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

KODAYAR DAM I

TN12HH0054

ENVIRONMENT AND SOCIAL DUE DILIGENCE REPORT

FEBURARY 2025

Tamil Nadu Green Energy Corporation Limited
(TNGECL)

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ABBREVIATIONS AND ACRONYMS

BOQ	:	Bill of Quantities
CA	:	Conservation Area
CAT	:	Catchment Area Treatment
CC	:	Cement Concrete
CPMU	:	Central Project Management Unit
CWC	:	Central Water Commission
DD	:	Due Diligence
DSRP	:	Dam Safety Review Panel
DRIP	:	Dam Rehabilitation and Improvement Project
EAP	:	Emergency Action Plan
EMC	:	Engineering and Management Consultant
ESCP	:	Environmental and Social Commitment Plan
ESDD	:	Environmental and Social Due Diligence
ESMP	:	Environment and Social Management Plan
ESMF	:	Environment and Social Management Framework
ESF	:	Environmental and Social Framework
ESIA	:	Environmental and Social Impact Assessment
EMP	:	Environmental Management Plan
E&S	:	Environment & Social
ESS	:	Environmental and Social Standard
GBV	:	Gender Based Violence
GCA	:	Gross Command Area
GIS	:	Geographic Information System
GRM	:	Grievance Redressal Mechanism
HIV	:	Human Immunodeficiency Virus
IA	:	Implementation Agency
LMP	:	Labour Management Procedure
MCM	:	Million Cubic Meters
MDDL	:	Minimum Draw Down Level
MWL	:	Maximum Water Level
NH	:	National Highway
OHS	:	Occupational Health & Safety
PDO	:	Project Development Objective
PA	:	Protected Area
PAP	:	Project Affected Person
PE	:	Physical Environment
PMC	:	Project Management Consultancy
PPE	:	Personal Protective Equipment
PST	:	Project Screening Template
SEP	:	Stakeholder Engagement Plan
SEA	:	Sexual Exploitation and Abuse
SIA	:	Social Impact Assessment
SC	:	Scheduled Castes
SF	:	Screening Format

SH	:	Sexual Harassment
SCADA	:	Supervisory Control and Data Acquisition
SEAH	:	Sexual Exploitation Abuse and Harassment
SPMU	:	State Project Management Unit
ST	:	Scheduled Tribes
TANGEDCO	:	Tamilnadu Generation and Distribution Corporation Limited
WQ	:	Water Quality
WB	:	World Bank
WRD	:	Water Resources Department

Chapter 1	INTRODUCTION

EXECUTIVE SUMMARY

This Environmental and Social Due Diligence Report (ESDD report) is for Kodayar dam I, which is one of the dam under DRIP in the State of Tamil Nadu (TANGEDCO). Members of the Dam Safety Review Panel (DSRP) for Kodayar dam I were, Thiru N.Annamalai, Thiru S.Esakkimuthu,Thiru K.Padmanabhan,Thiru R.Pitchai muthu,Thiru Rusthan Ali and Thiru K.K.Rajan. The DSRP inspected the dam in December 2020 and recommended structural & non-structural actions to be taken up by the dam authorities.

1) DSRP main recommendations included: Geophysical scanning of the dam masonry to identify the weak zones.Grouting the leakage holes with Polyurethane mortar and surface treatment with micro-concrete inside the regular gate groove.Treatment for arresting the leakage if any through the vertical joints by drilling suitable dia.holes at joint location from the dam top and grouting the same. Replace the worn out slanting pipe portion from the toe of the dam with new pipeline and to take it upto the dam top and embedding across the top of dam to discharge the pumped water into the reservoir with required anchoring arrangements. Stilling basin floor after dewatering and to repair works. Clear the earth and boulders obstructing the middle and right vent ways to maintain. Reaming the vertical shafts. Racking and pointing works wherever necessary to reduce the abnormal seepage. To clear the approach ways and provide WBM to enable periodical inspection and maintenance of the saddle dams. Cutting of the T-guides and to replace the same with suitable corrosion resistant material and fixing the same with wall fasteners and grouting. Overhauled the scourvent gate. The rubber seals may be replaced and the hoisting ropes greased. Spillway, Repair the distorted bottom member .Overhaul the gate components completely. The rubber seals of all three sides replaced with new one .Providing Optic Fibre cable from nearby location where mobile network signal is available to improve the communication facility and data transfer from instruments. Necessary roof treatment.

2) Non-structural measures included design flood review; dam breach analysis; .

The existing spillway for Kodayar dam I was designed for a flood of 321m^3/sec. The revised design flood (SPF) worked out to be 591 m^3/sec. Flood routing study is carried out by TANGEDCO in the modified pulse method and derived impinging level as 1325.30m to pass through the flood in the spillway.

Following DSRP recommendations, the dam rehabilitation works for Kodayar I dam, included:

Polyurethane injection grouting and micro concrete is proposed inside the scour vent gate pit area.

- Reaming the Vertical shafts in right flank saddle dam I and II. Raking and repointing works to the masonry joints on the upstream area of by cement mortar in right flank saddle dam I and II.

Drilling and grouting in right flank saddle dam I and II.

- Colour washing of Dam parapet wall in Kodayar I dam and right flank saddle dam I and II.
- Dam downstream water washing and flush pointing in Right flank saddle dam I and II and Left flank saddle dam I.
- Constructing skin wall and Protection wall near the downstream road bridge.
- Inspection bungalow roof repair works.
- Replacement of scour vent regular gate pit guide using SS angle and plates.
- Full overhauling of scour vent regular gate and gate hoisting mechanism.
- Replacement of gate rubber seal, steel rope and painting of scour vent regular gate.
- Spillway gate overhauling and repair works.
- Geo physical scanning of Kodayar I dam

The rehabilitation works were executed under package II (Civil) at a completion cost of 6.80 Crore.

1.1 PROJECT OVERVIEW

The proposed Dam Rehabilitation and Improvement Project (DRIP-2) would complement the suite of ongoing and pipeline operations supporting India's dam safety program. The project would continue to finance structural improvements but would break with the prevailing build-neglect-rebuild approach by giving greater emphasis to establishing sustainable mechanisms for financing regular O&M and dam rehabilitation, enhancing State capabilities to manage these critical assets through institutional strengthening, and introducing risk-informed dam safety management. The project development objective (PDO) is to increase the safety of selected dams and to strengthen institutional capacity for dam safety in participating States. Project Components include:

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

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

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

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

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

1.2 SUB-PROJECT DESCRIPTION – KODAYAR DAM I

1.2.1 The Kodayar Dam I across River Kodayar in Kanyakumari district during the year 1963 to 1972. This. This is a masonry gravity dam. The dam is located in Kanyakumari District at Upper Kodayar.of Tamilnadu State. The nearest Town is Kallidaikurchi, which is 47 Km and Tirunelveli, which is 35 Km away from the Dam. Nearest airport is Tuticorin, which is 156 Km away from Dam and nearest Railway station is Kallidaikurchi, which is 47 Km. This dam is a masonry gravity dam with a height of 87.78 m and a length of 166 m.It is a storage cum Forebay for Kodayar Power House (1x 60 MW) located at lower Kodayar.Apart from the water received from its own catchment, the water collected at Chinnakuttiyar Dam (from its catchment) as well as water diverted from Kuttiyar dam also, pumped into Kodayar dam-I reservoir to augument its storage. After generation of 60MW in Kodayar Power House I, the tail water is let into Kodayar Dam-II located downstream for generating power at Kodayar Power House II(1x40 MW).Ultimately, all the water reaches into Pechiparai reservoir of TNWRD for irrigation.

1.2.2 Salient features of the project area are reported below:

GENERAL

Location	: Kanyakumari District
Nearest Town	: Kallidaikurichi
River	: Kodayar River
Purpose	: Storage cum Forebay Dam for Kodayar II
Lat and Longitude	: 8° 31' N and 77° 18' E
Construction Period	: 1964-1972

RESERVOIR

Catchment Area	: 29.12 Sq.Km.
Area at FRL	: 8.30 Sq.Km.
Gross capacity	: 98.69 M.cum
Effective capacity	: 98.51 M.cum
MWL	: +1325.90m
FRL	: +1325.90m
MDDL	: +1295.40m

DAM

Type	: Masonry gravity
Height	: 87.78m
Length	: 166m
Top of Dam	: 352.05m
Volume	: 163330 cum.
Top of Dam	:1328.33m

SCOURVENT

Size	: 1.52 x 2.13m
Sill level	: 1290.56m
Regular gate	: 3.00 x 2.31m
Emergency gate	: 3.00 x 3.23m

TUNNEL

Length	: 3147.97m
Size	: 2.13 x 2.13m
Shape	: Horse shoe
Discharge capacity	: 8.21 cumecs

PENSTOCK

Length	: 2150.67m
Size	: 1.68mdia/1.52mdia/ 1.37mdia
Disc. Capacity	: 8.21 cumecs
Velocity	: 5.82 m/sec.

SPILLWAY

Discharge capacity	: 257 cumecs
Crest length	: 9.14m
Crest level	: 1319.80m
Type of Gate	: Lift Type
Size & Nos.	: 9.14 x6.1m/(1 No.)

INTAKE

Discharge capacity	: 8.21 cumecs
Size	: 2.135m dia.
Sill level	: 1290.56m
Regular gate	: 3.00m x 2.31m
Emergency gate	: 3.00m x 3.23m

POWER HOUSE

Size	: 33.98 x 23.16m
Type of Turbine	: Impulse Turbine
C.L.Distributor	: 354.20m
Head	:971m
Installed capacity	: 1x60 MW
Maxm..discharge	: 8.21 cumecs
Capacity of E.O.T.crane	:135/20T

View of Downstream face of the Dam

View of Kodayar Dam I Reservoir

Proposed Interventions / Activities and Intended Outcomes

Dam Safety Review Panel (DSRP) constituted by CWC, Government of India has made a visit to Kodayar Dam I on 08/12/2020 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.

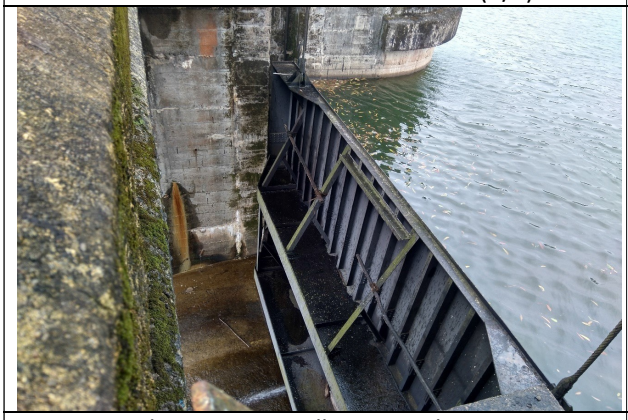
The objectives of the project are to be achieved through investments for physical and technological improvement activities, managerial upgrading of dam operations, management and maintenance, with accompanying institutional reforms. The project will improve the safety and operational performance of dam 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.

1.	**Structural Rehabilitation Works**	
	i	Downstream water washing works.
	ii	Removal of loose boulders on D/S of river.
	iii	Drilling and grouting of saddle dam
	iv	Scourvent gate pit repair work.
	v	Upstream and downstream face treatment works for saddle dam.
	vi	Reaming the vertical shafts.

	vii	Protection wall near bridge
	viii	Colour washing and painting, Dewatering the dead storage water.
	ix	Hand rails to saddle dam
	x	Approach steps and drain formation.
	xi	Inspection Bungalow repair works
	xii	Repairs/replacement of shutters with seals, Repair/renewal of hoisting arrangements
	xiii	Replacement of MS Pipe.
	xiv	Painting gates.
2.	**Basic Facilities Improvement**	
	i	Jungle clearence
	ii	Approach road to saddle dam.
3.	**Instrumentation, SCADA, Surveillance system, etc.**	
	i	Already installed.
4.	**Tourism/Fisheries/Hydropower Development**	
	i	Possibility of allowing Pisciculture in the reservoir area can be explored.
5.	**Other (Investigations, Design Studies, Consultancy)**	
	i	Non-destructive Geophysical scanning investigation of the dam structure for study and proposing remedial measures in future.

The above mentioned Pisciculture component is not considered as part of present ESDD,asfeasibility studies including various options and their possible impacts on environment and social are yet to be carried out.Conducting of ESDD/ESIA on these sub-components will be a pre-requisite in the Environmental and Social Commitment Plan (ESCP) before issuanceof bids.

Figures 1.1 and **1.2** provide photographs of key infrastructures in which rehabilitation works are proposed and locations where major interventions are proposed to be made under DRIP II.

	
Water jetting inside the Scourvent gate	View of Saddle dam-I of right flank
	
Downstream face of Saddle dam II(R/F)	View of Approach road to Saddle dams I & II
	
Leakage notice spillway gate bottom	Seepage from drainage saddle dam II (R/F)
	

Leaching on the Downstream face of dam (L/F)	Leaching on the Downstream face of dam (R/F)
	
Downstream face with Algae growth	View of Vertical shafts Saddle dam-I of right flank

Figure 1.1: Selected Photographs of Improvement/Intervention area

Figure 1.2: Project Area showing major intervention locations of Kodayar Dam I

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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 work, electro-mechanical work, instrumentation and non-structural measures such as Emergency Action Plan and Early Flood Warning with a view to improve dam safety.

Civil work will be carried out by contractor(s) as these are labour intensive activities and would be completed over a period of 3 years. SPMU will hire contractor(s) based on item rate and get the work executed. Timing of execution of certain activities will depend on weather condition including discharge in the river during monsoon. Electromechanical work such as repair of hoists and maintenance of gates will be done through specialised agency to be hired for the purpose. Non-structural intervention such preparation EAP, will be done through expert consultants.

a) Overall Phasing of Project Implementation:

Proposed Starting of implementation (MM/DD/YYYY) : 06/2025
Proposed Ending of implementation (MM/DD/YYYY) : 12/2026
Implementation Duration (months) (MM) : 18 months

b) Timeline phasing of implementation:

Sl. No.	Description	From (month/year)	To (month/year)	Status of Procurement Process
1	Main package C M E works	06/2025	12/2026	Tenders floated.
2	Other Packages – Geophysical scanning	08/2025	12/2025	Tenders to be floated.
3	Procurement– instrumentation, goods, inspection vehicles	NIL		

1.4 PURPOSE OF ESDD

The overall project (DRIP II) was categorized as **Substantial** 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 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.

viii. Consultations with communities living downstream / vicinity of the dam were done on 11.06.2020.

Chapter 2

INSTITUTIONAL FRAMEWORK AND CAPACITY ASSESSMENT OF IA

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 analyzed. Further, a comparison of national environmental and social regulations versus World Bank's ESS was 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" 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 cultivable command area served by irrigation projects. Forest related clearances become applicable, if new or any modifications in any existing project require diversion of forest land for non-forestry purposes. Wildlife Clearance process gets triggered if the project is in proximity to protected area or activities are proposed within protected or conservation areas.

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

2.2 DESCRIPTION OF INSTITUTIONAL FRAMEWORK

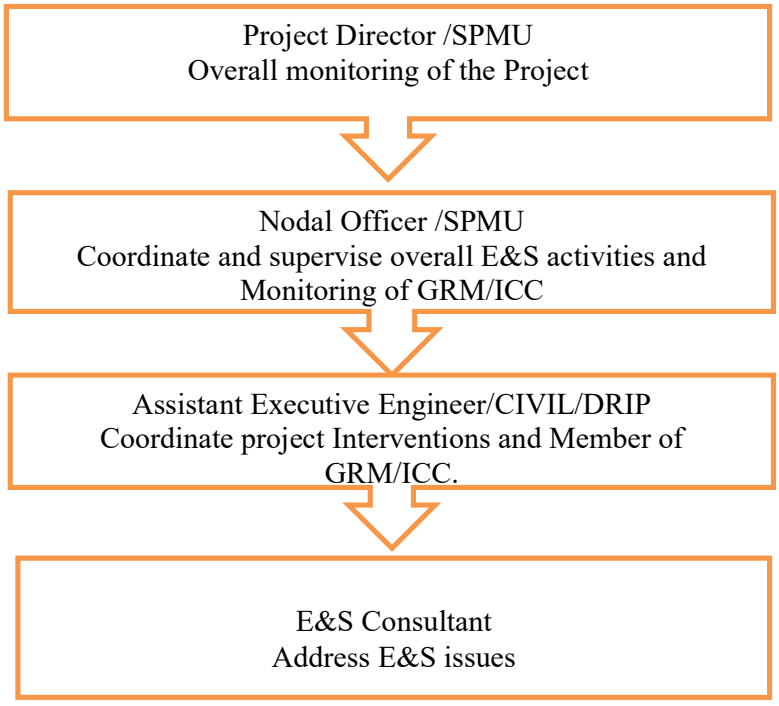
The sub-project will be implemented by Tamil Nadu Generation and Distribution Corporation, Government of Tamil Nadu. TNGECL being responsible for power generation, transmission and distribution; have a well-established customer complaint system for power consumer; where they can register their complaints 24x7 on dedicated line (1912). It also has a 24x7 Chairman's complaint cell with phone number and whatsapp numbers. In addition, it has established a Consumer Grievance Redressal Forum, where consumers can register complaints online/manually, directly or through a representative to be resolved

within a period of 60 days; with a provision of filing appeal in next 30 days if the complainant is not satisfied with the redressal.

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

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.

Presently, Grievance Redressal Mechanism has been established with two nodal officers, one at SPMU level and another at Field level. Sexual Harassment complaints can be made to either at dam level or SPMU 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.



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

3.1 PHYSICAL ENVIRONMENT

Land Use/ Land Cover

The project surrounding area's land use and environmental sensitivity was analyzed using GIS techniques.Land use/ land cover map within 5 Km radius of dam is presented at **Figure 3.1**. As can be seen from the map, present land use upstream of dam is waterbody (reservoir), on downstream side along both the banks there is forest area and rest is agriculture/fallow land and settlements i.e. habitation. Proposed rehabilitation work will be confined to dam body only and no structural interventions are proposed beyond existing dam boundaries.

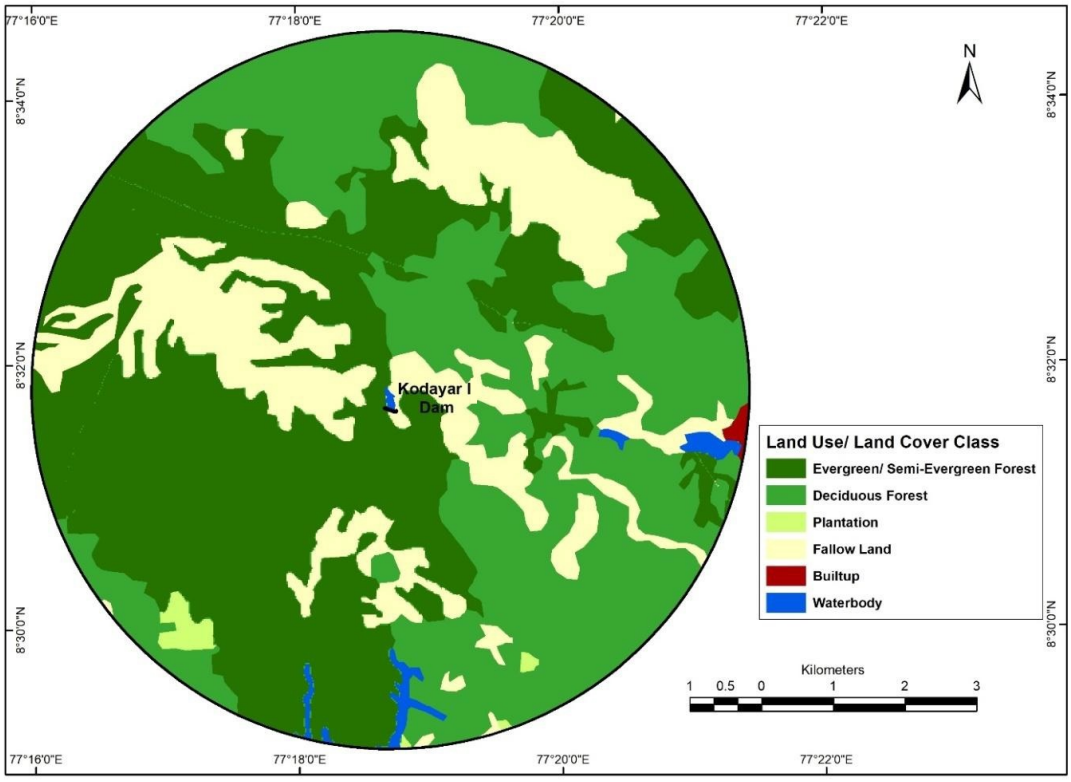


Figure 3.1: Land Use and Land Cover Map of 5 Km radius around Kodayar Dam I site

Natural Hazards

Potential of natural hazards such as flooding and earthquake is not significant. Project is designed for a design flood value of 591 Cumec, revised design flood has been worked as 257 cumec by CWC i.e. 43.48% increase. The revised PMF of 591 Cumecs can be discharged through the existing spillway by maintaining the impinging level of reservoir at 1325.30m against the FRL of 1325.90 m.

Project falls in earthquake zone II, there is no revision and dam design has taken care of this aspect as well. *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

Nearest Protected Area

Kodayar Dam I is located at the border of Kalakkad Mundanthurai Tiger Reserve and Kanniyakumari , with entry point from Kalakkad Mundanthurai Tiger Reserve from Kallidaikurchi. The location of the Sanctuary in relation to Kodayar Dam I is given at **Figure 3.2**.

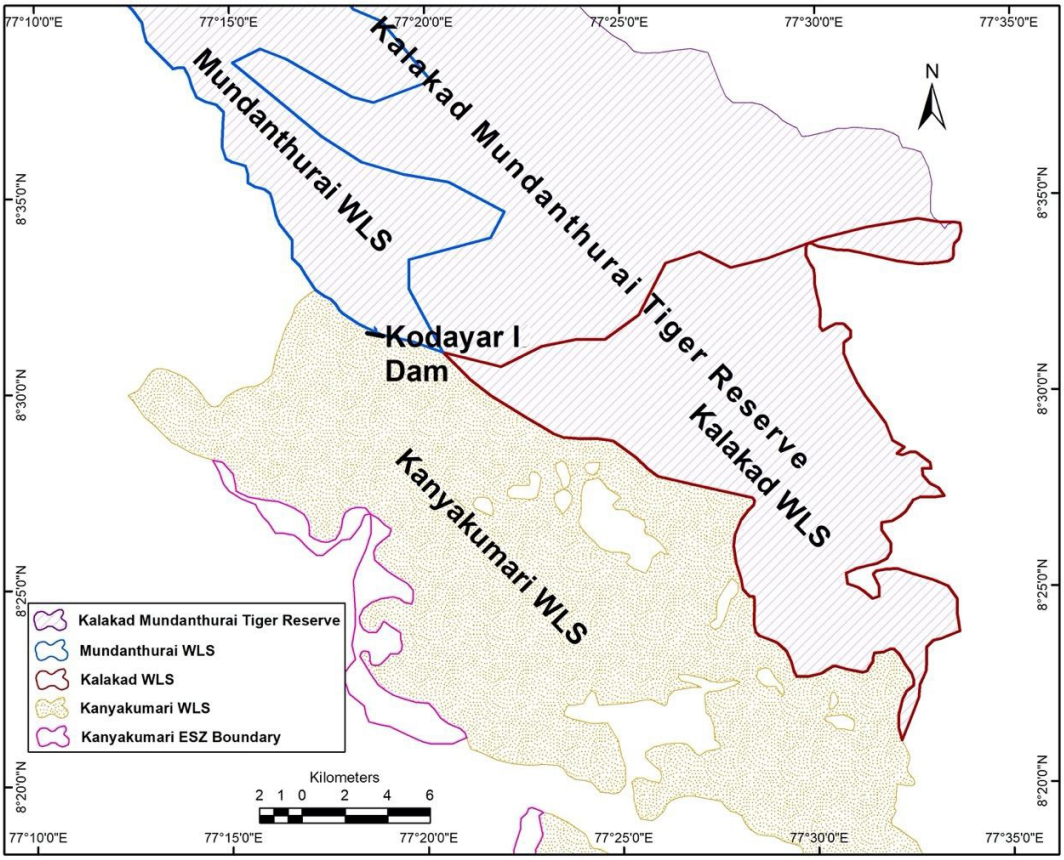


Figure 3.2: Location of Kalakad Mundathurai Tiger Reserve with respect to Kodayar Dam I

Conservation Reserves

Wildlife sanctuaries are declared for the purpose of protecting landscapes, seascapes, flora and fauna and their habitat. The rights of people living inside a Conservation Reserve are not affected. Forest permission is required to transport the Men and materials through the Forest check-post at Manimuthar. Above permission will get from District Forest officer / Kalakad before start the work.

3.3 SOCIAL ENVIRONMENT

The dam is located in Kanyakumari district. Three villages namely Pechiparai, Kadayal, and Kalial have been identified as falling in 5 Km area on downstream side of dam.

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

No. of Households	**4,82,175**	**Household Size**	
Total Population	**18,70,374**	**Population (0-6 age)**	**182,350**
Male	9,26,345	Boys (0-6 age)	92,835
Female	9,44,029	Girls (0-6 age)	89,515
Sex Ratio	1019	Sex Ratio (0-6)	964
Population (SC)	**74,249**	**Population (ST)**	**7,282**
Male	36,817	Male	3,554
Female	37,432	Female	3,728
Literates	**15,48,738**	**Literacy Rate**	**91.75**
Male	780,541	Male	93.65
Female	768,197	Female	89.90
No. of Workers	**6,79,620**	**Cultivators**	15,610(2.30%)
Male	5,24,629	**Agricultural Labours**	72,867(10.72%)
Female	1,54,991	**Household Industrial Workers**	35,789(5.27%)
No. of Main Workers	**5,52,658**	**Other Workers**	5,55,354(81.72%)
No. of Marginal Workers	**1,26,962**		
Source: Census of India, 2011 (District Handbook)			

Though there are Scheduled Tribe households in the downstream areas, there are no physical interventions planned in the downstream areas. The ST households are mainstreamed in the area and do not possess any characteristicsas outlined in ESS7.

Details could not be ascertained because of COVID 18 situation. The ST households will be taken into account during the preparation of Emergency Action Plan for Kodayar Dam II.

3.4 CULTURAL ENVIRONMENT

List of Monuments of National Importance and list of State Protected monuments in Tamilnadu have been reviewed. There are no protected monuments in the project vicinity.

Chapter 4

ACTIVITY WISE ENVIRONMENT & SOCIAL SCREENING, RISK AND IMPACTS IDENTIFICATION

4.1 SUB-PROJECT SCREENING

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

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

Outcome of three stage screening exercise is discussed below:

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

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

Screening indicated that all project components related activities are limited to within the dam area/premises. Due to nature of these activities, likely impacts will be on physical environment in terms of air pollution, noise pollution and waste generation. None of the proposed structural interventions involve acquisition of private land and/or private assets. These activities in no way cause restriction on access to land or use of resources by local communities and there is no economic displacement envisaged due to the sub-project. Activities interfacing with water bodies – river/reservoir 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 camps and debris disposal will be beyond dam area. Activities involving machinery and equipment will have OHS risks and impacts on physical environment. Transportation of material, debris disposal and labour camps are likely to generate pollution and impact on physical environment.

Project will involve project managers and supervisors, contracted workers – these would also include migrant workers as all the required labour will not be fully supplied locally for a number of reasons, such as worker's unavailability and lack of technical skills and capacity. Construction contractors are expected to stay at/near dam, set up construction equipment and machinery near work location at pre-determined/approved sites. Influx of skilled migrant labour, albeit few in numbers, for construction works is likely.The labour will stay outside the dam premises, hence risk of SEA/SH is likely.

Non-structural interventions include Emergency Action Plan, Early Warning System etc. In case of these interventions relating to early flood warning systems having siren systems, broadcasting facilities and Emergency Action Plans, project will reach out to the disadvantaged and vulnerable persons and groups and involve them mainly during implementation.. Population in vulnerable areas under different release scenario will be identified and contacted through public consultation meetings. Communities will be made aware about the warning systems and do's and dont's during such scenarios.

Output of this screeningis enclosed as **Annexure I**.

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

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

Occupational Health and safety is treated as substantial by default as its risk effect can be managed by adopting defined guidelines.

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

i. The assessment of weaker zones of the dam masonry by geophysical scanning of the dam.
ii. Downstream water washing works..
iii. Reaming of vertical shafts.
iv. Removal of loose boulders on D/S of river.
v. Drilling and grouting of saddle dam.

vi. Scourvent gate pit repair work .
vii. Upstream and downstream face treatment works for saddle dam.
viii. Protection wall near bridge.
ix. Colour washing and painting, Dewatering the dead storage water..
x. Hand rails to saddle dam
xi. Approach steps and drain formation..
xii. Inspection Bungalow repair works
xiii. Replacement of MS Pipe
xiv. Painting gates.
xv. Labour Camps involved (location within dam premises or outside).
xvi. Major Debris Disposal involved.

All other activities are categorized as low risk activities. E&S risks of none of the sub-activities for this sub-project is categorized as either Substantial or High risk. **The outcome of Screening is enclosed as Annexure II.** In case of GBV/SEAH, this site assessment fed into the Risk Assessment Tool that was used for Dam specific GBV/SEAH risk assessment and score came to 10.25 – 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	SEA/SH	OH and Safety to Labour/ Community
Civil (within Dam Boundary)	M	L	L	L	L	M	L	L	M	L	L	M
Electro Mechanical	M	L	L	L	L	L	L	L	M	L	L	M
Instrumentation, surveillance	L	L	L	L	L	L	L	L	L	L	L	L
Painting	M	M	L	L	L	M	L	L	M	L	L	M
Road work	M	L	L	L	L	L	L	L	M	L	L	M
Safety measures (Siren, Lighting)	L	L	L	L	L	L	L	L	L	L	L	L
Major debris disposal	M	L	L	L	L	L	L	L	M	L	L	M
Labour camps	M	L	L	L	L	L	L	L	M	L	L	L

Criteria for Risk Evaluation :		
Low	:	Localized, temporary and Negligible
Moderate	:	Temporary, or short term and reversible under control
Substantial	:	Medium term , covering larger impact zone, partially reversible
High	:	Significant , non- reversible, long term and can only be contained/compensated
Occupational Health and safety	:	Moderate by default as OHS effect can be kept controlled and with negligible effect with adoption of defined guidelines

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4.2 STAKEHOLDER CONSULTATION

Stakeholder consultation was conducted on 11.06.2020 amidst COVID-19 pandemic lockdown and rainfall during the South West monsoon, after providing mask to all the participants. It was attended by permanent staff of the borrower (TANGEDCO) working at dam, workers from nearby village.

Stakeholder consultation was made as part of environmental and social impact assessments. The purpose was to:

a. Provide initial information to the communities 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, etc.
e. Identify mechanisms that would be deployed to engage with different stakeholders and particularly communities living downstream.

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

A. Interaction with Dam Engineers/Staff

Questions	Responses provided / Observations
1. Please confirm whether all proposed structural rehabilitation activities for this dam are limited to dam compound only or any activities are proposed beyond dam complex like catchment area treatment plan, stabilization of reservoir rim area, slope stabilization, de-silting etc.? Please specify if any possibility of local community interference exist during the implementation of rehabilitation measures; including stakeholders consultation meetings planned for dissemination of emergency action plans which is a non-structural measure.	The proposed structural Rehabilitation activities are within the dam site only. Neither slope stabilization nor desilting work is proposed in this dam. Dam is located in the Wildlife Sanctuary and there is no possibility of community interference during the implementation of Rehabilitation work including EAP stackholders consultation meeting.
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.	The dam is located in Wildlife Sanctuary. There is neither displacement nor resettlement issues pending from the time of construction of dam.
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.	There is no encroacher (or) squatter within the dam premises as on date.
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?	TANGEDCO do not have in-house expertise to address E&S issues. Presently, Project Director at SPMU and Executive Engineer at dam level look after these aspects. Hiring of Experts will be processed.
5. Who will be in charge of E&S related activities at dam site and at SPMU level?	Dam site: Executive Engineer/Civil/DRIP/ Madurai SPMU : Executive
6. How do communities contact dam officials? Is there any existing mechanism known to communities to contact dam officials (through	Through telephone and mobile.

telephone/mobile/e-mail/official website?	
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?	i. By siren. ii. Written Communication to the District Collector. iii. Advance intimation to the public/ downstream communities through mobile.
8. How do you ensure that downstream community is fully aware of the above existing mechanism?	The downstream community had already been educated by the Department officials.
9. Are there women employees at the dam site?	EEs – 3 Nos. (EE/Electrical/Power Houses/Lower Kodayar, EE/ Civil and EE/Mechancial/Tirunelveli) AEs – 6Nos. Staff – 6 Nos.
10. Is there any existing Grievance Redressal Mechanism (GRM) within the department to address any kind of grievance/complaints by general public?	Yes. Executive Engineer/ Civil/ Dam Safety I/ Chennai @ SPMU Level Executive Engineer/ Civil/ DRIP/ Madurai @ Field Level.
11. Details of any grievances received lately related to this new Scheme?	NIL
12. Is dam premise a restricted area or has open access to general public?	Access to Dam area is fully restricted.
13. Are there tribals living in the surrounding area of dam complex? Which tribes are these? Please give brief detail.	Kani tribals are living in the surrounding dam area.
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.	NIL.
15. Do you engage any local labours for routine dam maintenance work? If yes, what is the process of engaging these locals for work at dam, whether through Government approved contractor or hired individually?	Routine Dam maintenance works are being done by Department staff only. Cleaning works are done through registered Contractors.

B. Interaction with Local Community

Questions	Responses provided / Observations
1. How many villages are in immediate downstream vicinity?	Three villages, namely Kadayam, Kalial and Pechiparai at the downstream side of this dam.
2. Are they dependent on dam in any way for their livelihood?	No, they are not dependent on the dam. All the basic amenities required are fulfilled by the respective Panchayats.

3. Does any of these villages were displaced and rehabilitated during the construction of Kodayar Dam II? Is there any pending compensation issues?	Dam area is fully covered in Wildlife Sanctuary. Displacement and Rehabilitation does not arise.
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 the fishing activities of this dam?	No fishing activity.
6. Are you aware of fishing working seasons, revenue earning, any access to general public for fishing, any suggestion, etc.	Not applicable.
7. Are you aware of local women affected in any way by dam operations?	Not affected.
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, warning siren is already provided in the dam. When the spillway gate is opened to discharge the surplus water, siren is blown.
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 loss of life reported
10. If you have to contact the dam authorities; how will you contact, through telephone/mobile/e mail/personally?	In person or through mobile.
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?	At the time of road blockage due to land slide, fallen trees, fallen boulders, Dam authorities are contacted through mobile. TANGEDCO dam authorities immediately cleared the blockages.
12. Give your views about Kodayar dam II, how this dam is helping Country, State, district or local communities in meeting its objectives, any specific concern can also be given?	1. Water conservation 2. Power generation 3. Transport facilities, education facilities (earlier a school was founded and run by TNEB and then it was handed over the State Education Department and is still functioning) 4. Rubber and spices plantations.
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?	No. Not yet. Consultation meeting to be conducted. Yes.

(d) If yes, how to contact you, please give the corresponding address along with all details to receive the official communication.	Through Mobile. Address and mobile Nos. are given in Annexure III.
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?	No.
15. Any suggestion to improve overall system by dam authorities in any way, please give in brief?	1. There is no objection to DRIP works. 2. Request to carry out DRIP works early. 3. Request for employment opportunities (daily wages) while executing DRIP works.

Following is the summary of the outcome of stakeholder consultation:

1. All the participants welcomed the proposed interventions relating to dam safety and ensured that our DRIP work will not affect the villages during execution.
2. The participants explicitly mentioned that the dam is their lifeline and strengthening works will help their long term livelihood and therefore welcomed such information.
3. Participants have expressed that they do not have any grievances and as such no grievances were ever reported from their communities/neighbourhoods.
4. There are no pending issues regarding dam construction related resettlement.
5. Plantations of spices and rubber are the main occupation of people nearer to the dam.
6. They are willing to work as daily wages labourers during execution of the DRIP works.

Communities welcomed such interactions and indicated that they would prefer Dam authorities conduct such face-to-face meeting, at a convenient location to inform of developments/interventions relevant to them. They welcomed other means of information such as advertisements in the local papers, local media, etc, but preferred to have face to face interactions.

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

Affected Stakeholders: There are no affected persons who shall be directly or indirectly adversely affected by the proposed interventions.

Other interested stakeholders: In relation to structural interventions, these would becontractors, project management consultants, regulatory bodies/institutional stakeholders such as revenue, environmental Authorities, etc. In relation to non-structural interventions, these would be communities living downstream including farmers; village heads, community leaders; district administration, police, state disaster management authority, revenue department, electronic and print media, etc. These communities would be key stakeholders requiring to be involved in the preparation and implementation of Emergency Action Plan (EAP).

Disadvantaged and vulnerable persons and groups: Illiterate persons, physically challenged, women and elderly would be key stakeholders – requiring special focus and outreach to ensure that they are well informed about the provisions of the EAP.

4.3 DESCRIPTIVE SUMMARY OF RISKS AND IMPACTSFROM ACTIVITIES BASED ON SCREENING

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

Environmental Impacts and Risks

1. Environment risks and impacts, as assessed above, for various project activities under this sub-project are categorised as Low and Moderate due to localised nature of proposed activities i.e. activities remain limited to dam area except for labour camp and muck/debris disposal.
2. Execution of civil and electromechanical work within dam body will generate localised impacts on physical environment and resource use; pose risk of exposure of workers requiring personal protective equipment (PPE) use.
3. Civil work interfaced with water body such as work on upstream face of dam and construction of steps in the upstream side pose risk of water pollution and impact on fish fauna.
4. Generation of hazardous waste such as empty paint containers from paint work pose risk of exposure of workers while handling and require careful disposal at authorised sites.
5. Construction waste and muck require careful disposal at pre-identified and approved site (by E&S Experts of IA) to minimise the risk of pollution on this count.
6. Rehabilitation work would require labour to work on various sections of dam involving working at height, working in confined spaces, working on reservoir side, etc; Further, workers will also be exposed to dust and noise and will have to handle chemicals/gases for some of the works; these will lead to occupational health and safety risks.

Social Impacts and Risks

1. As the interventions are within the dam premises and on the dam structure, there shall be no adverse impacts on land and assets due to any sub-component or sub-activities
2. The dam is not located in the Schedule V area. Though there are Scheduled Tribes households in the vicinity, these are mainstreamed into the overall society and do not meet the characteristics outlined in ESS 7. There will be no physical interventions.
3. Influx of migrant labour will be low as these works require only few e.g. 20-30 but, very skilled labour. Also these workers will mostly operate from labour camps within the dam premises 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. Labour related risk would include:
   - Safety issues while at work like injuries/accidents/ fatalities leading to even death, while at work; Occupational health and safety risks due to exposure of workers to unsafe conditions while working at heights, working using lifts, handling of equipment and machinery, exposure to air and noise pollution etc. will be addressed through OHS guidelines.
   - Short terms effects due to exposure to dust and noise levels, while atwork.
   - Long term effects on life due to exposure to chemical /hazardouswastes.
   - Inadequate accommodation facilities at work force camps, including inadequate sanitation and health facilities.

- Non-payment of wages.
- Discrimination in Employment (e.g. abrupt termination of the employment, working conditions, wages or benefits etc.).
- 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.

In addition, other risks that would be applicable for all types of workers would be as follows:

- Unclear terms and conditions of employment.
- Discrimination and denial of equal opportunity in hiring.

5.1 CONCLUSIONS

5.1.1 Risk Classification

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

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

5.1.2 National Legislation and WB ESS Applicability Screening

The applicability analysis of 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	Direct workers, Contracted workers and Community workers (likely for EAP and other non-structural interventions)
ESS3: Resource Efficiency, Pollution Prevention and Management	Civil and electro-mechanical work including resource consumption requiring protection of physical environment and conservation of resources
ESS 4: Community Health and Safety	Transportation of material, labour camp near habitation; and accidental risk during repair /improvement work and also leading to SEA/SH GBV risk

Relevant ESS	Reasons for Applicability of the standard
ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural resources	Location of labour camp in close proximity to conservation area
ESS 10: Stakeholder Engagement Plan	For engagement of stakeholders in all structural and non-structural interventions e.g. Early flood Warning system, siren systems, broadcasting facilities, Emergency Action Plan etc.

5.2 RECOMMENDATIONS

5.2.1 Mitigation and Management of Risks and Impacts

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

a. SPMU shall customise the generic Environmental and Social Management plan (ESMP) that has been provided in the Environmental and Social Management Framework (ESMF) and make it part of bid document for effective adherence by contractors.

b. It is recommended that ESMP provides due measures for protection of environment quality and resource conservation (during handling of resources) in line with ESF standard ESS3 requirements. Similarly, any impacts identified on fisheries have to be conserved. Likewise, due attention has to be given to Occupational Health and Safety of workers and community in line with the requirements of ESS4 and World Bank Group guidelines on Occupational Health and Safety (OHS). Hence SPMU shall develop following plans in line with outline provided in the ESMF and ensure its adherence by contractor:
    - Gender Based Violence or SEA/SH related actions (ESS1) Labour Management Plan (LMP)
    - Labour Management Procedure (ESS2)
    - Resource Efficiency and Pollution Prevention (ESS3)
    - Community Health and Safety (ESS4)
    - Bio-diversity Conservation Plan (ESS6)
    - Stakeholders Engagement Plan (ESS10)

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

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

Table 5.2: List of Mitigation Plans with responsibility and timelines

WB-ESS Triggered	Mitigation Instrument	Responsibility	Timelines
ESS2: Labour and Working Conditions	• LMP • OHS • GBV/SEAH	SPMU CPMU for GBV/SEAH	Before mobilization of contractor GBV/SEAH by appraisal
ESS3: Resource Efficiency, Pollution Prevention and Management	• ESMP • Muck Management Plan • Resource Conservation Plan	SPMU	Before mobilization of contractor

WB-ESS Triggered	Mitigation Instrument	Responsibility	Timelines
ESS 4: Community Health and Safety	• EAP	CPMU and SPMU	Within one year of commencement of work
ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural resources	• Biodiversity Conservation Plan	SPMU	Before mobilization of contractor
ESS 10: Stakeholder Engagement Plan	• SEP in accordance with project SEF	SPMU	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. Brief TORs for these Nodal E&S officers is included in ESMF. The SPMU, in case in-house expertise not available, will hire the qualified staffs on need basis to support management of E&S risks including Environmental and Social Experts for ensuring compliance with the Bank's ESF and ESS's and ensuring that these activities shall be implemented as per the procedures.

SPMU shall advise contractors about applicable legislative requirements and ensure that contractors fully comply with applicable requirements and submit compliance reports to SPMU on quarterly basis. SPMUs, TANGEDCO will share regular implementation status of ESMPs to CWC and The World Bank in line with Environmental Social Commitment Plan (ESCP) on quarterly basis.

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

EMC (Engineering and Management Consultant) for the project will have sufficient staff with skills on Environment and Social aspects. Awareness raising and capacity building on the new Environmental and Social Framework (ESF) need to be carried out for the environment and social staff engaged and this will be an area of continued focus, with a view to generate awareness at to dam level. EMC will develop formats for regular supervision and monitoring on E&S issues and undertake site visits/ inspections of the dam sites to monitor for compliance; collate and review QPRs and set up a monitoring and reporting system on E&S issues.

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

Annexure - I: Form SF1

Sl. No.	Project Component	Applicable (A) , Not Applicable (NA)	Environment and Social Risk Associated within dam area (DI), Beyond Dam Area (DE)	Likely Nature of Risk/Impact Water Quality (WQ), Fisheries(F), Conservation area(CA), Protected Area (PA), Ecological (E), Occupational Health (OH), Physical Environment (PE), Cultural (C), Tribal presence (T), impact on private land/assets/encroachers/squatters (LA), Labour (L), GBV risks (G) (Write whichever is applicable)
1	2	3	4	5
A	**Nature of Project Component Related**			
1	Reservoir Desiltation	**NA**		
2	Major structural changes – Spill way 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 – Treatment of weak masonry joints on upstream of Dam site (interfacing dam reservoir)(like treatment of Honeycombed etc.)	**A**	**DI**	**WQ,,F,E, PE, L, G,PA**
5	Structural Improvement/Repair work -Downstream of Dam site (with no interfacing with dam reservoir) (like repair of parapet walls, damage spillway crest, etc.)	**A**	**DI**	**WQ, PE, L, G**
6	Remodeling earth dams to safe, stable cross sections	**NA**		
7	Electro-mechanical activities with interface with dam reservoir	**A**	**DI**	**WQ,G, PE, L,**
8	General lighting	**A**	**DI**	**CA, OH, PE, L, G**
9	Basic Facilities (like access road improvement, construction of Police guard room ,etc.)	**A**	**DI**	**PE, L, G,PA,E**
10	Utility installation like standby generator.	**A**	**DI**	**PE, L,G**
11	Painting Work	**A**	**DI**	**PE, L,G WQ**
12	Water recreation activities	**NA**		
13	Tourism Development	**NA**		
14	Solar power/floating solar	**NA**		
15	List any other component not listed above			
i	Cleaning/Reaming of Drainage shafts (In Dam Body and foundation)	**A**	**DI**	**CA, OH, PE, L, G**
ii	Construction of RCC Retaining wall in downstream L/S and R/S to improve flow condition	**NA**	**DI**	**PE, L, G, WQ,**
B	**Pre-construction and construction stage major auxiliary or**			

Sl. No.	Project Component	Applicable (A) , Not Applicable (NA)	Environment and Social Risk Associated within dam area (DI), Beyond Dam Area (DE)	Likely Nature of Risk/Impact Water Quality (WQ), Fisheries(F), Conservation area(CA), Protected Area (PA), Ecological (E), Occupational Health (OH), Physical Environment (PE), Cultural (C), Tribal presence (T), impact on private land/assets/encroachers/squatters (LA), Labour (L), GBV risks (G) (Write whichever is applicable)
1	2	3	4	5
	preparatory intervention			
1	Acquisition of forest land involved	**NA**		
2	Taking of private land (including physical or economic displacement, impact on livelihood; temporary loss of business)	**NA**		
3	Major Borrow materials requirement involved	**NA**		
4	Major Quarry materials requirement involved	**NA**		
5	Blasting involved	**NA**		
6	Resettlement and Rehabilitation	**NA**		
7	Types of project workers (Direct, Contracted, Community Workers (or Volunteers i.e. for EAP implementation)	**A**	**DE**	**CA, L, G**
8	Labour Camps involved (location within dam premises or outside)	**A**	**DI**	**WQ, CA, PE, G, CA, E**
9	Migrant labour likely to be involved	**A**	**DE**	**L, G**
10	Heavy machinery to be deployed and related maintenance workshop set up involved	**A**	**DI**	**CA, OH, PE, L, G**
11	Hot mix plant Requirement	**NA**		
12	Concrete mixture and heavy pumps to be deployed	**A**	**DI**	**CA, OH, PE, L, G**
13	Temporary land acquisition involved	**NA**		
14	Temporary disruption to access, livelihoods	**NA**		
15	Tree felling/ vegetation clearance involved	**NA**		
16	Major Debris Disposal involved	**A**	**DE**	**PE, L, G**
17	Major Transport of materials involved	**A**	**DE**	**PE, L, G**
18	Utility shifting involved	**NA**		
19	Discharge of reservoir water (lowering of reservoir water involved)	**A**	**DI**	**OH, PE, L, G**
20	**List any other not listed above**			

Annexure – II: Form SF2

Sl. No	Applicable Sub-Project Component/ Construction preparatory Work related Sub activity (As per SF-1)	Nature of Risk (Conforming to Column 5 of SF-1) and nature of sub activity	Elaborate cause (risk) and its effect (Impact) on environment/social	Risk/Impact intensity for each type of risk/impact Low (L) , Moderate (M), Substantial(S), High (H)
1	2	3	4	5
A	**Project Component Related**			
1.	**Structural Strengthening/Improvement/Repair work -upstream of Dam site**			
a	Cleaning/Reaming of Drainage shafts (In Dam Body and foundation)	**CA, OH, PE, L, G**	Air pollution, noise pollution, waste generation from cleaning, Occupational health and safety risk due to Labour and GBV risk	**M**
b	Repairs to Parapet walls	**CA, OH, PE, L, G**	Air pollution, noise pollution, construction waste generation, empty paint containers, Occupational health and safety risk due to working at height, Labour and GBV risk	**L**
c	Treatment of weak masonry joints on upstream face of the dam	**WQ, CA, F, OH, PE, L**	Air pollution, noise pollution, risk of spillage of wastewater, risk of reservoir water contamination and impact on fishes, waste generation from surface cleaning and preparation, Occupational health and safety risk due to working on upstream face of dam and Labour risk	**M**
d	Special repairs of masonry portion of dam	**WQ,F,PE,L,G**	Air pollution, noise pollution, risk of spillage of wastewater, risk of reservoir water contamination and impact on fishes, generation of construction debris Labor and GBV risk	**M**
2.	**Structural Improvement/ Repair work - Downstream of Dam site (with no interfacing with dam reservoir)**			
a	Construction of Protection wall in downstream L/S and R/S to improve flow condition	**WQ, CA, F, OH, PE, L, G**	Air pollution, noise pollution, risk of spillage of wastewater to river, risk of river water contamination and impact on fishes, construction debris, Occupational health and safety risk, Labour and GBV risk	**M**
b	Construction of approach steps and Hand Rails on the downstream side saddle dam-I &II	**WQ, CA, F, OH, PE, L, G**	Air pollution, noise pollution, risk of spillage of wastewater to river, risk of river water contamination and impact on	**M**

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1	2	3	4	5
			fishes, construction debris and muck generation from excavation work for wall foundation, Occupational health and safety risk, Labour and GB risk	
c	Providing Polyurethane grouting and micro concrete	**CA, OH, PE, L, G**	Air pollution, noise pollution, construction debris, Occupational health and safety risk, Labour, GBV risk	**L**
d	Construction of Concrete Access road to saddle dams on downstream side	**CA, OH, PE, L, G**	Air pollution, noise pollution, construction debris, Occupational health and safety risk, Labour, GBV risk	**M**
3.	**Electro-mechanical activities Downstream of Dam site (with no interfacing with dam reservoir)**			
a	Repairs of hoist	**CA, OH, PE, L**	Air pollution, noise pollution, Occupational health and safety risk due to working at heights and exposure to paints, waste generation from removed parts and empty paint containers, Labour risk	**M**
b	Repairs/replacement of shutters with seals	**CA, OH, PE, L, G**	Air pollution, noise pollution, Occupational health and safety risk due to working at heights and exposure to paints, waste generation from removed parts and empty paint containers, Labour and GBV risk	**M**
c	Replacement of MS Pipe	**CA, OH, PE, L**	Occupational health and safety risk due to working at heights, waste generation from removed parts and packing material, Labour risk	**L**
4.	**Instrumentation, General lighting and SCADA systems**			
a	Dam Instrumentation (Geo-technical, hydro-meteorological, Seismic, Geodetic, data collection, storage, data transfer, analysis, retrieval, Operation & Maintenance etc.).			**NA**
B.	**Pre-construction and construction stage major auxiliary or preparatory intervention**			
1	Labour Camps involved (location within dam premises or outside)	**WQ, CA, PE, G, E, CA**	Wastewater generation from domestic activities, waste generation, risk of tree cutting	**M**

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1	2	3	4	5
			and hunting of wild animals, GBV risk within labour and involving community. Labour camp will be in close proximity to Kalakad Mundathurai Tiger Reserve and there is a risk of interference with conservation area	
2	Migrant labour likely to be involved	**L, G**	Migrant labour having low degree of interface with community	**L**
3	Likely interface of Workers with communities	**L, G**	Risk of GBV due to labour interaction with community	**L**
4	Heavy machinery to be deployed and related maintenance workshop set up involved	**CA, OH, PE, L, G**	Heavy machinery will be deployed for repair and maintenance of gates and hoists and for other activities - OH risk due to machine handling, waste, wastewater and air emissions from machines operations, hazardous waste generation from oil waste,	**L**
5	Concrete mixture and heavy pumps to be deployed	**CA, OH, PE, L, G**	Concrete mixture and pumps will be deployed for road repair and other civil works and dewatering - OH risk due to machine handling, waste generation, wastewater and air emissions from operations, hazardous waste generation from oil waste,Labour	**L**
6	Major Debris Disposal involved	**CA, OH, PE, L, G**	Debris will be generated from various repair activities such as repair of roads, rip-rap replacement, training walls, etc. - OH risk during debris handling, air and noise emissions from debris handling and transportation, water pollution risk due to debris finding its way to water body, and GBV risk due to labour involvement	**M**
7	Major Transport of materials involved	**CA, OH, PE, L, G**	Material will be transported from various vendors and suppliers to site for civil, electromechanical work and instrumentation - OH risk during material handling, loading and unloading, air and	**M**

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1	2	3	4	5
			noise emissions from transportation, Labour and GBV risk due to labour involvement, close proximity to Kalakad Mundathurai tiger reserve and risk of interference with conservation area.	

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

Annexure III: Stakeholder's consultation: List of Participants

Sl. No.	Name	Relation with Dam – Staff, contractor, worker, full time/part time, local, NGO..	Mobile Number	Address (at least village name)
1.	Mrs.P.Rameshwari	Executive Engineer/ Civil/DRIP/Madurai	9445442372	Madurai
2.	Mrs.C.Suleka	Executive Engineer/ Civil/Generation Circle /Tirunelveli	9445857134	Tirunelveli
3.	Er.S.Maheshvaran	Assistant Executive Engineer /Civil /DRIP/Papanasam	9443102291	Papanasam Lower Camp
4.	Er.Natesan	Assistant Executive Engineer /Civil /Generation Circle, Lower Kodayar	9445857146	Kodayar Lower Camp
5.	Er.WinsandJayarai	Assistant Executive Engineer /Mechanical /Generation Circle, Lower Kodayar	9445857145	Kodayar Lower Camp
6.	P.Veeramanikandan	Foreman, Generation Circle, Lower Kodayar.	9442935398	Kodayar Lower Camp
7.	Mrs.K.Jayakumari	Public from Mylar village	9486315192	Mylar, Kadayal Village
8.	S.Sajeen	Public from Kadayal village	9487016820	Kodayar, Market Area, Kadayal Village
9.	R.Vishnu	Public from Pechiparai village	9486501452	Kodayar, Manalikadu, Pechiparai Village
10.	P.Prabu	Public from Manalikarai village	8838120769	Manalikarai Village, Kodayar
11.	T.Jose	Public from KadayalKilthangal village	8903252715	Market Area, KadayalKilthangal, Kodayar
12.	G.Ragu	Public from Kotothorimali village	91488460038	Kotothorimali , Kodayar Post
13.	A.Rajendran	Public from Kaduvetty village	9698276025	Kaduvetty, Perunchani