

**DAM REHABILITATION AND IMPROVEMENT PROJECT (DRIP)
Phase II**

(Funded by World Bank)

MUKURTHY DAM

**ENVIRONMENT AND SOCIAL DUE DILIGENCE REPORT
(PIC: TN12HH0007)**



SEPTEMBER 2020

**Tamil Nadu Generation and Distribution Corporation
(TANGEDCO), Tamil Nadu**

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ABBREVIATIONS AND ACRONYMS

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
IA	:	Implementation Agency
IPF	:	Investment Project Financing
MCM	:	Million Cubic Meters
NOF	:	Non-Overflow
OHS	:	Occupational Health & Safety
PA	:	Protected Area
PDO	:	Project Development Objective
PMF	:	Probable Maximum Flood
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
SPMU	:	State Project Management Unit
ST	:	Scheduled Tribes
WB	:	World Bank
WQ	:	Water Quality

EXECUTIVE SUMMARY

Mukurthy masonry gravity curved dam is mainly a storage reservoir for Pykara Hydro Electric Scheme constructed across the river Mukurthy. It has been proposed to undertake rehabilitation measures (structural, non-structural, instrumentation and basic facility enhancement) under the proposed Dam Rehabilitation and Improvement Project (DRIP II) with a view to increase the safety and to strengthen dam safety management.

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

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

As per the ESDD exercise, risk/impacts that have been identified relate to Water Quality, Physical Environment, labour and SEAH/GBV. Environment risks of air, water, noise, land use, soil and resource use for repairs to revetment/rip-rap in u/s face 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 generic 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)
- Stakeholders Engagement Plan (ESS10)

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

1.1 PROJECT OVERVIEW

The 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\$ 26.84 million);

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 – MUKURTHY DAM

Mukurthy River originates at the high hills of Pykara range and flows in the Pykara Basin. It joins with Pykara River downstream to confluence with Moyar River and discharges into Bhavani Sagar reservoir in plains. The Bhavani River ultimately reaches Cauvery River.

The Mukurthy dam is a storage reservoir for Pykara Hydro Electric Scheme constructed across the river Mukurthy during the year 1935-38. It is located in a hilly tract of Moyar basin in the Nilgiris District of Tamilnadu. The catchment area of the dam is 25.25 sq km which lies between Pykara watershed in the east, Porthimund and Parsons valley in the South and Gudalur watershed in the west. The gross storage capacity of the reservoir is about 50.98 MCM and the length and the height of the masonry gravity curved dam are 161.54 m and 34 m respectively. The designed spillway capacity is 425 cumec. Water from dam is let into the Pykara reservoir, which is immediately downstream of the dam, for augmenting its storage. The mini Power House was commissioned in the year 2001 at the toe of the dam with 2 units having a generation capacity of 0.35 MW each.

Salient features of the project area are reported below:

Project Name	MUKURTHY DAM
River Basin	PYKARA
River/Stream	MUKURTHY
District	Nilgiris
Latitude/Longitude	11 ⁰ 24' 00" / 76 ⁰ 34' 00"
Type of Project	Hydro Power Project
Gross Command Area (GCA)	NA
Cultivable Command Area (CCA)	NA
Hydro Power Installed Capacity	0.7 MW
Average Annual Energy Generation (MU):	1.48 MU
Domestic/Municipal/Industrial Water Supply (Annual)	NA
Dam	
Type	Masonry Gravity -Curved Dam
Total length of the Main dam	161.54 m
Length of Embankment dam	NA
Length of Masonry/Concrete dam	164.54 m
Top width of Embankment Dam	NA
Top width of Masonry/Concrete Dam	2.7 m
Elevation of top of Embankment Dam	NA
Elevation of top of Masonry/Concrete Dam	2100.72 m
Elevation of top of Upstream Solid Parapet Wall	2100.72 m
Height of Embankment Dam above Lowest River Bed Level	NA
Height of Masonry/Concrete Dam above deepest foundation level	34 m
Lowest River Bed Elevation	2067.7 m
Deepest Foundation Elevation	2064.7 m
Saddle Dam	
Type	Embankment dam
Length of the Saddle dam (m):	180 m
Top width of Saddle Dam (m):	3 m
Height of Saddle Dam above Lowest Bed Level	32 m
Spillway	
Type of Spillway	Ogee
Length of Spillway	33.53 m
Location of Spillway	Central spillway
Spillway Crest Level	2094.89 m
Number of bays	4
Total Discharging Capacity at MWL	425 cumec
Spillway Gate	Sinking; 7.16 m width & 3.81 m height
Type of Hoist for Spillway Gates	Rope Drum Hoist Mechanism

Sluice Arrangement	
No. of Sluices & Sill Level (m)	2 No, 2072.33 m
Size of Sluice	1 m dia
Discharging Capacity of Sluice at FRL (cumec)	214.50 cumec
Reservoir	
Catchment Area at Dam site	25.25 sq km
Maximum Water Level	2098.70 m
Full Reservoir Level	2098.70 m
Minimum Draw Down Level	2076.20 m
Gross Storage Capacity at FRL	50.98 MCM
Live Storage Capacity	50.71 MCM
Date of Starting the Construction	1935
Date of Completion	1938
Date of first full impoundment	1938
Original Inflow Design Peak Flood	425 cumec
Maximum observed flood peak and date	567 cumec in 2009
Revised Inflow Design Peak Flood	567 cumec



View of Dam

Proposed Interventions/Activities and Intended Outcomes

The Dam Safety Review Panel (DSRP), constituted for the purpose of inspection of the projects that the TANGEDCO plans to undertake for the repair, rehabilitation and modernization work under World Bank aided DRIP-II & III schemes, made a visit to Mukurthy Dam Project on 11/12/2019 for inspection purpose and recommended measure to improve the safety and performance of dam and associated appurtenances in a sustainable manner, and also to strengthen the dam safety institutional set-up.

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

REMEDIAL WORKS

- Repairs to revetment/rip-rap in u/s face by removing and repacking the existing RR pitching stone with rough stone dry packing for aprons and dislocated portion of revetment on upstream side left flank and saddle dam
- Parapet walls/kerb walls
- Spillway treatment by repointing with special mortar (Epoxy treatment) over the masonry joints using cement mortar on the downstream side of the damaged portion of spillway bucket area and providing cementitious mortar for filling of big cavity to the masonry joint along with grouting the holes by poly cementitious material to reduce the porosity of masonry surface and to increase the strength of structure
- Clearing of shrubs on the upstream & downstream side on both flanks of the Dam
- Approach Steps: Hand rails with suitable stiffeners, bracing, in position with horizontal, vertical supports for dam steps
- Gauge Plate: Supplying, fabrication and erection of Gauge plate made of structural steel frames
- Cutting of removal of vegetative debris on the approach to earthen bund and left flank approach to dam
- Repair/renewal of hoisting arrangements
- Lights on the top of the dam, gallery, approach road
- Construction of new office building (area 39.50 m²)
- Renovation of police guard room

BASIC FACILITIES

- Providing lightning conductor (Supply, erection, testing and commissioning of Controlled streamer emission based Advanced Lightning Protection System)
- Improvement of Existing approach Road
- Standby Generators

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



Upstream left flank slope protection work



Downstream left flank side-slope protection work



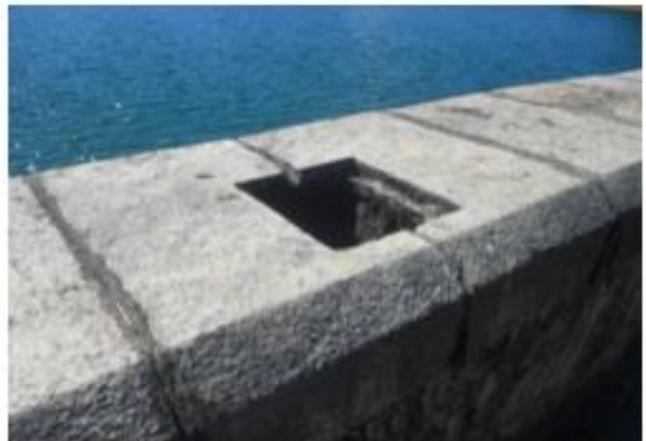
Power house left side protection works on downstream right flank of dam



Spillway bucket lip repair works



Dam top drainage by screed concrete



Construction joint (on parapet wall) top opening



Renovation of police guard room



New O & M office building in place of existing tin



Dam approach road renovation work



Saddle Dam rip-rap renovation work



Spillway gate and motors overhauling



Overhauling of scour vent gate screw rod mechanism

Figure 1.1: Selected Photographs of Improvement/Intervention area



Figure 1.2: Project Area showing major intervention locations

1.3 IMPLEMENTATION ARRANGEMENT AND SCHEDULE

As can be seen from the list of activities proposed under dam rehabilitation project; these activities can be divided into civil 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 18 months. Dam 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) : 01/2021
Proposed Ending of implementation (MM/DD/YYYY) : 16/2022
Implementation Duration (months) (MM) : 18 months

b) Timeline phasing of implementation:

Sl. No.	Description	From (month/year)	To (month/year)	Status of Procurement Process
1	Main package C M E works	01/2021	06/2022	Procurement process will be initiated after obtaining approval of the PST from World Bank.
2	Other Packages	NIL		
3	Procurement – instrumentation, goods, inspection vehicles	NIL		

1.4 PURPOSE OF ESDD

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

- i. To identify, evaluate and manage the environment and social risks and impacts of the sub-project in a manner consistent with the ESSs;
- ii. To adopt a mitigation hierarchy approach to the project's E&S risks i.e. a) anticipate and avoid risks and impacts; b) minimize or reduce risks and impacts to acceptable levels, if not avoidable; c) once risks and impacts have been minimized or reduced, mitigate; and (d) where significant residual impacts remain, compensate for or offset them, where technically and financially feasible;
- iii. To help identify differentiated impacts on the disadvantaged or vulnerable, 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 generic ESMP customized to mitigate E&S risks and impacts will suffice.

1.5 APPROACH AND METHODOLOGY OF ESDD

The following approach has been adopted for ESDD:

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

Stakeholder consultations with communities living downstream/vicinity of the dam, 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 or conservation areas (CA).

Therefore, for the proposed dam rehabilitation activities at Mukurthy dam, regulatory clearances will not be applicable as per Indian regulation. Another applicable regulatory requirement is discussed in ESMF.

2.2 DESCRIPTION OF INSTITUTIONAL FRAMEWORK

The sub-project will be implemented by Tamil Nadu Generation and Distribution Corporation, Government of Tamil Nadu. TANGEDCO being responsible for power generation, transmission and distribution; have a well-established customer complaint system for power consumer; where they can register their complaints 24x7 on dedicated line (1912). It also has a 24x7 Chairman's complaint cell with phone number and whatsapp numbers. In addition, it has established a Consumer Grievance Redressal Forum, where consumers can register complaints online/manually, directly or through a representative to be resolved within a period of 60 days; with a provision of filing appeal in next 30 days if the complainant is not satisfied with the redressal.

Tamil Nadu Generation and Distribution Corporation Limited do not have in-house expertise to address E&S issues. As per the suggestions of CPMU/CWC, it is proposed to outsource consultancy services of Environmental and Social experts to assist TANGEDCO in resolving E& S issues.

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

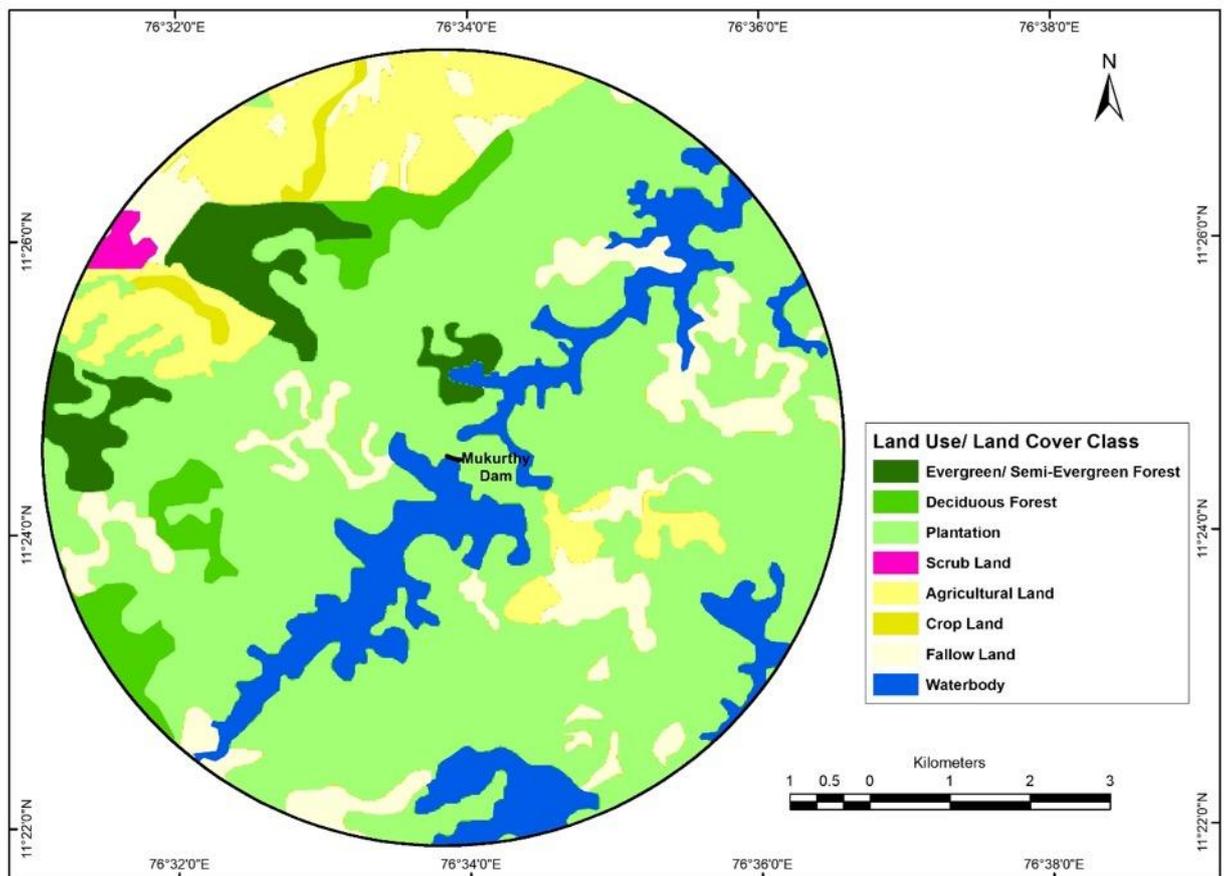
SPMU will designate Nodal Officer(s) (full time in-house engineering staff with E&S expertise) to coordinate and supervise E&S activities. They shall be at the level of Executive Engineer/ Deputy Directors and shall provide commensurate time to comply with E&S related activities. Brief TORs for these 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.

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

3.1 PHYSICAL ENVIRONMENT

Land Use/Land Cover

The project surrounding area's land use and environmental sensitivity was analyzed using GIS techniques. Land use/ land cover map within 5 km radius of dam is presented at **Figure 3.1**. Present land use in proximity to dam is mainly plantation, patches of evergreen/semi-evergreen forest and deciduous forest can also be seen. Water bodies (Mukurthy and Pykara reservoirs) along with agricultural land, and fallow land and scrub land are also visible. There is no significant habitation or village falling in 5 km radius of the Mukurthy dam.



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

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

Natural Hazards

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

In terms of Indian Standard IS 11223-1985 criteria, Mukurthy Dam is classified as a 'Large Dam' and, accordingly, qualifies for PMF (Probable Maximum Flood) as the design flood. The Original Inflow Design Peak Flood was 425 cumec. The Revised Inflow Peak Design Flood evaluated by Central Water Commission is 567 cumec, which is 33 % higher than the Original Design Flood. Original MWL / FRL is 2098.70 m corresponding to the Design Peak Flood of 425 cumec. As per the 'Flood Routing Studies' conducted for the Revised Design Flood of 567 cumec, it is indicated that with the 'impinging level of reservoir kept at 2096 m (instead of 2098.70 m), the existing spillway can safely handle the revised peak flood of 567 cumec, thereby, no structural measures are considered necessary in this respect.

Project falls in earthquake zone III, 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

Protected areas near Mukurthy dam have been reviewed to assess the impact of rehabilitation work on ecologically sensitive habitats.

Mudumalai Tiger Reserve, is the nearest tiger reserve, which is about 14.5 km away (shortest aerial distance). Tiger Reserve has 321.00 square kilometres as Core or Critical Tiger Habitat and 367.586 square kilometres as Buffer area and is part of Nilgiri Biosphere Reserve. As the dam is at quite a distance from the reserve, and even outside its buffer area and eco-sensitive zone in its surrounding, there is no risk on protected habitat due to proposed rehabilitation work.

Another, protected area in the Nilgiris, is Mukurthy National Park, which is popular for presence of Nilgiri Tahr, an ungulate endemic to Nilgiri hills. Nearest boundary of Mukurthy National Park is about 5 km from the dam and is beyond the tip of submergence. Proposed rehabilitation work is limited to dam only and do not pose any risk on flora and fauna of Mukurthy National Park.

Nilgiri Biosphere Reserve (NBR), a representative area of the Western Ghats, covers an area of 5670 sq. km. and is spread across the states of Tamil Nadu, Karnataka and Kerala. It was set up in 1986 as the first Biosphere Reserve in India. NBR is characterized by great biodiversity - more than 3700 plant species and 684 vertebrate species (among which 156 are endemic) have been registered. About 2 millions people live inside the NBR, which represents more than 30 communities. (*Ref: UNSEDOC Digital Diary*).

It is a large ecologically important area (not a protected area), the nearest boundary of Nilgiri Biosphere Reserve is about 1 km from the dam towards, upstream; where a part of

reservoir will fall inside the NBR. All the rehabilitation works are proposed to be undertaken outside the boundary of biosphere reserve and shall be confined within the dam boundary. Also, access to rehabilitation work sites is from the downstream side of the dam thus there is no risk of transportation of material through the reserve. Therefore, after careful review, it can be safely concluded that rehabilitation works do not pose any risk, either directly or indirectly, on any of the protected areas or biosphere reserve.

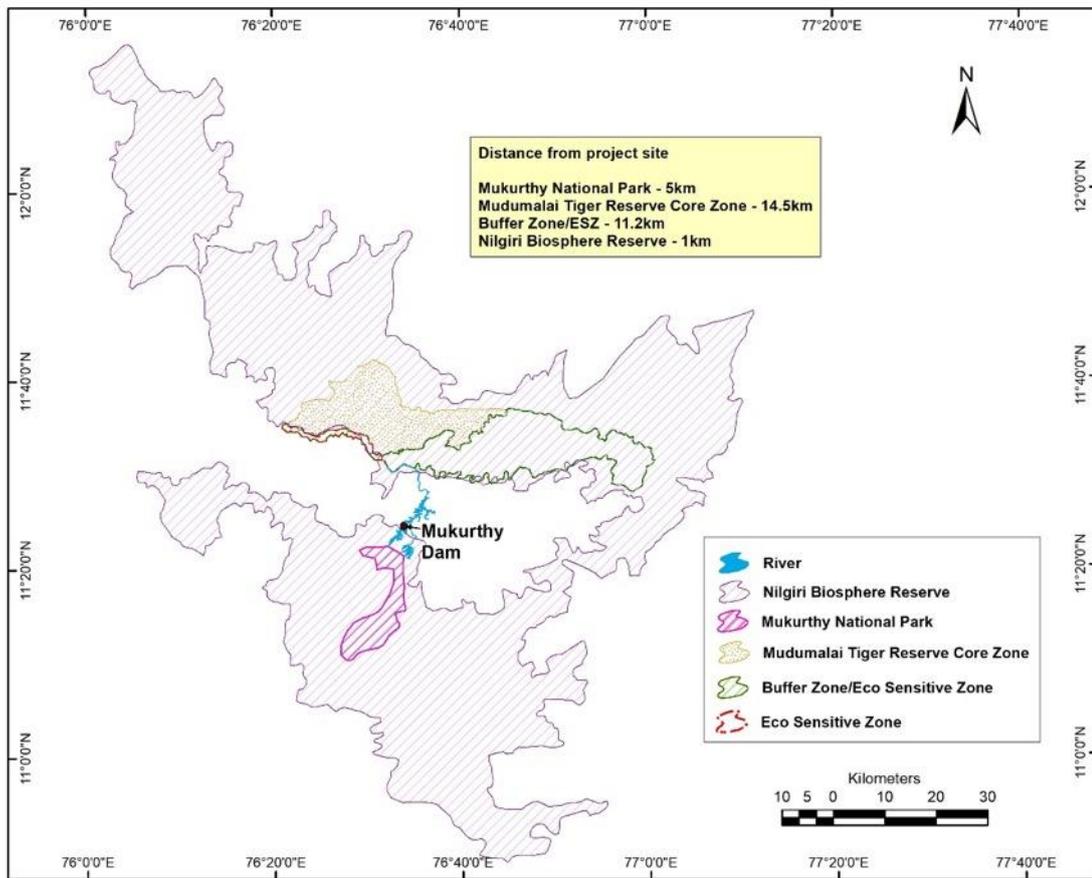


Figure 3.2: Protected Areas around Dam Site

3.3 SOCIAL ENVIRONMENT

Mukurthy Dam is constructed across the Mukurthy stream in the Nilgiris district in the state of Tamil Nadu. There are no settlements in the proximity areas of the project. There are no Schedule V¹ areas in Tamil Nadu. The district is divided into two revenue Divisions namely Coonoor and Gudalur. The district has six tehsils (talukas) namely Coonoor, Kotagiri, Udthagamandalam, Kundah, Gudalur and Panthalur along with 4 Panchayat Unions (Community Development Blocks); Gudalur, Udthagamandalam, Kotagiri and Coonoor. There are 40 Revenue Villages in the district.

The economy of the district is basically dependent on non-agricultural activities & resources. A large number of tea processing industries are the major employment

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**.

generation for the local people in the district. The brief demographic characteristic of the district is given in the table below:

No. of Households	1,97,653	Household Size	04
Total Population	7,35,394	Population (0-6 age)	6 6,799
Male	3,60,143	Boys (0-6 age)	3 3,648
Female	3,75,251	Girls (0-6 age)	3 3,151
Sex Ratio	1042	Sex Ratio (0-6)	985
Population (SC)	2,35,878 (32.08 %)	Population (ST)	32,813 (4.46%)
Male	1,15,917	Male	16,091
Female	1,19,961	Female	16,722
Literates	5,69,647	Literacy Rate (in %)	85.20
Male	2,99,447	Male	91.72
Female	2,70,200	Female	78.98
No. of Workers	3,49,974 (47.59%)	Cultivators	15,645 (4.47%)
Male	2,12,172	Agricultural Labours	79,100 (22.60%)
Female	1,37,802	Household Industrial Workers	3,895 (1.11%)
No. of Main Workers	3,18,924 (91.13%)	Other Workers	2,51,334 (71.82%)
No. of Marginal Workers	31,050 (8.87%)		
<i>Source: Census of India, 2011 (District Handbook)</i>			

With 7,35,394 population, the district ranks at 31st place in population size of the state and has sex ratio of 1042 which is highest among the districts in the state. The population density is 287 persons per sq.km in the district which makes it least densely populated among the districts in the state.

The district has literacy rate of 85.20% which is higher than that of the State average of 80.09%. The gender gap in the literacy rate is 12.74% in the district.

In the district, the Scheduled Caste and Scheduled Tribe population is 32.08% and 4.46% respectively with respect to the total population. There are low number of Scheduled Tribe households in the project area and there are no physical interventions planned in the downstream areas. These areas and the ST households will be taken into account during the implementation of Emergency Action Plan for Mukurthy Dam.

Work participation rate of the district is about 47.59% and gender gap in work participation rate is 22.19%. About 4.47% of the workers are cultivators and 22.60% are agricultural labourers. About 72.93% of work force is engaged in other than agricultural activities including 1.11% household as industrial workers.

3.4 CULTURAL ENVIRONMENT

List of National Monuments in Tamilnadu and list of State Protected monuments in Tamilnadu 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

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

Non-structural interventions including Emergency Action Plan, which is under preparation. During implementation, project will reach out to downstream population including disadvantaged and vulnerable persons and tribal households. 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 don't's during such scenarios.

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

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

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

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

Analysis of extent of risk/impact for sub-activities resulted in identification of following activities as having Moderate Risks/impacts.

- Repairs to revetment/rip-rap in u/s face by removing and repacking the existing RR pitching stone with rough stone dry packing for aprons and dislocated portion of revetment on upstream side left flank and saddle dam
- Labour Camps
- Major 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)	M	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	L	L	L	None	None	L	L	L	L	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	L	L	L	None	None	L	L	L	L	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

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

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

Environmental Impacts and Risks

1. Environment risks and impacts, as assessed above, for various project activities under this sub-project are categorised as Low and Moderate due to localised nature of proposed activities i.e. activities remain limited to dam area except for labour camp and muck/debris disposal.
2. Execution of civil and hydro-mechanical work within dam body will generate localised impacts on physical environment and resource use; pose risk of exposure of workers requiring personal protective equipment (PPE) use.
3. Civil work interfaced with water body pose risk of water pollution and impact on fish fauna.
4. Construction waste and muck from excavation for repairs to revetment/rip-rap, spillway treatment etc require careful disposal at pre-identified and approved site to minimise the risk of pollution on this count.
5. Rehabilitation work would require labour to work on various sections of dam involving working at height, working in confined spaces, working on reservoir side, etc; Further, workers will also be exposed to dust and noise and will have to handle chemicals/gases for some of the works; these will lead to occupational health and safety risks.

Social Impacts and Risks

1. As the interventions are within the dam premises and on the dam structure, there shall be no adverse impacts on land and assets due to any sub-component or sub-activities
2. The dam is not located in the Schedule V area. Though there are Scheduled Tribes households in the vicinity, these are mainstreamed into the overall society and do not meet the characteristics outlined in ESS 7. There will be no physical interventions.
3. Influx of migrant labour will be low as these works require only 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 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 terms effects due to exposure to dust and noise levels, while at work
- Long term effects on life due to exposure to chemical /hazardous wastes
- Inadequate accommodation facilities at work force camp, including inadequate sanitation and health facilities
- Sexual harassment at work
- Absence or inadequate or inaccessible emergency response system for rescue of labour/workforce in situations of natural calamities.
- Health risks of labour relating to HIV/AIDS and other sexually transmitted diseases
- Non-payment of wages
- Discrimination in Employment (e.g. abrupt termination of the employment, working conditions, wages or benefits etc.)
- Unclear terms and conditions of employment
- Discrimination and denial of equal opportunity in hiring and promotions/incentives/training opportunities
- Denial for workers' rights to form worker's organizations, etc.
- Absence of a grievance mechanism for labour to seek redressal of their grievances/issues

5.1 CONCLUSIONS

5.1.1 Risk Classification

As per the ESDD exercise, risk/impacts that have been identified relate to 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 earth work, bridge and road work 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 generic 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, four ESS standards are found relevant to this sub-project as per reasons given in **Table 5.1** below:

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

Relevant ESS	Reasons for Applicability of the standard
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 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)
 - 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 5.2: 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	<ul style="list-style-type: none"> • Gender Based Violence or SEA/SH related actions 	SPMU/IA	Before mobilization of contractor
ESS2: Labour and Working Conditions	<ul style="list-style-type: none"> • Labour Management Procedure (LMP) including OHS management plan 	SPMU/IA	Before mobilization of contractor
ESS3: Resource Efficiency, Pollution Prevention and Management	<ul style="list-style-type: none"> • Pollution Prevention and Environment Quality Management Plan (PPEQMP) 	SPMU/IA	Before mobilization of contractor
ESS 4: Community Health and Safety	<ul style="list-style-type: none"> • Community Health and Safety Management Plan (CHSMP) 	SPMU/IA	Before mobilization of contractor
ESS 10: Stakeholder	<ul style="list-style-type: none"> • SEP in accordance 	SPMU/IA	By negotiation

WB-ESS Triggered	Mitigation Instrument	Responsibility	Timelines
Engagement Plan	with project SEF		

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 Repairs to revetment/rip-rap in u/s face etc.)	A	DI	WQ, F, PE, L, G
5	Structural Improvement/Repair work -Downstream of Dam site (with no interfacing with dam reservoir) (like spillway treatment etc.)	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)	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	DI	PE, L, G
11	Utility installation like standby generator, or setting up solar power systems	A	DI	PE, L
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			

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
	above			
B	Pre-construction and construction stage major auxiliary or preparatory intervention			
1	Acquisition (diversion of forests land for non-forest purposes) of forest land	NA		
2	Acquisition of private land Resettlement and Rehabilitation (including physical or economic displacement/impact on livelihood;	NA		
3	Temporary loss of business or Damages to crops or trees or structures outside the ROW during Construction activities by Contractor	NA		
4	Borrowing earth to meet Borrow materials requirement	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	A	DI	PE, E, L, G
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 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
A	Project Component Related			
1.	Structural Strengthening/Improvement/Repair work -upstream of Dam site			
a	Repairs to revetment/rip-rap in u/s face by removing and repacking the existing RR pitching stone with rough stone dry packing for aprons and dislocated portion of revetment on upstream side left flank and saddle dam	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	M
b	Clearing of shrubs with uprooting on the upstream & downstream side on both flanks of the Dam	PE, E, L, G	Impacts on ecology, waste from vegetative debris, Labour and GBV risk	L
2.	Structural Improvement/Repair work - Downstream of Dam site (with no interfacing with dam reservoir) (like repair of parapet walls, damage spillway crest, downstream training walls, etc.)			
a	Spillway treatment by repointing with special mortar (Epoxy treatment) over the masonry joints using cement mortar on the downstream side of the damaged portion of spillway bucket area and providing cementitious mortar for filling of big cavity to the masonry joint along with grouting the holes by poly cementitious material to reduce the porosity of masonry surface and to increase the strength of structure	WQ, PE, L, G	Impacts on water quality due to epoxy treatment, construction waste, noise pollution, waste from vegetative debris, Labour and GBV risk	L
b	Parapet walls/kerb walls	PE, L, G	Air pollution, noise pollution, generation of construction debris, Labour and GBV risk	L
c	Cutting of removal of vegetative debris on the approach to earthen bund and left flank approach to dam	PE, L, G	Waste from vegetative debris, Labour and GBV risk	L
d	Road on top of dam	PE, L, G	Air pollution, noise pollution, generation of construction debris, Labour and GBV risk	L
3.	Hydro-Mechanical activities Down - stream of Dam Site (with no interfacing with dam reservoir)			
a	Repair/renewal of hoisting arrangements	PE, L, G	Generation of waste material from packaging etc, noise pollution, Labour and GBV risk	L
b	Gauge Plate: Supplying, fabrication and	PE, L, G	Generation of waste material	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
	erection of Gauge plate made of structural steel frames		from packaging etc, noise pollution, Labour and GBV risk	
4.	Instrumentation, General lighting and SCADA systems			
a	Providing lightning conductor (Supply, erection, testing and commissioning of Controlled streamer emission based Advanced Lightning Protection System)	PE, L, G	Generation of waste material from packaging etc, Labour and GBV risk	L
b	Lights on the top of the dam, gallery, approach road	PE, L, G	Generation of waste material from packaging etc, Labour and GBV risk	L
5	Basic Facilities Improvement			
a	Camp office, Quarters, IB, Police Guard Room	PE, L, G	Air and noise pollution, Labour and GBV risk	L
	Approach Steps: Hand rails with suitable stiffeners, bracing, in position with horizontal, vertical supports for dam steps	PE, L, G	Air and noise pollution, Labour and GBV risk	L
b	Standby Generators	PE, L, G	Air and noise pollution, Labour and GBV risk	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, 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, L, G	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, L, G	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

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
4	Disposal of large amount of Debris	PE, L, G	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, and GBV risk due to labour involvement	M
5	Transport of large construction material	PE, L, G	Material will be transported from various vendors and suppliers to site for civil, hydro-mechanical work and instrumentation, air and noise emissions from transportation, Labour and GBV risk	L

Criteria for Risk Evaluation:

Low: Localized, temporary and Negligible

Moderate: temporary, or short term and reversible under control

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

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

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