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

AVALANCHE DAM – TN12HH0022

ENVIRONMENT AND SOCIAL DUE DILIGENCE REPORT

OCTOBER 2022

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

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ABBREVIATIONS AND ACRONYMS

AIDS	**:**	**Acquired Immunodeficiency Syndrome**
CA	**:**	**Conservation Area**
CDSO	**:**	**Central Dam Safety Organisation**
CE	**:**	**Chief Engineer**
COVID	**:**	**Coronavirus Disease**
CPMU	**:**	**Central Project Management Unit**
CWC	**:**	**Central Water Commission**
DE	**:**	**Beyond Dam Area**
DHARMA	**:**	**Dam Health and Rehabilitation Monitoring Application**
DI	**:**	**Within Dam Area**
DRIP	**:**	**Dam Rehabilitation and Improvement Project**
DSRP	**:**	**Dam Safety Review Panel**
E&S	**:**	**Environment & Social**
EAP	**:**	**Emergency Action Plan**
ESCP	**:**	**Environmental and Social Commitment Plan**
ESDD	**:**	**Environmental and Social Due Diligence**
ESF	**:**	**Environmental and Social Framework**
ESIA	**:**	**Environmental and Social Impact Assessment**
ESMF	**:**	**Environment and Social Management Framework**
ESMP	**:**	**Environment and Social Management Plan**
ESS	**:**	**Environmental and Social Standard**
ESZ	**:**	**Eco-sensitive zone**
FRL	**:**	**Full reservoir level**
GBV	**:**	**Gender Based Violence**
GIS	**:**	**Geographic Information System**
GRM	**:**	**Grievance Redressal Mechanism**
HEP	**:**	**Hydroelectric Project**
HIV	**:**	**Human Immunodeficiency Virus**
IA	**:**	**Implementing Agency**
IB	**:**	**Inspection Bungalow**
IPF	**:**	**Investment Project Financing**
LMP	**:**	**Labour Management Procedure**
MCM	**:**	**Million Cubic Meters**
MDDL	**:**	**Minimum Draw down Level**
MIS	**:**	**Management Information System**
MW	**:**	**Mega watt**
MWL	**:**	**Maximum Water Level**
OHS	**:**	**Occupational Health & Safety**
OHSP	**:**	**Occupational Health & Safety Management Plan**
PA	**:**	**Protected Area**
PAP	**:**	**Project Affected Person**
PDO	**:**	**Project Development Objective**
PE	**:**	**Physical Environment**
PMC	**:**	**Project Management Consultancy**
PPE	**:**	**Personal Protective Equipment**
PST	**:**	**Project Screening Template**
RET	**:**	**Rare Endangered and Threatened**
RFB	**:**	**Request for Bids**

SC	**:**	**Scheduled Castes**
SCADA	**:**	**Supervisory Control and Data Acquisition**
SDSO	**:**	**State Dam Safety Organisation**
SEA	**:**	**Sexual Exploitation and Abuse**
SEAH	**:**	**Sexual Exploitation Abuse and Harassment**
SEF	**:**	**Stakeholder Engagement Framework**
SEP	**:**	**Stakeholder Engagement Plan**
SF	**:**	**Screening Format**
SH	**:**	**Sexual Harassment**
SPMU	**:**	**State Project Management Unit**
ST	**:**	**Scheduled Tribes**
TANGEDCO	**:**	**Tamil Nadu Generation and Distribution Corporation**
WB	**:**	**World Bank**
WQ	**:**	**Water Quality**

Chapter 1

INTRODUCTION

PROJECT OVERVIEW

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

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

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

Component 3: *Incidental Revenue Generation for sustainable operation and maintenance of dams;* in order to ensure long term sustainability of operations & maintenance of existing dams, it is proposed to encourage the dam owners to explore the incidental revenue generation through innovative ideas i.e. Development of tourism, fisheries, secondary sources of power generation (hydel as well as solar), water recreation activities etc. and divert some part of this generated revenue for O&M of a given dam. Few pilot dams can be selected to experiment this innovation.

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

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

1. SUB-PROJECT DESCRIPTION – AVALANCHE DAM

The Avalanche dam is mainly a Storage reservoir in Kundah basin, for Kundah Hydro electric scheme, constructed across Avalanche stream during 1956-1961. The dam is situated at 22 km from Udhagamandalam in Nilgiris District, Tamil Nadu.

The total length of this masonry gravity dam is 365.75 m and the height is 57.00 m. It has two vertical lift type gates in Spillway. It receives water from Upper Bhavani dam through Kundah (Avalanche) Power House-V and diverted water from West and East Varahapallam Weirs in addition to the inflow from its own catchment. Avalanche reservoir is interconnected with Emerald reservoir at same FRL of 1985.80 m with a combined storage of 5532 Mcft.

It acts as a buffer storage reservoir feeding the Kundah Hydro Electric Scheme. The water from Avalanche reservoir is being conveyed through tunnel for 3 x 20 MW Power Generation in Kundah Power House-I at Kundah Palam and the tail water is discharged into Kundah Palam reservoir.

Salient features of the project area are reported below:

1.	**River**	**Avalanche Stream**
2.	**Location of the Dam**	**Constructed across Avalanche Stream at Emerald. This dam is located at 22 km from Ooty in Nilgiris District, Tamil Nadu.**
3.	**Latitude**	**11° 19' 08" N**
4.	**Longitude**	**76° 37' 00" E**
5.	**Total Catchment area**	**58.534 Sq. Km (Combined) 30.50 Sq. Km (For Avalanche)**
6.	**Maximum Flood discharge through Spillway**	**705 Cumecs**
7.	**Revised Maximum Flood discharge as per CWC recommendation**	**1765 Cumecs**
8.	**Type of dam**	**Masonry Gravity**
9.	**Height of dam**	**57.00 m**
10.	**Scheme work commenced during**	**1956**
11.	**Works completed during**	**1961**
12.	**Reservoir capacity (Combined)**	**Gross capacity : 156.78 M.cum Effective capacity : 152.80 M.cum**
	Water spread area (Combined)	**8.06 Sq Km 3.818 Sq Km (For Avalanche)**

	Length of masonry dam	**365.75 m**
	Length of spillway	**28.96 m**
	Crest level of spillway	**+1979.70 m**
	Maximum water level	**+1985.80 m**
	FRL	**+1985.80 m**
	Deepest Bed level	**+1933.07 m**
	Deepest foundation level	**+1930.60 m**
	Top width of dam	**6.40 m**
	Free Board	**1.52 m**
	Spillway	**2 Nos**
	Spillway gate	**Lifting Type. 12.19 m X 6.10 m – 2Nos.**
	Top level of Non-spillway	**+1987.32 m**
	Length of Non-spillway	**336.79 m**
	Scour vent sill level	**+1935.50 m**
	Size of Scour vent	**1.52 m x 2.13 m**
	Minimum draw down level	**+1943.10 m**
	Dead storage Level	**+1935.50 m**

View of Dam

Proposed Interventions/ Activities and intended Outcomes Dam Safety Review Panel (DSRP) constituted by CWC, Government of India has inspected and made a review of Avalanche Dam on 05/11/2020 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.

Structural Rehabilitation Works

1.Basic Facilities:-
Improvements to the L/F & R/F approach roads to Dam.
Improvements to the Dam top and approach road lighting.
Providing 40 kVA DG Set and Lightning arrestor.

2.Remedial Works:-
Jungle Clearance.
Repair to revetment / pitching.
Parapet / Kerb wall.
Energy dissipation arrangements.
Colour washing, Painting and Name board.
Fencing to dam for safety aspects.

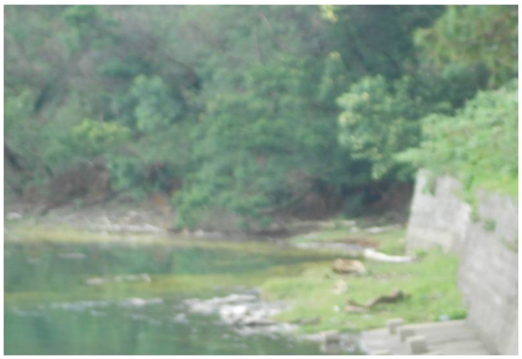
3.Earth slip protection works:-
In the both approach roads and to the left flank on the upstream side.

4.Special repairs to masonry portion of dam:-
Reaming the vertical & drainage shafts
Water washing for removal of lime leaching and pointing.
Spillway treatment.
Removal of calcination deposits.
Approach steps.

5.Repairs to shutters:-
Cleaning and Painting works.
Dismantling and overhauling the spillway and Scour vent gates.
Supply and fixing of seal for gates.
Repair/renewal of hoisting arrangements.

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

DSRP –II team's Inspection of Avalanche Dam.



Extension of Slope protection to the left flank side of reservoir

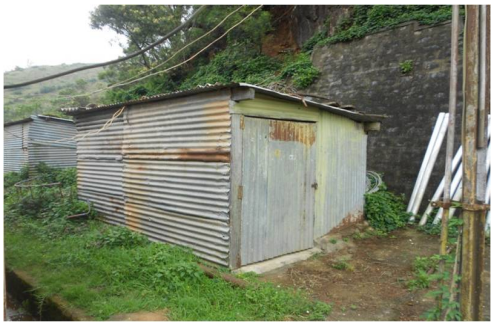
Chocked vertical drainage shafts

Algae growth and open joints in the spillway glacis

Calcination deposits and sweating on the downstream face of the dam

Condition of Spillway and Scour vent stilling basins

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td colspan="2">Requirement of masonry steps to assess the drainage gallery</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>V- Notch location inside drainage gallery</td><td>Insufficient lighting inside drainage gallery</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Slippery steps inside drainage gallery</td><td>Earth cutting on the back side of Police guard room require protection arrangements</td></tr>
</table>

	
Temporary DG set room to be made permanent	**Stretch requiring security chain link fencing**
	
Approach steps and security fencing for interconnecting tunnel gate location	**Existing condition of Scour vent Emergency gate**
	
Existing condition of Scour vent Emergency gate hoisting structure	**Existing condition of Intake gates**

	
Existing condition of Intake gate hoisting structure	**Spillway gate condition**
	
Spillway gate hoisting structure	**Condition of Interconnecting tunnel gate**
	
Insufficient lighting to the top of dam	**Insufficient lighting to the approach road**

	
Existing damaged condition left flank Approach road	
	
Existing condition of right flank downstream approach road	**Existing condition of right flank downstream approach road**

Figure 1.1: Selected Photographs of Improvement/Intervention area

Figure 1.2: Project Area showing major intervention locations

IMPLEMENTATION ARRANGEMENT AND SCHEDULE

As can be seen from the list of activities proposed under dam rehabilitation project; the activities for Avalanche Dam can be floated as one main package consisting of Civil, Mechanical and Electrical works. Works will be carried out by Contractor(s) as these are labour intensive activities and would be completed over a period of 18 months. IA 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:

Overall Phasing of Project Implementation:
Proposed Starting of implementation (MM/DD/YYYY): 05/2023
Proposed Ending of implementation (MM/DD/YYYY): 11/2024
Implementation Duration (months) (MM): 18 months

Timeline phasing of implementation:

Sl. No.	Description	From (month/year)	To (month/year)	Status of Procurement Process
1	Main package C M E works	05/2023	11/2024	NIT will be issued during october 2022
2	Other Packages	NIL		
3	Procurement – instrumentation, goods, inspection vehicles	NIL		

PURPOSE OF ESDD

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

To identify, evaluate and manage the environment and social risks and impacts of the sub-project in a manner consistent with the ESSs;

To adopt a mitigation hierarchy approach to the project's E&S risks i.e. a) anticipate and avoid risks and impacts; b) minimize or reduce risks and impacts to acceptable levels, if not avoidable; c) once risks and impacts have been minimized or reduced, mitigate; and (d) where significant residual impacts remain, compensate for or offset them, where technically and financially feasible;

To help identify differentiated impacts on the disadvantaged or vulnerable, if any, and to identify differentiated measures to mitigate such impacts, wherever applicable;

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
To assess borrower's existing capacity, gaps therein, and identify areas for enhanced capacity towards management of E&S risks.

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.

APPROACH AND METHODOLOGY OF ESDD

The following approach has been adopted for ESDD:
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;
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)

Conduct site visit to understand baseline environment and social settings, proposed activities under the sub-project, their location and sensitivity, if any.

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.

Undertake institutional assessment to identify existing capacities & relevant gaps to manage E&S risks and impacts

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 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.

Chapter 2

INSTITUTIONAL FRAMEWORK AND CAPACITY ASSESSMENT

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 analyzed. 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 regulation 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 require 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.

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

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.

Chapter 3

ASSESSMENT OF ENVIRONMENTAL AND SOCIAL CONDITIONS

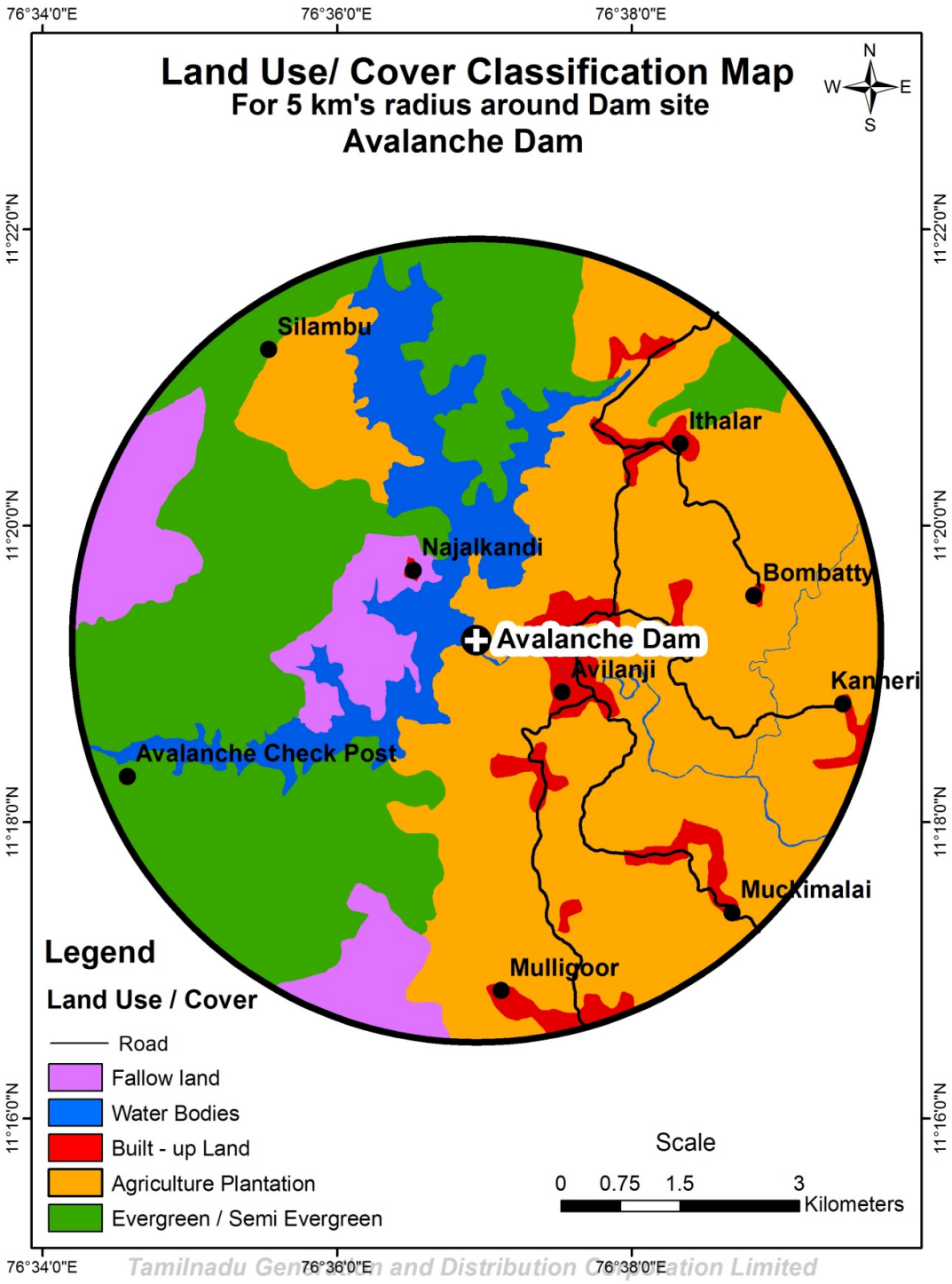
Tamil Nadu Generation and Distribution Corporation Limited do not have in-house expertise to address E&S issues. As per the suggestions of CPMU/CWC, it is proposed to outsource consultancy services of Environmental and Social experts to assist TANGEDCO in resolving E& S issues.

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.

PHYSICAL ENVIRONMENT

Land Use/ Land Cover

The project surrounding area land use and environmental sensitivity was analysed using GIS techniques. Land use/ Land cover map within 5 km radius of dam is presented at Figure 3.1. As can be seen from the map, evergreen/semi-evergreen forest, deciduous forest, and agriculture/fallow land dominates the land use in project surrounding area. In addition, there are small patches of scrub forest and crop land; small and scattered settlement and water body (reservoir). However, the project activities will be confined to dam body only and no structural interventions are proposed beyond existing dam boundaries. Four major villages are identified in dam surrounding (within 5 km) viz.Emerald, Avalanche, Mulligoor, Mukkimalai, Kanneri, Bombatty, Ithlar, Silambu, Najalkandy, and Yedakkadu.



[(Source: Digital data on land use/land cover maps using bhuvan prepared by National Remote Sensing Centre (NRSC) by Private Agency 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 earthquake have been assessed. Project falls in the close to the boundary of earthquake zone III, dam design has taken care of this aspect. (Earthquake Z*ones, viz. Zone II, III, IV and V. Zone II is the least active and Zone V is the most active.)*

The peak design flood for this dam is worked out as 1765 Cumecs, which is above the original spillway capacity of 705 Cumecs and revised to 764 Cumecs worked out based on IS:6934-1998 ("Hydraulic design of High Ogee-overflow spillways). As per flood routing study carried out by the Chief Engineer/ Civil Designs / TANGEDCO, the peak design flood can be safely passed through the existing spillway gates by maintaining the reservoir level (impinging level) during South West monsoon period at +1983.00 m.

Hence, there is no necessity to provide additional spillway arrangements for the Avalanche Dam. However, as revealed from the flood routing study the maximum water level in the reservoir rises by 0.12 m above the designed MWL. Similarly the downstream water level will also rise corresponding to the peak spillway discharge of 850 Cumecs instead of the originally designed discharge of 705 Cumecs.

PROTECTED AREA

Protected areas near Avalanche dam have been reviewed to assess the applicability of ESS 6. Mudumalai Tiger Reserve is about 25 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. In addition, lately an Eco-sensitive Zone (ESZ) has also been notified for the protection of tiger reserve. Buffer Zone (including notified ESZ) is about 21 Km from the dam. No rehabilitation work is proposed beyond the dam boundary, which can directly or indirectly impact the protected area, there ESS 6 will not be triggered.

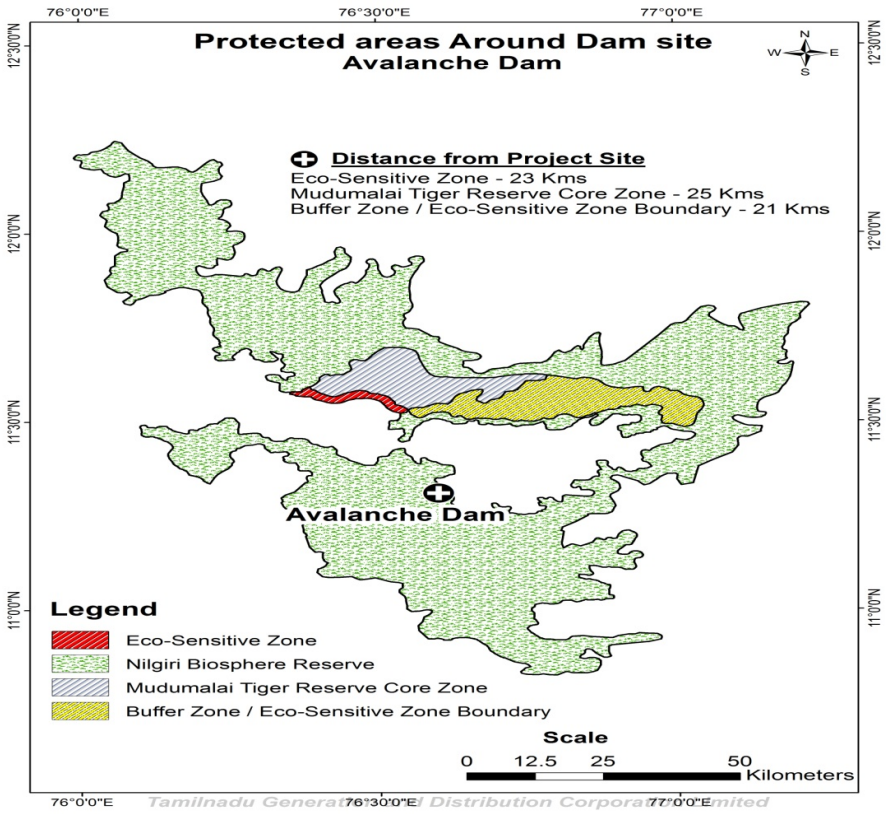


Figure 3.2: Protected Areas around Dam Site

SOCIAL ENVIRONMENT

The Avalanche Dam is located across the stream Avalanche in the Nilgiris district, Tamil Nadu. The proximity villages' areas i.e. villages which fall within 5 km distance from the dam are Emerald, Avalanche, Mulligoor, Mukkimalai, Kanneri, Bombatty, Ithlar, Silambu, Najalkandy, and Yedakkadu. There are no Schedule V[1]areas in state of Tamil Nadu. The district is divided into two revenue Divisions namely Coonoor and Gudalur. The district has six tehsils (talukas) namely Coonoor, Kotagiri, Udhagamandalam, Kundah, Gudalur and Panthalur along with 4 Panchayat Unions (Community Development Blocks); Gudalur, Udhagamandalam, Kotagiri and Coonoor.

The economy of the district is basically dependent on non-agricultural activities & resources. A large number of tea processing industries are the major employment 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	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	Other Workers	2,51,334 (71.82%)
No. of Marginal Workers	31,050		
Source: Census of India, 2011 (District Handbook)			

Schedule tribe population in the district is very limited (4.46%) and are scattered. There are only very few Scheduled Tribe households in the downstream areas and they are mainstreamed in the area with other households. No physical interventions planned in the downstream areas. Therefore, ESS7 is not applicable. Downstream areas including ST households will be taken into account during the preparation of Emergency Action Plan for Avalanche Dam.

[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

CULTURAL ENVIRONMENT

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

SUB-PROJECT SCREENING

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

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

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

Screening indicated that all project components related activities are limited to within the dam area/premises. Due to nature of these activities, likely impacts will be on physical environment in terms of air pollution, noise pollution and waste generation. None of the proposed structural interventions involve acquisition of private land and/or private assets. These activities in no way cause restriction on access to land or use of resources by local communities and there is no economic displacement envisaged due to the sub-project. Activities interfacing with water bodies – river/reservoir may 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 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 OHS risks and impacts on physical environment. Transportation of material, debris/silt 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 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 preparation of EAP, dam break scenario will be simulated and inundation map prepared to delineate the potential risk area in case of an emergency situation. Similarly, during flood release scenario, area inundated will be delineated by simulation. 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 screenings 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 is treated as Moderate by default as its risk effect can be managed by adopting defined guidelines.

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

Special repairs to Approach road to dam and Road on top of dam Energy dissipation arrangement

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

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

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	OH and Safety to Labour/ Community
Civil (within Dam Boundary)	M	M	L	None	None	L	L	L	M	L	L	M
Hydro Mechanical/Electrical	L	L	L	None	None	L	L	L	L	L	L	M
Instrumental SCADA, surveillance	L	L	L	None	None	L	L	L	L	L	L	L
Road work	M	L	L	None	None	L	L	L	M	L	L	L
Major debris disposal	L	L	L	None	None	L	L	L	L	L	L	L
Labour camp	L	L	L	None	None	L	L	L	L	L	L	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: it will be treated as Moderate by default as OHS effect can be kept controlled and with negligible effect with adoption of defined guidelines,

STAKEHOLDERS CONSULTATION

To ensure the participation of stakeholders in ESDD preparation and record their views, 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 local people from vicinity villages.

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

provide initial information to the communities on the proposed project interventions and particularly the non-structural interventions, if any;

Help identify potential stakeholders who are involved at this stage and will be involved a later stage.

Assess their responses in understanding the potential risks and prepare mitigation plan to address their concerns

Stakeholder consultation was made at Avalanche Dam on 15/09/2021. Inputs were taken from permanent staff of the borrower (TANGEDCO) working at Dam and the Villagers of Emerald.

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

Interaction with Dam Engineers/Staff

Questions	Responses provided / Observations
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.	The proposed structural Rehabilitation activities are within the dam compound only, on upstream left flank 45 m length slope protection work only involved. No de-silting work involved in this dam. This dam is located in the Reserve forest area and there is no possibility of community interference during the implementation of Rehabilitation work including stake holders consultant meeting.
Is there any unsettled issues (legacy) related to displacement or resettlement, pending since time of dam construction? If yes, please give a brief detail.	The dam is located in the Reserve forest area. There were no displacement and resettlement issues during construction.
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 encroachers (or) squatters within the dam premises so far.
What is the proposed institutional arrangement to deal the Environment and Social activities within the scheme i.e. in-house team of experts/hired agency or individual experts?	Dealing of Environmental and social activity by CWC environmental experts.
Who will be in charge of E&S related activities at dam site and at SPMU level?	Dam site : Executive Engineer/ Civil/ DRIP/ Kundah SPMU : Executive Engineer/ Civil/ DRIP/ Madurai
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?	Through telephone and mobile.

	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?	By siren. Written Communication to the District Collector. Advance intimation to the public/ downstream communities through mobile.
	How do you ensure that downstream community is fully aware of the above existing mechanism?	The downstream community already educated by Department officials.
	Are there women employees at the dam site?	-Nil-
	Is there any existing Grievance Redressal Mechanism (GRM) within the department to address any kind of grievance/complaints by general public?	Yes: Executive Engineer/Civil/DamSafety-I/ Chennai @ HQrs Executive Engineer/Civil/DRIP/Madurai @ Field.
	Details of any grievances received lately related to this new Scheme?	-Nil-
	Is dam premise a restricted area or has open access to general public?	Access to Dam area – Fully restricted.
	Are there tribal's living in the surrounding area of dam complex? Which tribes are these? Please give brief detail.	No Tribals living in the surrounding dam area.
	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.	-Nil-
	Do you engage any local labours 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?	Routine Dam maintenance works are being done by department staff only.

Interaction with Local Community

Questions	Responses provided / Observations
How many villages are in immediate downstream vicinity?	The Dam is in Reserved Forest Area. One village is in immediate downstream vicinity.
Are they dependent on dam in any way for their livelihood?	-NO-
Does any of these villages were displaced and rehabilitated during the construction of Avalanche Dam. Is there any pending compensation issues?	Dam area is fully covered in Reserved forest area. Displacement and Rehabilitation does not arise.
Is there any R&R affected person known to you who is currently working with the dam authorities? If so, in what capacity (employee/direct worker/contractor)	-NO-
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-
Are you aware of fishing working seasons, revenue earning, any access to general public for fishing, any suggestion etc.	-NO-
Are you aware of local women affected in any way by dam operations?	-NO-
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?	YES.
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-
If you have to contact the dam authorities; how will you contact, through telephone/ mobile/ e mail/	By Telephone, Mobile and in Person.

personally?	
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?	**Such situation did not arise.**
Give your views about Avalanche Dam, how this dam is helping Country, State, district or local communities in meeting its objectives, any specific concern can also be given?	**It acts as a buffer storage reservoir feeding the Kundah Hydro Electric Scheme. The water from Avalanche reservoir is being conveyed through tunnel for Power Generation of 3 x 20 MW in Kundah Power House-I at Kundah Palam and the tail water is discharged into Kundah Palam reservoir.**
(a) Are you aware of any document named Emergency Action Plan (EAP) of the dam? **(b) If yes, do dam authorities conduct any annual mock drill or consultation meeting on dam site and invite all stakeholders to inform about various protocols in place and consequences in case dam fails?** **(c) In future, during stakeholder's consultation meeting, would you like to be a part of these consultation and mock drill activities to be conducted by dam authorities?** **(d) If yes, how to contact you, please give the corresponding address alongwith all details to receive the official communication.**	**YES.** **Consultation meeting was conducted on 04.03.2020.** **YES** **Thiru. M.Mahendrakumar,** **Electrician I Grade,** **Mechanical Section,** **Emerald, The Nilgiris – 643 209.** **Ph No: 9442085357.** **Thiru. R.Vasudevan,** **Assistant Operator, Mechanical Section,** **Emerald, The Nilgris – 643 209.** **Ph No: 9487510241.** **Thiru. D.Lakshmanan,** **Carpenter II Grade, Civil Section,** **Emerald, The Nilgris – 643 209.** **Ph No: 9786031543.** **Thiru. V.Baskar,** **D.No.9/284, Surendra Nagar,** **Emerald, The Nilgris – 643 209.** **Ph No: 9443401547.** **Thiru. P.Sekar,**

	D.No.3/159A, Nehru Nagar, Emerald, The Nilgris – 643 209. Ph No: 9442101581. Thiru. B.Anbarasan, D.No.2/174, Anna Nagar, Emerald, The Nilgris – 643 209. Ph No: 9655035023. Thiru. P.Robin, D.No.104, Nehru Nagar, Emerald, The Nilgris – 643 209. Ph No: 9344008117. Thiru. P.Indiran, D.No.184, Nehru Nagar, Emerald, The Nilgris – 643 209. Ph No: 9442011934.
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 tenders notices being invited for various maintenance of this dam?	-NO-
Any suggestion to improve overall system by dam authorities in any way, please give in brief?	Proposed Dam Rehabilitation and Improvement works, as per DSRP recommendations, shall be carried out as a safety measure.

Following is the summary outcome of the stakeholder consultation:
Technical Aspects:
1. It acts as a buffer storage reservoir feeding the Kundah Hydro Electric Scheme.
2. The water from Avalanche reservoir is being conveyed through tunnel for Power Generation of 3 x 20 MW in Kundah Power House-I at Kundah Palam and the tail wateris discharged into Kundah Palam reservoir.

DESCRIPTIVE SUMMARY OF RISKS AND IMPACTS BASED ON SCREENING
Based on the above screening analysis, potential impacts and risks from the sub-project are summarised below:

Environmental Impacts and Risks
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.
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.
Civil work interfaced with water body especially such as repairs to revetment/rip-rap in u/s faceas work on upstream face of dam pose risk of water pollution and impact on fish fauna.
Construction and demolition waste and muck require careful disposal at pre-identified and approved site to minimise the risk of pollution on this count.

No impact on general ecology is envisaged.

Social Risk and impacts

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

The dam is not located in the Schedule V area. Though 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.

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.

Waste generation from labour colony can pollute drinking water sources of community, risk is low and can be mitigated by providing adequate sanitation facilities.

No impacts are envisaged on cultural heritage as works shall not be undertaken in their vicinity or result in any impact.

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.

Chapter 5 CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Risk Classification

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

Hence the overall risk of this sub-project Dam is categorized as Moderate.

National Legislation and WB ESS Applicability Screening

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

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

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

Relevant ESS	Reasons for Applicability of the standard
ESS2: Labour and Working Conditions	Direct workers, Contracted workers(for civil and hydro-mechanical works) and Community workers (likely to be engaged for EAP and other non-structural interventions)
ESS3: Resource Efficiency, Pollution Prevention and Management	Civil and hydro-mechanical/electrical work including resource consumption requiring protection of physical environment and conservation of resources
ESS 4: Community Health and Safety	Transportation of material, labour camp near habitation; and accidental risk during repair /improvement work and also leading to SEA/SH GBV risk Community involvement during EAP preparation
ESS 10: Stakeholder Engagement Plan	For engagement of stakeholders in all interventions

RECOMMENDATIONS

Mitigation and Management of Risks and Impacts

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

IA shall customise the generic 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.

It is recommended that ESMP provides due measures for protection of environment quality and resource conservation (during handling of resources) in line with ESF standard ESS3 requirements. Similarly, any impacts identified has to be conserved. Likewise, due attention has to be given to Occupational Health and Safety of workers and community in line with the requirements of ESS4 and World Bank Group guidelines on Occupational Health and Safety (OHS). Hence SPMU/IA shall prepare a standard ESMP in line with outline provided in the ESMF and ensure its adherence by contractor. The standard 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)

Contractor shall submit BOQ as per ESMP of the sub project and will also include environmental and social budget as part of bid submission.

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

Table 5.2: List of Mitigation Plans with responsibility and timelines

WB-ESS Triggered	Mitigation Instrument	Responsibility	Timelines
ESS2: Labour and Working Conditions ESS 4: Community Health and Safety	LMP OHS GBV/SEAH	SPMU/IA SPMU for GBV/SEAH	Before mobilization of contractor GBV/SEAH by appraisal
ESS3: Resource Efficiency, Pollution Prevention and Management	ESMP Muck Management Plan Resource Conservation Plan	SPMU/IA	Before mobilization of contractor
ESS 10: Stakeholder Engagement Plan	SEP in accordance with project SEF	SPMU/IA	By negotiation

IA shall disclose the finalised ESDD, ESMP, ESCP and other related plans on its website after formal approval from CPMU. Executive summary of proposed ESMP based on ESDD shall be translated and disclosed in local language.

Institutional Management, Monitoring and Reporting

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

3. **SPMU/IA shall advise contractors about applicable legislative requirements and ensure that contractors fully comply with applicable requirements 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 Environmental Social Commitment Plan (ESCP) on quarterly basis.**

4. **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. Grievance redress mechanism will be designed to address concerns and complaints promptly and transparently with no impacts (for any complaints made by project affected people (PAPs). GRM will work within existing legal and cultural frameworks and shall comprise project level and respective State level redress mechanisms.**

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

6. **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 PMC, 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), Occupational Health (OH), Physical Environment (PE), Cultural (C), Tribal presence (T), impact on private land/assets/encroachers/squatters (LA), Labour (L), GBV risks (G), (Write whichever is applicable)
1	2	3	4	5
A	Nature of Project Component 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) (likeRepairs to revetment/rip-rap in u/s face)	A	DI	WQ, F, OH, PE, L, G
5	Structural Improvement/Repair work - Downstream of Dam site (with no interfacing with dam reservoir) (likeenergy	A	DI	WQ, OH, PE, L, G

Sl. No	Project Component	Applicable (A), Not Applicable (NA)	Environment and Social Risk Associated within dam area (DI), Beyond Dam Area (DE)	Likely Nature of Risk/Impact Water Quality (WQ), Fisheries(F), Conservation area(CA), Protected Area (PA), Ecological (E), Occupational Health (OH), Physical Environment (PE), Cultural (C), Tribal presence (T), impact on private land/assets/encroachers/squatters (LA), Labour (L), GBV risks (G), (Write whichever is applicable)
1	2	3	4	5
	dissipating arrangement etc.)			
6	Remodeling earth dams to safe,stable cross sections	NA		
7	Hydro-mechanical/electrical activities with interface with dam reservoir	A	DI	OH, WQ, L, G
8	Hydro-mechanical/ electrical activities Downstream of Dam site (with no interfacing with dam reservoir)	NA		
9	Instrumentation, General lighting and SCADA systems	A	DI	OH, L
10	Basic Facilities (like access road improvement, renovation of office, etc)	A	DI	OH, PE, L, G
11	Utility installation like standby generator, or setting up solar power systems	A	DI	OH, L
12	Painting Work	A	DI	WQ, OH, L
13	Water recreation activities	NA		
14	Tourism Development	NA		

Sl. No	Project Component	Applicable (A), Not Applicable (NA)	Environment and Social Risk Associated within dam area (DI), Beyond Dam Area (DE)	Likely Nature of Risk/Impact Water Quality (WQ), Fisheries(F), Conservation area(CA), Protected Area (PA), Ecological (E), Occupational Health (OH), Physical Environment (PE), Cultural (C), Tribal presence (T), impact on private land/assets/encroachers/squatters (LA), Labour (L), GBV risks (G), (Write whichever is applicable)
1	2	3	4	5
15	Solar power/floating solar	NA		
16	List any other component not listed above			
i	Jungle clearance	A	DI	E, L, G
B	Pre-construction and construction stage major auxiliary or preparatory intervention			
1	Acquisition of forest land involved	NA		
2	Taking of private land (including physical or economic displacement, impact on livelihood; temporary loss of business)	NA		
3	Major Borrow materials requirement involved	NA		
4	Major Quarry materials requirement involved	NA		
5	Blasting involved	NA		
6	Resettlement and Rehabilitation	NA		
7	Types of project workers (Direct, Contracted, Community Workers (or Volunteers i.e.	A	DE	L, G

Sl. No	Project Component	Applicable (A), Not Applicable (NA)	Environment and Social Risk Associated within dam area (DI), Beyond Dam Area (DE)	Likely Nature of Risk/Impact Water Quality (WQ), Fisheries(F), Conservation area(CA), Protected Area (PA), Ecological (E), Occupational Health (OH), Physical Environment (PE), Cultural (C), Tribal presence (T), impact on private land/assets/encroachers/squatters (LA), Labour (L), GBV risks (G), (Write whichever is applicable)
1	2	3	4	5
	for EAP implementation)			
8	Labour Camp involved (location within dam premises or outside)	A	DE	WQ, PE, L, G
9	Migrant labour likely to be involved	A	DE	L, G
10	Heavy machinery to be deployed and related maintenance workshop set up involved	A	DI	OH, PE, L, G
11	Hot mix plant Requirement	NA		
12	Concrete mixture and heavy pumps to be deployed	A	DI	OH, PE, L, G
13	Temporary land acquisition involved	NA		
14	Temporary disruption to access, livelihoods	NA		
15	Tree felling/ vegetation clearance involved	NA		
16	Haulage of machinery involved	A	DI	OH, PE, L, G
17	Major Debris Disposal involved	A	DE	PE, L, G
18	Major Transport of materials involved	A	DE	PE, L, G
19	Utility shifting involved	NA		
20	Discharge of reservoir water (lowering of	NA		

Sl. No	Project Component	Applicable (A), Not Applicable (NA)	Environment and Social Risk Associated within dam area (DI), Beyond Dam Area (DE)	Likely Nature of Risk/Impact Water Quality (WQ), Fisheries(F), Conservation area(CA), Protected Area (PA), Ecological (E), Occupational Health (OH), Physical Environment (PE), Cultural (C), Tribal presence (T), impact on private land/assets/encroachers/squatters (LA), Labour (L), GBV risks (G), (Write whichever is applicable)
1	2	3	4	5
	reservoir water involved)			
21	List any other not listed above			

Annexure – II: Form SF2

Sl. No	Applicable Sub-Project Component/ Construction preparatory Work related Sub activity (s 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 - upstream of Dam site			
a	Repairs to revetment/rip-rap in u/s face	WQ, F, OH, PE, L, G	Air pollution, noise pollution, risk of reservoir water contamination and impact on fishes, generation of construction debris, Occupational health and safety risk due to working on upstream face of dam, labour and GBV risk	L
b	Special repairs to masonry portion of dam Reaming the drainage shaft	WQ, OH, Pl L, G	Air pollution, noise pollution, water pollution, Occupational health and safety risk, labour and GBV risk	L
c	Jungle clearance	E, L, G	Impact on ecology, labour and GBV risk	L
d	Painting to the Entrance gate and Water level Gauge plate	PE, L, G	waste generation from removed parts, Labour& GBV risk	L
2.	Structural Improvement/Repair work -Downstream of Dam site (with no interfacing with dam reservoir)			

Sl. No	Applicable Sub-Project Component/ Construction preparatory Work related Sub activity (s 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
	(like repair of parapet walls, damage spillway crest, downstream training walls, etc.)			
a	Energy dissipation arrangement	WQ, OH, PE, L, G	Air pollution, noise pollution, water pollution, generation of construction waste/silt, Occupational health and safety risk, labour and GBV risk	M
b	Colour washing, Painting & chipping, Water washing and Pointing	WQ, PE, L, G	water pollution, hazardous waste, Labour and GBV risk	L
c	Special repairs to Approach road to dam	OH, PE, L, G	Air pollution, noise pollution, construction debris, Occupational health and safety risk	M
d	Special repairs/constructions/improvements to buildings including electrification and fencing Police Guard Room & DG set Room	OH, PE, L, G	Air pollution, noise pollution, construction debris, Occupational health and safety risk	L
3.	Hydro-mechanical/Electrical activities Downstream of Dam site (with no interfacing with dam reservoir)			
B	Repairs to shutters Repairs/replacement of shutters with seals Repair / renewal of hoisting arrangements	PE, L, G	waste generation from removed parts, Labour & GBV risk	L
c	Painting gates	OH, PE, L, G	water pollution, hazardous waste, Labour and GBV risk	L
4.	Instrumentation, General lighting and SCADA systems			

Sl. No	Applicable Sub-Project Component/ Construction preparatory Work related Sub activity (s 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	Providing electrification to dams Lights on the top of the dam, gallery, approach road Dam Electrification	OH, PE, L, G	Occupational health and safety risk due to electrical work, waste generation from removed parts and packing material, labour and GBV risk	L
B.	Pre-construction and construction stage major auxiliary or preparatory intervention			
1	Types of project workers (Direct, Contracted, Community Workers (or Volunteers i.e. for EAP implementation)	L, G	GBV risk due to involvement of workers and local population.	L
2	Labour Camp involved (location within dam premises or outside)	WQ, PE, L, G	Wastewater generation from domestic activities, waste generation, GBV risk within labour and involving community.	L
3	Migrant labour likely to be involved	L, G	Migrant labour having low degree of interface with community	L
4	Likely interface of Workers with communities	L, G	Risk of GBV due to labour interaction with community.	L
5	Heavy machinery to be deployed and related maintenance workshop set up involved	OH, PE, L, G	Heavy machinery will be deployed for structural measures - OH risk due to machine handling, waste, wastewater and air emissions from machines operations, Labour & GBV risk.	L

Sl. No	Applicable Sub-Project Component/ Construction preparatory Work related Sub activity (s 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
6	Concrete mixture and heavy pumps to be deployed	OH, PE, L, G	Concrete mixture and pumps will be deployed for road repair and other civil works and de-watering - OH risk due to machine handling, waste generation, wastewater and air emissions from operations, Labour &GBV risk.	L
7	Haulage of machinery involved	OH, PE, L, G	Machines will be hauled from different location and brought to site; OHS risk during loading/unloading and air and noise pollution during transportation, labour and GBV risk.	L
8	Debris/Silt Disposal involved	OH, PE, L, G	Debris will be generated from various activities - OH 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	L

Sl. No	Applicable Sub-Project Component/ Construction preparatory Work related Sub activity (s 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
			GBV risk due to labour involvement.	
9	Major Transport of materials involved	OH, PE, L, G	Material will be transported from various vendors and suppliers to site for civil, hydro-mechanical work and instrumentation - OH risk during material handling, loading and unloading; ,air and noise emissions from transportation, Labour and GBV risk.	

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: it will be treated as Moderate by default as OHS effect can be kept controlled and with negligible effect with adoption of defined guidelines,

Annexure III: Stakeholder's consultation: List of Participants

Sl. No.	Name	Relation with Dam – Staff, contractor, worker, full time/part time, local, NGO….	Mobile Number	Address (at least village name)
1.	P. Vadivelu	Assistant Executive Engineer/ Civil/ DRIP/Kundah	9445360733	Kundah Upper Camp
2.	M. Mahendara Kumar	Electrician I Grade, Mechanical Section, Emerald, The Nilgiris – 643 209.	9442085357	Emerald Camp
3.	R.Vasudevan	Assistant Operator, Mechanical Section, Emerald, The Nilgris – 643 209.	9487510241	Emerald Camp
4.	D.Lakshmanan	Carpenter II Grade, Civil Section,Emerald, The Nilgris – 643 209.	9786031543	Emerald Camp
5.	V.Baskar	D.No.9/284, Surendra Nagar,Emerald, The Nilgris – 643 209.	9443401547	Emerald
6.	P.Sekar	D.No.3/159A, Nehru Nagar,Emerald, The Nilgris – 643 209.	9442101581	Emerald
7.	B.Anbarasan	D.No.2/174, Anna Nagar, Emerald, The Nilgris – 643 209.	9655035023	Emerald
8.	P.Robin	D.No.104, Nehru Nagar, Emerald, The Nilgris – 643 209.	9344008117	Emerald
9.	P.Indiran	D.No.184, Nehru Nagar, Emerald, The Nilgris – 643 209.	9442011934	Emerald