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

BHAVANISAGAR DAM
(PIC: TN 12 HH0014)

ENVIRONMENTAL AND SOCIAL DUE DILIGENCE REPORT

FEB 2023

Office of the Chief Engineer,
Coimbatore Region, Water Resources Department
Government of Tamil Nadu

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ABBREVIATIONS AND ACRONYMS

AIDS	:	Acquired Immunodeficiency Syndrome
CA	:	Conservation Area
CCA	:	Culturable Command Area
COVID	:	Corona virus 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
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
SF	:	Screening Format
SH	:	Sexual Harassment
SPMU	:	State Project Management Unit
ST	:	Scheduled Tribes
WB	:	World Bank
WQ	:	Water Quality

EXECUTIVE SUMMARY

Lower Bhavani Project is the first major irrigation project executed in Tamil Nadu after independence of India. It was executed during 1948-1955 in the first five year plan. Lower Bhavani Dam is located in the Bhavani River just below the confluence of river Moyar and river Bhavani in Sathyamangalam Taluk of Erode district. Lower Bhavani Dam is one of the Major multipurpose dams in Tamil Nadu and it is mainly used for the irrigation purpose. Lower Bhavani main canal is having length of 124 miles (200 Km). The total command area of 2,47,247 acres are benefited by this dam through the Lower Bhavani project main canal in two Irrigation seasons (1st season- wet crop and 2nd season Dry crop) and through River systems. There are two power generation house (Capacity of 8MW each) are installed in the downstream side of the Dam. It has proposed to undertake rehabilitation measures (civil, hydro-mechanical, electrical and basic facilities) 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 various civil works are Low. Similarly, environment and social risk of labour camp and disposal of debris has been identified as Low. Risk of all other activities has been identified as Low. These risks are low 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 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 risks resulting in the overall sub-project to be categorized as Low risk category. These risks and impacts can be effectively mitigated with effective implementation of mitigation plans by SPMU/IA, Contractors and monitoring by EMC, SPMU and CWC.

Chapter 1 INTRODUCTION

1.1 PROJECT OVERVIEW

The proposed Dam Rehabilitation and Improvement Project (DRIP II) would complement the suite of ongoing and pipeline operations supporting India's dam safety program. The project development objective (PDO) is to increase the safety of selected dams in participating States and to strengthen dam safety management in India. Project Components include:

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

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

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

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

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

The project is likely to be implemented for 300 dams in 18 states across the country. The primary beneficiaries of the project are the communities that live in dam breach flood inundation areas and the communities that depend on water, irrigation and electricity services provided by the dams that could be compromised by poor dam performance or failure. In addition to saving lives, improved dam safety will avoid potential flood damage to houses, farm areas, infrastructure (roads, bridges and other public & 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 – Lower Bhavani (Bhavanisagar) Dam

Bhavanisagar Dam is also called as Lower Bhavani Dam is constructed across the river Bhavani at Pungar Village in Sathyamangalam Taluk of Erode District in Tamil Nadu. The Dam is the Largest Earthen Dam of its kind in the State Measuring 8780.21 meters of which 464.21 meter is in masonry structure in the river bed portion. Bhavanisagar Dam is the 2nd largest reservoir in Tamil Nadu with a capacity of 928 Million Cubic meters. The operation of the Dam is oriented to cater down the irrigation needs. Power is also generated utilizing the water released for the irrigation. The total extent of 2,47,247 acres of land in three Districts (Erode, Karur and Tirupur) are benefited by this Lower Bhavani Dam.

Salient features of the project are reported below:

Project Name	Lower Bhavani Resorvoir Project (LBP)
River Basin	Cauvery Basin- Bhavani Sub Basin
River/Stream	Bhavani River, Moyar River and its tributaries
District	Erode
Latitude/Longitude	11^0 28' 16.2" North / 77^0 06' 47.5" East
Type of Project	Multipurpose Reservoir Project
Gross Command Area (GCA)	100059 ha
Cultivable Command Area (CCA)	100059 ha
Hydro Power Installed Capacity	16 MW
Average Annual Energy Generation (MU)	68MU
Domestic/Municipal/Industrial Water Supply (Annual)	453.50 MCM
Dam	
Type	Composite Dam
Total length of the Main dam	8780.21 m
Length of Embankment dam	8316 m
Length of Masonry/Concrete dam	464.21 m
Top width of Embankment Dam	7.62 m
Top width of Masonry/Concrete Dam	6.71 m
Height of Embankment Dam above Lowest River Bed Level	40.54 m
Height of Masonry/Concrete Dam above deepest foundation level	62.18 m
Lowest River Bed Elevation	242.93 m
Deepest Foundation Elevation	222.81 m
Saddle Dam	NA
S**pillway**	
Type of Spillway	Ogee
Length of Spillway	120.70 m
Location of Spillway	Spillway starts from LS 4902.81 m to LS 5023.51m
Spillway Crest Level	274.32
Number of bays	9
Total Discharging Capacity at MWL	3282.40 cumec
Spillway Gate	Vertical fixed wheel gates; 10.97 m width &6.10 m height
Type of Hoist for Spillway Gates	Chain block with counter weight concrete beam
Sluice Arrangement	
No. of Sluices & Sill Level (m)	River - 9 Nos & 248.41, Canal - 3 Nos & 256.03
Size of Sluice	1.83 m wide & 3.05 m high
Discharging Capacity of Sluice at FRL	1005.27 cumec
Reservoir	
Catchment Area at Dam site	4199.67 sq km
Maximum Water Level	280.416 m

Full Reservoir Level	278.892 m
Minimum Draw Down Level	258.623m
Gross Storage Capacity at FRL	928.78 MCM
Live Storage Capacity	907.69 MCM
Reservoir Spread Area at FRL	78.76 sq km
Date of Starting the Construction	07.01.1948
Date of Completion	19.08.1955
Date of first full impoundment	16.11.1960
Original Inflow Design Peak Flood	3078.01 cumec
Maximum observed flood peak and date	2939 cumec and 03.07.1961
Revised Inflow Design Peak Flood	9832 cumec

Proposed Interventions/Activities and Intended Outcomes

The Dam Safety Review Panel (DSRP), constituted for the purpose of inspection of the projects that the Government of Tamil Nadu plans to undertake for the repair, rehabilitation and modernization work under World Bank aided DRIP-II & III schemes, made a visit to Lower Bhavani Project on 17.02.2021 for inspection purpose and recommended measure to improve the safety and performance of dam and associated appurtenances in a sustainable manner, and also to strengthen the dam safety institutional set-up.

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

CIVIL WORK

a) MASONRY PORTION:

1) Rehabilitation works in Infiltration Gallery.
2) Rehabilitation works in Masonry Dam portion.
3) Rehabilitation of Existing and New construction of Electrical cable way RCC trench from masonry gauge well room portion to flood control room of earthen portion.

b) EARTHEN BUND PORTION:

1) Rehabilitation of Rock Toe drain Filter, Toe Drain and leading channel of "V" Notches arrangements.
2) Rehabilitation to the Dam Approach and Service Roads.
3) Construction of Security Guard Room at the entrance Gates of LBP Dam.
4) Providing Entrance Arch of LBP Dam with necessary Safety arrangements.
5) Providing fencing arrangements for protection of earthen portion.

HYDRO MECHANICAL WORK

i) Providing Roof shed in top of the deck bridge of spillway gates and replacement of the existing damaged steel cover plate at top of the dam for River & Canal sluice.

ii) Supply of spare parts of gear wheel, shaft and pinion wheel etc., Spillway shutters.

iii) Repairs to Wheel track and Guide shoe plates in vertical shutters and Renewal of Rubber seal, Limit Switches and Dial Gauge arrangements of Spillway, River and Canal Sluice Shutters.

ELECTRICAL WORKS:

i) Provision of 6 Person's Passenger Lift to the Gantry House in LBP Dam at Bhavanisagar.

ii) Provision of LED Lights and power mains to Gantry house in LBP Dam at Bhavanisagar.

iii) Provision of Power Plugs and LTUG Copper Cable for Crane moving area in Gantry House to River Sluice area in LBP Dam at Bhavanisagar.

iv) Provision of EI and LED Flood Light Fittings to the Sluice Well Chamber in River and Canal Sluice area in LBP Dam at Bhavanisagar.

v) Provision of LED Street Light Fitting to Approach road, "V" Notches road and Masonry main road left wing in LBP Dam at Bhavanisagar.

vi) Provision of LED Street Light Fitting in Mettupalayam Gate to Masonry Road Right wing in LBP dam at Bhavanisagar.

vii) Provision of EI and LED Fittings in Spillway Motor area in LBP Dam at Bhavanisagar.

viii) Provision of Lightening Arrester to Gantry house and Spillway Top area in LBP Dam at Bhavanisagar.

ix) Provision of LTUG cable in panel room to orchard Gate and shed in LBP Dam at Bhavanisagar.

x) Provision of Lighting to Canal sluice area in LBP Dam at Bhavanisagar.

xi) Provision of Lighting to River sluice area in LBP Dam at Bhavanisagar.

xii) Provision of Lighting to Spillway area in LBP Dam at Bhavanisagar.

xiii) Provision of Lightening Arrester near HT Panel room in LBP Dam at Bhavanisagar.

xiv) Provision of 40.00KVA Diesel Generator Set with AMF panel and renewal of in Power Distribution arrangements in the Inspection Bungalow (IB) in Bhavanisagar Dam in Erode District.

xv) Provision of 40.00KVA Diesel Generator Set with AMF panel and Renewal of in Power Distribution arrangements in the PWD office building at Bhavanisagar Dam in Erode District.

PROVISION FOR ESSENTIAL FEATURE ASSOCIATED WORKS:

i) Under Water Scanning cum Inspection of Upstream Masonry portion using Remotely Operated Vehicle (ROV) from the level of +840.00ft to +815.00ft, Report preparation of hard and soft copy through video soft copy, Mapping and submission of repairs proposal based on the defects identified. Complete complying with standard specification and as directed by the departmental officers. (Through Consultancy)

ii) Purchase of New Boat for Regular inspection of U/S portion and Water spread area of LBP

iii) Provision for study of Environmental Impact Assessment in water spread area of LBP reservoir.

iv) Provision for Examination of Spillway Gate Component for upgraded Seismic Parameter.

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

DSRP Team inspecting the Lower Bhavani Dam

River sluice

Gallery Porous drain

Spillway Shutter motors

Spillway gear box

Toe Drain and V notch

Damaged Toe drain portion

Earthen Embankment

BT Road at Top of the Dam

Damaged BT Road on EB Gate to Dam Power House

Existing Damaged Cable way trench in Masonry Portions

Proposed New Cable Way Trench in Earthen Portion

Damaged Chain Link Fencing Portions in D/S of Dam

Proposed Handrails in Left Flank Bell Mouth Joinery Portion

Proposed Handrails in Boat Dock Portion

Proposed Handrails in River Sluice Chamber Portion

Damaged Leading Channels of V-Notch Earthen Portion

Existing Damaged Revetment Portions (River Bund) on Immediate D/s of LBP Dam

Existing Damaged pointing in masonry joints of Spillway Glacis Portions

Existing Damaged Rock Toe Filter arrangements

Damaged WRD Staff Quarters

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 package, Hydro Mechanical work package and Electrical work package. 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) : 01.04.2023
Proposed Ending of implementation (MM/DD/YYYY) : 30.09.2024
Implementation Duration (months) (MM) : 18months

b) Timeline phasing of implementation:

Sl. No.	Description	From (Month/Year)	To (Month/Year)	Status of Procurement Process
1	Civil works – Main Package	4 / 2023	9 / 2024	NCB
2	Hydro Mechanical package	4 / 2023	9 / 2024	NCB
3	Electrical work package	4 / 2023	9 / 2024	NCB

1.4 PURPOSE OF ESDD

The overall project (DRIP II) was categorized as **low 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 hold as soon as situation is conducive for holding such consultations.

Chapter 2 INSTITUTIONAL FRAMEWORK AND CAPACITY ASSESSMENT

2.1 POLICY AND LEGAL FRAMEWORK

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

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

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

Therefore, for the proposed dam rehabilitation activities at Lower Bhavani dam, Tamil Nadu, regulatory clearances will not be applicable as per Indian regulation as mentioned above as the rehabilitation activities are restricted to the already existing dam and it's apparatus. Other applicable regulatory requirement is discussed in ESMF. As the sub-project is an improvement project of existing dam and no land acquisition or expansion activities are involved; therefore, the Forest (Conservation) Act, 1980, Wildlife (Protection) Act, 1972, Environmental Clearance under the Environment (Protection) Act, 1986, The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 etc. are not applicable. The major labour laws are applicable as the activities proposed will engage contractor/labour.

2.2 DESCRIPTION OF INSTITUTIONAL FRAMEWORK

Water Resources Department, Government of Tamil Nadu is the implementing agency for this sub-project. The Engineer-in-Chief, Water Resources Department (WRD) & Chief Engineer (General) are functioning heads of the Water Resources Department.

Tamil Nadu Water Resources Department is responsible for the following:

- Ground water wing carries out assessment of the ground water potential and quality periodically all over the State. To maintain and upkeep of structural and non-structural components of irrigation facilities;
- To develop new additional projects, structures, etc., to augment potential sources for irrigation;
- To maintain, upkeep and develop buildings for the State;
- To maintain and upkeep of navigation and drainage facilities;
- To maintain and upkeep and to build conveyance facilities by way of roads for the agricultural produce to be moved to the interior, rail heads, ports, etc.;
- To identify, investigate, formulate and estimate feasible and viable irrigation projects so that there is always a shelf of projects to implement the policy, promises and the programmes of the Government;
- Coastal protection measures
- Field tests and laboratory tests for soil and concrete are being carried out by the Soil Mechanics and Research Division, Chennai.
- Evolving designs for all the components of the schemes for new irrigation projects and also for rehabilitation of existing irrigation systems

Generally in Tamil Nadu, all departments are following Grievance Redressal mechanisms at various levels.

State Level

Chief Minister's Special Cell functions as the Hon'ble Chief Minister's Grievance Redressal forum open to public from all walks of life. Norms are established to redress the grievances in an expeditious, fair and sympathetic manner without giving room for public dissatisfaction. The petitions are sent to the respective Departments and replies are fed into the online monitoring system (**cmcell.tn.gov.in**) The Water Resources Department have been sensitised on the necessity for prompt and effective disposal of the petitions. Review meetings are being convened with the nodal officers of each Department .The action taken on the grievances are promptly informed to the Public.

All Departments of Government of Tamil Nadu

In Water Resources Department, Public Information Officers and Appellate Authorities are available in all the Chief Engineers and Superintending Engineers office so as to provide information as per the Right to Information Act, 2005. Reply for the each petition sent to the petitioner with due acknowledgement.

District Level

Tamil Nadu Government has developed (e-District GDP) Petition Processing Portal. Using this link **gdp.tn.gov.in** the general public can submit their grievance petition to Petition Processing Portal (PPP) to concern District Collector. After the initial scrutiny, the submitted

petitions will be forwarded to the Concerned Executive Engineer, WRD /other Departments for taking necessary action. For each petition, the petitioner will get an SMS on both submission and final disposal of the petition.

Sub-project Level

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.

The sub-project will be implemented by WRD, Government of Tamil Nadu and will have overall responsibility for the coordination of the project activities and will monitor the progress including environment and social safeguards issues. WRD do not have in-house expertise to address E&S issues. Presently, the Project Director and Superintending Engineer at SPMU and Executive Engineer at dam level look after these aspects.

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.

In Tamil Nadu the organizational structure for Bhavanisagar Dam Sub-Project is as follows:

The Chief Engineer, WRD, Coimbatore Region, Town Hall Road, Coimbatore-641001 Email:chiefwropwd@gmail.com Phone: 0422-2381804

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Superintending Engineer, Bhavani Basin Circle, Erode-1 Email:sewroerode@gmail.com Ph.No.0422-2395522

↓

Executive Engineer, Bhavanisagar Dam Division, Bhavanisagar – 638451, Email - eewrobsr@gmail.com Ph.No.04295-240224/240234

↓

Assistant Executive Engineer, Bhavanisagar Sub Division, Bhavanisagar - 638451.Email - aeepwdwrdbsr@gmail.com Ph.No.04295-240224/240234

↓

Assistant Engineer, Dam Section, Bhavanisagar - 638451. Email - aebsrdam@gmail.com Ph.No.04295-240224/240234

- The project Implementing Agency is TNWRD and the Dam in Charge is Executive Engineer, Bhavanisagar Dam Division, Bhavanisagar.

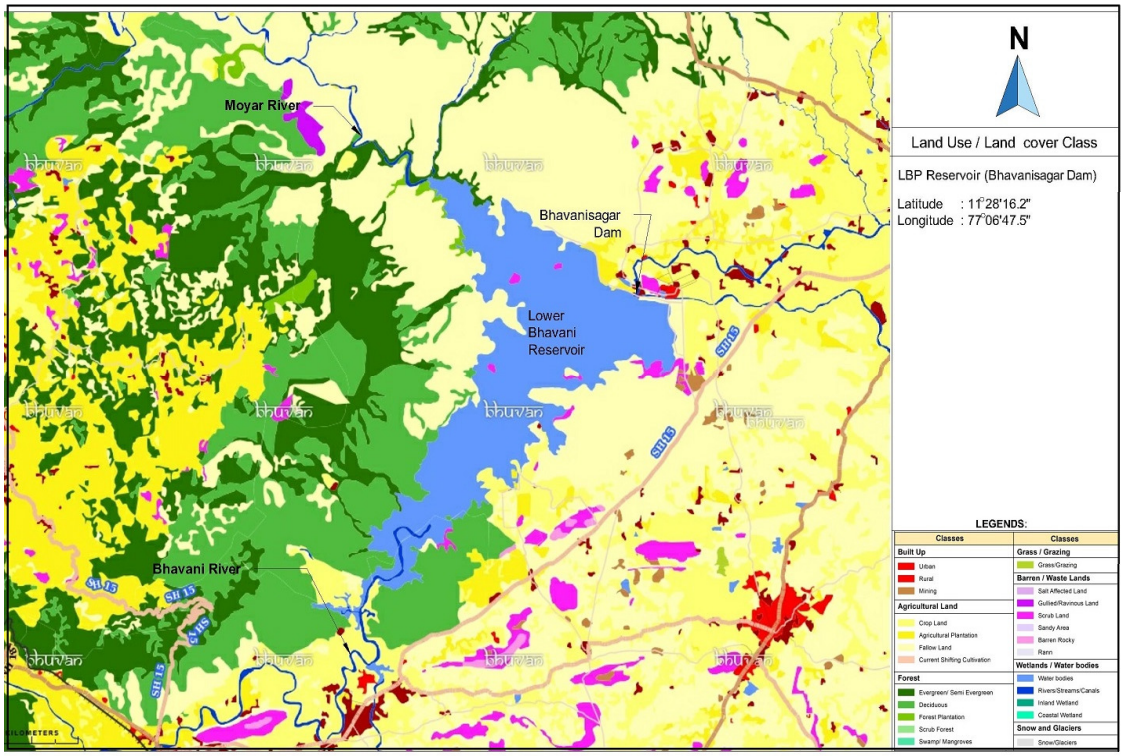
Chapter 3 ASSESSMENT OF ENVIRONMENTAL AND SOCIAL CONDITIONS

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

3.1 PHYSICAL ENVIRONMENT

Land Use/Land Cover

The project surrounding area's land use and environmental sensitivity was analyzed using GIS techniques. Land use/ land cover map of LBP dam is presented at **Figure 3.1**. Present land use is mainly agriculture followed by built-up lands, evergreen/semi-evergreen forest, deciduous forest, water bodies (reservoir and minor irrigation), scrub forest and grass cum barren lands. Total three major villages are falling in 5 km of radius of the Bhavanisagar dam namely: Pungar, Mudukkanthurai and Thottampalayam in Sathyamangalam Taluk of Erode Districts.



[(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 around Dam site

Table 3.1: Land use / Landover Area of 5 Km. Buffer Zone of Bhavanisagar dam Site		
Land use Class	Area in Sq. Km.	% of Total Area
Dense Forest	-	-
Open Forest	-	-
Degraded Forest / Rock Exposure	-	-
Water Bodies	18.97	16.19
Settlement / Dam Facility	-	-
Crop land	34.93	29.82
Fallow	44.63	38.10
Mining	1.72	1.47
Plantation	7.51	6.41
River / Stream / Canals	1.69	1.44
Rural	2.98	2.54
Scrub land	4.03	3.44
Urban	0.68	0.58
Total Area	**117.14**	**100.00**

Natural Hazards

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

The gross storage capacity of Lower Bhavani dam is 928.780 MCM and the hydraulic head is 32.004 m so as per the Indian Standard IS 11223:1985 classification criteria, Bhavanisagar dam is classified as a large dam and, accordingly qualifies for "PMF (Probable Maximum Flood)" as the design flood. The estimated PMF worked out by CWC is 9832 m^3/sec, against the original design flood of 3078.01m^3/sec, for the dam safety review of the project.

MWL with original design flood is +280.42 m (and TBL of dam +283.464 m)and revised MWL after flood routing is 282.46 m. , as after revised flood routing, the free board remaining is 1 m. as such the existing surplus sing arrangement is capable of disposing flood. The revised MWL worked out as 282.46 m. which is 2.044 m. above original MWL 280.416 m. and no additional arrangement is required.

The Bureau of Indian Standards has categorized India into 4 seismic zones depending upon the degree of vulnerability to earthquakes. The subproject falls in earthquake zone II, 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 Bhavanisagar dam have been reviewed to assess the impact of rehabilitation work on ecologically sensitive habitats. Sathyamangalam Tiger Reserve, is the

nearest protected area, which is about 9 km away (shortest aerial distance). Project construction was completed in 1955, area in proximity to project was declared as Sathyamangalam Wildlife Sanctuary vide GO No. 122 E&F (FR-5) Dept. dated 03.11.2008; Sathyamangalam Wildlife Sanctuary area as "Sathyamangalam Tiger Reserve" under section 38 V (1) of Wildlife (Protection) Act 1972 vide G.O (Ms) No. 41 E&F (FR V) Dept. dated 15.03.2013 based on the approval accorded by the Government of India on 12.03.2013.

From the scat analysis and camera trapping study, the population of Tiger in the Sathyamangalam Wildlife Sanctuary was estimated as 18 nos. in 2011. In order to protect the endangered species of Tiger, the Government of Tamil Nadu has declared an extent of 1408.405 sq.km. Sathyamangalam Wildlife Sanctuary area as "Sathyamangalam Tiger Reserve" under section 38 V (1) of Wildlife (Protection) Act 1972 vide G.O (Ms) No. 41 E&F (FR V) Dept. dated 15.03.2013 based on the approval accorded by the Government of India on 12.03.2013. The notified extent of Core zone and Buffer Zone areas are as follows: Total extent of core zone: 79349.331 Ha. (or) 793.493 sq.km. Total extent of Buffer zone: 61491.21 Ha. (or) 614.912 sq.km. Total extent: 140840.541 Ha. (or) 1408.405 sq.km. The 9 Forest Tribal Settlements and 19 Revenue Tribal Settlements in Sathyamangalam Forest Division are not included in Sathyamangalam Tiger Reserve.
The Sathyamangalam forest is mostly tropical dry forest, part of the South Deccan Plateau dry deciduous forests ecoregion. There are five distinct forest types: tropical evergreen (Shola), semi-evergreen, mixed-deciduous, dry deciduous and thorn forests. Evergreen forests are restricted to small patches in a few high altitude hill tops of Sathyamamgalam between 750 metres (2,460 ft) and 1,649 metres (5,410 ft). These patches are threatened on account of land use changing to hill agriculture and plantation crops, including fruit. Semi-evergreen forests are found at high altitude. Mixed and dry deciduous forests are located on middle altitude slopes and the thorn forests are usually found in the foothills and some times, due degradation of dry deciduous forests, at the middle elevations. About 65% of the forest division is under forest cover. Significant areas of mixed scrubland and grasslands support a large population of herbivore ungulates, the preferred prey of tigers.

The Sathyamangalam forests link the Eastern Ghats and Western Ghats allowing gene flow between diverse fauna populations of the two eco-regions. The 2009 wildlife survey conducted by Government of Tamil Nadu enumerated 10 Bengal tiger, 866 Indian elephants, 672 gaurs, and 27 leopards. The survey party observed four additional species of horned antelope including 2,348 spotted deer, 1,068 blackbucks, 304 sambar deer, 77 barking deer and four-horned antelopes, 843 wild boars, and 43 sloth bears. Herds of the famous feral buffaloes can also be spotted in places near the Moyar river.

The 2010 wildlife survey counted 12 Bengal tigers. In December 2011, the Conservator of Forests of Tamil Nadu stated that the sanctuary is home to at least 28 tigers as confirmed by a camera trap study conducted by World Wildlife Fund. In the 2012 national wildlife survey, 25 tigers were recorded. As per the 2011 census, the Sathyamangalam forests was home to over 850 Indian elephants and is part of a protected area, which consists of the largest Asian elephant population in the world.

Many bird species including tree pies, bulbuls, babblers, mynahs and crows were noted. In 2010, the first ever bird survey was conducted in the Sathyamangalam forests. A total of

230 species of birds were recorded in the survey. In 2010, a small population of critically endangered Indian vulture (*Gyps indicus*) and three other species of vultures were discovered to be thriving in the Moyar river valley. 20 nests were sighted and the population was estimated to consist up of 40 adults. Last sighted in the region in the 1970s, the rediscovery of the vulture, a bird rapidly disappearing from India, has been significant. Diclofenac which caused the decline of vulture population was banned in 2006 and since then, vulture numbers have started to grow back.

All the rehabilitation works are proposed to be undertaken outside the boundary of tiger 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. Therefore, rehabilitation works do not pose any risk, either directly or indirectly, on tiger reserve.

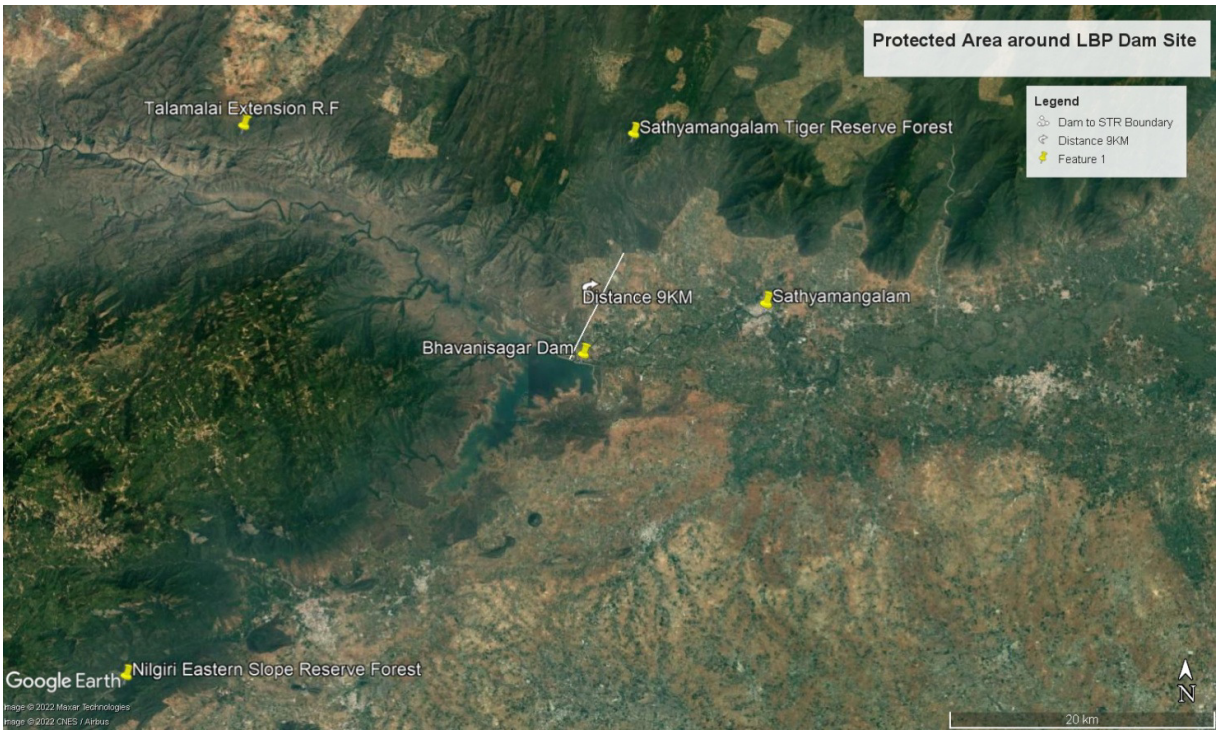


Figure 3.2: Protected Area around Dam Site

3.3 SOCIAL ENVIRONMENT

The Bhavanisagar Dam is located at a distance of 16 km from Sathyamangalam, 36 km from Mettupalayam and 85 km from Erode city in Erode district in the state of Tamil Nadu. The proximity villages from the dam are Pungar, Kothamangalam, Mudukkanthurai, Thottampalayam and. There are no Schedule V[1]areas in the state of Tamil Nadu**.**

[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**.

There are five (05) talukas (tehsils) in the district. The district has 14 Community Development Blocks and 306 Revenue Villages, out of which 287 are inhabited and 19 villages are un-inhabited. The district has one Municipal Corporation, 8 Municipalities, 44 Town Panchayats and 6 Census Towns.

The economy of the district is mostly dependent on agricultural activities & industrial resources. There are many small, medium and large scale industries and large turmeric market city across the state and various textile mills in the district. The district has high concentration of power loom & Handloom weaving, Rice milling, edible oil expelling units. The other industries are Tanneries, Chemical & Plastic Products, Paper Products, Basic Metal Products industries etc.

In rural part of the district, agriculture is the common activity, despite the district is considered as industrially developed one. The major crops in this district are Rice, Groundnut, Sugarcane, Gingerly, Turmeric, Jowar, Ragi, Coconut, Cotton, Horse gram, Tobacco, Banana, and Tapioca etc. The cropping intensity is 1.15. Cultivable area is 61.7% of the total geographical area of the district. Total area covered under Rice, Groundnut, Sugarcane, Gingerly, Turmeric, Jowar, Ragi, Coconut, Cotton, Horse gram, Green gram, Maize, Tobacco, Tapioca and Fruit crops is 2.52 lakh hectares. It contributes 71% of the total cropped area of the district giving rich scope for the growth and development of the food products, textile products and other agro based industries in this district.

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

No. of Households	**6,56,811**	**Household Size**	**6**
Total Population	**22,51,744**	**Population (0-6 age)**	**1,95,213 (8.67%)**
Male	11,29,868 (50.08%)	Boys (0-6 age)	99,943 (51.20%)
Female	11,21,876 (49.82%)	Girls (0-6 age)	95,270 (48.80%)
Sex Ratio	993	Sex Ratio (0-6)	953
Population (SC)	**3,69,483 (16.41%)**	**Population (ST)**	**21,880(0.97%)**
Male	1,84,408	Male	11,024
Female	1,85,075	Female	10,856
Literates	**14,92,662**	**Literacy Rate (in %)**	**72.58**
Male	8,28,300	Male	80.42
Female	6,64,362	Female	64.71
No. of Workers	**11,95,773 (53.10%)**	**Cultivators**	1,78,170 (14.90%)
Male	7,32,083 (64.79%)	**Agricultural Labours**	3,70,212 (30.96%)
Female	4,63,690 (41.33%)	**Household Industrial Workers**	54,322 (4.54%)
No. of Main Workers	**11,11,051 (49.34%)**	**Other Workers**	5,93,069 (49.60%)
No. of Marginal Workers	**84,722 (3.76%)**		
			Source: *Census of India, 2011 (District Handbook)*

According to Census of India 2011, the district has total population of 22, 51,744 out of which 50.08% are males and 49.82% are females with sex ratio of 999 which is higher than the state's sex ratio (993). The population density in the district is 391 persons per sq.km.

The district has literacy rate of 72.58% which is lower than that of the state average of 80.09%. The male literacy rate is 80.42% and female literacy rate is 64.71%, creating a gender gap in literacy rate of 15.71% in the district.

The Scheduled Caste and Scheduled Tribe population is 16.41% and 0.97% respectively to the total population in the district. Number of scheduled tribe household is small and also they are mainstreamed into the area and do not possess characteristics as per ESS7.

Work participation rate of the district has observed about 53.10%, out of which 64.79% are male workers and 41.33% are female workers, creating a gender gap in work participation rate of 23.46%. About 14.90% workers are cultivators and 30.96% are agricultural labourers. About 54.14% of work force is engaged in other than agricultural activities including 4.54% household industrial workers.

There are no physical interventions planned in the project surrounding or downstream areas. These areas and the ST households may be taken into account during the implementation of Emergency Action Plan for Bhavanisagar Dam.

3.4 CULTURAL ENVIRONMENT

List of National Monuments in Tamil Nadu 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

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

4.1 SUB-PROJECT SCREENING

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

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

Outcome of three stage screening exercise is discussed below.

Step I Screening (using Form SF-1): Sub-Project Component, Construction Support Preparatory Intervention related v_s 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 (DI) or outside the dam area (DE) 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.

The structural activities include:

- Jet washing of Dam body; pressure washing of the face of the dam and its appurtenance. Scarping and cleaning and removing dirt, grease oil, algae and vegetable growths
- Grouting and reaming of infiltration galleries are confined to the body of the dam.

Due to nature of these activities, likely impacts will be on physical environment in terms of air pollution, noise pollution and waste generation during the implementation / construction phase (To be monitored As per AQI, CPHEEO, EPA-1986 and IS 4954 (noise pollution)). 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. No activities or impacts of the activities will impact forest or wildlife. 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 (Activities involving machinery and equipment will have Operational Health and Safety (OHS) risks and impacts on physical environment). Transportation of material, debris disposal and labour camp are likely to generate pollution and impact on physical environment in terms of air pollution, noise pollution and waste generation during the implementation/ construction.

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 such Emergency Action Plan has not been proposed, however, EAP shall be prepared and implemented. Bhavanisagar dam drains into Bhavani river and there is very little habitation in the downstream stretch up to its confluence. Still during implementation, project will reach out to downstream population including disadvantaged and vulnerable persons and tribal households.

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.

- Reaming/Grouting in Drainage gallery of masonry portion.
- D/S River and Canal Sluice Vents – Rehabilitation in Roof Slab Bottom portion
- D/S side Spillway ogee portion flush pointing
- 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)	L	L	L	L	None	L	L	L	L	None	L
Hydro Mechanical	L	L	L	L	None	L	L	L	L	None	L
Instrumental SCADA, surveillance	L	L	L	L	None	L	L	L	L	None	L
Painting	L	L	L	None	None	L	L	L	L	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	L	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

Earlier, In light of the COVID 19 pandemic, that constrained holding of consultation meetings; stakeholder consultations could not be carried out. However, now the situation become conducive and stakeholder consultations will be organized and report updated.

Stakeholder consultation was conducted as part of environmental and social impact assessments. The purpose was to;

a. provide initial information to the stakeholders on the proposed project interventions and particularly the non-structural interventions;
b. Help identify potential stakeholders who are involved at this stage and will be involved a later stage.
c. Ascertain if there are any legacy issues relating to displacement, resettlement, etc.
d. Elicit their responses in relation to key non-structural interventions such as early warning systems, emergency action plans.
e. Identify mechanisms that would be deployed to engage with different stakeholders and particularly communities living downstream.

The following table has type of stakeholder [like farmer (Land owner), farm worker, Industrialists (if applicable), tribal people and fisherman community] and their views with response given by the officials.

Meeting Conducted Date: 01.02.2023

Consultation with stakeholders of LBP Dam

Following is the outcome of the stakeholder consultation meeting:

Based on these findings relating to both structural and non-structural interventions, potential stakeholders were categorized as Affected stakeholders, other interested stakeholders and disadvantaged & vulnerable stakeholders.

List of participants is enclosed as Annexure III.

Interactions made with Engineers and local stakeholders are tabulated below;

A. Interaction with Dam Engineers/Staff

Questions	Responses provided / Observations
1. Please confirm whether all proposed structural rehabilitation activities for this dam are limited to dam compound only or any activities are proposed beyond dam complex like catchment area treatment plan, stabilization of reservoir rim area, slope stabilization, de-silting etc.? Please specify if any possibility of local community interference exist during the implementation of rehabilitation measures; including stakeholders consultation meetings planned for dissemination of emergency action plans which is a non-structural measure.	All the works proposed for the dam rehabilitation and its activities are involved within the dam premises only and there are no such mentioned activities like catchment area treatment plan, stabilization of reservoir rim area, slope stabilization etc are proposed beyond dam complex. Since the location of dam and the nearby lands are comes under the purview of TNWRD, there would not be any arise of the local community interference during the implementation of rehabilitation activities in dam site. Further, the stakeholders of the dam are being in cordial relationship and they have already been disseminated about the importance of Emergency Action Plan and circulated the booklet of EAP document among all of them for information as well as to face any preparedness action.
2. Is there any unsettled issues (legacy) related to displacement or resettlement, pending since time of dam construction? If yes, please give a brief detail.	There are no any unsettled issues (legacy) related to displacement / resettlement which are pending since time of dam construction.
3. Any unauthorized encroachers or squatters living within the dam premise? If yes, are these not a threat for dam security and dam premise, any official action taken in the past, does the state government have legalized these squatters and these have full right in the property of dam authorities.	No. There are no such unauthorized encroachers or squatters have been living within the dam premises.
4. What is the proposed institutional arrangement to deal the Environment and Social activities within the scheme i.e. in-house team of experts/hired agency or individual experts?	It is sufficient enough by the in house team of experts would handle the environment and social activities within the scheme.
5. Who will be in charge of E&S related activities at dam site and at SPMU level?	**Charge of E&S related activities at dam site** 1. Assistant Engineer. WRD, Dam Section, Bhavanisagar.

	2. Assistant Executive Engineer,WRD, Bhavanisagar Sub-Division, Bhavanisagar. **Charge of E&S related activities at SPMU level**
6. How do communities contact dam officials? Is there any existing mechanism known to communities to contact dam officials (through telephone/mobile/e-mail/official website?	**Yes. The existing mechanisms which are known to the communities for contacting dam officials through telephone/e-mail put forth below.** **The contact details of Dam officials** 1. Assistant Engineer.WRD. Dam Section, Bhavanisagar. Office No. 04295-240224 & 240234 Mail ID- aebsrdam@gmail.com 2. Assistant Executive Engineer, WRD, Bhavanisagar Sub-Division, Bhavanisagar. Office No. 04295-240224 & 240234 Mail ID- aeepwdwrdbsr@gmail.com
7. What is existing mechanism to communicate with downstream communities / public on unregulated releases of water during high flood time siren / written communication to district authorities / telephone / mobile / text messages or any other mode of communication?	**The existing mechanism to communicate with downstream communities / public on unregulated releases of water during high flood times which are put forth as below.** i) Advance Flood warning intimation by letter as well as given message to the following listed officials for taking all precautionary action to alert the immediate downstream Public / Communities for shifting them all to the safe shutters. ii) Before releasing of surplus water, all the downstream Publics living below the dam site are being sounded flood alerted though loudspeaker announcement conducted by the controlling revenue department immediately. iii) A sounded siren would be alarmed @ the dam site. iv) A series of first, severe, very severe flood warning message would be given in the form of written and telephonic communication to all the stakeholders and the listed officials, until the flood water recedes. 1. The Additional Chief Secretary, Water Resources Department, Secretariat, Chennai 2. The Principal Secretary/Commissioner of Revenue Administration, Disaster Management and Mitigation, Chepauk, Chennai 3. The Engineer in Chief, WRD., & Chief Engineer (GI), Chepauk, Chennai - 5 4. The Chief Engineer, WRD., (Operation and Maintenance) Chepauk, Chennai – 5

	5. The Chief Engineer, WRD, Coimbatore Region, Coimbatore. 6. The Chief Engineer, WRD, Trichy Region, Trichy. 7. The Superintending Engineer, WRD, Bhavani Basin Circle, Erode. 8. The Superintending Engineer, WRD, Upper Cauvery Basin Circle, Salem. 9. The Superintending Engineer, WRD, Middle Cauvery Basin Circle, Trichy. 10. The Superintending Engineer, WRD, Lower Cauvery Basin Circle, Tanjore. 11. The Superintending Engineer, WRD, Athikadavu Avinashi Special Project Circle, Avinashi. 12. The Collector of Erode District, Erode. 13. The Collector of Karur District, Karur. 14. The Collector of Coimbatore District, Coimbatore. 15. The Collector of Tiruppur District, Tiruppur. 16. The Executive Engineer, WRD, Bhavanisagar Dam Division, Bhavanisagar. 17. The Executive Engineer, WRD, Mettur Dam Division, Mettur Dam. 18. The Executive Engineer, WRD, Lower Bhavani Basin Division, Erode. 19. The Executive Engineer, TWAD Board, Maintenance division, Karungalpalayam Erode. 20. The Assistant Executive Engineer,WRD., Irrigation Sub division, Gobichettipalayam. 21. The Assistant Executive Engineer,WRD., Bhavani Sub division, Bhavani. 22. The Revenue Divisional Officer, Gobichettipalayam. 23. The Revenue Divisional Officer, Erode 24. The Superintendent of Police, Erode. 25. The Deputy Superintendent of Police, Sathyamangalam. 26. The Deputy Superintendent of Police, Gobichettipalayam. 27. The Deputy Superintendent of Police, Bhavani. 28. The Inspector of Police, Bhavanisagar Police Station, Bhavanisagar. 29. The Tahsildar of Sathyamangalam Taluk Sathyamangalam. 30. The Tahsildar of Gobichettipalayam Taluk, Gobichettipalayam. 31. The Tahsildar of Bhavani Taluk, Bhavani. 32. The Tahsildar of Anthiyur Taluk, Anthiyur. 33. The Commissioner, Sathyamangalam Municipality, Sathyamangalam. 34. The Commissioner, Bhavani Municipality, Bhavani. 35. The Village Administrative officer, Bhavanisagar.

<table>
<tr><td></td><td>36. The Assistant Engineer,WRD, Bhavanisagar Dam Section, Bhavanisagar.</td></tr>
<tr><td>8. How do you ensure that downstream community is fully aware of the above existing mechanism?</td><td>The District level revenue team and its authorities are being readily prepared and will take immediate necessary action to inform and alert all the downstream communities for creating awareness as well as shifting them into safer shelters.</td></tr>
<tr><td>9. Are there women employees at the dam site?</td><td>Yes, there are women employees working at the dam site.</td></tr>
<tr><td>10. Is there any existing Grievance Redressal Mechanism (GRM) within the department to address any kind of grievance / complaints by general public?</td><td>Yes, the Grievance Redressal Mechanism (GRM) is functioning within the department at the office of the Superintending Engineer, Bhavani Basin Circle, Erode.</td></tr>
<tr><td>11. Details of any grievances received lately related to this new Scheme?</td><td>No grievances are received sofar.</td></tr>
<tr><td>12. Is dam premise a restricted area or has open access to general public?</td><td>Yes. The premises of dam site are being completely kept as restricted area against the access of general public.</td></tr>
<tr><td>13. Are there tribal’s living in the surrounding area of dam complex? Which tribes are these? Please give brief detail.</td><td>No. There has been no such tribal’s living in the surrounding area of dam campus.</td></tr>
<tr><td>14. Does the dam have any tourism / water recreation facilities? If yes, how many approximate tourist visits annually, annual revenue generated, whether any portion of this generated revenue is diverted to regular O&M of this dam.</td><td>Yes. At the immediate downstream side of the dam, the LBP park which has been established and maintained for tourism cum recreational activities. The tourists visiting and the revenue generated details of the LBP park are tabulated below.
Annual Revenue from the year 2015 to 2019
<table>
<tr><th colspan="2">Number of tourist people visited</th><th>Revenue generated</th></tr>
<tr><td>year</td><td>No.</td><td>Rs.in Lakh</td></tr>
<tr><td>2015</td><td>616181</td><td>30.81</td></tr>
<tr><td>2016</td><td>455473</td><td>22.77</td></tr>
<tr><td>2017</td><td>561902</td><td>28.10</td></tr>
<tr><td>2018</td><td>584893</td><td>29.24</td></tr>
<tr><td>2019</td><td>520554</td><td>26.03</td></tr>
</table></td></tr>
</table>

	No. Presently the revenue generated through tourism is being directly remitted to the TNWRD in the following **Head of Account** **"04001 - Water Resources Department** **AC-other Receipt** **D.P. Code-0701-03-116-AC29001**" through SBI, Sathyamangalam, by weekly twice (Monday & Friday). Further, the present revenue generation are not being diverted for the O&M activities of the dam. But it is an immense necessary for utilization in the future which will be a policy decision of the state government.
15. Do you engage any local labourers for routine dam maintenance work? If yes, what is the process of engaging these locals for work at dam, whether through Government approved contractor or hired individually?	No. At present, there are no such local labourers were engage for routine dam maintenance work.

B. Interaction with Local Community

Questions	Responses provided / Observations
1. How many villages are in immediate downstream vicinity? 2. Are they dependent on dam in any way for their livelihood?	There are totally 105 villages are located in downstream vicinity of the dam. Yes. Majority of the people are fully dependent on the dam as their livelihood satisfied through Drinking, Irrigation, Industries, Power production and Pisciculture activities etc.
3. Does any of these villages were displaced and rehabilitated during the construction of the Dam. Is there any pending compensation issues?	Yes. There are totally about 8no's of villages and its people were completely displaced and rehabilitated before the construction of the dam with due paid clearances of all compensations.
4. Is there any R&R affected person known to you who is currently working with the dam authorities? If so, in what capacity (employee / direct worker / contractor)	No.
5. Are you aware of any fishing communities living immediately downstream of dam whose livelihood are directly linked with	Yes. At present, the fishing activities in the dam are completely governed by Tamilnadu Fisheries Development

the fishing activities of this dam?	Corporation Limited and are the activities are being implemented though the fishing communities which are living in the immediate downstream of the dam.
6. Are you aware of fishing working seasons, revenue earning, any access to general public for fishing, any suggestion etc.	Yes. The working season for fishing activities are being done throughout the year. The yield and revenue generated through fishing are being completely monitored and maintained by the TNFDC ltd. It is known that the access to the general public for fishing is strictly prohibited.
7. Are you aware of local women affected in any way by dam operations?	No.
8. Are you aware of any early flood warning system for this dam or any other system wherein downstream communities getting regular update during flood season for any uncontrolled release of water?	Yes, It was informed by phone communication.
9. Are you aware of any dam related incident happened in the past wherein some loss of life encountered? If yes, brief summary may be given	No. There are no such untoward incidents happened in the past.
10. If you have to contact the dam authorities; how will you contact, through telephone / mobile / e mail / personally? 11. In the past, on any occasion, did you contact dam authorities for any specific reason affecting public in general? If so, how did you contact and how was the response of dam authority?	Yes. It was contacted through both telephone / mobile. Yes. It was contacted through mobile. The dam authorities responded quickly and fulfilled our needs.
12. Give your views about the dam, how this dam is helping Country, State, district or local communities in meeting its objectives, any specific concern can also be given?	The Bhavanisagar Dam is the first major irrigation project executed in our country after its Independence. The project features of the dam have its own uniqueness and greatness in numbers. This dam is a multipurpose reservoir project of fulfilling the needs of Drinking, Irrigation, Industries, Power generation, Flood control and Pisciculture activities besides activities being a great livelihood of all living beings covering three major District of the state such as Erode, Tiruppur and karur. The command area

	benefitted by the dam through irrigation itself is about 1.21 lakh Ha (300000Acres) including direct and indirect sources. As such, the living tradition and social culture of the local communities are being properly connected as well as their economic standards have been well improved.
13. (a) Are you aware of any document named Emergency Action Plan (EAP) of the dam? (b) If yes, do dam authorities conduct any annual mock drill or consultation meeting on dam site and invite all stakeholders to inform about various protocols in place and consequences in case dam fails? (c) In future, during stakeholder's consultation meeting, would you like to be a part of these consultation and mock drill activities to be conducted by dam authorities? (d) If yes, how to contact you, please give the corresponding address along with all details to receive the official communication.	Yes. There are no such mock drill has been conducted sofar. But the stakeholders have been informed about the preparedness activities and protocols to be followed at time of emergency situation. Yes. The contact details are given to the dam office.
14. 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?	Yes.
15. Any suggestion to improve overall system by dam authorities in any way, please give in brief?	The overall system of maintenance works which are being carried in Bhavanisagar Dam is found satisfactory. It is suggested to improve the tourism LBP park which is located downstream side of the dam which includes a variety of basic facilities and amusement activities needs to be rehabilitated on par with National level. The local community people specified that the Bhavanisagar Dam is considered as their lifelines fulfilling all the basics needs besides being improved the social and economical growth in all aspects. Hence they expressed their support and welcomed the proposed works.

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. The proposed rehabilitation and associated interventions involve only localized structural / civil works, instrumentation and non-structural measures in order to improve the dam safety and efficiency. All proposed major activities are restricted to the existing Dam site only.
2. The major civil work is grouting, for which there will be large scale use of chemical grouting materials. There are chances of blending of chemicals from grouting activities which may cause pollution and may adversely impact on the aquatic life of the reservoir and the river.
3. Execution of civil work will generate localized impacts on physical environment and resource use; pose risk of exposure of workers requiring personal protective equipment (PPE) use.
4. Environment risks and impacts, for various activities under this sub-projects assessed above, are categorized as Low and Moderate due to localized nature i.e. activities remain limited to Dam area except for labour camp, transportation of material and muck/debris disposal. Thus, the environment and social risk of the sub-project is categorized as Moderate.
5. Though the waste and muck generated during drilling and grouting is not substantial but require careful disposal at pre-identified and approved site (by E&S Experts of IA) to minimize the risk of pollution on this count.
6. There will be no significant impact on physiographic of the region due to the proposed interventions as these comprise repairing work of existing dam.
7. The civil works will require specialized construction materials such as grouting mix, cement, and sand. The requirement of such material is not in very large quantity and will be sourced from already operational and approved mines / quarries. The construction waste generation is also likely to be minimal and will be either reused or used for land filling or leveling purposes. However, requisite mitigation measures will be taken to minimize impact thereof following standard procedure.
8. There is likelihood of pollution of water resources from the leakage of the grouting materials during grouting activities.
9. Construction related impacts and risks those may impact water quality include:
    a) Accidental release of fuel, chemicals from grouting and contamination from poor waste management practices can affect surface and groundwater
    b) Contamination from construction machinery working near water bodies
    c) Discharges and disturbance of soil and sediment that drain into surface waters
    d) Generation of wastes from camp site and construction sites finding way to water bodies.

10. Construction activities will give rise to dust emissions and have the potential to cause air pollution, near to the main construction sites due to dust generated from demolition, excavation, operation of construction equipment and machinery, increased movement of vehicles, on the local road network. Necessary dust suppression measures to be adopted by the contractor at such work sites.

11. Gaseous emission during construction will be from the machinery, equipment and vehicles used for material transportation. The operation of vehicles and equipment will result in emissions of Carbon monoxide, Sculpture dioxide, and Oxides of nitrogen (NOx). The impact on air quality due to emissions from vehicles and construction equipment will be mostly in the areas adjacent to the work area and will thus affect the workers.

12. Sources of noise will be from the movement of vehicles and operation equipment for construction at the project site. Due to construction activity in the area, noise levels will further increase during the period of construction, however, they will remain limited to the work area mainly where construction activity will progress. Noise generation due to operation of construction machinery and equipment will impact operators operating these machines and workers in the surrounding areas.

13. Migratory workers are expected to reside in the labour camps during peak construction period. Proper sanitation and solid waste management need to be ensured at the labour colonies.

14. As most of the proposed rehabilitation activities involve repair and renovation, so, it is expected that construction and demolition waste in the form of debris will be generated. These beings largely repair work, quantities have not been estimated and they are not expected to be significant and likely to create disposal problem.

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 labours. 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 ate identified in project vicinity.
6. During the construction phase, there may be a temporary influx of skilled workers from outside of the project area. The local communities will also get employment opportunity for the unskilled jobs.
7. 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

Chapter 5 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

5.1.1 Risk Classification

As per the ESDD exercise, risk/impacts that have been identified relate to Water Quality, Physical Environment, labour and SEAH/GBV. The summarised environmental and social risks of identified activities with level of risk are presented in previous chapter. Environment risks of air, water, noise, land use, soil and resource use for major civil works are Low. Similarly, environment and social risk of labour camp and disposal of debris has been identified as Low. These risks are low 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 Low. 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	Applicable, ESS2 provides guidance to promote sound worker-management relationships and enhance the development benefits of a project by treating workers in the project fairly and providing safe and healthy working conditions. It includes Migrant workers, Direct workers, Contracted workers and Community workers. It provides guidance for developing; grievance mechanism, Occupational Health and Safety Plan.
ESS3: Resource Efficiency, Pollution Prevention and Management	Applicable, The ESS Provides the guidance for sustainable use of the resources including energy, water and raw materials. Also, to avoid and minimize project related emission, generation of hazardous and nonhazardous waste, adverse impacts on human

Relevant ESS	Reasons for Applicability of the standard
	health and environment. With the ESS3 guidance, Resource Conservation Plan(RCP), Occupational Health & Safety Management Plan(OHSP), Muck Management Plan (MMP) will be prepared to conserve and efficient use of energy, water and raw materials. Muck Management Plan and during construction the contractor will ensure safe handling, storage and non-release of harmful substances/chemicals during grouting, to the water body and land.
ESS 4: Community Health and Safety	Applicable, ESS4 provides the guidance and frame work, to anticipate and avoid adverse impacts on the health and safety of project-affected communities during the project life cycle. Also to avoid or minimize community exposure to project-related traffic and road safety risks, diseases and hazardous materials. During the implementation of the sub-project; transportation of material, movement of heavy vehicles, transport of machinery and equipment, labour camps close to worksites ; and accidental risk during repair /improvement work and chances of SEA/SH GBV risk.
ESS 10: Stakeholder Engagement and Information Disclosure	Applicable for the sub project as a whole and in particular in relation to the non-structural interventions involving Early flood Warning system having siren systems, broadcasting facilities, etc. Based on the guidance of ESS7, Preparation of Stakeholder Engagement Plan Establishment of a project level GRM will be done by PMU.

5.2 RECOMMENDATIONS

5.2.1 Mitigation and Management of Risks and Impacts

Since risks and impacts are low 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.
d. The mitigation plan to be prepared based on the activities mentioned below
    - From civil work grouting has maximum chances of blending chemicals from grouting activities and it'll affect the soil or aquatic life or water quality. So it should be safely protected and removed before reaching into the soil or water body.
    - An activity from a civil or labour camp produces wastages and muck which should be pre-identified and will be removed or disposed to the specified site.
    - The construction activities may produce emissions (Gaseous emissions during construction will be from the machinery, excavation of soil, equipment and vehicles used for material transportation. The operation of vehicles and equipment will result in emissions of Carbon monoxide, Sculpture dioxide, and Oxides of nitrogen (NOx)) which can be monitored and controlled as per norms given by AQI.
    - Proper solid waste management and sanitation should be provided for the labours when they're staying at the dam site.

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	Gender Based Violence or SEA/SH related actions	IA	Before mobilization of contractor
ESS2: Labour and Working Conditions	Labour Management Procedure (LMP) including OHS management plan	IA	Before mobilization of contractor
ESS3: Resource Efficiency, Pollution Prevention and Management	Pollution Prevention and Environment Quality Management Plan (PPEQMP)	IA	Before mobilization of contractor
ESS 4: Community Health and Safety	Community Health and Safety Management Plan (CHSMP)	IA	Before mobilization of contractor
ESS 10: Stakeholder Engagement Plan	Stakeholder Engagement Plan	IA	By negotiation and to be updated once the EAP preparation is to commence

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**.** They should continue for the entire project cycle. Dedicated Environmental and Social personnel with requisite skill in the SPMU will be utilized for the following tasks; (a) development of ESDD of each sub project, (b) E and S staff will coordinate for hiring consultants where ESDDs for sub-projects 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 mitigation measures during implementation. The E&S experts will work in coordination with Project Management Consultancy (PMC) contracted by SPMU. The SPMU, in case in-house expertise not available, will Engage 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 promptly and efficiently on E&S issues at sub-project level. Grievance redress mechanism will be designed to address concerns and complaints promptly and transparently. 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. Details on the processes and procedures for the GRM are to be provided in the Stakeholder Engagement Framework.

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 risks** resulting in the overall sub-project to be categorized as low 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 with in dam area (DI), Beyond Dam Area (DE)	Likely Nature of Risk/Impact Water Quality (WQ), Fisheries (F), Conservation Area (CA), Protected Area (PA), Ecological (E), Physical Environment (PE), Cultural (C), Tribal Presence (T), Impact on private land / assets / encroachers /squatters (LA), Labour (L), GBV risks (G), (Write whichever is applicable)
1	**2**	**3**	**4**	**5**
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 Sealing of Expansion Joints, Dam body Grouting etc.)	**NA**		
5	Structural Improvement/Repair work -Downstream of Dam site (with no interfacing with dam reservoir) (like Rehabilitation works in D/S side Ogee spillway portion, D/S River & Canal slab vent roof bottom portion, 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)	**NA**		
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	**NA**		
12	Painting of dam u/s or d/s or both	**A**	**DI**	**WQ, PE, L, G**

Sl. No	Project Component	Applicable (A), Not Applicable (NA)	Environment and Social Risk Associated with in dam area (DI), Beyond Dam Area (DE)	Likely Nature of Risk/Impact Water Quality (WQ), Fisheries (F), Conservation Area (CA), Protected Area (PA), Ecological (E), Physical Environment (PE), Cultural (C), Tribal Presence (T), Impact on private land / assets / encroachers /squatters (LA), Labour (L), GBV risks (G), (Write whichever is applicable)
1	**2**	**3**	**4**	**5**
	faces			
13	Water recreation activities	**NA**		
14	Tourism Development	**A**	**DI**	**PE, L, G**
15	Installation of Solar power/floating solar	**NA**		
16	List any other component not listed above	**NA**		
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**	**DI**	**WQ, PE, L, G**
8	Heavy machinery deployment and setting up maintenance workshop	**NA**		
9	Setting up Hot mix plant	**NA**		
10	Deployment of Concrete mixture and heavy pumps	**NA**		
11	Temporary land acquisition	**NA**		
12	Need of Tree felling/ vegetation clearance	**NA**		
13	Disposal of large amount of Debris	**A**	**DE**	**PE, L, G**
14	Transport of large construction material	**A**	**DE**	**PE, L, G**
15	Utility shifting	**NA**		
16	Discharge of reservoir water (lowering of reservoir water involved)	**NA**		

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

Annexure – II: Form SF2

Sl. No	Applicable Sub-Project Component/ Construction preparatory Work-related Sub activity (As per 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 Improvement/Repair work - Downstream of Dam site (with no interfacing with dam reservoir) (Rehabilitation works in D/S side Ogee spillway portion, D/S River & Canal slab vent roof bottom portion, etc.)**			
i)	**MASONRY PORTION:**			
a	Reaming of drainage holes	PE, L, G	Waste generation, Labour and GBV risk	L
b	Grouting	PE, L, G	Waste generation, Labour and GBV risk	L
c	***D/S River and Canal Sluice Vents - Roof Slab Bottom portion*** - Surface Preparation, High abrasion resistant coating, Surface Hardener coating	WQ,PE, L, G	Waste generation, Labour and GBV risk	L
d	*D/S side Spillway* – Surface preparation, Flush pointing, Surface Hardener coating	WQ,PE, L, G	Waste generation, Labour and GBV risk	L
e	***Immediate D/S of LBP dam –*** Rough stone dry packing works	WQ,PE, L, G	Waste generation, Labour and GBV risk	L
f	Rehabilitation of Existing and New construction of Electrical cable way RCC trench from masonry gauge well room portion to flood control room of Earthen portion.	PE, L, G	Waste generation, Labour and GBV risk	L
ii)	EARTHEN BUND PORTION:			
a	Rehabilitation of Rock Toe Drain Filter, Toe Drain and leading channel of "V" Notches arrangements.	WQ,PE, L, G	Waste generation, Labour and GBV risk	L
b	Rehabilitation to the Dam Approach and Service Roads.	PE, L, G	Waste generation, Labour and GBV risk	L
c	Construction of Security Guard Room at the Entrance Gates of LBP Dam.	PE, L, G	Waste generation, Labour and GBV risk	L
d	Providing Main Entrance Arch of LBP Dam with necessary Safety arrangements.	PE, L, G	Waste generation, Labour and GBV risk	L
e	Providing Fencing arrangements for protection of Earthen portion.	PE, L, G	Waste generation, Labour and GBV risk	L
2.	Hydro-Mechanical activities Down - stream of Dam Site (with no interfacing with dam reservoir)			
a	Providing Roof shed in top of the deck bridge of spillway gates and replaced the existing damaged steel cover at top of dam for River & Canal sluice.	PE, L, G	Noise pollution, Waste generation from packing material, Labour and GBV risk	L
b	Supply of Spare parts of gear wheel, shaft and pinion wheel etc., for Spillway shutters.	PE, L, G	Waste generation from packing material, Labour and GBV risk	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
c	Repairs to Wheel Track and Guide Shoe plates in Vertical Shutters and Renewal of Rubber seal, Limit Switches and Dial Gauge arrangements of spillway, River and Canal Sluice Shutters.	**PE, L, G**	Noise pollution, Waste generation from packing material, Labour and GBV risk	**L**
3.	**Instrumentation, Electrical works**			
a	Instruments, Electrical items of work in Dam	**PE, L, G**	Waste generation from packing material, Labour and GBV risk	**L**
4.	**Basic Facilities Improvement**			
a	Reconstruction of damaged WRD Staff Quarters (Twin Type C - G+1).	**PE, L, G**	Air pollution, noise pollution, Labour and GBV risk	**L**
b	Rehabilitation of WRD Engineer's Quarters.	**PE, L, G**	Air pollution, noise pollution, Labour and GBV risk	**L**
c	Improvements to the Campus of Division Office including Sub division and Section Offices.	**PE, L, G**	Air pollution, noise pollution, Labour and GBV risk	**L**
d	Improvements to Park for Tourism Development Activities.	**PE, L, G**	Air pollution, 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.	**L**
2	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	**L**
3	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

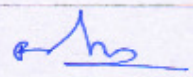
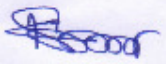
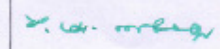
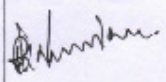
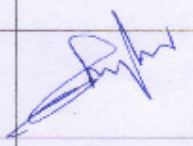
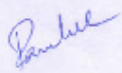
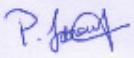
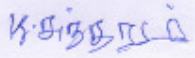
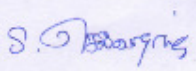
High: significant, non- reversible, long term and can only be contained / compensated

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.

Annexure – III

LIST OF PARTICIPANTS DETAILS

Sl. No.	Name of participant	Designation / Others	Mobile Number	Address (at least village name)	Signature
1	Er.K.Arulalagan,B.E,	Exe. Engineer,WRD, Bhavanisagar Dam Division, Bhavanisagar.	9443066432	Bhavanisagar	
2	Er.D.Sivakumar, M.E,	Technical PA to Exe. Engeer,WRD, Bhavanisagar Dam Division, Bhavanisagar.	9965177177	Bhavanisagar	
3	Er.S.Ponniyannan,B.E,	Asst. Exe. Engineer,WRD, Bhavanisagar Sub Division, Bhavanisagar.	9486256800	Bhavanisagar	
4	Er.R.SureshBaleji,M.E,	Assistant Engineer,WRD, Dam Section, Bhavanisagar.	9443462982	Bhavanisagar	
5	Er.P.Balasubramaniam,B.E	Assistant Engineer,WRD, Camp Section, Bhavanisagar.	9488312240	Bhavanisagar	
6	Er.K.Ponnuswami,B.E,	Assistant Engineer,WRD, Water Spread Section, Bhavanisagar.	9942485849	Bhavanisagar	
7	N.Baskar	Work Inspector	8925402626	Bhavanisagar	
8	M.Vijayakumar	NMR	9786016140	Bhavanisagar	
9	Thiru.T.Kanagaraj	Contractor	8248934110	Bhavanisagar	

10	Thiru.B.Panneerselvam	Contractor	8778247744	Bhavanisagar	
11	Thiru.K.Selvam	Contractor	9385711860	Bhavanisagar	
12	Thiru.T.A.Mohan	Chairman, Bhavanisagar Town Panchayat	9443233118	Bhavanisagar	
13	Thiru.Karunakaran	Representative from fisherman, Bhavanisagar	6381948476	Bhavanisagar	
14	Thiru.P.Sharfudeen	Local people resided at Mettupalayam	9787416232	Mettupalayam	
15	Thiru.U.Panneerselvan	Local people resided at Bhavanisagar	8526982320	Bhavanisagar	
16	P.Jayanthi	Local people resided at Puliyampatti	8508425684	Puliyampatti	
17	Thiru. Sundaram	Local farmers	9943468513	Sujilkuttai, Bhavanisagar	
18	Thiru. Selvaraj	Local farmers	9578589866	Karachikorai, Bhavanisagar	
19	Thiru. Chinraj	Local farmers	9786549683	Pungar, Bhavanisagar