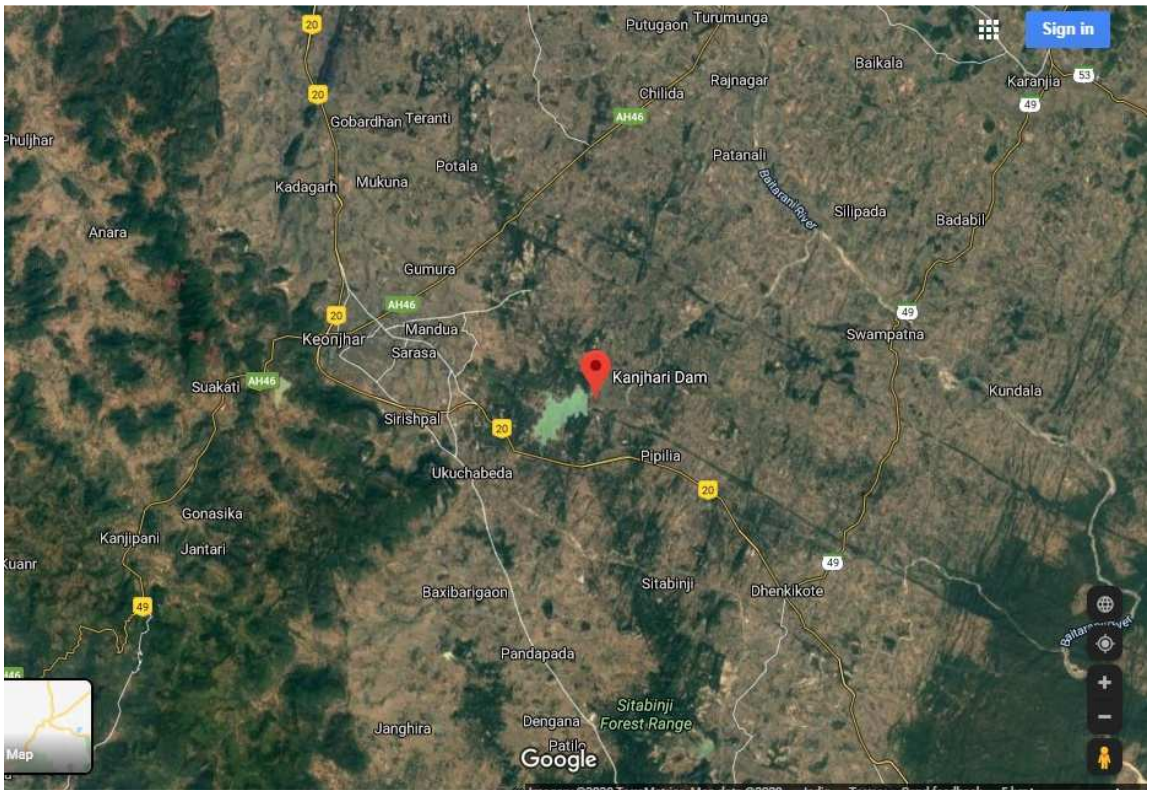


Figure 1.2: Satellite imagery of Kanjhari Dam and surroundings

Kanjhari Dam was constructed under the reservoir scheme across Kanjhari Nallah, a tributary of river Baitarani to provide irrigation to an ayacut of 9800 ha (CCA). The project is located at Latitude 21^0 35’ 30”N and Longitude 85^0 43’ 30”E near village Chaka in Keonjhar block of Keonjhar district. The construction of the Project commenced in 1980 and completed in 1989. The reservoir has been created across KanjhariNalla, by the construction of two homogeneous rolled fill earthen dam, namely left earthen dam and

right earthen dam, of the total length of 1135 m. with a maximum height of 29.50m. Catchment area at the dam site is 358.00 km^2. The dam has ogee shaped gated central spillway provided with seven nos. of 12 x 6 m radial gates. There exists a masonry non-over flow section of 13.50m length between the spillway and right earth dam. The spillway is provided with drainage gallery. The ski-jump bucket has also been provided for energy dissipation. There are two head regulators one on the left and the other on the right having design discharge of 5.74 and 6.75 m3/s respectively.

Salient features of the project are reported below:

i.	**Location :**	Near village Chaka in Keonjhar District of Odisha State.
a)	Latitude	21^0 35’ 30” N
b)	Longitude	85^0 43’ 30” E
c)	Topo sheet	73 G/10
ii**.**	**Hydrology** :	
a)	Catchment area	358.00 km^2.
b)	Maximum monsoon Rainfall	1704 mm
c)	Minimum monsoon Rainfall	835 mm
d)	Average monsoon before (1957-1976)	1298 mm
e)	Design Flood (Original)	2286 m^3/s
f)	Design Flood (Revised)	3157 m^3/s
iii**.**	**Reservoir**	
a)	Full Reservoir level	408.50m
b)	D.S.L.	398.00m
c)	Gross Storage capacity	40.52 Mm^3
d)	Submerged Are at MWL	5.164 km^2.
e)	Dead Storage Capacity	6.00 Mm^3
f)	Live Storage Capacity	34.52 Mm^3
iv**.**	Dam	
a)	Type	Homogeneous rolled fill earth dam
b)	The total length of Dam	1245 m
c)	T.B.L.	411.50 m
d)	Top width of Dam	6.00 m
e)	Maximum height of Dam	29.50 m
f)	Slope U/S. D/S	4:1 2.5:1
v**.**	**Spillway**	
a)	Type	Central spillway with ogee type
b)	Length of spillway	111.5m
b)	No. of Spillway span	7 Nos.
c)	Type of Gate	Radial
d)	Size of Gates	12 m x 6 m
e)	Crest level of Spillway	402.50 m
vi**.**	**Irrigation**	
a)	G.C.A.	14,410 ha.
b)	C.C.A.	9,800 ha.
c)	Area irrigated during Rabi	9800 ha.
d)	Area irrigated during Kharif	9800 ha.
e)	Annual irrigation	13390 ha.
f)	Length of Main Canal	
	Left Right	21.26 km. 15.09 km.

1.3 PROPOSED INTERVENTIONS/ACTIVITIES AND INTENDED OUTCOMES

Dam Safety Review Panel (DSRP) constituted by CWC, Government of India has inspected and made a review of Kanjhari Dam on 03/06/2019 and recommended measures 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.

A. Structural Rehabilitation Works

1. Extension of U/S pitching 1.5 m below the dead storage level.
2. Provision of wave breakers on the U/S rip-rap.
3. Renovation of surface drainage arrangement on the D/s face of the dam.
4. Removal of vegetation growth from the toe drain including renovation of toe drain at damaged patches.
5. Procurement of additional Generator.
6. Re-drilling of Foundation drainage holes & provision of new holes between old drain holes.
7. Treatment of peeled off the concrete of piers near trunnion by use of epoxy, jacketing, stitching with anchoring.
8. Removal of dowel bars from the spillway crest.
9. Treatment of cracks in the pier face.
10. Renovation of the ski-jump bucket.
11. Rehabilitation of side seal seats and bottom seal seats of radial gates & surface protected and painted.
12. Provision of the lightning arrester.

B. Structural Measures for Ensuring Hydrological Safety

1. Raising of D/S Return wall.

C. Non-structural Measures

1. Provision of Siren.

D. Basic Facilities Improvement

1. Improvement of approach road from NH20 to Dam site for a total length of about 3.1 Km with formation width of 7.5 m and black top width of 3.75m plus dam top road of 1.2 Km length, having 4 m width, out of which 3 m is black top and 0.5m is concrete berm on each side.
2. Construction of watch tower, control room, watchman shed and security arrangement.
3. Dam top lighting.
4. Renovation of IB.
5. Construction of bridge on D/s of the spillway - The bridge is proposed to be constructed at location of existing bridge which had been washed away. Length

of bridge is 115.89 m, width of the bridge is 7.15 m with approach road from left and right side having lengths of 810m and 520m respectively. Approach roads are having formation width of 7.5m, out of which 3.75m is black top.

E. Instrumentation, SCADA, Surveillance system, etc.

- Provision of Instrumentation like Piezometer, V-notch, Surface Settlement Marker, Pressure Gauge, Weather Station, Automatic Water Level Recorder, Rain Gauge Station & Accelerograph etc.

F. Tourism/Fisheries/Hydropower Development

The above Tourism/Fisheries/Hydropower Development hasnot been 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 this sub-component will be conducted separately once the planning/design and feasibility studies are completed.

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

Park At Dam Toe

Dam Top B.T. Road

Protection Wall At D/S Of Spillway

Foundation Gallary

Washed Away Bridge at D/S of Spillway

Renovation of Visitor House

Repair of Riprap of U/S Dam

Approach B.T. Road

Figure 1.3: Selected Photographs of Improvement/Intervention area

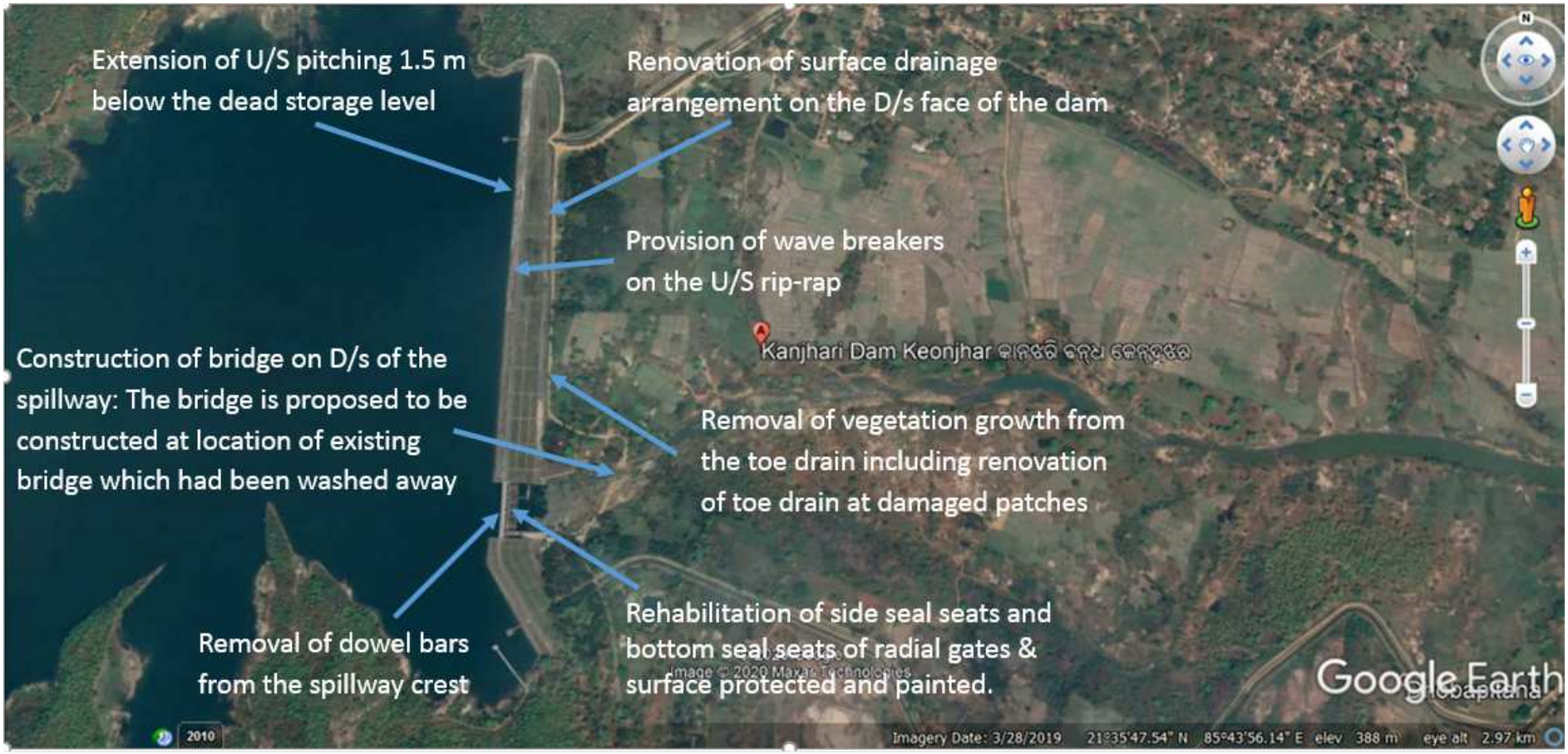


Figure 1.4: Project Area showing major intervention locations

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 2 years. SPMU will hire contractor(s) based on nationalopencompetitive procurementusinga RequestforBids(RFB)asspecifiedinthe WorldBank's-ProcurementRegulationsfor IPFBorrowers,July 2016,_RevisedAugust2018Procurement Regulations),andis open toallBiddersasdefinedintheProcurementRegulations. Following is the overall implementation and procurement schedule:

(a) Overall Phasing of Project Implementation:
Proposed date of commencement (MM/DD/YYYY): 1/10/2020
Expected date of completion (MM/DD/YYYY): 30/09/2022
Implementation Duration (months) (MM): 24

(b) Timeline phasing of implementation:

Sl. No.	Description	From (Month/Year)	To (Month/Year)	Status of Procurement Process
1	Civil Work – Main Package	01/10/20	31/03/22	Under Estimate
2	Other Packages	28/02/21	31/08/21	Under Estimate
3	Procurement of Goods (a) Provision for Instrumentation (b) Provision for the inspection vehicles	15/03/21	15/09/21	Under Estimate

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:

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, 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 Dam 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 dam, have been carried out in a limited way under the current circumstances due to COVID and these shall be held as soon as situation is conducive for holding such consultations.

Chapter 2 INSTITUTIONAL FRAMEWORK AND CAPACITY ASSESSMENT

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 (CA).

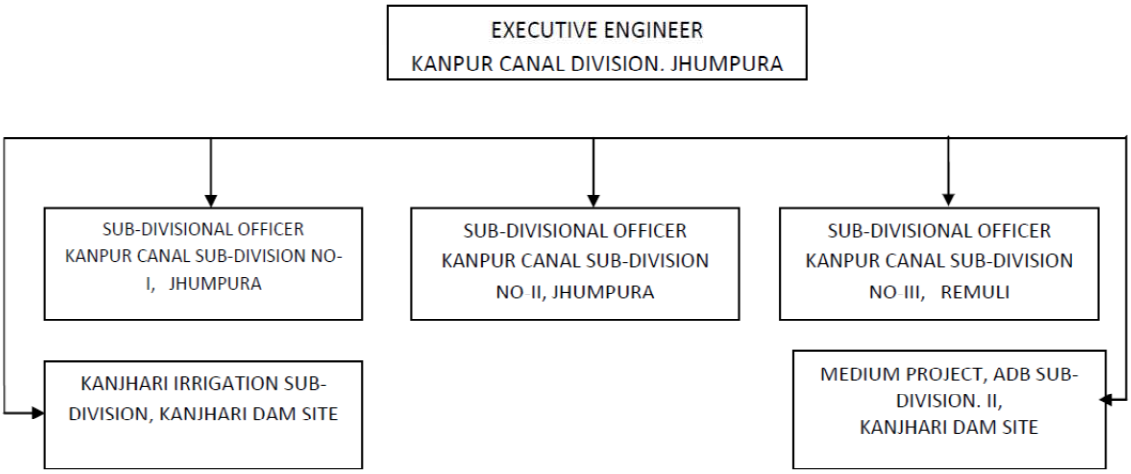
Therefore, for the proposed dam rehabilitation activities at Kanjhari Dam, which are limited to dam area and do not require any additional private or forest land and do not fall within any protected area; regulatory clearances will not be applicable as per Indian regulation.

2.2 DESCRIPTION OF INSTITUTIONAL FRAMEWORK

The sub-project will be implemented by Water Resources Department, Govt. of Odisha through Kanpur Canal Division, Jhumpura.

Sub-Project level:

The organizational structure of Kanjhari Dam is as follows:



Project Ownership Details:

Dam Owner	: Water Resources Department, Govt. of Odisha
Implementing Agency	: E. E., Kanpur Canal Division, Jhumpura

Details of Dam In-charge

Name	:Sri Ranjan Rashmi Nayak
Designation	:Executive Engineer
Phone No. (With STD Code)	:7978150400
E-mail:	: kcdivn@gmail.com
Contact Address	:O/o Executive Engineer, Kanpur Canal Division, Jhumpura, Keonjhar

There is one "Mo Sarkar cell" in Dam site Sub division office for Grievance Redressal Mechanism (GRM).There is no internal complaint committee as per Sexual Harassment Act either at dam level, which will be implemented before start of work. A Grievance Redress Mechanism (GRM) will be established and operated by the contracted agencies to address Project workers workplace concerns before start of the work. SPMU will have oversight responsibility on the functioning of the GRM.

Chapter 3 ASSESSMENT OF ENVIRONMENTAL AND SOCIAL CONDITIONS

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

Physiography and Relief

Kanjhari Dam is located in Keonjhar District of Odisha. The length of the district from north to south is nearly 145 Km, and the average breadth from East to West is about 65 Km, dividing into two widely dissimilar tracts-the lower Kendujhar and the upper Kendujhar. The former is a region of valleys and low lands, while the latter includes mountainous highlands with a general slope from North to South. The highlands, consisting of clusters of rugged crags, afford a safe retreat to its inhabitants in troubled times. The mountaintops appear to be sharp ridged or peaked from the low lands, but in reality, with extensive tablelands on their summits, are fit both for pasture and for tillage. The average elevation in its central part is about 500m. At places, isolated hills rise abruptly from the plains. But most of the areas have a general elevation of over 600m, which forms the watershed of some rivers.

The National Highway-215 transient through Keonjhar divides the district into two regions; to the east are the planes of Anandapur and a portion of Sadar Sub-division and to the West is a range of lofty hills which contains the highest peaks of Odisha, namely, Gandhamardan (3477 ft.), Mankadnacha (3639 ft.), Gonasika (3219ft.) and Thakurani (3003 ft.).

The river Baitarani originates from Gonasika Hills and flows to the north near the border of the Singhbhum district of Jharkhand, and it again flows East entering Anandapur Sub-division and the district of Bhadrak.

The elevation in the project command area varies from 380 to 400 m; the highest contour is 488 m near the dam as per Survey of India, Toposheet No. F45N10 &F45N14, 1:50,000 scale. The elevation in the region is around 50 m and the slope ranging from 10-20 m / Km as per NATMO District Planning Map series of Kendujhar, Odisha). From the survey data, the bed level from the Mean Sea level for the left bank is maxed 396.55m and minimum is 388.94 m and for the right main canal the max is396.55m and min is 393.04 m.

Climate

The climate of the district is characterized by an oppressively hot summer with high humidity from March to July, and cold from November to February. Summer generally commences in the month of March. The temperature begins to rise rapidly, attaining the

maximum in the month of May. During the summer, the maximum temperature is 38.20 C. The weather becomes more pleasant with the advent of the monsoon in June and remains as such up to the end of October. The temperature in the month of December is lowest, i.e. 11.7^0 C. Sometimes it even drops down to 7^0 C. The average annual rainfall is 1534.5 mm.

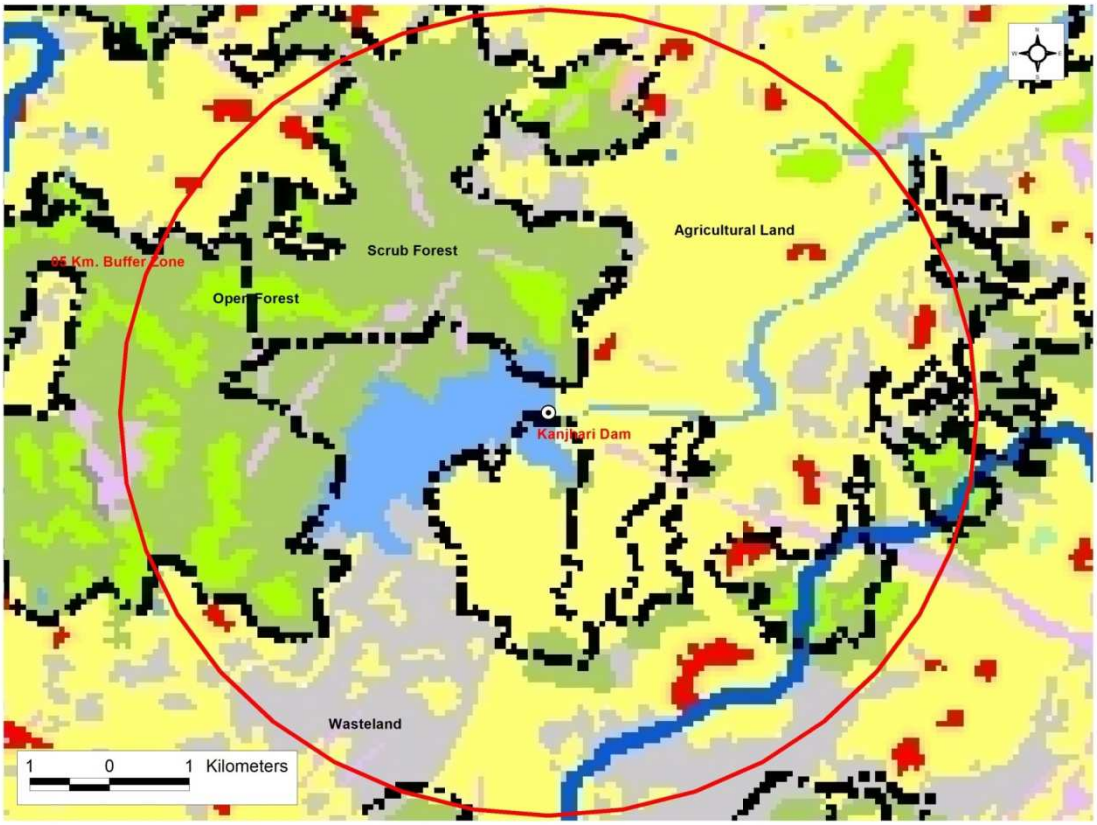


Figure 3.1: Land Use and Land Cover Map of 5 km radius around Dam site

Geology

The Keonjhar district has distinctive rocks which are some of the oldest rocks in the world, covering an area of 100 sq. Km at Asanpat, i.e. nearly 38,000 million years old. They must date from before peninsular India broke away from Antarctica and moved north. The rocks found in Nuasahi in the southern part of Keonjhar are intruded by granites and gneisses which may be equated with singhbhum granites. The Koira –Noamundi group comprising the gritty basal sandstone – quartzite with inter bedded conglomerate basic lava and tuff with excelled development of banded iron formation cherts, clay shale, black and banded shale overlies the SinghbhumGraniteun comfortably. The iron formation of Gandhamardhan hill lying west of Kendujhar is associated with quartzites, ferruginous shale, basalt and tuff form the south-eastern boundary of this group in the district. While the rocks of Kolhan group comprises and stone conglomerate with purple shale occurs as small outliers on the Koira group of rocks with an unconformity at the base. Dolerite dykes intrusive partly into Iron-ore and partly into Koira – Noamundi group form lineal topographical features in the flatgranite terrain to the north and east of kendujhar (Source District Gazetteers –Kendujhar).

While the geology of the dam site consists of rocks of massive granite and dolerite intrusive, these rocks are exposed as small outcrops on the right bank and as a large exposure on the right edge of the riverbed. The dolerite dykes trending in N-S direction are

exposed on the abutment hills and as scattered outcrops on the left bank. A thin dyke of dolerite trending E-W cut across the axis around RD 720 m(Source: Kanjhari irrigation project report- 1980).

In the dam site, the granite is of biotite – granite in composition with medium tocoarse-grained at places porphyritic, unifoliate and traversed by E-W and N-Sdirections. The dolerite exposures are covered with boulders mostly.

Soils & Drainage

Physio graphically Odisha State has been divided into seven physiographic regions, namely Eastern ghat, Garhjat hills, Dandakaranaya region, Mahanadi basin, Bengal Basin, Utkal basin and Mahanadi delta. The project area covers Kendhujhar, Patna, and Ghatgaon Tehsils the soils in these tehsils are mainly Balisahi series and Raghubera series. The Balisahi series are of fine mixed, hyperthermic, typic Haplustepts locally known as "BaliaChikitaMati". These are gently sloping soils ranging from 3 to 8% with moderate erosion, normal relief. The soils are of granite genesis and moderately well-drained and with moderate permeability. The thickness of the column ranges from 60 to 85 cm. The texture of a horizon ranges from sandy clay to sandy loam, while the horizon B texture varies from sandy clay loam to silty clay. These soils have a land capability subclass of IIIes and irritability sub-class of 3t. While Ghatgaon block has Raghubra series with fine loamy, mixed hyperthermic,typic Rhodustalfs locally known as BaliaDorasa Mati, these are moderately slopingwith 8 to 15% with severe soil erosion and excessive relief. These are of Granite and granite gneiss parent material with well-drained and with moderate permeability. The column is more than 100 cm thick; a horizon texture varies from sandy loam to sandy clay. B horizon texture varies from sandy clay to sandy clay as per Soil Series of Odisha, NBSS&LUP publication.

3.2 PROTECTED AREA

There are no national parks and wildlife sanctuaries within the vicinity of the project i.e. in 10 Km surrounding.

3.3 SOCIAL ENVIRONMENT

As per the Census 2011, the total population of Odisha state is 4,19,74,218 with a growth rate of 14 while Keonjhar district has a total population of 1,801,733 with a growth rate of 15.3. The literacy of the Odisha state is 73.45% while that of Keonjhar district is 68.2%, while the female literacy of the Odisha State is 64.36% and that of Keonjhar is 58.3%. The district ranks 8th position in terms of population and the percentage of the population to the state is 4.24. The percentage of growth of the population compared to 2001 -2011 for the State of Odisha is 14, and the Keonjhar district is 15.3, i.e. an annual growth rate of 1.44 for the district. The sex ratio for the district is 977 per 1000 males.

The economy of the district is primarily dependent on agriculture sector. Forest also plays a vital role in the economy & ecology of the district. About 3/4th of the working force are engaged in agriculture & allied activities. The brief demographic characteristic of the district is given in the table below:

No. of Households	**4,03,869**	**Household Size**	**04**
Total Population	**18,01,733**	**Population (0-6 age)**	**2,59,403**
Male	9,06,487	Boys (0-6 age)	1,31,885
Female	8,95,246	Girls (0-6 age)	1,27,518
Sex Ratio	988	Sex Ratio (0-6)	967
Population (SC)	**2,09,357 (11.62%)**	**Population (ST)**	**8,18,878 (45.45%)**
Male	1,04,684	Male	4,05,927
Female	1,04,673	Female	4,12,951
Literates	**10,52,518**	**Literacy Rate (in %)**	**68.24**
Male	6,05,119	Male	78.12
Female	4,47,399	Female	58.28
No. of Workers	**7,66,514**	**Cultivators**	1,98,044 (25.84%)
Male	4,98,077	**Agricultural Labours**	3,10,075 (40.45%)
Female	2,68,437	**Household Industrial Workers**	21,314 (2.78%)
No. of Main Workers	**4,42,497**	**Other Workers**	2,37,081 (30.93%)
No. of Marginal Workers	**3,24,017**		
			Source: Census of India, 2011 (District Handbook)

As per the 2011 census, **the tribal population of Keonjhar district is 45.4%,** the different tribes present in the area are Bhuyan, Gond, Ho, Juangs, Kolha and Munda etc. The sub-project covers the three blocks of Keonjhar district, i.e. Ghatagaon, Keonjhar and Patna. The Ghatgaon block has a total population of 1,02,117, and it has 11.62% of Schedule caste (SC) and 44.5% of Schedule tribes (ST) population, Keonjhar block has 1,36,567 total populations, and 10.23 % of SC and 49.25 % of ST population and the Patna block has a total population of 92,513 and has 7.4 % of SC and 51.6 % of ST population.

The project area falls within the Schedule V[1]areas of OdishaAs per the list of Schedule V areas of Odisha, Keonjhar Tehsil of Keonjhar district is a schedule V area.Although no physical interventions planned with community interface, these tribal areas and the ST households will be taken into account during the preparation of Emergency Action Plan for KanjhariProject.

3.4 CULTURAL ENVIRONMENT

The tribal community dominating the District and the Project area love to immerse with nature. They worship nature, and their traditional culture is intricately linked to nature. They venerate trees, mountain, river, water and soil. Most of the village have sacred groves which are their place of worship. Traditionally they conserve nature and practice wise use of natural products.

The Keonjhar district has three beautiful waterfalls which act as a tourist attraction; Badaghagra, 60 Km from Keonjhar, Sanaghagra, 30 Km from Keonjhar and Mruga Mahadev near Keonjhar. Even the Kanjari dam, surrounded by lush green forest with aesthetic value, acts as a tourist destination. There are no major historical or archaeological or religious spots or temples in the vicinity of the Project Area. None of the culturally important location will have any risk due to rehabilitation work.

[1]**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**.

Chapter 4 ACTIVITY WISE ENVIRONMENT & SOCIAL SCREENING, RISK AND IMPACTS IDENTIFICATION

4.1 SUB-PROJECT SCREENING

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, Labor, Migrant Labor 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 mostproject 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. 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 interventions are within dam area as well as beyond dam area. Deployment and haulage of heavy machinery,

setting up of workshop, operation of concrete mixture and heavy pumps will be within dam area. Other activities such as labour camp and debris disposal will be beyond dam area. 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.

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.

Emergency Action Plan, Early Warning System and Flood Forecasting System, etc. would be required to be prepared. In that case, project will reach out to the disadvantaged and vulnerable persons and groups and involve them mainly during implementation. During implementation of EAP, population in vulnerable areas under different release scenario will be identified and contacted through public consultation meetings. Communities will be made aware about the warning systems and do's and dont's during such scenarios.

Output of this screeningis 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.

- Improvement of approach road from NH20 to Dam site.
- Construction of bridge on D/s of the spillway: The bridge is proposed to be constructed at location of existing bridge which had been washed away.
- Labour Camps involved (location within dam premises or outside)
- Debris disposal

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 dam water body	Land	Tribal	Labour	Cultural heritage	GBV/SEAH
Civil (within Dam Boundary)	L	L	L	None	None	L	L	L	M	None	L
Hydro Mechanical	L	L	L	None	None	L	L	L	M	None	L
Instrumental SCADA, surveillance	L	L	L	None	None	L	L	L	L	None	L
Painting	L	L	L	None	None	L	L	L	M	None	L
Road work	M	L	L	None	None	L	L	L	M	None	L
Safety measures (Siren, Lighting)	L	L	L	None	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 Dam Area Like training Structure	M	M	L	None	None	L	L	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

Stakeholder consultations with communities living downstream/vicinity of the dam, could not be held in the current circumstances due to COVID19.However, to ensure the participation of stakeholders in ESDD preparation and record their views, limited stakeholders were contacted over phone and their views recorded. Two sets of questions are prepared, one for each category of stakeholders – direct workers and community. Direct workers included Engineers/staff working at dam (present or working from home) – full time or contracted and community stakeholders included people living in the dam vicinity.

Stakeholder consultation was conducted as part of environmental and social due diligence, 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

Following is the outcome of the stakeholder consultation exercise. List of participants is enclosed as **Annexure III**.

A. *Interaction with Dam Engineers/Staff*

Questions	Responses provided / Observations
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 stakeholder's consultation meetings planned for dissemination of emergency action plans which is a non-structural measure.	All the proposed structural rehabilitation activities for this dam are limited to dam compound only. No activity is given beyond dam complex. There is no possibility of any kind of interference of local community during implementation of rehabilitation measures.
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, there is no unsettled issues (legacy) related to displacement or resettlement, pending since time of dam construction.
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 legalized these squatters and these have full right in the property of dam authorities.	No unauthorized encroachers or squatters living within the dam premise.
4. What is the proposed institutional arrangement to deal the Environment and Social activities within the scheme i.e. in-	As such there is no institutional arrangement to deal with the Environment and Social activities within the scheme. However, while improvement

house team of experts/hired agency or individual experts?	of eco-tourism park on the D/S toe, will be taken up, expert opinion will be taken up in consultation with the concerned experts if available in SPMU.
5. Who will be in charge of E&S related activities at dam site and at SPMU level?	Sub Divisional Officer, Kanjhari Irrigation project will be in charge of E&S related activities and he will be coordinating with the concerned experts of SPMU.
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? 7.	The communities contact the dam officials through Mobile and e-mail.
8. 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?	The downstream communities are communicated by siren, mike announcement, mobile contact and by distributing leaflets during high flood time and with the advance intimation to district administration.
9. How do you ensure that downstream community is fully aware of the above existing mechanism?	Through regular mobile contact with the downstream community, their awareness is ensured.
10. Are there women employees at the dam site?	No, at present there is no woman employee at the dam site.
11. Is there any existing Grievance Redressal Mechanism (GRM) within the department to address any kind of grievance/complaints by general public?	Yes, there is one **"Mo Sarkar cell"** in Dam site Sub division office for Grievance Redressal Mechanism (GRM).
12. Details of any grievances received lately related to this new scheme?	No grievance has been received till now for this new scheme.
13. Is dam premise a restricted area or has open access to general public?	At present the dam premise has open access to general public. There is no security arrangement to dam site.
14. Are there tribals living in the surrounding area of dam complex? Which tribes are these? Please give brief detail.	No tribal is living in the surrounding area of dam complex.
15. 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.	There is a park on the D/S toe of dam for tourists which need improvement. Generally, in the winter season, tourists visit to the dam site. Annually on an average 15000 tourists visit to the dam site. No revenue is generated from these tourists as basic facilities are not made available and there is no checking arrangement for the tourists entering to the dam site.
16. Do you engage any local labor 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. Local labour is engaged for routine dam maintenance work. Labour is engaged through Government approved contractors as and when necessary.

B. *Interaction with Local Community*

Questions	Responses provided / Observations
1. How many villages are in immediate downstream vicinity? 2. Are they dependent on dam in any way for their livelihood?	1. One number of village is in immediate downstream vicinity of the dam 2. Yes, they are dependent on dam for their lively hood mainly for irrigation to their cultivated land.
3. Does any of these villages were displaced and rehabilitated during the construction of Kanjhari Dam. Is there any pending compensation issues?	No, only five number of villages in the upstream area were displaced during construction period. There are no pending compensation issues.
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)	Yes, currently two numbers of R&R affected persons are working with the dam authorities. They are working as employees (work charge mulia)
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, there is no fishing communities living immediately downstream of dam.
6. Are you aware of fishing working seasons, revenue earning, any access to general public for fishing, any suggestion etc. 7.	No, there is no fishing working seasons, revenue earning, and any access to general public for fishing.
8. Are you aware of local women affected in any way by dam operations?	No, no local women are affected in any way by dam operations.
9. 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?	No, there is no early flood warning system for this dam. Downstream community is communicated through siren, mike announcement, leaflets and mobile contact before release of flood water.
10. 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, no dam related incident has happened in the past.
11. If you have to contact the dam authorities; how will you contact, through telephone/mobile/e mail/personally? 12. 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?	The dam authorities are contacted through mobile number, mail, WhatsApp etc. In the past dam authorities were contacted through mobile number and they have responded immediately.
13. Give your views about Kanjhari dam, how this dam is helping Country, State, district or local communities in meeting its objectives, any specific concern can also be given?	Kanjhari dam is irrigating in Kharif and Rabi covering 96 villages. Also this dam is supplying drinking water to Keonjhar town which is 20 kms away from dam site. Thus this dam has contributed a lot to the Keonjhar district of Odisha State.
14. (a) Are you aware of any document named	(a) No, Emergency Action Plan (EAP) for this dam

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.	has not been prepared. (b) Dam authorities conduct annual mock drill every year before monsoon for ascertaining the smooth operation of gates. As such no stakeholders meeting has been conducted to inform about various protocols in place and consequences in case of dam failure. However, dam authority conducts Pani Panchayat meeting and other awareness meeting regularly with the stakeholders. (c)Yes in future, during stakeholder's consultation meeting, we will like to be a part of these consultation and mock drill activities to be conducted by dam authorities. (d) Yes, it can be contacted through mail and mobile phone of Executive Engineer.
15. Are you a regular follower of official website of dam authorities as a general public, in case you are a contractor, do you follow various tender's notices being invited for various maintenance of this dam?	No
16. Any suggestion to improve overall system by dam authorities in any way, please give in brief?	1. Security arrangement should be done for the dam. 2. One bridge on the D/S of spill way must be constructed. 3. The approach road from NH-20 to Dam site must be improved. 4. The eco-tourism park on D/S of the dam should be renovated.

4.3 DESCRIPTIVE SUMMARY OF RISKS AND IMPACTSFROM ACTIVITIES BASED ON SCREENING

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

Environmental Impacts and Risks

1. Environment risks and impacts, as assessed above, for various project activities under this sub-project are categorized as Low and Moderate due to localized nature of proposed activities i.e. activities remain limited to dam area except for construction of a bridge at a location just downstream of spillway where a bridge existed earlier and got washed away. No land acquisition is involved.
2. Execution of civil and hydro-mechanical work within dam body will generate localized impacts on physical environment and resource use; pose risk of exposure of workers requiring personal protective equipment (PPE) use.
3. Civil work interfaced with water body pose risk of water pollution and impact on fish fauna.

4. Generation of hazardous waste such as empty paint containers from paint work pose risk of exposure of workers while handling and require careful disposal at authorized sites.
5. Construction and demolition waste and muck from excavation for retaining wall footing require careful disposal at pre-identified and approved site to minimize the risk of pollution on this count.

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 located in the Schedule V area and there are Scheduled Tribe households in the downstream areas. These households shall not be directly impacted by project in any manner. These ST households will be taken into account during the preparation of Emergency Action Plan. A tribal development plan will be prepared.
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 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 atwork
   - Long term effects on life due to exposure to chemical /hazardouswastes
   - 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

Positive Impacts of the Sub Project

Surface irrigation improved the agriculture production of the project area. This has significantly improved the economic condition of the local inhabitant who are mostly scheduled tribes. At present, the Kanjhari dam is providing irrigation to 9,740 Ha during Kharif & 2800 Ha during Rabi (DPR Nov. 2011) in Keonjhar, Ghatgaon& Patna Tehsil under the ayacut area of the Project. However, presently there are some deficiencies, which is reducing the efficiency of the Dam. In this context, the proposed rehabilitation activities of Kanjhari Dam will improve the efficiency and will have positive impacts on community. Local indicated during stakeholder consultation that they are dependent on dam for water and are keen to have improved efficiency. The rehabilitation of the dam would enhance water security and agriculture production. This will enhance the crop production and economic conditions of the local communities.

Further, Improved road and construction of new bridge where old bridge is washed away, is based on community demand and will help improve local commuting. Locals are keen to improve the dame safety, as indicated during stakeholder consultation, and have shown keen interest in participation of EAP implementation.

Chapter 5 CONCLUSIONS AND RECOMMENDATIONS

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 Improvement of approach road from NH20 to Dam site, Construction of bridge on D/s of the spillway are Moderate. Similarly, environment and social risk of labour camp and disposal of debris has been identified as 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 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.

In addition to overarching ESS1, five 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
ESS 4: Community Health and Safety	Rehabilitation work, although limited to dam complex, can increase community exposure to risk and impacts; directly or indirectly.
ESS 7: Indigenous Peoples	Dam is located within Schedule V area – areas with preponderance of tribals/indigenous persons
ESS 10: Stakeholder Engagement Plan	For engagement of stakeholders in all structural and non-structural measures e.g. implementation of Early flood

Relevant ESS	Reasons for Applicability of the standard
	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)
   - Tribal Development Plan (ESS7)
   - 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

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

WB-ESS Triggered	Mitigation Instrument	Responsibility	Timelines
Management	Plan (PPEQMP)		
ESS 4: Community Health and Safety	• Community Health and Safety Management Plan (CHSMP)	SPMU/IA	Before mobilization of contractor
ESS 7: Indigenous Peoples	• Tribal Development Plan	SPMU/IA	Before mobilization of Contractor
ESS 10: Stakeholder Engagement Plan	• Stakeholder Engagement Plan	SPMU/IA	By negotiation

ESDD and ESMP will be placed on the www.damsafety.in website as well as other accessible locations such as the office of Engineer in Charge at Dam 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 dam 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 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.

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), Labor (L), GBV risks (G), (Write whichever is applicable)
1	**2**	**3**	**4**	**5**
A	**Nature of Project Component and related sub activity Related**			
1	Reservoir Desiltation	**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 treatmentetc.)	A	DI	WQ, F, PE, L, G
5	Structural Improvement/Repair work -Downstream of Dam site (with no interfacing with dam reservoir)	A	DI	WQ, F, PE, L, G
6	Re-sectioning earth dams to safe, stable cross sections	NA		
7	Hydro-mechanical activities with interface with dam reservoir	**NA**		
8	Hydro-mechanical activities Downstream of Dam site (with no interfacing with dam reservoir)	**A**	**DI**	**PE, L, G**
9	Instrumentation, General lighting and SCADA systems	**A**	**DI**	**PE, L, G**
10	Basic Facilities (like access road improvement, renovation of office, etc)	**A**	**DE**	**PE, L, G**
11	Utility installation like standby generator, or setting up solar power systems	**A**	**DE**	**PE, L, G**
12	Painting of dam u/s or d/s or both faces	**A**	**DI**	**WQ, PE, L, G**
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			
i	Construction of bridge on D/S of the spillway	**A**	**DE**	**WQ, PE, L, G**
B	**Pre-construction and construction stage major auxiliary or preparatory intervention**			
1	Acquisition (diversion of forests 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), Labor (L), GBV risks (G), (Write whichever is applicable)
1	**2**	**3**	**4**	**5**
	for non-forest purposes) of forest land			
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**	**DE**	**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**	**DE**	**PE, L, G**
14	Transport of large construction material	**A**	**DE**	**PE, L, G**
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 SC-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
A	**Project Component Related**			
1.	**Structural Strengthening/Improvement/Repair work**			
a	Extension of U/S pitching 1.5 m below the dead storage level	**WQ, F, PE, L, G**	Air pollution, noise pollution, risk of spillage of wastewater, risk of reservoir water contamination and impact on fishes, generation of construction debris, Labour and GBV risk	**L**
b	Provision of wave breakers on the U/S rip-rap	**WQ, F, PE, L, G**	Air pollution, noise pollution, risk of spillage of wastewater, risk of reservoir water contamination and impact on fishes, generation of construction debris, Labour and GBV risk	**L**
c	Renovation of surface drainage arrangement on the D/s face of the dam.	**PE, L, G**	Air pollution, noise pollution, waste generation from cleaning, labour andGBV risk	**L**
d	Removal of vegetation growth from the toe drain including renovation of toe drain at damaged patches	**PE, L, G**	Generation and disposal of biological waste, Labour involvement carry the risk of GBV	**L**
e	Procurement of additional Generator	**L**	Risk during unloading and installation	**L**
f	Re-drilling of Foundation drainage holes & provision of new holes between old drain holes	**PE, L, G**	Impact on physical environment during construction work, labour and GBV risks	**L**
g	Treatment of peeled off the concrete of piers near trunnion by use of epoxy, jacketing, stitching with anchoring	**PE, L, G**	Impact on physical environment during construction work, labour and GBV risks	**L**
h	Removal of dowel bars from the spillway crest	**PE, L**	Impact on physical environment during construction work, labour a	**L**
i	Treatment of cracks in the pier face	**PE, L**	Impact on physical environment during construction work, labour	**L**
j	Renovation of the ski-jump bucket	**PE, L**	Impact on physical environment during construction work, labour	**L**

Sl. No	Applicable Sub-Project Component/ Construction preparatory Work related Sub activity (As per SC-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)
k	Rehabilitation of side seal seats and bottom seal seats of radial gates & surface protected and painted	**PE, L**	Impact on physical environment during construction work, labour a	**L**
l	Provision of the lightning arrester	**L**	Risk during unloading and installation	**L**
m	Raising of D/S Return wall	**PE, L, G**	Impact on physical environment during construction work, labour and GBV risks	**L**
2.	**Structural Improvement/Repair work - Basic facility improvement**			
a	Improvement of approach road from NH20 to Dam site	**PE, L, G**	Air pollution, noise pollution, risk of spillage of wastewater to river, risk of river water contamination and impact on fishes, construction debris, Labour and GBV risk	**M**
b	Construction of watch tower, control room, watchman shed and security arrangement	**PE, L, G**	Air pollution, noise pollution, risk of spillage of wastewater to river, risk of river water contamination and impact on fishes, construction debris, muck from excavation, Labour and GBV risk	**L**
c	Dam top lighting	**L**	Air pollution, noise pollution, risk of spillage of wastewater to river, risk of river water contamination and impact on fishes, construction debris and muck generation from excavation work for wall foundation, Labour	**L**
d	Renovation of IB	**PE, G**	Air pollution, noise pollution, Labour and GBV risk	**L**
e	Construction of bridge on D/S of the spillway	**WQ, PE, L, G**	Air pollution, noise pollution, risk of spillage of wastewater, risk of river water contamination, generation of construction debris, Labour and GBV risk	**M**
4.	**Instrumentation, General lighting and SCADA systems**			
a	Provision of Instrumentation like Piezometer, V-notch, Surface Settlement Marker, Pressure Gauge, Weather Station, Automatic Water Level Recorder, Rain Gauge Station &Accelerograph etc.	**PE, L**	waste generation from removed parts and packing material, Labour	**L**

Sl. No	Applicable Sub-Project Component/ Construction preparatory Work related Sub activity (As per SC-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)
b	Provision of sirens	**PE, L**	waste generation from removed parts and packing material, Labour	**L**
B.	**Pre-construction and construction stage major auxiliary or preparatory intervention**			
1	Setting up Labour Camps (location within dam premises or outside)	**WQ, PE, L, 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, Labour and GBV risks	**L**
4	Disposal of large amount of Debris	**PE, L**	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**
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.

Annexure III: Stakeholder's Consultation - List of Participants

S. No.	Name	Relation with Dam – Staff, contractor, worker, full time/part time, local, NGO	Mobile Number	Address (at least village name)
1	Sri Natyananda Mahant	Ex-employee of dam & farmer	9337251264	Village-Chaka
2	Sri Dambarudhar Mahant	Farmer	9777285452	Village-Chaka
3	Sri Dwarika Naik	Farmer	6370861385	Village- Jajapasi
4	Sri Laxmidhar Mahant	Farmer	9090902857	Village-Kaliabeda
5	Sri Benudhar Mahant	Farmer	7854836169	Village-Mayurpasi
6	Sri Jhadeswar Mahant	Farmer	8280826757	Village-Chaka
7	Sri Dillip Kumar Mahant	Farmer	9348275494	Village-Chaka
8	Sri Pitambar Mahant	Farmer	8658430148	Village-Kaliabeda
9	Sri Bhagaban Mahant	Farmer	9438869433	Village-Kaliabeda
10	Sri Parama Mahant	Farmer	9438673430	Village-Kaliabeda
11	Sri Sarbeswar Dhar	Sub Divisional officer of dam	9437213852	Dam site
12	Sri Narendra Kumar Naik	Assistant Engineer of dam	9437784277	Dam site
13	Sri Sarat Chandra Mahant	Progress recorder	6372288337	Dam site
14	Sri Rajendra Sukla	Khalasi	9938054927	Dam site
15	Sri Chaitan Mahant	Khalasi	6370216668	Dam site