Environmental and Social Management Framework

Kerala Climate Resilient Agri Value Chain Modernization Project

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Document Owner	Department of Agriculture Development and Farmer's Welfare, Govt. of Kerala

Abbreviation

ABC	Agri-Business Centre
ACM	Asbestos Containing Materials
AEU	Agro-Ecological Unit
AEZ	Agro-Ecological Zone
AIDS	Acquired Immune Deficiency Syndrome
APD	Assistant Project Director
ASI	Archaeological Importance sites
ATMA	Agricultural Technology Management Agency
AWD	Alternate Wetting & Drying
BCM	Billion Cubic Meters
BEE	Bureau of Energy Efficiency
BoD	Board of Director
BoQ	Bill of Quantities
C&D	Construction and Demolition
CC	Climate Change
CERC	Contingent Emergency Response Component
CHCs	Custom Hiring Centres
CHC	Community Health Center
CIB	Central Insecticides Board
CNG	Compressed Natural Gas
CPC	Common Processing Centre
CPCB	Central Pollution Control Board
CPCRI	Central Plantation Crops Research Institute
CSA	Climate-Smart Agriculture
CtE	Consent to Establish
CtO	Consent to Operate
DAF	District Agriculture Farm
DDH	Deputy Director of Horticulture
DFO	Divisional Forest Officer
DG	Diesel Generator
DoA	Department of Agriculture
DoE	Department of Environment
DoIC	Department of Industries and Commerce
DoLSG	Department of Local Self Governance
DPIU	District Project Implementation Unit
DPR	Detailed Project Report
DSSC	Department of Soil Survey & Soil Conservation
ECZ	Eco-sensitive Zones
EE	Executive Engineer
EFL	Eco-friendly Land
EHS	Environment Health and Safety
EHSG	Environment Health and Safety Group
EMP	Environment Management Plan
ESCP	Environmental and Social Commitment Plan
ESF	Environmental and Social Framework
ESIA	Environmental and Social Impact Assessment

ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plans
ESS	Environmental and Social Standards
ETP	Effluent Treatment Plant
FI	Financial Intermediaries
FPC	Farmer Producer Company
FPO	Farmers Producer Organisation
FSSAI	Food Safety and Standards Authority of India.
GAP	Good Agricultural Practices
GBH	Girth at Breast Height
GBV	Gender-Based Violence
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GoI	Government of India
GoK	Government of Kerala
GP	Gram Panchayet
GRC	Grievance Redressal Committees
GRM	Grievance Redressal Mechanism
GRO	Grievance Redressal Officers
GSDP	Gross State Domestic Product
HIV	Human Immunodeficiency Virus
IA	Implementing Agency
ICAR	Indian Council of Agricultural Research
ICRI	Indian Cardamom Research Institute
ICT	Information and Communications Technology
INM	Integrated Nutrient Management
IP	Indigenous People
IPDP	Indigenous People Development Plan
IPM	Integrated Pest Management
IPNM	Integrated Pest and Nutrient Management
IPPF	Indigenous Peoples Planning Framework
JPD	Joint Project Director
KABCO	Kerala Agro-Business Company
KAICO	Kerala Agro Industries Corporation Ltd
KAU	Kerala Agriculture University
KERA	Kerala Climate Resilient Agri Value Chain Modernization
KII	Key Informants Interview
KIIFB	Kerala Infrastructure Investment Fund Board
KILA	Kerala Institute of Local Administration
KINFRA	Kerala Industrial Infrastructure Development Corporation
KSPCB	Kerala State Pollution Control Board
LMP	Labour Management Procedure
LPG	Liquefied Petroleum Gas
LSGD	Local Self Government Department
M&E	Monitoring and Evaluation
MCM	Million Cubic Meters
MNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
MoEFCC	Ministry of Environment, Forest and Climate Change
MoFPI	Ministry of Food Processing Industries
MPR	Monthly Progress Report

MRL	Maximum Residue Level
MSL	Mean Sea Level
MSME	Micro, Small & Medium Enterprises
NABARD	National Bank for Agriculture and Rural Development
NABL	National Accreditation Board for Testing and Calibration Laboratories
NAMP	National Ambient Air Quality Monitoring Programme
NMP	Nutrient Management Plan
NOC	No-Objection Certificate
NRCWA	National Research Centre for Women in Agriculture
ODOP	One District One Product
OHS	Occupational Health and Safety
PAO	Principal Agriculture Officer
PAP	Project Affected Person
PCR	Physical and Cultural Resources
PD	Project Director
PES	Payment for Ecosystem Services
PESA	Panchayats Extension to Scheduled Areas Act
PHC	Primary Health Centers
PIP	Project Implementation Plan
PIU	Project Implementation Unit
PMIS	Project Monitoring Information System
PMU	Project Management Unit
PP	Pani Panchayet
PPE	Personal Protective Equipment
PPT	Project Preparation Team
PVTG	Particularly Vulnerable Tribal Groups
QA	Quality Assurance
QC	Quality Control
QPR	Quarterly Progress Reports
R&D	Research and Development
RAMP	Raising and Accelerating MSME Performance
RATTC	Regional Agricultural Technology Training Centre
REOI	Request for Expressions of Interest
RFCTLARR	Right to Fair Compensation and Transparency in Land Acquisition
RPMU	Regional Project Management Unit
RSPM	Respirable Suspended Particulate Matter
RTO	Regional Transport Office
SC	Scheduled Castes
SEA/SH	Sexual Exploitation and Abuse and Sexual Harassment
SEP	Stakeholder Engagement Plan
SHG	Self Help Groups
SRLM	State Rural Livelihood Mission
ST	Scheduled Tribes
STP	Sewage Treatment Plant
TA	Technical assistance
VA	Vulnerability Assessment
VAAM	Value Added Agriculture Mission
VFPCK	Vegetable and Fruit Promotion Council Keralam
WB	World Bank
WPG	Women Producer Groups

Executive summary

Project Background

Kerala State has envisaged to promote value addition and processing, to meet higher wage demands, capitalize on private investments, and establish economies of scale in agriculture. The Kerala Resilient Agri Value Chain Modernization (KERA) project, aims to enhance resilience against natural disasters and climate change in the agriculture sector. The primary aim of the KERA project is to bolster the resilient commercialization of Kerala's food and agricultural sector, specifically targeting small-scale farmers and MSMEs in the agri-food domain. Key areas of focus include the enhancement of agriculture supply chains and value chains, the empowerment of agri-food-based MSMEs and FPOs, development of market infrastructure and services, and the promotion of regenerative agriculture practices for ecosystem revival and climate resilience. The project encompasses the modernization of agricultural offices (Krishi Bhavans) to facilitate farmer access, employing a robust ICT-based infrastructure that may involve digital platforms, mobile applications, and online resources for efficient farmer-government interactions, dissemination of agricultural information, and streamlined management of agricultural data. Through strategic investments in agriculture and MSME, implementation of climate-smart agricultural practices, increased land and labor revenues, reduced GHG emissions from Paddy cultivation, enhanced employment opportunities, and heightened climate resilience, the initiative aims to strengthen the local economy.

Project Description

To achieve the overall goal of enhancing climate resilience, promote sustainable agriculture, and strengthen the agribusiness sector three distinctive project component along with project management and zero allocation Contingent Emergency Response Component (CERC) and Climate Financing component is planned under KERA.

Component 1: Climate Resilience and Mitigation in Agriculture: This component focuses on strengthening the agricultural production base in the face of climate change across all 14 districts in Kerala. It aims to implement an innovative Agro-Ecological Zone (AEZ)-based approach, aligning Climate Smart Agriculture (CSA) practices with AEZs and farmer preferences. The component includes activities such as scaling up the adoption of CSA, updating existing Package of Practices, strengthening the capacity of extension services, and integrating digital technology for extension and advisory support. It also supports low carbon rice production, weather information infrastructure, and agromet systems.

Component 2: Enhancing small-holder commercialization for value addition: This component focuses on commercializing market-based agricultural production systems. It supports the formation of productive alliances between farmers and agribusinesses, providing grants and investments in critical value chain infrastructure. The component also includes subcomponents replanting of climate-resilient varieties of coffee, cardamom, rubber, and addressing land-related issues through context-specific measures.

Component 3: Agribusiness and the food system: This component aims to support value addition, technological innovation, and sustainability in agribusiness. It includes subcomponents for enhancing competitiveness and growth of agri-MSMEs, supporting technology incubation and agri-based start-ups, and establishing food parks to address land constraints and promote network economies.

Component 4: Project Management: This component finances project management costs for the central Project Management Unit (PMU) and Regional PMUs, as well as subsidiary Project Implementation Units (PIUs) within relevant agencies. It ensures effective implementation and coordination across components, including environment and social management.

Component 5: Contingent Emergency Response Component (CERC): This component establishes a CERC with zero allocation at project approval. It allows for rapid project restructuring in the event of a disaster in Kerala, enabling quick recovery support from the World Bank.

Legal framework and the World Bank's Environmental and Social Framework (ESF)

The KERA project adheres to the World Bank's Environmental and Social Framework (ESF), incorporating the Environmental and Social Standards (ESS) along with Environment and Social Policy & Directives. Employing a framework approach, the Environmental and Social Management Framework (ESMF) serves three primary objectives: (a) efficiently manage environmental and social responsibilities by integrating them into the KERA project's interventions, (b) address environmental and social risks and impacts comprehensively, systematically, and adaptively, and (c) handle environmental and social concerns by allocating resources, assigning responsibilities, and implementing E&S procedures and processes. The framework provisions align with the relevant statutory provisions of the Governments of India and Kerala. They encompass key environmental and social laws and policies at both national and state levels, covering areas such as forests, biodiversity, pollution, waste management, agriculture, STs / Scheduled castes, labor, gender, and grievance redressal mechanism etc. Nine ESSs except Rehabilitation and Relocation out of total ten ESSs are triggered for this project.

Environmental and Social Risks

The project aims to benefit farmers, FPOs, and small agri-business holders by promoting the adoption of Climate-Smart Agriculture (CSA) at the Agro-Ecological Unit (AEU) level through Krishi Bhavans. It seeks to encourage sustainable land and water management practices, including the Alternate Wetting and Drying (AWD) approach with incentives for carbon emission reductions. The project also aims to enhance the resolution of the agromet system at the AEU level, improve the functioning of agri-insurance systems, and facilitate productive alliances to connect farmers to markets. Other interventions include rejuvenating the select tree crops sector, supporting Land Reform Policy, establishing agri-parks, aiding emerging MSMEs in the food and agriculture sector, providing finance and credit schemes, and supporting technology incubation and Agri-based hi-tech startups. The KERA project involves civil works for the construction of Agri-Parks, Mini Agri-Parks, Common Processing Centres, Agri-Business Centres, canal renovations, and upgrades or renovations of existing government buildings. It is emphasized that KERA interventions are not expected to pose significant or large-scale environmental and social risks. Civil construction activities will be conducted on existing government lands, with no land acquisition planned. Predictable and reversible impacts are anticipated, manageable through site-specific Environmental and Social Management Plans (ESMPs) and conventional mitigation measures. The Environmental and Social Management Framework (ESMF) includes an exclusion/negative list to prohibit project support to activities with potential significant impacts on wild sanctuaries, national parks, critical/natural habitats, environmental sensitive zones, land acquisition, customary tribal lands, natural resources, and cultural properties. Generic ESMPs will be adopted along with site-specific E&S management plans and incorporated into bidding/contract documents.

Environment and Social Management Framework

To address and control environmental and social (E&S) risks associated with the KERA project, an Environmental and Social Management Framework (ESMF) has been formulated. The ESMF systematically identifies potential E&S risks and impacts, providing recommendations for risk identification, mitigation processes, and best practices. It establishes mechanisms and procedures for the implementation and monitoring of these measures. Key components of the ESMF include instruments, guidelines, and tools such as- a) List of Non-Permissible Activities; b) Environment and Social Screening; c) Environment and Social Management Plans; d) Training and Capacity Building Plan; e) Stakeholder Engagement Plan; f) Labor Management Procedures; g) Integrated Pest and Nutrient Management Plan; h) Grievance Redressal Mechanisms; i) Monitoring, Reporting and Auditing Mechanism

Non-Permissible Activities

The Environmental and Social Management Framework (ESMF) comprises a catalog of non-permissible activities that delineates those activities or subprojects with the potential to induce significant adverse impacts on wildlife sanctuaries, national parks, natural habitats, critical habitats, people's land holdings, assets, livelihoods, customary land/territories, and cultural heritage. Such activities will not receive support under the KERA Project.

SN.	List of Non-Permissible Activities
a.	Any activity located within a notified Protected Area and Eco Sensitive Zone (ESZ)
b.	Any activity within forest area or critical natural habitat
c.	Any activity located within a Sites of Conservation Importance[1]
d.	Any activity that converts or leads to conversion and/or degradation of significant areas of critical natural habitats (areas officially protected) and/or Sites of Conservation Importance and designated forest areas
e.	Any activity involving pesticides that are banned by the Government of India and WHO (class Ia, Ib and II)
f.	Purchase or use of pesticides, insecticides, herbicides and other dangerous chemicals; asbestos and other investments detrimental to the environment.
g.	Any activity involving construction within 100 meters[2] from an archaeological site/monument
h.	Any activity involving use of Asbestos Containing Materials (e.g., AC pipes for irrigation, AC sheets for roof)
i.	Convert prime agricultural land to non-agricultural use or impair the agricultural productivity of prime agricultural land
j.	Any activity involving land acquisition and / resettlement under RFCTLARR Act 2013
	Any activity in alienated land
k.	Any activity that violates the provisions of applicable National and State laws and of International Treaties and Conventions where India is a signatory.
l.	Area expansion for rubber cultivation
m.	Construction of new canals and new branch canals

Environment and Social Screening

Within the Environmental and Social Management Framework (ESMF), there is an Environment and Social Screening Checklist designed to assess the eligibility of interventions for financing under the KERA project. This checklist also serves to offer preliminary insights into potential environmental and social (ES) risks and impacts associated with various factors, including but not limited to Eco-sensitive zones, critical natural habitats, resource utilization and pollution, waste management, Sensitive Receptors, trees and forests, regulatory compliance, biodiversity, community health and safety, Gender-Based Violence (GBV) and Social and Environmental Safeguards (SEA/SH), STs, labor/labour influx and working conditions, stakeholder engagement, and cultural heritage

Process Flow for E&S Management

The fulfillment of environmental and social safeguard requirements throughout the sub-project cycle, encompassing feasibility, planning, implementation, supervision, and monitoring & evaluation stages, is succinctly summarized in the table below –

[1] Sites of Conservation Importance in Kerala, refer to
< http://www.wiienvis.nic.in/Database/ConservationAreas_844.aspx >

[2] In case of archaeological sites/monuments, the prohibited area is 100 mts and the regulated area is 200 mts.

Project Phase	Project Activity	Tasks	Responsible Entities
Pre- planning	Selection of Subprojects	▸ Check and ensure that none of the activities listed in the Negative/ Exclusion List of Activities are supported under the KERA. ▸ Screen all subprojects/ activities to ensure that they do not contain any activities on the Negative/ Exclusion List of Activities.	RPMU/ PIUs and DPR Consultants
Planning Phase	Screening of Subprojects	▸ Screening of subprojects to be done using a pre-defined E&S checklist; ▸ Completing the checklist in consultation with concerned RPMU/ PIUs/ Department; ▸ Internal verification on accuracy and coverage of risks and impacts.	Prepared by DPR Consultants and reviewed/ accepted by RPMU/ PIU
Planning Phase	Preparation of Site specific Environmental and Social Management Plan	▸ Ensure Site specific ESMP provides detail on the planned activities; ▸ The potential E&S impact & risks from each activity; ▸ Measures to mitigate negative E&S impacts and risks; ▸ Measures to enhance positive environmental impacts; ▸ Ensure all the key risks/impacts are adequately addressed and that provision has been made to meet the costs involved.	Prepared by DPR Consultants and reviewed/ accepted by PIU and PMU
Construction Phase	Implementation of ESMP	▸ Implementation of mitigation measures and ESMP	Contractors
		▸ Provided orientation on the mitigation measures and ESMP	PMU and RPMU/ PIU
		▸ Supervise, monitor, reporting and documentation of implemented ESMPs.	PIUs and RPMUs

Integrated Pest and Nutrient Management

The Environmental and Social Management Framework (ESMF) incorporates a plan to introduce Integrated Pest and Nutrient Management (IPNM) practices to farmers within the project area. This initiative aims to empower farmers in tackling challenges related to pests, diseases, and nutrient deficiencies. The effective adoption of IPNM is expected to reduce the risk of water pollution resulting from the leaching of chemicals into both surface and sub-surface water sources. IPNM will prioritize pest management through a comprehensive approach that integrates cultural, biological, and chemical control strategies, ensuring long-term pest control with minimal environmental impact and economic loss. The project strictly prohibits the use of pesticides banned by the Government of India and those classified as IA, IB, and II by the World Health Organization. Nutrient Management Plans (NMP) will be provided to farmers to assist them in achieving production goals efficiently while safeguarding the environment.

Stakeholder Engagement Plan

The nature, scope, and frequency of stakeholder engagement will be proportionate to potential environmental and social risks and impacts. Aligned with ESS 10, the SEP aims to provide stakeholders, including project beneficiaries and local communities, particularly vulnerable and marginalized groups, with ample opportunities to express opinions and concerns that may influence project decisions. The SEP serves as a guiding tool for managing outreach, communication, and engagement between Government implementing agencies and stakeholders. In an Adaptive Management approach, the SEP remains a dynamic document, with additional measures and engagement strategies incorporated based on experiences during implementation and any changes to project design or intervention strategies. The proposed engagement strategy in the SEP is informed by extensive consultations with local communities

and implementing agencies by the project preparatory team and ESMF development consultant since the project's conceptualization.

Consultations were carried out with multiple stakeholders including local community, government and non-government institutions. These consultations mainly acted as a forum to inform people about the proposed project interventions and its likely impacts, understand their past experience of engaging with different implementing agencies and departments, the extent of participation or inclusive engagement experienced in various schemes- programs and also to elicit their opinion about the benefits they perceive and seek suggestions on how positive impacts and their distribution could be improved and made more equitable. Information dissemination on various project components, including interventions in agri and allied activities, role of the community, grievance redress, gender related aspects (SEA/SH) etc were discussed. Issues were also raised about the transparency in the project implementation process. People in general welcomed the climate resilient agriculture practice, agri-value chain creation, agri based livelihood related interventions. The process of dissemination of information was highly appreciated by the local community, women members, community level organization and (Panchayati Raj Institutions) PRI members.

Institutional Arrangements for ESMF

Department of Agriculture (DoA) will be responsible for overall planning and implementation of the entire project. It will ensure that ESMF is followed during project implementation. The project management consulting (PMC) firm to be engaged under the proposed loan will have one (1) Environmental Expert and one (1) Social Safeguard Expert and two (2) E&S associates at PMU level and one (1) E&S Nodal Person from PMU. One (1) Environmental Officer and one (1) Social Officer at each RPMU level. Environmental and Social Safeguard Expert at PMC will directly report to PD and E&S associates placed at PMC will report to respective senior expert placed at PMU. These experts will assist PMU and RPMU in implementing and monitoring environmental and social mitigation measures as per ESMP. Safeguard experts at PMU together will also assist PMU in preparing half-yearly safeguards monitoring reports as required by the World Bank. Environmental and social Officer at RPMU level will report to respective Deputy/ Assistant Directors.

Grievance Redressal Mechanism

For KERA, a 3-tier grievance redress mechanism is proposed. At the PMU Level the grievance system will be headed by the Project Director and will be responsible for the overall functionality of the Project GRM. The GRM's at the R-PMU level will have Regional Director of RPMU/Deputy/ Principal Agriculture Officer as Grievance Redressal Officers. The lowest level of GRM will be in the project GP and will be the responsibility of Assistant Director of Agriculture7. The concerned Grievance Redressal Officer will be responding to grievance/query through phone calls, meetings and letters, in order to resolve issues. If needed, site visits will be undertaken to appraise the exact nature of stakeholder concerns. The Complainant will be made part of the grievance resolution process and kept updated of the resolution process through phone calls and formal letters. Information material on GRM will also inform the stakeholders about grievance escalation hierarchy that would help the complainant to escalate any unresolved issues to higher level officers, as well as the existing state level GRM channels of government portal and grievance committee chaired by the district collectors. The grievance redress process will be a continuous, transparent and participatory process that would be an integral part of the project's accountability and governance agenda. The GRM mechanism will be notified within three months of project effectiveness.

The project level GRM will be headed by the Project Director (PMU). Social Safeguard Expert at the PMU will act as convenor for GRM. Social Safeguard Expert at PMU shall assist the PD to monitor the overall Project GRM and co-ordinate with all the R-PMUs. The project website will also have a link where grievances can be filed by the citizens.

GP level GRO's in consultation with the Asst. Director, DoADFW (Block) will directly address all grievances related to the project affected persons (PAPs), project workers and community members. Grievance Registers will be maintained at District/Block levels and also at each worksite to record, track and report

on the inflow of stakeholder grievances, enquiries and feedback. Status of Grievances received and resolved will be track through the project MIS as well as monthly progress reports from the Districts and Blocks. All unresolved grievances will be escalated to the PMU level GRM. The aggrieved will have the option to send their grievances to the project GRM or to the state level public GRMs.

In addition, separate site level grievance mechanism will also be created aimed at local communities and workers. These will include complaints and suggestion boxes, complaint registers at site for workers, site level display of contact numbers of local, nodal persons from the contractor and the implementing agency.

Labour Management Procedure (LMP)

The LMP is designed to achieve several key objectives, including prioritizing workplace safety and health, ensuring equitable treatment and opportunities for all project workers, safeguarding the well-being of vulnerable groups such as women, persons with disabilities, children (within the defined working age), migrant workers, contracted workers, community workers, and primary supply workers. It aims to eradicate forced labor and child labor, uphold principles of freedom of association and collective bargaining as per national laws, and establish accessible channels for project workers to voice their workplace concerns.

Indigenous Peoples Planning Framework (IPPF)

The Indigenous Peoples Planning Framework (IPPF) outlines the policy, strategy, processes, and procedures for assessing the impact of the Kerala Climate Resilient Agri Value Chain Modernization Project (KERA) on Indigenous Peoples (IPs). The IPPF is specifically applicable to the construction of Agri-parks and ABC under the "Support to Agri-parks" sub-component of Component - 3. The IPPF anticipates the impacts on Indigenous People during project activities, and detailed planning, including the Indigenous People Development Plan (IPDP), will be conducted in the subsequent project phases, such as the detailed design and Environmental and Social Impact Assessment (ESIA) stage of the "Support to Agri-parks" sub-component under Component - 3.

Environmental and Social Management Budget

An allocation of approximately INR 8.57 crores has been earmarked for the implementation of environmental and social management measures.

Sno.	Particulars	Total Cost in lakhs
1	Preparation of ESMF	42
3	PIU Training -E &S	20
4	Contract Training	20
5	District Community Training	30
6	FPO Training	10
7	Training -MSME and Start up on E&S	20
8	IEC for E &S	145
9	Knowledge events, exposure visits and studies	50
10	Tribal Plan Preparation	15
11	Tribal Plan Implementation support	30
12	Implementation of tribal Development Plan	100
13	GRM	25
14	E&S innovation and pilot interventions under TP (including green innovations) - Farmer FPOs, GAP, GHP, labour health welfare etc.	100
15	Stakeholder Engagement Plan - Implementation	50
16	Operational expenses of E&S - travel, monitoring and training and by experts	200
	Total	**857**

1. INTRODUCTION

1.1. Objective of ESMF

Main objective of present assignment is to undertake environment and social assessment and prepare a comprehensive Environment and Social Management Framework (ESMF) and related plans/frameworks that would be apply to all components, activities and sub-projects of KERA. Identification of all prevailed (baseline) Environmental and Social (E&S) risk and project induced anticipated E&S risk which may arise due to implementation of project activities is very crucial for preparation of ESMF. It will inform the design of the project, identify mitigation measures and actions, and ensure that KERA interventions are environmentally and socially sound and sustainable. KERA project should consider all prevailed as well as project induced E&S risk while designing project activities so as either to eliminate or minimize any E&S risk as well as further improvement of E&S related issues.

This ESMF preparation work has three specific objectives:

a) Conduct Environment and Social Assessment

b) Undertake stakeholder consultation; and

c) Prepare an ESMF along with specific plans/frameworks as detailed out in scope of work section

1.2. Scope of ESMF Work

Scope of work under this ESMF preparation work will be as below:

- Review of applicable constitutional provisions, Government rules, regulation, notification, and ESS standards of the World Bank to address environmental and social concerns/ challenges.
- Identification of all primary stakeholders and assessment of institutional mechanism and departmental capacity to manage environmental and social risk and impacts.
- Profiling of baseline physical and biological environment and social conditions in and around the project intervention areas and identification of prevailed E&S and biodiversity related issues, eco-sensitive zone, critically polluted area, protected area, natural habitat, socially disadvantaged or vulnerable communities.
- Assessment of project induced potential E&S risk during construction as well as operation stage.
- Stakeholders' consultation with all primary and secondary stakeholders i.e., potential project beneficiaries and project-affected persons/ group and. etc.
- Disclosure of draft ESMF document including all sub-plans/ frameworks to larger group to attract suggestion or any comments on it.
- Preparing ESMF including all other applicable sub-plan based on Environmental and Social Assessment findings.

2. PROJECT DESCRIPTION

2.1. KERA Project Objective

The fundamental objective of the project is to support the resilient commercialization of Kerala's food and agricultural sector for small-scale farmers and MSMEs with a focus on agri-food. The initiative will assist in establishing and growing investments and innovations in:

- The upgradation of agriculture supply chains and value chains
- Empowerment of agri-food based MSMEs and FPOs
- Market infrastructure and services
- Promotion of regenerative agriculture practices to revive natural ecosystems, biodiversity, soil health and build climate resilience

The KERA project will also modernize agricultural offices (Krishi Bhavans) for simpler farmer access and improve agricultural service delivery through a solid (Information and Communication Technology) ICT-based infrastructure which may include the development of digital platforms, mobile applications, and online resources to facilitate farmer-government interactions, provide agricultural information, and manage agricultural data efficiently. Through proper investments in agriculture and and industries, implementation of climate-smart agricultural practices, elevated land and labour revenues, economically viable MSMEs, decreased GHG emissions especially from Paddy, greater possibilities of employment, and increased climate resilience, the project will strengthen the local economy.

2.2. KERA Project Description

The project includes three components, in addition to project management and a zero-allocation contingent component. These are described below.

Component 1: Climate Resilience and Mitigation in Agriculture

This component focuses on strengthening the agricultural production base in the face of CC across all 14 districts in Kerala and securing emissions reductions through low carbon rice. Based on the innovative AEZ-based approach, Kerala has been delineated into 23 agro-ecological Units (AEUs). This component will help to implement this new approach by: (i) aligning existing CSA practices to the individual AEZs and farmer preferences; (ii) deploying extension services necessary to foster adoption of these practices with a focus on enhancing the capacity of public sector agriculture extension and advisory service providers; and (iii) doing so in a sustainable basis with expanded coverage utilizing digital technology in the delivery of extension advise and knowledge to farmers. The major emphasis is to promote climate resilience and adaptation; additionally, this component also seeks to secure emissions reductions for the sector. The component activities are structured around four subcomponents.

Subcomponent 1.1: Scaling-up Adoption of Climate Smart Agriculture. This subcomponent will support the development of locally specific CSA technologies and practices with demonstrable benefits for Kerala's farmers; strengthen the capacity of agriculture extension and advisory service providers to disseminate technologies including use of ICT; and upgrade agromet infrastructure to generate high quality weather information. The following specific activities will be financed under this sub-component:

(i) **A CC vulnerability assessment (CCVA) will identify localized climate-related risks** (such as temperature fluctuations, floods, drought, pests and diseases as well as risks of landslides) for all 23 AEUs based upon the methodology already developed by the Kerala Agricultural University (KAU)

College of Climate Change and Environmental Sciences under the District level vulnerability assessment initiative[1] and will inform tailored adaptation and resilience-building strategies.

(ii) **The existing Package of Practices (PoPs) will be updated throughout the project by incorporating the latest CSA technologies for improving resilience and productivity**[2] and will inform revisions to materials used by extension agents at the Panchayat level. The existing PoPs are generic across the state, lack locally relevant climate-smart practices, and do not cover practices beyond the farm gate (post-harvest handling, processing, storage, and marketing approaches) – vital to ensure resilience along agricultural value chains – or sustainable land management especially hillsides at risk of landslides. This update will include short-term research to generate new scientific knowledge, management by farmers to incorporate indigenous practices, and other participatory approaches, such as farmer field schools, demonstration plots, and related farmer-level knowledge platforms to identify effective practices and adapt them to the respective agroecological contexts. To develop a longer-term pipeline of CSA practices, this component will also finance limited priority (as determined by the CCVA) adaptive research on an open and competitive basis. Competitive grants – a well-established modality with proven benefits[3] – will be provided to develop new technologies (including high value crop varieties with improved yield potential under environmental stress), practices and strategies that can help farmers adapt to exiting and projected climate change impacts on agriculture. This approach will fill critical gaps in high quality research by building a more diverse and pluralistic agricultural innovation system that is able to bring a range of innovative options to address priority challenges related to climate change.

(iii) **Strengthen the capacity of Kerala's extension and advisory service providers to deliver improved practices to farmers on a cost-effective basis** by strengthening the human resource capability, the physical infrastructure and investments in digital technology. Shortcomings in the provision of agriculture extension provision and delivery mechanisms is one of the key constraints to adoption of climate resilient technologies by farmers: few extension officers are trained in contemporary and emerging CSA technologies. A diagnostic needs assessment will underpin a comprehensive training program to enhance the capacity of agriculture officers across all project districts. It will include the provision of a mandatory 'refresher' annual training of agriculture officers to stay abreast of the latest technologies and solutions relevant to their respective AEUs. The training program would be developed with KAU, Regional Agricultural Research Stations (RARs), and Krishi Vigyan Kendra (KVKs) with support from specialized training institutions from the market, on a case-by-case basis. The training activities will be aligned with the district level Strategic Research and Extension Plans (SREPs) implemented by the respective Agriculture Technology Management Agency (ATMA). This will ensure that the capacity development activities contribute to filling extension related gaps and priorities identified by the SREPs. The training programs will be delivered through Regional Agriculture Technical Training Centers (RATTCs) and State Agricultural Management and Extension Training Institute

[1] The Kerala State Disaster Management Agency (KSDMA) has developed a 30-year (1976 – 2005) baseline data set on rainfall and temperature in the Pamba basin, covering 4 districts (with RKI support). The daily precipitation data spatial resolution is 0.25° × 0.25° and temperature 0.1° × 0.1°. They used a bias corrected 'CORDEX simulation' approach for estimating climate change projections. The projected data is available for - near term (2021-2040); medium term (2041 – 2060) and long term (2061 – 2099).

[2] In this context CSA practices are defined as the broad range of practices from simple steps such as shifts in the planting calendar to reflect new rainfall patterns to the development of new climate resilient seed varieties. The update to extension material will incorporate 'off the shelf' practices including those already known by some extension staff that may be of wider application as well as CSA practices which are considered to be easily and quickly deployed without further field testing. extension manual update will be completed in year one and will take off-the-shelf CSA practices (including those already applied by extension staff on an ad hoc basis that are of relevance more widely).

[3] Derek Byerlee, "Competitive Funding of Agricultural Research in the World Bank: Lessons and Challenges" https://documents1.worldbank.org/curated/en/884551468762885845/pdf/319010Comp1Funding1AGresearch.pdf

(SAMETI). In this context, the project will provide technical assistance to RATTC and the SAMETI to enhance their capacities to deliver effective training programs.[4]

(iv) **Augment the role of ICT in the delivery of extension and advisory support to provide facilitate informed decision making by farmers as they seek to adapt to CC.** It will support the development and scaling up of digital applications that can easily be accessed by farmers and used by agriculture officers to give farmers high-quality information on best practices, weather, markets for inputs and outputs, access to credit, etc. It will also upgrade the ICT infrastructure in Krishi Bhavans and local Plant Health Clinics. Additionally, support will be provided to pilot a selected set of precision agriculture technologies leveraging existing digital technologies, including those developed by startups incubated through KSUM (see below). To support longer-term institutional sustainability of the new modalities supported in this subcomponent – including a management system that fully incorporates the AEUs approach – technical assistance (TA) will be provided for a functional review of the agriculture extension service delivery model. The project will finance a selected set of priority interventions to implement the recommendations that are aligned with the objectives of the project.

(v) **Finally, recognizing that not all risks can be mitigated, the project will strengthen the underlying system for agromet** by providing TA and equipment to improve the quality and availability of climate and weather data and expanding the number of weather stations across the state. Resulting data will be integrated into the extension systems accessible to farmers to facilitate timely and accurate information on weather patterns to allow better informed decisions about crop selection, planting times and other agricultural practices. The greater resolution of weather data will improve the functioning of existing agriculture insurance schemes. The project is also positioned to leverage parallel technical assessments of existing agricultural insurance instruments and support the implementation of resulting recommendations.[5]

Subcomponent 1.2: Supporting Low Carbon Paddy Production and Access to Climate Finance. This subcomponent will support low carbon paddy in over 20,000 ha in two districts with the aim of developing the necessary protocols for on-farm practices, water management and the technical baselines necessary for securing climate finance. The following specific activities will be financed under this subcomponent:

(i) **Leverage the global expertise of the CGIAR system – specifically the International Rice Research Institute (IRRI) – to support the adoption of low carbon paddy cultivation** in 20,000 ha in the two districts of Palakkad and Thrissur.[6] Through the application of alternate wet and dry (AWD) and other practices broadly under the System for Rice Intensification (SRI), with potential emissions reductions of over 2,760 kg of CO_2 per ha per year[7], this gives the potential emissions reductions of over 50,000 tonnes of CO_2 per ha per year. While the aggregate volume is modest, this activity will demonstrate methodologies for on-farm adoption in a range of irrigated paddy cultivation AEZs of wider replicability. In summary, this is activity will identify, pilot and field-test specific on-farm practices in up to 35 specific locations.

(ii) **Support the necessary technical baseline studies to calculate the volume of emissions reductions** realized in the field in collaboration with local research institutions, with the objective of establishing a robust measuring, reporting and verification (MRV) instrument to ready for securing climate change finance by project close. Finally, the project will pilot a mechanism for payment for ecosystem services

[4] Currently, technical trainers of these institutions are staff of the DoADFW and lack the necessary technical expertise on CSA technologies and innovations. To fill this gap, the project will facilitate sourcing of technical expertise from the market and through collaboration with other agriculture innovation and knowledge institutions, such as the Consultative Group on International Agricultural Research (CGIAR), the Indian Council of Agricultural Research (ICAR), the private sector and civil society organizations (CSOs) etc.
[5] For instance, Kerala is one of the proposed states to be covered in FCI's "deep dive' of agricultural insurance in India.]
[6] These are the two major rice growing Districts in Kerala, accounting for 40 percent and 14 percent of aggregate production respectively (data for 2020/21).
[7] Sapkota, et al (2019) Cost-Effective Opportunities for Climate Change Mitigation in Indian Agriculture, Science of the Total Environment, 655: 1342 - 1354.

(PES) for mitigation efforts adopted at the farmer level in the project locations, based on the estimated emissions reductions achieved through the application of AWD. The goal of this activity is to have the on-farm practices adopted, the MRV established, and the payment value and transfer mechanism piloted such that at the end of the project, GoK can secure alternative climate finance and continue the payments to farmers on a sustainable basis.

(iii) Create a contingent (zero allocation) potential climate financing facility to prepare for securing climate change finance based on the project activities under subcomponent 1.2 from World Bank-managed sources of climate finance.

Component 2: Enhancing small-holder commercialization for value addition

This component augments the commercialization of market-based agricultural production systems by investing in market linkages and promoting climate smart value addition. It supports efforts to build mutually beneficial alliances between farmer groups and agribusinesses across a range of crops with the project playing the 'matchmaking' function and providing targeted support for essential investments through grants and investments in critical value chain infrastructure – specifically agribusiness centers (ABCs) at the local level. The component activities are structured around three subcomponents.

Subcomponent 2.1 provides support to generate up to 150 productive alliances (PAs) between farmers (or farmer groups, especially farmer producer companies [FPCs]) and agribusinesses. PAs are an established methodology for strengthening the linkages between producers, buyers and the public sector within the agriculture value chain.[8] They typically result in a tri-partite agreement between farmers, an agribusiness and the Government (i.e. the project) which embodies commitments and obligations designed to elevate the relationships between agribusiness and farmers to more sophisticated and therefore more remunerative, longer-term engagement. Traditionally, value chain constraints to 'reaching out to the market' have been diagnosed from the perspective of the farm gate. In contrast, the original PA approach pioneered in Latin America has been to identify potential off-takers and seek to understand the constraints they face in 'reaching back to producers.' This subcomponent will support both approaches by: (i) issuing a call for proposals to FPCs (and other eligible farmer groups) interested in seeking PAs; and (ii) issuing a separate call for proposals to agribusinesses seeking to invest further in their value chains and require the support of the project to do so.

In both cases, the project will support the following steps, with the aim of subsequently securing an agreement setting out the nature of specific PAs and making the following investments/ grants as part of the public sector contribution to its success. The project will: (1) assess the readiness of FPCs against established assessment methodologies[9] to engage in a PA (under track [i]) and assess the capacity and ability of the agribusiness (under track [ii]); (2) undertake a match-making function to then identify potentially interested counter-parties; (3) undertake a detailed analysis of the potential benefits to the FPCs and agribusinesses from a (tailored) PA agreement which would include the expected investments (cash or in kind) by the agribusinesses and FPCs; (4) identify the constraints to a successful PA and the required remedial measures whether these are written commitments, investments in productive assets or additional equipment for value addition as well as any physical infrastructure for FPCs; (5) draft and secure agreement to a written agreement setting out the rights and obligations of the three parties under the PA[10]; (6) provide (partial) grants to the agribusinesses and FPCs (as appropriate) to undertake these investments as well as the direct provision of required physical assets to FPCs; and (7) monitor implementation of that PA, providing further guidance and TA as necessary (including facilitating access to finance from commercial

[8] Linking farmers to Markets through Productive Alliances: An assessment of the World Bank experience in Latin America. https://openknowledge.worldbank.org/entities/publication/49611822-2516-5468-97f2-2b040cff6c12

[9] IFC has developed several assessment methodologies in collaboration with industry such as ScopeInsight https://scopeinsight.com/how-we-do-it/assessments/. Similar approaches have been applied in India, with Bank support, such as M-CRIL https://www.m-cril.com/.

[10] While each PA will need to be tailored to the specific circumstances, it will have common elements; therefore the project will prepare a template agreement that can then serve as a starting point for all subsequent PA to be realized under the project.

lenders) throughout the life of the agreement. The project will not pre-select specific value chains to be supported under the PA subcomponent; however, the implementation will be phased by district(s) to avoid overextension. Moreover, specific efforts will be made to generate synergies between PAs supported in the project and the tree-crop replanting subcomponent – see below. This subcomponent will be implemented technical service agency, which will be competitively recruited and will be responsible for identifying potential PAs, providing all necessary TA to their formation, and in preparing the business plans and requests for grants/ infrastructure (to be determined by the Project Management Unit [PMU]) and monitoring and follow-up.

This subcomponent will also support the preparation of climate informed - commodity cluster development plan (CCDPs) that identify more direct synergies between the interventions in Component 1 and the potential for coordinated investments in specific value chains, in particular for high value exports, that may not emerge from the PA modality. Finally, this component will finance the construction of fifteen (15) Agri-Business Centers (ABCs) on pre-identified locations (under the DoA's scheme for 'one-acre parks') to benefit selected FPCs – subject to (basic) feasibility studies demonstrating the commercial benefits of such investments and viable arrangements for operations and maintenance (O&M) of these facilities.

Subcomponent 2.2 will support the replanting of certified climate resilient varieties of coffee, cardamom and rubber in a total of 8 districts, with the on-farm investment costs largely leveraged from the financial sector via a partial credit guarantee (PCG). The project will support intervention in three main areas:

(i) **Broad dissemination of state-of-the-art climate smart production techniques** including recommended clones/ sackers/ seedlings for each location (produced by accredited nurseries under a scheme developed by the project) and a suite of improved agronomic practices to maximize the yield potential and minimize mortality risks of the replanted trees;

(ii) **Financial incentives to adopt the recommended technologies** through a performance-linked grant provided to farmers (disbursed during the first two years for rubber and three years for cardamom and coffee). The grant will be disbursed retroactively based on farmer adherence to recommended practices, based on field verification.[11] The grant for rubber will target by far the largest number of farmers among the three crops corresponding to its dominant position in the state economy. The coffee and cardamom grant will focus on expanding the existing grant schemes to improve their performance; and

(iii) **Improved access to long-term finance** for farmers interested in such loans through a PCG mechanism and technical assistance to banks.

Under the current high-risk and low-return situation, both demand for and supply of long-term finance for replanting are very low – the proposed rollout of a structured replanting program based on the latest technologies and farming practices will improve the risk-return equation by not only increasing farmers' interest in investing in replanting but also increasing the effective demand for long-term finance enabling farmers to better cope with the negative cash flow during the gestation period. In combination with a PCG scheme (covering 70 – 80 percent of the outstanding loan balance) banks are expected to provide longer-term finance with appropriate grace periods. The project will finance the initial capital to set up a new PCG to facilitate agriculture long-term loans in Kerala including replanting loans. Technical assistance will be provided to establish PCG operational policies and procedures[12]. The scheme will be managed by Nabsanrakshan, a PCG subsidiary of the National Bank for Agriculture and Rural Development (NABARD). Some banks have already identified opportunities to expand their engagement in financing replanting, and other banks will be 'crowded in' by a combination of de-risking and technical assistance. The latter will consist of support to the design of suitable long-term credit products and delivery mechanisms for

[11] Analysis confirms that farmers are expected to be able to pre-finance the cost in advance of the grant through savings or, in the case of rubber, through revenues from the sale of rubber timber from uprooted trees.
[12] The design work will be guided by the World Bank Principles for SME Credit Guarantee Schemes.

replanting and training of bank staff on best agricultural practices in replanting to improve loan appraisal and structuring.

Interventions across the three tree-crops are summarized below:

- The ***rubber*** replanting program will be rolled out in six districts with the highest population of senile trees which are composed of 10 blocks each.[13] It is proposed that the project will support about 30 percent of the estimated area of senile rubber plantations requiring replanting. All rubber producers with less than 10 ha will be eligible to participate in the replanting program in order to balance the outreach and impact of the program. Medium-sized farmers are likely to be more focused on rubber production and in a better position to access credit. Therefore, replanting grants will only be provided to small and marginal farmers whereas training and technical assistance can be availed by medium-sized farmers as well. The replanting grants are expected to support replanting of about one-quarter of the senile areas. The eligibility criteria include a strong commitment to rubber production for higher productivity. This results in a total replanted area of 8,559 ha and 15,832 small farmers benefiting from the grant and technical assistance per year. An additional 700 farmers with 2,501 ha will receive technical support for replanting per year. The total number of farmers benefiting from the rubber replanting program would be 16,532 with 11,060 ha per year which would amount to 82,660 farmers with a total area of 55,299 ha over five years. Overall, small marginal farmers would make up 96 percent of the total beneficiaries accounting for almost 80 percent of the total area replanted.
- The ***cardamom*** replanting activities will focus on the Idukki district. Based on the survey by the Spice Board, it is assumed that 12 percent of the total production areas will be replanted every year and the project will provide grant and technical assistance packages to 25 percent of the small farmers with up to 2 ha and technical assistance to all the replanting farmers. The priorities of the grant will be given to the farmers in the FPOs/FPCs for more aggregation, improved post-harvest treatment, and value addition. The replanting grants will benefit 1,761 small cardamom growers with a total production area of about 705 ha per year. Technical assistance covers improved agronomic practices and post-harvest activities. The total annual beneficiaries would amount to 7,281 farmers with 4,697 ha. The project intends to support 36,403 farmers with a replanting area of about 23,486 ha in total for 5 years.
- The target of the ***coffee*** replanting will be in the Wayanad district. Based on a survey by the Coffee Board, 10 percent of the total coffee area will be replanted every year in Wayanad and 15 percent of all the replanting farmers up to 10 ha will be eligible for the project-funded grant following the Coffee Board's existing program. Priority will be given to the farmers in the FPOs/ FPCs for more aggregation and stronger market access. The remaining replanting farmers will receive technical assistance which covers improved agronomic practices and post-harvest activities. The grant beneficiaries would amount to 852 farmers with 842 ha per year and the TA-only beneficiaries will be 4,827 farmers with 4,774 ha. In total, the project intends to support the replanting of 28,083 ha and 28,391 farmers for 5 years. In addition, as the medium farmers with 2 – 10 ha of land face greater drought risk with water conservation potential, a grant for irrigation covering 40 percent of the capital investment costs will be made available to them.

Finally, subcomponent 2.3 will develop context-specific measures to address land-related issues in Kerala, in particular: (i) modalities for bring fallow land back into production through leasing-type arrangements; and (ii) measures to promote collective decision-making among small-holders in order to generate economies of scale that can increase competitiveness of an agricultural system based on fragmented land holdings. Recognizing the legacy and sensitivity of land issues in Kerala, this modest set of activities will include TA and lessons-sharing from similar countries (e.g. Vietnam, and China), including outreach and citizen engagement, and the piloting of approaches in two districts (to be determined).

Component 3: Strengthening agribusiness, agri-tech start-ups and food and agriculture SMEs

[13] Ernakulam, Kottayam, Pathanamthitta, Kannur, Malappuram and Thiruvananthapuram.

This component will support value addition, technological innovation and a more (environmentally, economically and financially) sustainable base of agribusiness firms including through expanded and downscaled investment of food parks that help address land constraints and harness 'network economies' of interrelated firms. The component activities are structured around three subcomponents.

Subcomponent 3.1 seeks to enhance competitiveness and growth of agri-MSMEs in Kerala. It will align with the existing Mission 1,000 initiative of the Department of Industry (DoI) and provide technical and financial support to high-growth agri-MSMEs to enhance competitiveness, market access, job-creation and value-added in the agricultural sector. The subcomponent will finance the following activities: (i) identification and standardized assessments of high-growth enterprises in the sector; (ii) quality technical service provision across identified gap areas including technology adoption, marketing, mobilizing commercial financing, and improving food quality and safety standards; and (iii) partial financial support to incentivize MSMEs adopting improved technologies, enhanced marketing efforts and improved product standards. Interventions will include a focus on 'greening' MSMEs, supporting the adoption of energy efficiency and improved waste management measures. In addition to support for high-growth agribusiness MSMEs, the sub-component will support more limited TA to a larger number of agri-MSMEs in the state for: (i) energy and waste management assessments leading to reduction in GHG emissions and (ii) onboarding onto digital marketing platforms. The sub-component will also support capacity building of the DoI to manage support programs targeting the agri-sector including partnering with recognized technical agencies to develop a pool of accredited TA providers in the state.

Subcomponent 3.2 will support technology incubation and agri-based hi-tech start-ups. Start-ups can provide the necessary tools and fresh ideas to address climate resilience especially in a sector characterized by small and fragmented farms. Since 2014, KSUM[14] has supported over 2,900 startups creating over 40,000 jobs and attracted over $551 million of venture capital funding.[15] However, to date less than 10 percent – only about 250 start-ups – have been focused on agri-tech. The existing support infrastructure is tailored predominantly for software enterprises. This has been successful in general but requires recalibration to meet the unique nuances of the agribusiness sector. As such, the project will support incremental innovations to the existing incubation process that are tailored to agri-tech startups and their key clientele in Kerala – smallholder farmers – thereby contributing to solutions to the state's distinct agricultural challenges, CC being paramount among them.

Under this subcomponent, entrepreneurs from across India will be invited to tackle Kerala's agricultural challenges. Drawing on synergies of the priorities for CC adaptation (component 1) and opportunities for value addition (component 2), KSUM will release specific calls for proposals centered on these challenges. The overarching objective during the project's lifespan is to support 150 startups, each boasting prototypes equipped to confront these identified issues. The subcomponent also aims to refine the traditional incubation process, making it more relevant to Kerala's agri-food sector. It will support a range of customized interventions through a TA procured by KSUM. The revamped process will emphasize a field-driven methodology, enabling agri-tech startups to immerse themselves among their clientele, extract direct insights, and trial their innovations with smallholders in Kerala. Furthermore, as part of the agri-tech incubation process, KSUM will facilitate workshops to guide startups in tailoring their business models to Kerala's specific requirements, complemented by bespoke support based on each startup's distinct needs. To be sustainable, the project will establish a network of *fellows* and institutions that facilitate the direct interaction/ incubation of start-ups with farmers across the state. This component will largely be implemented as a scalable performance-based condition (PBC) based on annual assessments undertaken by an independence verification agency (IVA) to be procured by the PMU.

[14] KSUM is an autonomous entity of the Department of Electronics and Information Technology (DoE&IT).
[15] The State of Kerala Startup Ecosystem Report, 2022.

Subcomponent 3.3 provides support for the establishment of food parks at differing scale in several locations across Kerala. Food parks are not new to Kerala: KINFRA has already set up three food parks,[16] helping businesses access land and critical infrastructure thereby creating over 3,500 jobs and attracting nearly INRs 45,000 lakh in investment.[17] At the same time, DoA's current approach – targeted at a more local level and more directly connected to producing areas – is less market-oriented and uptake has been limited. Therefore, the project seeks to leverage Kerala's success in two ways: first, by rolling out the existing approach of KINFRA – with a strong market focus – to support the development of a further 3 large agri-parks managed by KINFRA; and second, by supporting the 'down-scaling' of KINFRA's approach to 2 smaller agri-parks which they would normally consider too small. In all 5 cases, publicly owned land has been identified.[18] Support will commence by preparing pre-feasibility studies to determine the commercial and operational viability of constructing food parks on the proposed locations. Should the evaluated locations prove suitable, this subcomponent will subsequently finance comprehensive feasibility studies and the formulation of design parameters and bidding documents. In the final phase, the subcomponent will finance the construction of developing the land for future leasing to tenants.

In addition, this subcomponent will support a more commercially oriented approach to the development of a further 5 common processing centers (CPCs). These CPCs will similarly be subject to pre-feasibility studies to confirm their commercial viability and to identify prospective tenants and suitable management arrangements. (One of the CPCs will be developed on an existing processing facility[19] while the remaining 4 are new locations where DoA already owns the land.[20]) Again, depending on positive conclusions, this subcomponent will finance comprehensive feasibility studies and required design/ bidding documents and subsequent construction. Should any of the pre/ feasibility studies conclude negatively, the project will support GoK to identify alternative potential locations instead.

Component 4: Project management

This component will finance project management costs for the (central) PMU and three regional sub-PMUs[21] and component specific subsidiary Project Implementation Units (PIUs) in DoI (subcomponent 3.1) and KINFRA (responsible for implementing subcomponent 3.3). A PIU will also be established within KAU given their significant role envisaged role across multiple components. No PIU is required in KSUM under subcomponent 3.2 since this is being implemented on a payment for results basis as a PBC. The arrangement with IRRI will include a management overhead for their overall implementation of activities under subcomponent 1.4.

Project resources will be provided to key state agencies including ATMA and CDRW (under component 1), the commodity boards for rubber, cardamom and coffee (subcomponent 2.2), Small Farmers Agribusiness Consortium (subcomponent 2.1) to cover incremental operational expenses directly related to their role in

[16] The Malappuram Park covers 71 acres and has 45 businesses running, with an investment of NRs 14,978 lakh, creating 1,479 jobs. The Mega Food Park in Palakkad, spread over 79 acres, has 40 businesses, with an investment of NRs 24,026 lakh, and 1,266 jobs. The smaller Pathanamthitta Park on 40 acres has 18 businesses, an investment of NRs 6,831 lakh, and provides 796 jobs. Based on land leases, the three parks are nearly fully occupied, with some factories under construction.
[17] Kerala Economic Review, 2022.
[18] For two of the three locations for the large-scale agri-parks, KINFRA already owns the land (located in Palakkad and Kannur Districts), while one location is land already owned by DoADFW (in Kollam District). For the two smaller agri-parks (located in Thrissur and Palakkad Districts), land is owned by DoADFW.
[19] This was originally constructed as a banana and honey processing facility in Thrissur but is yet to be operational.
[20] The four indicative locations are: two coconut parks in Kozhikode, a mango park in Palakkad and a vegetable park in Alappuzha.
[21] Each regional PMU will cover designated districts as follows. A regional PMU for the North will be located Kannur District and will cover Kannur, Wayanad, Kozhikode and Kasargod. A central regional PMU will be responsible for Palakkad, Thirssur and Ernakulam. A regional PMU for the Eastern area will be located in Kottayam and will supervise Idukki and Kottayam. Activities in the remaining Districts in Southern Kerala will be supervised from the main PMU in Trivandrum.

the project. Roles will be defined in the PIM, formalized in individual MoUs and resources allocated annually based on agreed workplans and budgets.

Component 5: Contingent Emergency Response Component

The project will include a contingent emergency response (*CERC)* with a zero allocation at project approval which will facilitate a rapid project restructuring should a disaster impact Kerala to allow the Bank to support recovery efforts quickly;

2.3. Project Location

Kerala state has a total of 14 districts representing five (5) AEZs and 23 AEUs. KERA project is planned to encompass AEZ-represented areas, districts with a significant presence of market-oriented farmers, and agricultural value chains with the highest prospect of productive collaborations.

Project activity specific exact geographical location for intervention is not yet determined at this initial phase of project formulation. However, PPT in coordination with different line/implementing departments has tentatively identified location for construction of three (3) large Agri-Park, two (2) Mini Agri-park, five (5) Common Processing Centre and nine (9) Agri-Business Centre. A map showing all these locations is presented below.

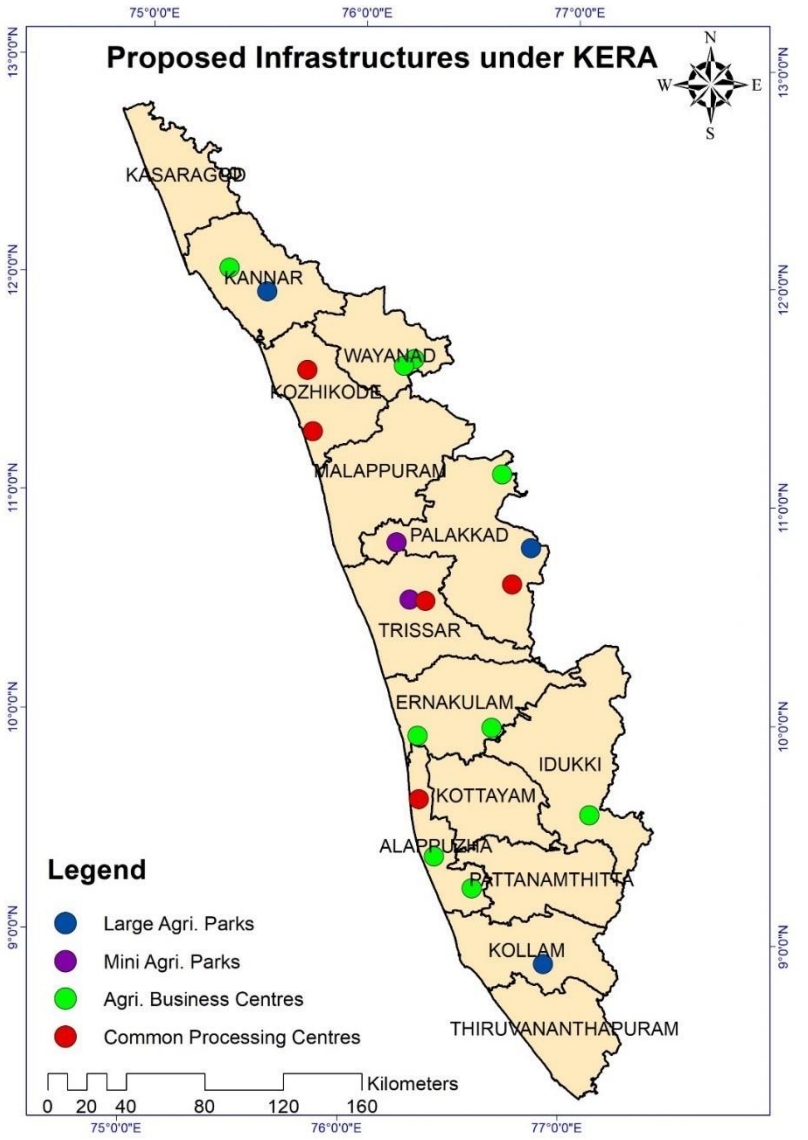

Figure 1: Figure 1: Proposed Locations of Physical Infrastructure Proposed Under KERA

2.4. Project Duration

Project activities are planned to be implemented in phase wise manner over a period of five (5) year starting from financial year 2024-25 to 2028-29. Detail phase wise implementation plan is given in project implementation plan (Plan) which is under the process of preparation at this stage.

3. ENVIRONMENTAL AND SOCIAL BASELINE

The objective of conducting baseline environmental assessment is to find out issues and challenges within project and surrounding areas. Baseline assessment was done mainly based on secondary data/ information available with the different Govt. Departments and available in public domain. Physical visit to few of the proposed project sites where agri-park, processing centre are proposed were made by the ESMF consulting team in addition to the visit made by PPT in other proposed project areas. District level data/ information are considered to find out common issues or challenges with regards to existing practices of pesticide & fertilizer use, irrigation practice, cropping pattern as well as diseases, etc. Desk review of available published information/ report as well as consultation with PPT and respective District, Block and GP level line departments/ Agencies were held. Key officials of following Govt. Departments, Agencies, Research Institute, traders/ suppliers of two (2) wholesale markets etc. were consulted during the entire process of E&S assessment to understand the prevailed E&S related challenges prevailed in the project area, anticipated impact due to proposed project activities, departmental capacity in managing E&S related issues and etc.

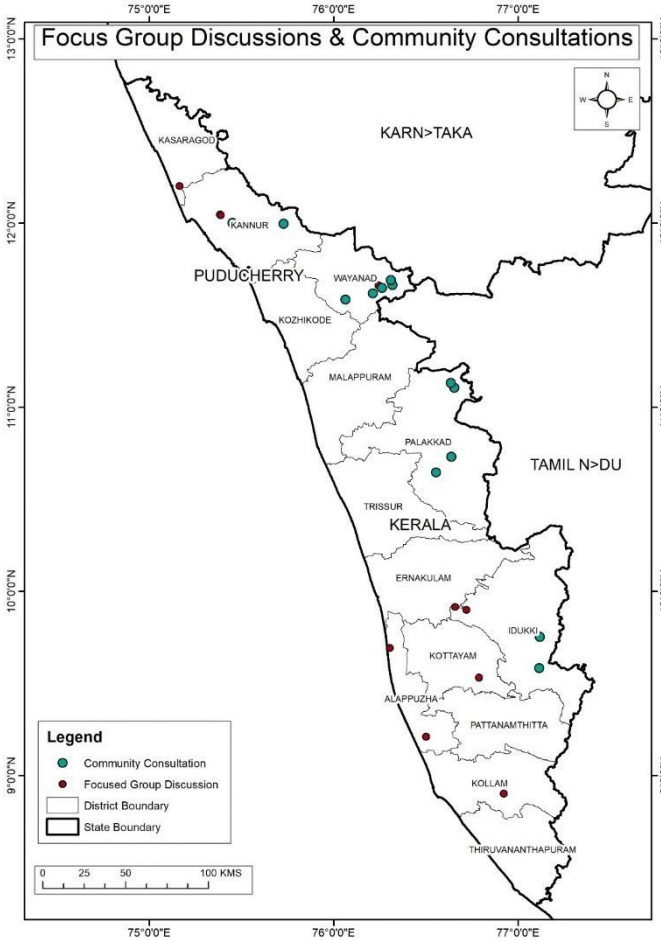

Figure 2: 1st Time FGD and 2nd Time Community Consultation by EY Team

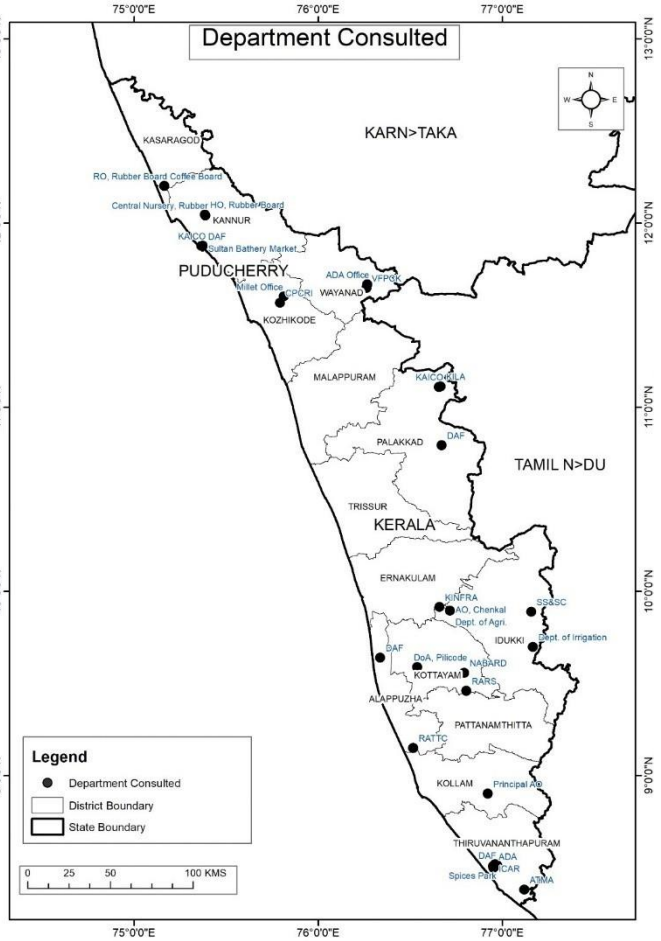

Figure 3: Departments/ Agencies consulted by EY Team

1) Departments - Dept. of Agriculture (Vikas Bhavan); GP level Agriculture Office (Chenkal); Department of Irrigation; Soil Survey & Soil Conservation; NABARD; Dept. of Agriculture (Pilicode); District Agr. Farm (Kannaur); Principal Agr. Office (Kannaur); District Agriculture Firm (Arrikuzha); ADA (Arikuzha); ATMA (Idduki); Coffee Board (Sultan Bathery); Rubber Board Regional Office (Kanjirapally); Rubber Board Head Office (Kottayam); Dist. Agr. Farm (Koothali); ADA Office (Attapaddi); Millet Office (Attapaddi); DAF (Aanchal);

2) Agencies - KINFRA; KAICO (Kannaur); VFPCK (Cherthala); KILA Office (Agali, Palakkad);

3) Research Institute - ICRI (Myladampara); KAU- Regional Agricultural Research Station (Pilicode); Regional Agricultural Technology Training Centre (Taliparambu); CPCRI (Krishnapuram);

4) Wholesale market - Rural Agriculture Wholesale Market (Sulthan Bathery); KAICO - Agricultural Urban Wholesale Market (Koothali);

5) Spices Park (Puttadi); Rubber Board Central Nursery (Mukkada);

In addition, FPO, SHG, Kudumbasree group, Marginal Farmers, Women, tribal people were also consulted in common community consultation platform as well as individually. All identified significant environmental features located in and around sample project location were thoroughly assessed during field visit to proposed project location to understand present practice, existing physical features, presence of flora/ fauna, natural drain, topography, presence of ASI site/ sacred groves etc. Further, "Google" based survey was also conducted to identify presence of significant environmental features like presence of Polluting Industry, Forest area etc.

Baseline assessment of environmental features will help in identifying prevailed environmental issues and challenges as well as probable impact during project implementation and operation stage. Findings of baseline assessment will be the foundation in preparing management framework. Baseline value will also help in comparing changes during mid-term as well as end-term evaluation.

3.1. Demography

Kerala's population stands at 3.34 Cr., representing 2.76% of the nation's total. Of the state's populace, 48% are male, while 52% are female. The rural population is 1.74 Cr. and the urban population is 1.59 Cr. Kerala exhibits a population density of 860 individuals per square kilometre, significantly surpassing the national average of 382. Thiruvananthapuram ranks as the most densely populated district with 1,508 persons per sq. km., while Idukki is the least densely populated with 255. The state's decadal population growth rate is 4.91, notably lower than the national growth rate of 17.64. Kerala's crude birth rate decreased from 15.75 in 2010 to 12.77 in 2020[3]. The crude death rate for 2020 was 7.17, compared to 6.88 in 2010. The infant mortality rate for 2020 stands at 5.13, down from 7.42 in 2010. Districts with a higher Scheduled Caste (SC) population include Palakkad (403,833), Trivandrum (372,977), Kollam, Thrissur, Malappuram, Pathanamthitta, and Kottayam. Districts with a higher ST (ST) population are Wayanad (151,443), Palakkad (48,972), Kasargod (48,857), Kannur (41,371), and Trivandrum (26,759)[4].

Literacy Rate

Kerala exhibits the highest percentage of literate individuals among Indian states, boasting an effective literacy rate of 94%. Within Kerala, 96.11% of men and 92.07% of women are literate, surpassing the national averages of 82.14% for men and 65.46% for women. In terms of district-wise literacy, Kottayam leads with a literacy rate of 97.2%, followed by Pathanamthitta at 96.5%. Conversely, Wayanad and Palakkad display the lowest literacy rates at 89% and 89.3%, respectively. It is noteworthy that even Wayanad, with the lowest literacy rate, surpasses the national average. Comparing the data to 2001, all districts in Kerala have witnessed an improvement in literacy rates as of 2011.

Sex Ratio

Women outnumber men across all districts, reflecting a statewide sex ratio of 1,084. The sex ratio in Kerala exhibited a progressive rise from 1,032 in 1981 to 1,036 in 1991 and further to 1,058 in 2001. Kerala

[3] Source: Annual Vital Statistics Report of 2020 by the Economics and Statistics Department,
[4] Source: 2011 Census of India

stands as the sole state where the historical sex ratio has consistently exceeded unity, contrasting with the all-India level sex ratio of 943. When examining individual districts, Kannur records the highest sex ratio at 1,136, closely followed by Pathanamthitta at 1,132. Conversely, Idukki reports the lowest sex ratio among districts, standing at 1,006. Importantly, all districts in Kerala maintain a sex ratio above 1,000, indicative of the predominance of women.

Gross State Domestic Product (GSDP)

In the fiscal year 2021-22, the state demonstrated a robust economic recovery, with a real Gross State Domestic Product (GSDP) growth of 12.01%, as opposed to the contraction of 8.43% in 2020-21. In the fiscal year 2021-22, revenue receipts of the state, relative to GSDP, marginally increased to 12.86% from 12.66% in 2020-21.

Analyzing the sectoral composition of growth, there was a notable increase in the growth of agriculture and allied activities, reaching 4.64% in 2021-22 (QE) compared to 0.24% in 2020-21. The crop sector experienced a significant increase of 3.63% compared to 0.46% in the corresponding periods. Despite this positive growth, the share of Agriculture and Allied sectors in total GSVA decreased from 12.9% in 2020-21 to 11.6% in 2021-22 at current prices.

Cropping and Productivity

In terms of land use data for 2021-22, out of the total geographical area of 38.86 lakh hectares, the cultivated area was 25.23 lakh hectares (64.92%), and the net area sown was 20.29 lakh hectares (52.22%). Non-agricultural use occupied 14.7%, and forest area accounted for 27.8%. Food crops constituted 10.51% of the gross cropped area, while cash crops comprised 65.8%, with rubber, coffee, tea, and cardamom accounting for 28.2%.

Production trends in plantation crops varied, with increases observed in coffee, rubber, and cardamom (1.97%, 7.14%, and 3.4%, respectively) and a decline in tea production by 9.7% in 2021-22 compared to the previous year. Coconut production and productivity increased by 15.6% and 16%, respectively. Inland fish production reached 2.25 lakh tonnes, showcasing a consistent rise over the past four years, while marine fish production was 6.01 lakh tonnes. Inland fisheries face challenges, primarily related to the availability of high-quality fish seed.

Irrigation

The net and gross irrigated areas in the state increased in 2021-22, with the net irrigated area rising from 3.89 lakh hectares in 2020-21 to 4.03 lakh hectares, and the gross irrigated area expanding from 5.21 lakh hectares to 5.61 lakh hectares. The gross irrigated area as a percentage of the gross cropped area increased to 22.25% in 2021-22 from 20.3% in 2020-21[5].

Scheduled Tribes

The Scheduled Tribe (ST) population in Kerala totals 484,839, comprising 1.45% of the state's overall population. Male holds 49.13 % and female 50.87% share of total ST population. The decadal growth rate of the ST population during the 2011 census was 26.6%. The state is home to a total of 36 STs, as documented in the 2011 Census, with subsequent inclusion of the Maratti Community not accounted for in that census. STs are predominantly rural, with 89.33% of the STs residing in villages, and only 10.67% in urban areas. Wayanad District holds the highest proportion of STs at 18.53%, while Thrissur District exhibits the lowest proportion at 0.30%. Among the 36 STs, the *Paniyan* tribe accounts the highest 18.24%, followed by *Kurichchan* tribe constituting 7.25% of the total tribal population in Kerala. Conversely, the Cholanaickan tribe is the smallest, with a population of 124, forming 0.026% of the total tribal population. *Paniyan*

[5] https://spb.kerala.gov.in/sites/default/files/2023-02/ENGLISH%20FINAL%20PRESS%2004.02.2023_0.pdf

exhibits the highest percentage in Malappuram (51.86%) and Kannur (33.24%) districts, while *Kurichchan* has the highest proportion in Kannur (23.97%). Among other larger tribes, *Malai Arayan* is predominantly concentrated in Kottayam (65.25%), and *Mavilan* is prominent in Kasaragod (55.56%) districts. A table is provided below, illustrating the tribal groups present in the districts undergoing KERA project's physical interventions –

Table 1: Project district wise demographic profile of IPs

ST Group	Project District	Population			Households	Male Literacy Rate	Female Literacy Rate	Worker Participation Rate
		Male	Female	Total				
Adiyans	Wayanad	5515	6011	11526	2668	73.6	60.7	50.7
Kurumans	Wayanad	12148	12357	24505	6330	91.3	77.1	49.4
Irular,Irulan Attappady	Palakkad	11766	11955	23721	6710	68.4	57.3	52.1
Eravalan	Palakkad	2362	2435	4797	1302	56.7	49.4	58.4
Hill Pulaya	Idukki	1461	1498	2959	874	65.0	57.6	59.2
Kadar,Wayanad Kadar	Idukki	1454	1495	2949	769	76.1	66.4	47.5
Kanikaran, Kanikkar	Kollam, Thiruvananthapuram	9975	11276	21251	6463	90.7	85.5	42.4
Kattunayakan	Wayanad, Kozhikode, Malappuram and Palakkad	9039	9160	18199		60.7	54.3	49.2
Kurichiyan	Wayanad,Kannur and Kozhikode	17643	17528	35171		89.4	77.8	48.3
Kurumbar	Attappady, Palakkad	2586	1302	1284	723	66.1	46.4	49.4
Maha Malasar	Palakkad	71	83	154	65	57.4	49.3	43.5
Mala Arayans	Kottayam and Idukki	16622	16594	33216	9749	97.2	95.4	45.1
Malai Pandaram	Kollam and Pathanamthitta	1227	1195	2422	715	65.0	55.6	43.6
Mala Vedan	Kollam, Pathanamthitta and Kottayam	3901	4248	8149		85.9	78.3	44.0
Malakkuravan		88	87	175		73.8	57.5	46.3
Malasar	Palakkad			3195		52.1	45.4	55.3
Nattu Malayan	Ernakulam, Thrissur, Palakkad			5,917		69.7	59.3	49.2
Malayarayar	Kottayam and Idukki			1568		84.0	77.5	51.4
Mannan	Idukki			9780		76.5	62.3	53.1
Muthuvan, Mudugar	Ernakulam, Thrissur, Palakkad			23746		67.1	46.7	55.4
Paliyan	Idukki	736	728	1464		79.7	67.3	61.2
Paniyan	Wayanad, Kozhikode, Kannur, Malappuram and Gudalur taluks of Nilgiri			88450		69.9	57.0	49.8
Ulladan	Pathanamthitta, Idukki, Kollam, Alappuzha, Kottayam, Ernakulam,Thrissur	7877	8353	16230		91.2	85.8	42.8
Uraly	Idukki, Kottayam			11,179		84.0	76.2	55.2
Malavettuvan	Kasaragod, Kannur			17,869		70.0	61.7	47.7
Ten Kurumban, Jenu Kurumban						50.0	70.0	40.0
Thachanadan Moopan	Wayanad			1745		85.5	73.7	49.7
Mavilan	Kannur, Kasaragod					83.5	71.3	48.0
Karimpalan	Wayanad, Kozhikode, Kannur			14,098		88.4	79.7	47.9
Vetta Kuruman	Wayanad			739		80.5	60.9	49.9
Marati								

3.2. Migrant Workers in Kerala

The states significantly contributing to the increasing migration trend in Kerala in recent years are West Bengal, Assam, Odisha, and Bihar. The migrants originating from these states exhibit growth rates

exceeding 20 percent in Kerala. Additionally, it is noteworthy that the proportion of female migrants constitutes nearly half of the total migrants from other states in Kerala. In 2011, it is observed that out of the total 6.5 lakh migrants from other states to Kerala, 3.1 lakh were females.

Approximately 24 percent of the total migrants from other states relocated to Kerala for employment reasons in 2011. About 38% of male migrants and around 8% of female migrants cited employment as their primary motive for migrating to Kerala. The number of migrants from other states in Kerala moving for employment or jobs increased from 1.24 lakh to 1.54 lakh during 2001 to 2011.

3.3. Agro-Climatic Zones

Kerala lies in the Agro climatic Zone XII which is called as West Coast Plains and Hills Regions. The state is divided into 13 Agro Climatic Zones viz., Onattukara, Coastal Sandy, Southern Midlands, Central Midlands, Northern Midlands, Malappuram type, Malayoram, Palakkad plains, Red loam, Chittoor black soil, Kuttanad, Riverbank alluvium, High ranges. It has tropical climate and the coastal state has hot and humid climate during April-May, pleasant cold climate in December-January. Summer is followed by Southwest monsoon that starts during the month of June. Proposed KERA project is planned to be implemented across the Kerala States, hence it will fall in all agro-climatic zones (ACZs) of Kerala.

Kerala state has a total 14 districts representing five (5) AEZs and 23 AEUs. AEZ, AEU wise district coverage is given in Annexure-II. However, KERA project is planned to encompass AEZ-represented areas, districts with a significant presence of market-oriented farmers, and agricultural value chains with the highest prospect of productive collaborations.

Project activity specific exact geographical location for intervention is not yet determined at this initial phase of project formulation. However, PPT in coordination with different line/implementing departments has tentatively identified probable intervention location for few of the proposed activities. Activity specific tentative locations identified so far are given in annexure-I.

3.4. Location and Geography

Kerala, situated at the southernmost point of India, encompasses the Arabian Sea coastline to the west and is bordered by the Western Ghats in the east. This state spans approximately 580 kilometers along the coast, with a width ranging from 35 to 120 kilometers. Kerala covers approximately 1.18% of India's total land area. It also includes *Mahé*, which is a coastal exclave of Pondicherry. With 14 districts and other urban centers, Kerala's overall land area totals 38,863 square kilometers.

Kerala exhibits three distinct geographical regions: the Highlands, Midlands, and Lowlands. The Highlands are characterized by a gradual descent from the Western Ghats, which boast an average elevation of 900 meters, featuring numerous peaks exceeding 1,800 meters. This region is primarily dedicated to major plantations such as tea, coffee, rubber, and cardamom. Situated between the mountains and lowlands, the Midlands consist of rolling hills and valleys, providing fertile ground for intensive cultivation. Cashew, coconut, arecanut, cassava (tapioca), banana, rice, ginger, pepper, sugarcane, and various vegetables flourish in this area. The coastal area or the lowlands is primarily composed of river deltas, backwaters, and the Arabian Sea shore, primarily dominated by coconut and rice cultivation. Fisheries and the coir industry constitute the key economic sectors in this region[6].

The Western Ghats span across Kerala, Tamil Nadu, Karanataka, Goa, and Maharashtra, running in parallel to the Arabian Sea. With a total length of approximately 1,800 kilometers, Kerala is home to around 450 kilometers of the Western Ghats, with a division at Palghat. The region of the Western Ghats in Kerala covers roughly 21,856 square kilometers, accounting for 56% of the state's total geographical area and 42.7% of the entire Western Ghats region. This area serves as the watershed for all 44 rivers that sustain

[6] https://www.mapsofindia.com/maps/kerala/geography-and-history/

Kerala's agricultural economy. Historically, the Western Ghats possessed abundant forest and mineral resources, regulating soil and water systems. It boasted lush tropical moist vegetation comparable to similar ecosystems worldwide. However, exponential population growth, rising demands for non-forest land, and the apathetic approach of those in positions of authority have resulted in the reduction of forest cover to less than 20% of the land area. Additional factors contributing to forest degradation include fires, overgrazing, excessive and unscientific logging practices[7].

Physical infrastructure like three (3) Large Agri-park, two (2) Mini Agri-park, five (5) Common Processing Centre and nine (9) Agri Business Centre (ABC) proposed to be constructed are scattered across whole Kerala State barring five (5) Districts (Kasaragod, Malappuram, Kottayam, Pattanamthitta and Thiruvanantapuram). Additionally, repairing of 800 Km. long canal infrastructure; renovation of Krishi Bhavans, Agro Climate Research Centre; Solorizarion of 50 Krishi Bhavans is also considered under this KERA project.

3.5. Soil

The topographical and lithological sequence observed in Kerala, combined with variations in rainfall, temperature, and alternating wet and dry conditions, particularly from the western coast to the high ranges in the east, is accountable for the diverse array of natural vegetation and soil types in the region. Broadly categorizing Kerala's soils, they can be classified as coastal alluvium, mixed alluvium, acid saline, kari, laterite, red, hill, black cotton, and forest soils[8]. Red loam, laterite, coastal alluvial, riverine, alluvium, onatukama atluvium, black soils and forest loam are major soil types in Kerala.

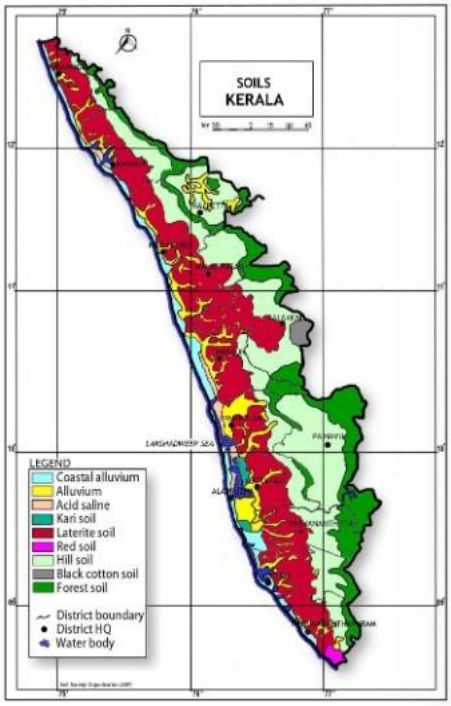

Figure 4: Soil Quality Map of Kerala

Saline soils are distributed sporadically across the coastal regions, primarily concentrated in the Ernakulam, Thrissur, and Kannur districts. This type of soil is predominantly found in low-lying marshes and poorly drained areas adjacent to rivers and streams, these soils are susceptible to tidal influences. The salinity in these soils is attributed to the intrusion of seawater and backwater tides.

3.6. Land-use Pattern

The land use pattern of the State has witnessed drastic changes over the years. Out of the total geographical area of 38.86 lakh hectares of the State, the net sown area was 20.29 lakh ha (52.22 per cent), land put to non-agricultural use was 5.72 lakh ha (14.71 per cent) and area under forest was 10.82 lakh ha (27.82 per cent), Barren and uncultivable land is 9529 Ha. (0.25%), Cultivable waste 93973 Ha. (2.42%), Marshy land is only nine (9) Ha. The change in agricultural land use is marked by changes in coverage of individual crops and the total cropped area. The total cropped area, which was 77 per cent of the total geographical area in 2000-01, has declined to 64.92 per cent in 2021-22. As per the land use data of 2021-22, out of the total geographical area of 38.86 lakh ha, total cultivated area was 25.23 lakh ha (64.92 per cent) and the net area sown was 20.29 lakh ha (52.22 per cent). Compared to the land use data of 2020-21, the area under cultivable waste and current fallow has declined by 5.83 per cent and 0.63 per cent respectively. But there has been considerable increase in the area under 'fallow other than current fallow' and 'barren and uncultivated land' by 15.6 per cent and 2.67 per cent respectively. The 'net area sown' and 'area sown more than once' declined by 0.28 per cent and 7.53 per cent respectively. This is reflected in the total

[7] https://forest.kerala.gov.in/index.php/about-us/kerala-state-profile
[8] https://www.keralasoils.gov.in/en/soils-kerala

cropped area of the State showing a decline of 1.79 per cent in 2021-22. The cropping intensity declined from 126 per cent to 124 per cent in the period of review[9].

3.7. Climate

According to Koppen's classification, Kerala experiences a tropical monsoon climate characterized by seasonal heavy rainfall and hot summers, with the exception of Thiruvananthapuram district where the climate is classified as tropical savanna, featuring dry and hot summers. For climatological purposes, the entire state is classified as a single meteorological subdivision. The year can be divided into four seasons, starting with the hot season from March to the end of May. This is followed by the Southwest Monsoon season that lasts until early October, succeeded by the Northeast Monsoon season from October to December. The winter season spans January and February. From September to February, the climate is pleasant, while the summer months of March to May can be uncomfortable due to high temperatures and humidity. The presence of the Arabian Sea to the west contributes to the overall high humidity levels in the state.

Due to its geographical orientation from north to south and its proximity to the Arabian Sea in the west, Kerala experiences generally high levels of relative humidity across the state. From January to March, the afternoon relative humidity decreases to approximately 60-63%, with variations ranging from 35% in the interior regions to 71% along the coastal areas. During this period, the diurnal variation in relative humidity is at its maximum, fluctuating between 4% and 16% depending on the proximity to the sea. In the monsoon period, the relative humidity increases to around 85% throughout the state, and the variation in humidity is minimal.

3.8. Temperature

Over the plains of Kerala, the day temperatures remain relatively consistent throughout the year, except during the monsoon months when they typically decrease by approximately 3 to 5 ^{0}C. The plateau and high-level stations generally experience lower day and night temperatures compared to the plains. Coastal regions tend to have lower day temperatures compared to inland areas. The hottest month is typically March, with an average maximum temperature of around 33 ^{0}C. In July, when the state receives ample rainfall and the sky is heavily clouded, the mean maximum temperature reaches its minimum value. For the entirety of Kerala, the mean maximum temperature in July is about 28.5 ^{0}C, varying slightly from about 28 ^{0}C in the north to approximately 29 ^{0}C in the south. Inland stations generally register higher maximum temperatures than coastal stations. Starting from May, both the maximum and minimum temperatures gradually decrease, with the latter plummeting rapidly while the former decrease at a slower pace. This monsoon season continues until the end of September. The average temperature during South-West Monsoon ranges from 19°C to 30°C.

3.9. Rainfall

The annual precipitation in Kerala exhibits a significant variation, with the extreme northern parts receiving approximately 360 cm and the southern parts receiving around 180 cm. The primary rainy season is the southwest monsoon, which contributes about 70% of the total annual rainfall in the state. The proportion of monsoon rainfall as a percentage of the overall annual precipitation decreases gradually from north to south, ranging from 83% in the northernmost district of Kasaragod to 50% in the southernmost district of Thiruvananthapuram. Conversely, the contribution of northeast monsoon rainfall to the annual total increases from north to south, varying from 9% in Kasaragod to 27% in Thiruvananthapuram. As the height of the Western Ghats decreases towards the south, so does the amount of rainfall observed across the state. The southernmost district of Thiruvananthapuram, characterized by the closest proximity of the Western Ghats to the coastline and the lowest average height in the state, experiences the least amount of rainfall. The southwest monsoon typically begins in the southern parts of the state around 1st June and

[9] https://spb.kerala.gov.in/sites/default/files/2023-02/ENGLISH%20FINAL%20PRESS%2004.02.2023_0.pdf

gradually covers the entire region by 5th June. June and July stand out as the rainiest months, with each contributing approximately 23% of the total annual rainfall. Average rainfall is 3055 mm which is received in 120 -140 days mostly for June to September.

South-West Monsoon in Kerala

Nearly 85% of the region's rainfall is attributed to the monsoon. The slopes of the Western Ghats experience the highest amount of rain, leading to flooding in rivers. This monsoon season continues until the end of September. The average rainfall recorded during the rainy season is around 2250-2500 mm.

Rainfall from June 1, 2022, to September 30, 2022, was classified as 'normal' with a total of 1720mm. This deviated by 14% from the average rainfall of 2004mm. Among the districts in the state, eleven experienced normal rainfall, while three districts, namely Thiruvananthapuram (592.9mm), Kollam (998.7mm), and Alappuzha (1,159.3mm), received deficient rainfall. In contrast, all northern districts received rainfall within the normal range. Kasaragod District received the highest recorded rainfall, with a total of 2,785.7mm.

North-East Monsoon in Kerala

The Northeast monsoon, occur typically from October to November, and sometimes extending into December. This season is characterized by heavy rainfall in the afternoon accompanied by thunder and lightning. The days are generally warm and humid with little temperature variation. The average temperature during this period ranges from 29°C to 35°C. The average rainfall recorded during the North East monsoon is approximately 450-500 mm[10].

3.10. Ambient Air Quality

Kerala State Pollution Control Board is monitoring the ambient air quality at a total of 36 stations in the state. The annual average concentrations of Sulphur dioxide and Oxides of Nitrogen has not exceeded the limit values in any of the monitoring stations during the period from 2012 to 2021. Whereas the Respirable Suspended Particulate Matter (RSPM) values (PM10) has exceeded the limit of 60µg/m³ many times in some stations. The annual average of PM10 exceeded the limit at monitoring station located at Kuttipadam (72µg/m³) in Ernakulam district during the year 2021[11].

3.11. Groundwater

Groundwater serves as the primary source for meeting domestic requirements of over 80% of the rural population and 50% of the urban population, while also fulfilling the irrigation needs of approximately 50% of irrigated agriculture. The ease and simplicity of extracting groundwater have been crucial factors in its utilization. However, recent reports from various locations highlight challenges such as declining water tables, groundwater contamination, and seawater intrusion. Kerala's groundwater potential is considerably lower compared to many other states in the country. The groundwater balance is estimated to be 5590 million cubic meters (Mm³). As of March 31, 2022, the total annual groundwater availability in Kerala is calculated to be 5.73 billion cubic meters (BCM). Rainfall recharge contributes approximately 82.37% of the annual recharge, with the remaining portion sourced from other means. The statewide annual extractable groundwater recharge amounts to 5.19 BCM. District-wise availability ranges from 189.06 million cubic meters (MCM) in Idukki district to 589.82 MCM in Palakkad district. The geographical

[10] https://kerenvis.nic.in/Database/CLIMATE_829.aspx
[11] https://kspcb.kerala.gov.in/assets/uploads/widget/directory/Water_Air_Quality_Directory_2021_(2).pdf

distribution of Annual Extractable Groundwater Recharge in depth units for Kerala as of March 2022 is given below -

Groundwater extraction in Kerala caters primarily to domestic and irrigation purposes. The estimated groundwater extraction for domestic use is 1.55 BCM, while the irrigation sector accounts for 1.17 BCM. Industrial water extraction is relatively low, estimated at 0.01 BCM. The total annual groundwater extraction for all purposes in the state amounts to approximately 2.729 BCM, with variations across districts ranging from 55.46 MCM in Wayanad district to 339.35 MCM in Palakkad district. The overall stage of groundwater extraction in Kerala is 52.56%. Among districts, Kasaragod district has the highest stage of groundwater extraction at 72.16%, whereas Wayanad district has the lowest at 24.95%.

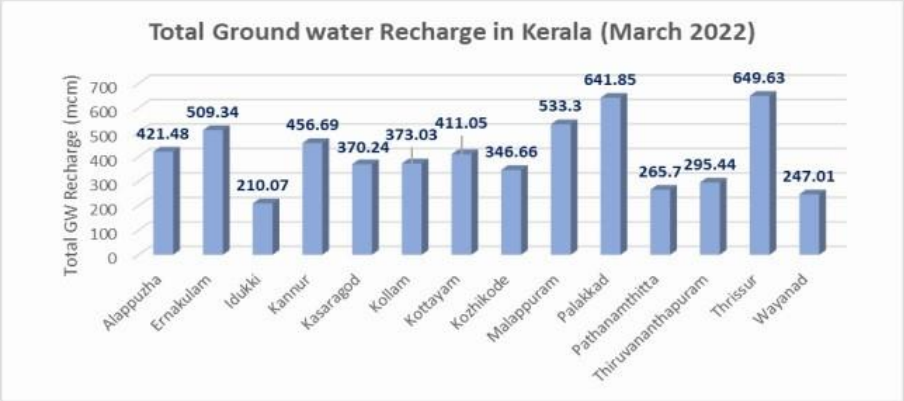

Figure 5: Contribution of districts to the Total Ground Water Recharge in Kerala

Among the 152 assessed units in Kerala, three blocks (Chittur and Malampuzha blocks in Palakkad district, and Kasaragod block in Kasaragod district) have been classified as "Critical" in terms of groundwater availability. Additionally, 27 blocks are categorized as "Semi-critical," while 122 blocks fall under the "Safe" category[12].

3.12. Drainage and Rivers

Kerala is home to 44 perennial rivers, of which three flow towards the East while the remaining 41 empty into the Lakshadweep Sea along the western side of the state. These rivers generally have swift flows and steep gradients in their upper reaches. Unlike in other regions, Kerala rivers do not form deltas. The drainage pattern of these rivers is primarily dendritic, although there are instances of trellis, sub-parallel, and radial patterns as well. The segments of the river courses are typically straight, indicating structural control that aligns with the prominent directions of lineaments (NW-SE and NE-SW). Among the medium-sized rivers, such as Chaliyar, Bharathapuzha, Periyar, and Pamba, their combined drainage area is only 8250 km^2, with respective lengths of 169 km, 209 km, 244 km, and 176 km. The lengths of the remaining rivers range from 16 km to 130 km, with an average length of 62 km and a total drainage area of 19,485 km^2. The river flow is modulated by about 30 reservoirs, mostly located in highlands. Within the state, Kerala boasts two freshwater lakes, namely Pookot and Sasthamkottah. Additionally, it encompasses a total area of 46.13 km^2 comprising estuaries and backwaters. Notably, the significant backwaters in Kerala include Vembanad and Ashtamudi lakes[13].

3.13. Flora and Fauna

The State of Kerala, situated on the windward side of the southern Western Ghats, holds significant bio-geographic importance. This region accounts for 95% of the flowering plants and 90% of the vertebrate fauna found in the Western Ghats, featuring a notably high rate of endemism . A significant portion of Kerala's remarkable biodiversity is centralized and safeguarded within the Agasthyamalai Biosphere Reserve located in the eastern hills. Nearly one-fourth of India's 10,000 plant species are documented within the boundaries of the state. Within this diverse flora, there exist almost 4,000 flowering plant species, with 1,272 of them being exclusive to Kerala and 159 categorized as threatened. Notably, among

[12] Resources: Water– Status of Environment related issues: Kerala ENVIS Centre, Ministry of Environment and Forests, Govt. of India (kerenvis.nic.in)

[13] https://kerenvis.nic.in/Database/ENVIRONMENT_824.aspx

these flowering plants are 900 species highly valued for their medicinal properties. Kerala's 9,400 km² of forests encompass various types, such as tropical wet evergreen, semi-evergreen, moist and dry deciduous, and montane subtropical and temperate forests. Undergoing substantial clearing for agricultural purposes during the 20th century, a significant portion of the remaining forest cover in Kerala is now safeguarded against clear-cutting. The fauna in Kerala stands out for its diversity and notable levels of endemism, encompassing 102 mammal species (of which 56 are endemic), 476 bird species, 202 freshwater fish species, 169 reptile species (with 139 being endemic), and 89 amphibian species (86 of which are endemic). However, these diverse species face threats due to extensive habitat destruction, which includes soil erosion, landslides, salinization, and resource extraction. The windward mountains of eastern Kerala provide refuge to tropical moist forests and tropical dry forests, a common feature in the Western Ghats. Within this region, there exists a diverse array of over 1,000 tree species, including sonokeling (Indian rosewood), anjili, mullumurikku (Erythrina), and Cassia. Additionally, the vegetation includes bamboo, wild black pepper, wild cardamom, the calamus rattan palm (a climbing palm), and aromatic vetiver grass (Vetiveria zizanioides). In this habitat, various fauna coexist, such as the Asian Elephant, Bengal Tiger, Leopard (Panthera pardus), Nilgiri Tahr, Common Palm Civet, and Grizzled Giant Squirrel. Reptilian inhabitants include the king cobra, viper, python, and crocodile. Kerala boasts a diverse avian population, featuring emblematic species like Peafowl, the Great Hornbill, Indian Grey Hornbill, Indian Cormorant, and Jungle Myna. In the lakes, wetlands, and waterways, fish such as kadu (stinging catfish) and Choottachi (Orange chromide - Etroplus maculatus), valued as an aquarium specimen, can be found .

3.14. Protected Areas

3.15. National Park & Wildlife

There are 5 National parks with an area of 356 km^2, 17 Wildlife Sanctuaries with an area of 2855 km^2 and one community reserve of 1.5 km^2. The total area coverage is about 3213 km^2. The comprehensive forest coverage within the state of Kerala is distributed as follows: Reserve Forests encompass 6451 km^2, representing 55.9% of the total area. Proposed Reserve occupies 285.0 km^2, accounting for 2.47%. Vested Forests cover 1586.1 km^2, constituting 13.76%. Eco-friendly land (EFL) spans 135.8 km^2, making up 1.18%. Protected Area extends over 3066.1 km^2, comprising 26.61%. In totality, the state's forested expanse amounts to 11524.9 km^2.

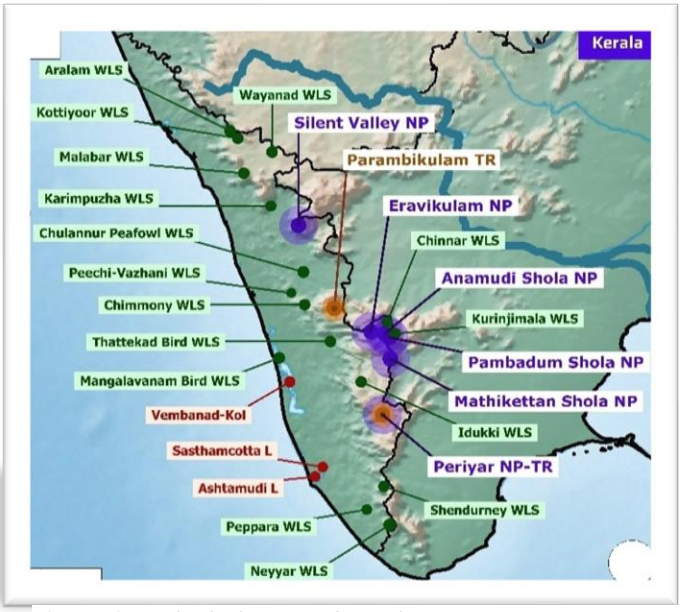

Figure 6: Protected Areas of Kerala

The forest area under the administrative charge of the department is 11524.9 km^2 at the close of the year 2020-21 and forms 29.65% of the total geographical area of Kerala State 8863 km^2. During 2020-21, 2.92 sq.km forest area has been increased from the previous year[14]. Interventions are strictly prohibited within the confines of Wildlife Sanctuaries and National Parks. Similarly, within the proximity of National Parks and Wildlife Sanctuaries, no interventions are executed as part of the KERA project. Proposed civil construction in 4 places will be within 10 kms from the outer boundaries of wildlife sanctuaries on the existing parcels of land owned by the Dept. of Agriculture. The proposed construction of Agri Business Centres at the State Vegetable Farm in Vandiperiyar, Idukki, is situated 1.4 kilometers from the Periyar Wildlife Sanctuary. Additionally, the Common Processing Centres

[14] https://www.ecostat.kerala.gov.in/publication-detail/kerala-forest-statistics-2021

proposed to being constructed in Mango Park, Muthalamada, Palakkad, is located 10 kilometers away from the Parambikulam Wildlife Sanctuary. The Common Processing Centres in Banana and Honeypark in Thrissur are positioned 2.4 kilometers from the Peechi-Vazhani Wildlife Sanctuary. Furthermore, the construction of Mini Agri-Parks at KVK Thrissur is taking place 7 kilometers away from the Peechi-Vazhani Wildlife Sanctuary.

3.15.1. Ramsar Sites

[15]Kerala hosts a total of three Ramsar-designated wetland sites. Among these, the Vembanad-Kol Wetland System stands out as the largest estuarine system among the western coastal wetland ecosystems, spanning across the districts of Alappuzha, Kottayam, Ernakulam, and Thrissur. Another Ramsar site, the Ashtamudi Wetland (Ashtamudi Kayal), is situated in proximity to Kollam City, falling within the jurisdiction of Kollam City Corporation and adjacent Grama Panchayats. The Sasthamkotta Lake, recognized as the largest freshwater lake in Kerala with an area of 373 hectares, is also designated as a Ramsar site and is located in Kunnathur Taluk of Kollam District. Additionally, four wetlands in Kerala, namely Vellayani and Akkulam-Veli in Thiruvananthapuram, Kottooli in Kozhikode, and the Kattampally-Valapattanam-Kuppam wetland complex in Kannur, are actively seeking Ramsar site designation. There are no proposed civil construction occurring in the vicinity of the Ramsar sites.

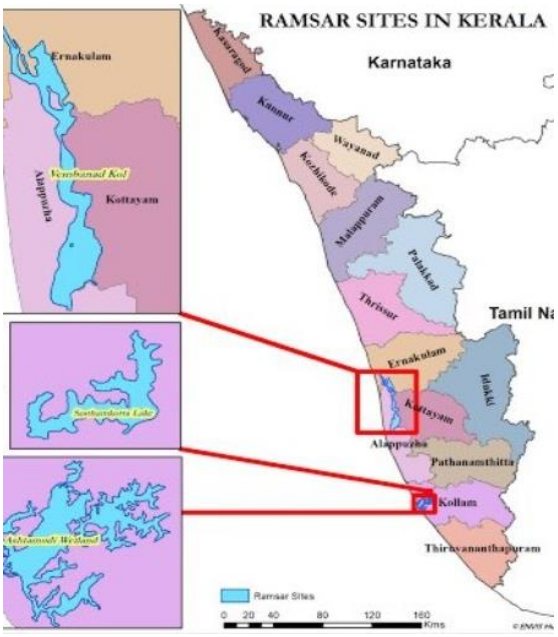

Figure 7: Ramsar sites in Kerala

3.15.2. Eco-Sensitive Zones

According to the Kasturirangan Report, a total of 25 Taluks, covering 123 villages and spanning an area of 12,908 square kilometers, have been identified as Eco-Sensitive villages. Specifically, in the Palakkad District's Chittur Taluk, Muthalamada Village is earmarked for the construction of the Common Processing Centre in Mango Park (INKEL) on existing land owned by the Department of Agriculture, Government of Kerala. Additionally, there are plans for the proposed construction of Agriculture Business Centres (ABCs) at the District Agricultural Farm in Attapadi (Millet Village) within Mannarkkad Taluk, under Kottathara GP. These initiatives fall within the eco-sensitive zone and constitute integral components of the interventions undertaken by the KERA Project.

3.16. Natural Hazard and Vulnerability Profile

Kerala state is susceptible to 39 natural hazards, in addition to hazards induced by human activities. The state's elevated population density of 860 persons per square kilometer heightens its vulnerability to disaster-related losses and damages. Reoccurring occurrences of floods and landslides, particularly along the Western Ghats in districts such as Wayanad, Kozhikode, Idukki, and Kottayam, underscore the region's susceptibility. During summer months, the state commonly experiences drought-like conditions, with 66 drought years recorded between 1881 and 2000. Water scarcity exacerbates during this period due to dry rivers and diminished water tables. Kerala faces additional natural hazards such as lightning, forest fires, and high wind speeds. Factors like soil piping and coastal erosion further contribute to the region's vulnerability to hazards and disasters. Additionally, being situated in seismic zone III indicates the state's susceptibility to earthquakes. Floods, a predominant and recurrent hazard, affect approximately 14.8% of Kerala's area, often leading to secondary disasters like landslides, as witnessed in the 2018 floods. A

[15] https://twitter.com/avijeet_writes/status/1639838516581634048

substantial 50% of the state's land area is classified as moderately to severely drought-prone. Furthermore, the state grapples with progressive coastal erosion, impacting nearly 63% of its 580 km coastline[16].

3.16.1. Extreme Precipitation and Flooding

In the state of Kerala, there is a decreasing trend in precipitation observed over the past century, with a particular focus on extreme events such as flooding. Areas susceptible to flooding cover 5624 square kilometers, constituting 14.5% of the state's total area. Rainfall patterns in Kerala during the last decade reveal intermittent prolonged episodes of heavy rains, contributing to an elevated risk of extreme rainfall events and subsequent flooding.

The significant flood of '99 was a consequence of the Periyar River inundation in July 1999. One notable flood incident in the last two decades occurred in 2013, resulting in 145 human fatalities. Kerala encountered unprecedented floods between June 1 and August 19, 2018, surpassing even the historic flood of 1999. During this period, the state received 42% more rainfall than the average. All districts were adversely affected, with seven severely impacted districts—Alappuzha, Ernakulam, Idukki, Kottayam, Pathanamthitta, Thrissur, and Wayanad—being officially declared as flood-affected. This calamity affected 5.4 million people, displacing 1.4 million and claiming the lives of 449 individuals. The torrential rains triggered landslides in hilly regions, causing soil erosion and inundating villages. These cascades of water, soil, rock, and vegetation overwhelmed communities, disrupted power lines, and impeded immediate aid to some areas. Idukki, with 143 reported landslides, emerged as the worst-hit district.

3.16.2. Drought

Annually, Kerala undergoes seasonal drought conditions, particularly during the summer months. The State's Disaster Risk Management projections for the future indicate that over 50% of the state's land area will be prone to moderate to severe drought, predominantly affecting the availability of drinking water. The percentage breakdown of vulnerable regions in relation to Kerala's total land area is delineated as follows: 2.5% for severe drought, 63.8% for moderate drought, 23% for slight drought, and 10.7% for areas with no drought. The most significant drought event in Kerala within the last two decades occurred during 2012-13, necessitating the official declaration of drought by the State Government across all 14 districts.

3.16.3. Sea Level Rise

The historical rise in sea level for Cochin, measured from Mean Sea Level (MSL), is approximated at 2 cm over the past century, while future sea level rise is expected to increase between 10 cm and 20 cm along the state's coast in the next hundred years due to global warming, posing significant vulnerability to a majority of coastal communities residing on sandy coasts, including barrier beaches or spits, as well as impacting backwater banks, islands, filtration ponds, and paddy fields in the coastal zone.

3.16.4. Tsunami

The 590-kilometer coastline of Kerala, characterized by high population density, faces exposure to elevated waves, storm surges, and tsunamis, notably demonstrated by the Indian Ocean Tsunami on December 26, 2004, impacting approximately 250 kilometers of Kerala's coastline and penetrating up to 1.5 kilometers inland, resulting in significant devastation along the coastal belt, particularly affecting the impoverished settlement of Azheekkal near Karunagappally in Kollam District, where numerous individuals were killed, injured, displaced, and rendered homeless.

3.16.5. Landslides

The mountainous regions of Kerala regularly face numerous landslides during the monsoon season, with a historical count of 65 fatal landslides recorded between 1961 and 2009, resulting in the loss of 257 lives;

[16] https://nidm.gov.in/PDF/pubs/KeralaFlood_18.pdf

during the 2018 floods, the state encountered over 5,000 small and large landslides and landslips, emerging as a significant contributor to both economic and human losses, with a susceptible area encompassing 5607.4 square kilometers, equivalent to 14.4% of the state's total area; notably, the most impactful landslide in the last two decades was the debris flow at Amboori, Thiruvananthapuram, on November 10, 2001, leading to 38 human fatalities.

3.16.6. Earthquakes

The most significant earthquake in Kerala within the past two decades was the Erattupetta Earthquake on December 12, 2000. However, there have been no notable reports of major fatalities or damage caused by earthquakes in the recent history of the state.

3.16.7. Forest Fires

In Kerala, the peak fire season typically commences in late January and spans approximately 13 weeks. Between November 7, 2022, and November 6, 2023, there were 64 VIIRS fire alerts reported, considering only high-confidence alerts, a frequency consistent with the norm observed in previous years dating back to 2012. For the year 2023, 63 VIIRS fire alerts have been recorded thus far, maintaining a normal pattern compared to previous years since 2012. The highest number of fires documented in a year was in 2012, totalling 116. Over the period from 2001 to 2022, Kerala experienced the loss of 275 hectares of tree cover due to fires and 84.1 thousand hectares from various other drivers of loss. In 2007, the year with the most significant tree cover loss due to fires, 35 hectares were affected, accounting for 0.80% of all tree cover loss for that year. Throughout the years from 2001 to 2022, Idukki exhibited the highest rate of tree cover loss due to fires, averaging 5 hectares lost per year[17].

3.16.8. Stubble burning

Stubble burning is reported in different pockets of Kuttanad. Kuttanad is a place with high wind velocity and is very close to sea. So, the wind is disposing of the smoke. Burning of fields is causing a rise in mercury levels and air pollution. The smoke from stubble contains carbon monoxide and other chemical. A farmer died after inhaling the smoke while burning his field in Kuttanad

3.17. ASI Sites

Kerala harbours approximately 102 officially recognized protected monuments under the purview of the Archaeological Survey of India (ASI) . The exhaustive list of these ASI sites is conveniently provided in the annexure for easy reference. Before the initiation of KERA project, an Environmental and Social (E&S) screening study will be conducted. This study aims to discern or investigate the potential existence of archaeological, paleontological, historical, cultural, or religious sites within a 300-meter radius from the project boundary.

[17] https://www.globalforestwatch.org/dashboards/country/IND/17/?category=fires

4. ENVIRONMENTAL AND SOCIAL POLICIES, REGULATIONS, AND LAWS

This section explains the constitutional provisions, policies, legal and regularity requirements under different acts / rules enforced by Government of India and State Government of Kerala for social and environment safeguards. It also identifies the requirement of permits / licenses in the project under different rules /regulation as different stages of the project period. Further, an outline of the environmental and social safeguards policies of the World Bank has been presented. As is evident from the section below, there are no substantial differences in principle between the two set of policies and operational procedures applicable -

4.1. India's Constitutional Provisions

The Constitution of India has several provisions for environmental and social protection. It lays down the duties and rights of the state as well as the citizens.

Article 48-A - lays down a directive principle noting that the state shall endeavour to protect and improve the natural environment.

Article 51-A - specify fundamental duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers, and wildlife, and to have compassion for living creatures

Article 342 – As per this provision, the State shall not discriminate against any citizen on grounds only of religion, race, caste, sex, place of birth or any of them.

Clause (2) of article 29 - Nothing shall prevent the State from making any special provision for the advancement of any socially and educationally backward classes of citizens or for the Scheduled Castes and the STs.

Directive Principles of State Policy: The State shall promote with special care the educational and economic interests of the weaker sections of the people, and, in particular, of the Scheduled Castes and the STs, and shall protect them from social injustice and all forms of exploitation.

4.2. Applicable National Policies

The national policies which may be relevant to the project from an environmental or social perspective are presented below.

National Conservation Strategy & Policy on Environment & Development, 1992: Policy emphasizes on sustainable and equitable use, prevent and control future deterioration of environmental resources; take steps for restoration of ecologically degraded areas and for environmental improvement.

National Environmental Policy, 2006: Objective of this policy is to conserve critical environmental resources, integration of environmental concerns in developmental process, efficient use of environmental resources

National Water Policy, 2012: Policy states that water should be treated as an economic good so as to promote its conservation and efficient use and depletion of ground water should be arrested by introducing improved technologies of water use and incentivizing efficient water use

National Policy for Women: The policy is created with a vision to build a society in which women attain their full potential and are able to participate as equal partners in all spheres of life and influence the process of social change.

National Agricultural Policy, 2000: The policy seeks to promote technically sound, economically viable, environmentally non-degrading use of natural resources – land, water and genetic endowment to achieve sustainable development of agriculture. The policy while stressing on conjunctive use of surface and ground water intends to promote on-farm management of water resources to optimize use of irrigation potential.

National Policy for Farmers, 2007: The aim of the Policy is to stimulate attitudes and actions which should result in assessing agricultural progress in terms of improvement in the income of farm families.

It stresses on rainwater harvesting and aquifer recharge for ensuring sustainability of supply and the need for regulation and control of the development and management of ground water resources. It emphasis on equitable sharing of water and to include local communities in managing water resources.

Food Safety and Standards Act 2006: The Food Safety and Standards Act of 2006 legislation unifies food-related laws, creating the Food Safety and Standards Authority of India. This authority sets science-based standards for food products and oversees their production, storage, distribution, sale, and importation, all with the aim of ensuring the availability of safe and nutritious food for human consumption and addressing related matters.

4.3. Applicable State Policies

Kerala State Action Plan on Climate Change 2023-2030: Objective is to reduce climate vulnerability, mitigate greenhouse gas (GHG) emission, and enhance resilience and adaptation capability. It has identified nine districts as most vulnerable. The action plan also lists sector-wise climate change adaptation strategies for agriculture, livestock, coastal fisheries, health, water resources, forests, and biodiversity.

Kerala State Environment Policy, 2009: Ensuring clean air, water, soil and food to the people of Kerala and its sustainability for a healthy living condition, as well as ensuring conservation of natural resources, including species, ecosystems and genetic wealth of the State.

Kerala State Disaster Management Plan, 2016: Objective is to reduce the vulnerability of the community through proper risk assessment and develop a new culture of prevention, preparedness and quick response to disasters.

Kerala Solar Energy Policy 2013: ▸ Vision is to mainstream the use of solar energy in the energy mix of Kerala in an inclusive manner to ensure optimal usage of the available solar potential in this region.

Kerala FPO policy 2020: it will enable creation, guiding, strengthening, and streamlining the functions of FPO's in the state by establishing forward and backward linkages for aggregation of inputs, produce, value chain development and better marketing opportunities resulting in higher returns for the farmers.

Subhiksha Keralam: The Subhiksha Keralam scheme envisages bringing an additional 25,000 hectares under farming in the state by converging the activities under various departments such as animal husbandry, dairy development, horticulture, and fisheries. It mainly aims to produce food through organic production protocols.

Kerala Tree Climbers Welfare Scheme: Envisaged in the payment of ex-gratia financial assistance to workers in the event of permanent total disablement or to the dependents in the case of death of the worker.

Unorganized Daily Waged Employees Distress Relief Fund: This scheme was sanctioned in 2007-08 and implemented through Labour Department to provide financial assistance @ Rs.2000/- to the workers covered under the definition of daily waged workers but not covered under any other welfare schemes and have sustained injury during the course of employment.

Wage Protection System: Wage Protection System means an Information Technology enabled system provided by the Labour Commissionerate to ensure payment of minimum wages to all or any class of employees employed in any scheduled employment as prescribed by the government. It is a system through which the employers of the Scheduled Employment shall pay and disburse the wages to the employees through individual bank Accounts.

Value-Added Agriculture Mission: aimed at increasing the farmer's income, enhancing agricultural production and raising the income of agricultural value-added products.

Kerala Agricultural Development Policy 2015: aims to ensure that every citizen in the state has a good income from farming. It also focuses on providing food, water, livelihood security, and modern living conditions. The goal is to maintain sustainable agricultural practices and make farming an attractive and respectable occupation that offers a modern and dignified lifestyle. This approach aims to encourage future generations to view farming as an appealing and challenging profession, which includes areas like animal husbandry, dairy, inland fisheries, and crop management, including harvesting and processing.

Organic farming policy of Kerala 2010: This policy was devised with a vision to make Kerala's farming sustainable, rewarding, and competitive, ensuring toxin-free water, soil, and food to every citizen. Policy emphasized that the mission to convert Kerala into an organic State is to be achieved focusing on potential crops and areas in a phased and compact manner with the aim of converting a minimum of 10 % of the cultivable land into fully organic every year and thus achieving the target within five to ten years.[18]

Coconut Mission: The main objectives are to revive the coconut wealth of Kerala through a campaign of replanting and maintenance and to ensure forward linkages with agro-industry. Application of green manure and application of biocontrol agents is planned to be promoted under this mission. The activities of Keragramam will also be integrated into this programme for efficient use of the resources. All operations will be carried out with the support of LSGD and MNREGS.[19]

4.4. Applicable Regulations

The implementation of the project activities will be governed by a sets of applicable environmental and social related acts, rules, regulations, and standards imposed by the Government of India and the Government of Kerala. It is the responsibility of the project executing and implementing agencies to ensure project implementation is consistent with the legal framework. Key standards include those related to air quality, and protected areas are included. Compliance is required in all stages of the subprojects, including design, construction, operation, and maintenance.

[18] Source: Agriculture Division, State Planning Board, Thiruvananthapuram, March 2017, Thirteen Five Year Plan (2017-2022).

[19] Source: Schemes – Karshika Keralam (keralaagriculture.gov.in)

Table 2: Applicable Relevant Acts, Policies, Legislations and Guidelines

Acts, Policies and Notifications & Relevant ESS of WB	Key Provision / Applicability	Type of permit	Concerned Authority	Project Activity/ Stage of applicability	Responsibility
(1)	(2)	(3)	(4)	(5)	(6)
Environment Protection Act, 1986 / ESS 1, ESS 3, ESS 6	To protect and improve overall Environment. Will be applicable to construction of Agri-park, ABC, Processing Centre, Plantation, Crop Cluster and Market Development	-	MoEFCC, GoI DoE, Govt. of Kerala, CPCB, KSPCB	All project activity // Throughout the project cycle	All agencies including Contractor
Air (Prevention and Control of Pollution) Act, 1981, 1987 / ESS 1 , ESS 3	To prevent and control air pollution from construction activity, running of machineries, vehicle, DG set, application of pesticide and fertilizer use	Consent to Establish (CtE)	KSPCB	Agri park, CPC, Canal Repairing, Building Renovation // Before Establishment	Contractor
		Consent to Operate (CtO)		Agri park, CPC, Canal Repairing, Building Renovation // Before Operation	Contractor
Water Prevention and Control of Pollution) Act, 1974, 1988 / ESS 1, ESS 3	To prevent and control water pollution due to operation of batching plants, diesel generator, hot mixing plant etc.	Consent to Establish (CtE)	KSPCB	Agri park, CPC, Canal Repairing, Building Renovation // Before Establishment	Contractor
		Consent to Operate (CtO)	KSPCB	Agri park, CPC, Canal Repairing, Building Renovation // Before Operation	Contractor
Kerala Ground Water (Control and Regulation), Act, 2002; Regulate and Control Ground Water Extraction in India, 2019 / ESS 1, ESS 3	Permission needed to dig borewell beyond the depth of 100 metre in critical or semi-critical block	Ground water extraction permission	Ground Water Department	Agri park, Common Processing Centre, Crop Cluster Development // Before Establishment of Borewell	KINFRA/ DoA
EIA Notification 2006 / ESS 1	Purpose is to carryout Environmental Impact Assessment and obtain prior Environmental Clearance (EC).	EC is needed for construction of CETP	SEIAA, Kerala	Agri-park, CPC // Before Construction of CETP	KINFRA/ DoA

Acts, Policies and Notifications & Relevant ESS of WB	Key Provision / Applicability	Type of permit	Concerned Authority	Project Activity/ Stage of applicability	Responsibility
(1)	(2)	(3)	(4)	(5)	(6)
	The proposed food parks do not house any Category A / B Industries and hence to be considered under 8(b) – Township and Area Development. However, EC is needed only if project area is ≥ 50 ha. or built up area > 150000 sq. mtrs. None of the proposed food parks are falling in this category. **Applicable** – EC is needed as it involves construction of Common Effluent Treatment Plant (CETP)				
Eco Sensitive Zone Notifications / ESS 1, ESS 6	Regulate certain activities around National Parks and Wildlife Sanctuaries so as to minimise the negative impacts of such activities on the fragile ecosystem encompassing the protected areas. Eco Sensitive Zones have been notified for each National Park and Wildlife Sanctuary.	None	NBWL, MOEF&CC	The project will not finance any civil works in the eco-sensitive zones, national parks, wildlife sanctuaries	
Coastal Regulation Zone (CRZ) Notification, 2019 / ESS 1, ESS 6	It declares coastal stretches as CRZ and restricts new construction, and industrial activities. Objective is to protect fragile coastal belts. **Not Applicable** as none of the infrastructures proposed under KERA projects falls withing CRZ demarcated area.	CRZ clearance is not needed	SCZMA/ MoEFCC	Before Establishment	Not Applicable
Noise Pollution (Regulation and Control Rules) 2000 and amendments / ESS 1, ESS 3	Ambient Noise Standards for different areas and zones	No permits issued under this act	KSPCB	During Implementation	Contractor

Acts, Policies and Notifications & Relevant ESS of WB	Key Provision / Applicability	Type of permit	Concerned Authority	Project Activity/ Stage of applicability	Responsibility
(1)	(2)	(3)	(4)	(5)	(6)
	(Different construction equipment, machineries, vehicle will be deployed during Agri-park, ABC, Processing Centre, renovation pf Govt. office and canal infrastructure)				
Plastic waste Management Rules, 2016 / ESS 1, ESS 3	To manage the plastic waste generated during project implementation (Plastic waste is expected to be generated from construction camp as well as operation phase of Agri-Park, ABC & Processing Centre, Market Place)	No authorization to be obtained	KSPCB	During Implementation	Contractor
Construction and Demolition Waste Management Rules, 2016 / ESS 1, ESS 6	To manage C&D waste resulting from construction of Agri-park, ABC, Processing Centre, renovation of Govt. Offices, repairing of canal.	No authorization to be obtained, but the wastes (if any) to be diposed in pre-identfied sites by PCB/local authority	KSPCB	All civil construction work like Agri-park, CPC, ABC, Repairing of Govt Offices// During Implementation	Contractor
Hazardous and other Wastes (Management and Transboundary Movement) Rules, 2015 / ESS 1, ESS 3	This will be applicable during civil construction work involving handling / generation of spent oil, used engine oil, gear oil, hydraulic oil, turbine oil, compressor oil, industrial gear oil, heat transfer oil, transformer oil and their tank bottom sludges handling, storage and disposal facility (TSDF), painting work	Requires Pollution Control Board's consent for handling hazardous waste	CPCB and KSPCB	Before Implementation	Contractor
E-Waste (Management) Rules, 2016 / ESS 1, ESS 3	The project would dispose old IT assets of different Govt. office and purchase IT asset in bulk for setting up of office/ laboratories. e-waste generated from the project must comply with the provisions of the rules and be disposed of through the recyclers registered with PCB only	Requires Pollution Control Board's consent	KSPCB	Before disposal	DoA

Acts, Policies and Notifications & Relevant ESS of WB	Key Provision / Applicability	Type of permit	Concerned Authority	Project Activity/ Stage of applicability	Responsibility
(1)	(2)	(3)	(4)	(5)	(6)
National Institute of Occupational Safety and Health (NIOSH) Publication No. 98-126 / ESS 1, ESS 2	Internationally recognized environmental standards on Occupational Safety Applicable to the construction and operation stages of the project	No permits required however contractor shall follow all recommendation		During Implementation	Contractor
The Kerala Preservation of Trees Act, 1986 the Kerala restriction on cutting and destruction of valuable trees rules, 1974 / ESS 1, ESS 6	Removal of trees located at proposed Agri-park area or any such requirement under KERA project require prior permission from DFO. This will not be applied for replantation activity.	Obtain Permission before felling of tree. Compensatory afforestation shall be done in 1: 5 ratio	State Forest Department (State DFO)	Before Tree Felling	Respective RPMU
The Wildlife Protection Act, 1972 / ESS 1, ESS 6	The Act provides for the protection of wildlife and for all matters that are connected to wildlife and their habitat. This Act prohibits destruction, exploitation or removal of any wildlife, and provides for protection to listed species of flora and fauna.	None	NBWL, MOEF&CC, Supreme Court of India	No subproject will be located within protected area. Hence, wildlife clearance is not required.	
Biological Diversity (Amendment) Act 2023, and Biological Diversity Rules, 2004 / ESS 1, ESS 6	Provide guideline in preventing the planning of project subcomponents near the environmental sensitive areas including national parks, wildlife sanctuaries etc.	None	National Biodiversity Authority	Before site selection	DoA
Public Liability and Insurance Act 1991 / ESS 1, ESS 2	Protection from liability arising due to accidents from handling of hazardous chemicals (This will be applicable to construction activity involving handling or generation of spent oil, used engine oil, gear oil, hydraulic oil, turbine oil, compressor oil, industrial gear oil, heat transfer oil, transformer oil and their tank bottom sludges handling, storage and disposal facility (TSDF), painting work	Contractor of project should take out Insurance policies providing for contracts of insurance so as he is insured against liability to give relief, before handling any such hazardous material	Dist. Collector	Before Implementation	RPMU / PMU

Acts, Policies and Notifications & Relevant ESS of WB	Key Provision / Applicability	Type of permit	Concerned Authority	Project Activity/ Stage of applicability	Responsibility
(1)	(2)	(3)	(4)	(5)	(6)
Central Motor Vehicle Act 1988 and amendment Central Motor Vehicle Rules, 1989 and amendments till date / ESS 1, ESS 3, ESS 4	To minimize the road accidents, penalizing the guilty, provision of compensation to victim and family and check vehicular air and noise Pollution. Will be applicable to all construction work involving use of transportation vehicle, heavy machineries. This should be applied if there is any road accident caused by transportation vehicle or machineries deployed for transportation or construction work. All vehicle/ machineries should comply with PUC norm and have valid fitness certificate	No permit issued under this Act, however the contractor has to ensure proper license, PUC, permits as required	Regional Transport Officer	During Implementation	Contractor
Municipal Solid Waste Management Rule 2016 / ESS 1, ESS 3	Generated weed waste due to site cleaning and kitchen waste from camp site shall be stored separately and dispose of as per the directions of the local body from time to time. No waste shall be thrown, burn or buried on streets, open public spaces or in the drain or water bodies.	Obtaining authorization under solid waste management rules for handling and disposal of waste generated.	KSPCB	Before weed clearing and camp operation	Contractor
National Building Code, 2016 / ESS 1, ESS 3	The code provides the 'accepted standards' in relation to material specification, testing or other related information. The code provides development control rules and general building requirements (e.g. floor area ratio, specifications on building design, etc.).	None	building plan from appropriate agency	Agri-park, CPC. Renovation of Govt. Building	Contractor
Building & Other Construction workers (Regulation of Employment & Condition of Service) Act, 1996 / ESS 2	To regulate the employment and condition of service of building and other construction workers and to provide for their safety, health and welfare measures. This will be applied to all civil construction work like Agri-Park, ABC, Processing Centre, Repairing of Canal & Govt. Building	Obtaining labourer license	Chief Labour Commissioner, Government of Kerala	Before commencement of civil work	Contractor

Acts, Policies and Notifications & Relevant ESS of WB	Key Provision / Applicability	Type of permit	Concerned Authority	Project Activity/ Stage of applicability	Responsibility
(1)	(2)	(3)	(4)	(5)	(6)
Contract Labour (Regulation and Abolition) Act, 1970 / ESS 1, ESS 2	The Act is applicable to the establishments or Contractor of principal employer if they employ 20 or more contract labour. The Act provides for certain welfare measures to be provided by the Contractor to contract labour. It is estimated to engage about 750 skilled and semi-skilled labours for all construction activity proposed under KERA project. It will be applied, if any Contractor employ $\geq$ 20 contract labour at a time.	Contractor to obtain a Certificate of Registration as the principle employer and License	Chief Labour Commissioner, Government of Kerala	Before Implementation	Contractor
The Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Act, 1979 / ESS 1, ESS 2	The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). Certain facilities such as housing, medical aid, traveling expenses from home up to the establishment and back, etc. to be provided to inter- state migrant workmen It is estimated to engage about 390 contract labour for different kind of construction activity proposed under KERA project specially Agri-park, ABC, Processing Centre construction and repairing of Govt. building and canal infrastructure.	Contractor shall register with Labour Department	Chief Labour Commissioner, Government of Kerala	Before Implementation	Contractor
The Child Labour (Prohibition and Regulation) Act, 1986 / ESS 1, ESS 2	The Act prohibits employment of children below 14 and 15 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of child labour is prohibited in Building and Construction Industry (All contractor engaged for construction of Agri-park, ABC, Processing centre, repairing	No permit issued under this Act, however the contractor has to ensure nor-employment of child labour	Chief Labour Commissioner, Government of Kerala	During Implementation	Contractor

Acts, Policies and Notifications & Relevant ESS of WB	Key Provision / Applicability	Type of permit	Concerned Authority	Project Activity/ Stage of applicability	Responsibility
(1)	(2)	(3)	(4)	(5)	(6)
	of Govt. Building and canal shall adhere to this)				
Notification for use of fly ash, 2003 and subsequent amendment, 2016 / ESS 1, ESS 3	Mandated to use fly ash in construction activity if there is presence of TPPs within 300 km radius of proposed project area. Applicable to all kind of civil construction activity like construction of Agri-park, ABC, Processing Centre, upgradation of Govt. Building and repairing of Canal proposed under KERA project. Contractor shall identify the presence of any TPP within 300 km. radius from proposed project area.	No permit issued under this Act, however the DPMU has to explore possibility of fly ash use in civil work	MoEF&CC	Designing stage	RPMU/ Contractor
Fertilizer (Control) Order, 1985 / ESS 1, ESS 3	Strict penalties are imposed for any person that produces, sells or distributes fertilizers not in accordance with the stated requirements. This shall be applicable to these activities like Crop Cluster development, replantation of Coffee, Cardamom, Coconut & Rubber	No permit issued under this Act, however the RPMU has to ensure use of fertilizer as per recommended dose	Department of Fertilizers under the Ministry of Chemicals and Fertilizers, Government of India	During Operation	RPMU
Insecticides Act, 1968, Rule 1971 / ESS 1, ESS 3	Use of registered and recommended insecticides and non-use of banned insecticides. This shall be applicable to these activities like Crop Cluster development, replantation of Coffee, Cardamom, Coconut & Rubber which involves use of Pesticide/ Insecticide/ herbicide and Weedicide	No permit issued under this Act, however the RPMU has to ensure non-use of banned pesticides	Central Insecticides Board and Registration Committees (CIB & RC)	During operation	RPMU
Seeds Act, 1966 / ESS 1, ESS 3	Objective is to regulate the quality of seeds sold to farmers.	No permit issued under this Act, however the RPMU shall conducts regular inspections of	Department of Agriculture Development and Farmers' Welfare	During operation	RPMU

Acts, Policies and Notifications & Relevant ESS of WB	Key Provision / Applicability	Type of permit	Concerned Authority	Project Activity/ Stage of applicability	Responsibility
(1)	(2)	(3)	(4)	(5)	(6)
	This shall be applicable to these activities like Crop Cluster development, replantation of Coffee, Cardamom, Coconut & Rubber	seed testing laboratories and seed selling outlets to ensure compliance with the Act.			
Minimum Wages Act, 1948 / ESS 1, ESS 2	The employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of Buildings, Roads, Runways are scheduled employment. Will be applicable as it is expected to engage about 750 nos. contract labour during construction stage. Contract labour will also be employed in operation phase of Agri-park, Common Processing Centre, Agri-business Centre and 4 crops targeted for replantation	No permit issued under this Act, however contractor has to ensure that no construction workers are paid not less than the prescribed minimum wage	Chief Labour Commissioner, Government of Kerala	During implementation of Civil work	Contractor
Equal Remuneration Act, 1979 / ESS 1, ESS 2	The Act provides for payment of equal wages for work of equal nature to Male and Female workers and not for making discrimination against Female employees in the matters of transfers, training and promotions etc. Will be applicable as it is estimated to engage about 150 nos. contract labour during construction stage. Contract labour will also be employed in operation phase of Agri-park, Common Processing Centre, Agri-business Centre.	No permit issued under this Act, however contractor has to ensure that equal wages are provided for work of equal nature to Male and Female	Chief Labour Commissioner, Government of Kerala	During implementation	Contractor
Panchayats (Extension to the Scheduled Areas) Act, 1996	There are 4 GP which fulfills the requirement of PESA. Customary laws of 15 communities coming under PESA in Kerala[20].	The provisions of the Act will be applicable		Before and during project implementation	PMU/ RPMU

[20] Source: Vol. Issue 1 (kila.ac.in)

Acts, Policies and Notifications & Relevant ESS of WB	Key Provision / Applicability	Type of permit	Concerned Authority	Project Activity/ Stage of applicability	Responsibility
(1)	(2)	(3)	(4)	(5)	(6)
The SCs and the STs (Prevention of Atrocities) Act, 1989	This act is applicable as IPs are primary beneficiaries of this project. There are thirty-six (36) Schedule Tribal (IP) Group and five (5) PVTG with IP population ranging between 0.14% in Alappuzha to 18.76% in Wayanad wrt. total District population.	The provisions of the Act will be applicable		Before and during project implementation	PMU/ RPMU
Workmen Compensation Act, 1923	The Act provides for compensation in case of injury by accident arising out of and during the course of employment. This will be applicable to construction and operation of Agri-park, ABC, CPC along with upgradation of Govt. Buildings	No permit issued under this Act, however contractor has to record all cases of accidents and provide compensation	Chief Labour Commissioner, Government of Kerala	During implementation	Contractor
Energy Conservation Building Code (ECBC) 2017	Sets minimum energy standards for new commercial buildings having a connected load of 100 kW	No permit needed	BEE	Agri park, CPC, Renovation of Govt. Offices Designing Stage	
Kerala State Disaster Management Rules, 2007	Objective is to prevention of disasters and provide necessary technical assistance for disaster management	None	Kerala State Disaster Management Authority (KSDMA)	Entire Project Throughout the project	PMU

Note: The responsibility of the concerned authority as mentioned in column (6) pertains to fulfilling key requirements as mentioned in column (2) and obtaining necessary permit as mentioned in column (3).

4.4.1. List of Regulatory Clearance Requirements

Only those rules/ act under which any kind of prior clearance/ permission/ permit is needed are discussed in this section. This summarized form of Table 2. Table 3 which is derived from previous Table 2 is for easy reference of project authorities and contractors to know the permission / clearance required under different laws.

There are certain project activities for which prior Regulatory clearance will be required. Concerned/ responsible agency should obtain regulatory clearance as per the requirement under applicable lays. List of such clearance/ permit required for implementation of KERA project are listed below along with the stage of applicability and responsible party to obtain clearance.

Table 3: List of Regulatory Clearance Requirements

Project Activity	Clearance Required	Applicable Regulation	Issuing Authority	Requirement	Responsibility
Construction of Agri park, Common Processing Centre,	Consent to Establish (CtE) and Operate (CtO)	Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981	KSPCB	Consent shall be obtained before commencement of construction work for the plant and machinery, i.e. (Batching Plant, Crusher) required for the project.	Contractor
Construction of Agri park, Common Processing Centre, Agribusiness Centre, Canal Repairing	Tree felling permission	The Kerala Preservation of Trees Act, 1986 the Kerala restriction on cutting and destruction of valuable trees rules, 1974	State Forest Department (State DFO)	Permission shall be obtained before felling of tree	PIU/ RPMU
Construction of Agri park, Common Processing Centre, Agribusiness Centre, Canal Repairing, Repairing and construction of Govt Building	Pollution Under Control Certificate	Motor Vehicles Act, 1988	Regional Transport Officer	Contractor shall submit undertaking to Executive Engineer (EE- MI) on deployment of latest PUC certified vehicles and machineries and regular renewal of PUC certificate as per motor vehicle act	Contractor
	Disposal of debris		Gram Panchayat (GP) or local authority	Obtain permission from local Gram Panchayat (GP) or local authority for disposal of debris	Contractor
Construction of Common Effluent Treatment Plant in Agri-park or Common	Environmental Clearance	EIA Notification, 2006 as amended in 2009 and 2013, 2016	SEIAA, Kerala	Obtain Environmental Clearance for if requirement construction of CETP	KINFRA/ DoA/ Other PIUs

Project Activity	Clearance Required	Applicable Regulation	Issuing Authority	Requirement	Responsibility
Processing Centre					
Agri-park, Common Processing Centre	Permission for withdrawal of Ground Water	Kerala Ground Water (Control and Regulation), Act, 2002	Ground Water Department	Obtain permission for drilling borewell beyond 100 metre	KINFRA/ DoA/ Other PIUs
Crop Cluster development and replantation of plantation crop	License to trade of seeds, fertilizers, pesticide, firm implement	Fertilizer (Control) Order, 1985, Seeds Act, 1966, Insecticides Act, 1968	Director of Agriculture (DoA)	FPO/ FPC to Obtain license for trading of seeds, fertilizers, pesticide, firm implement	FPO/ FPC
Agri-ark, Common Processing Centre, Agri-start-ups, MSME involved in food processing	Ensures that the food is safe and free from contaminants, pathogens, and harmful chemicals	The Food Safety and Standards Act, 2006	Commissioner of Food Safety, Kerala	MSME/ Start-ups involved in food processing shall obtain Food Safety and Standards Authority of India (FSSAI) license	MSME/ Start-ups (Food)

4.5. World Bank ESF Policy, Directives and Standards

The objective of World Bank's environmental and social safeguards (ESSs) are to prevent and mitigate undue harm to people and their environment in the development process. These policies provide guidelines for Bank and borrower in the identification, preparation, and implementation of programs and projects. They also provide a platform for the participation of stakeholders in project design. In essence, the safeguard policies ensure that environmental and social issues are evaluated in decision making, help reduce and manage the risks associated with the project and provide a mechanism for consultation and disclosure of information. The safeguards policies of the World Bank and the implications of these policies for the KERA project are discussed in Table 4.

Table 4: Applicability of ESF and its Implications for the Project

ESS	Triggered (Yes/No)	Implications for the sub-project/ project
ESS-1 Assessment and Management of Environmental and Social Risks and Impacts	Yes	E&S risks and Impacts have been identified based on surveys and consultations with primary stakeholders, including communities and implementing agencies. A summary of the assessment has also been presented in the ESMF.
ESS-10 Stakeholder-Engagement-and-Information-Disclosure	Yes	Many stakeholders are involved in this project, including the Department of Agriculture Development and Farmers' Welfare, Irrigation Department, Department of Industries and Commerce (DoIC), Department of Local Self Governance (DoLSG) and Kerala Industrial Infrastructure Development Corporation (KINFRA), FPO, SHG and WUA members. Initial consultations were held with these stakeholders during the project preparations. Their concerns have been integrated into the design. Stakeholder engagement would be continuous during the project's entire lifecycle. A stakeholder engagement plan has been developed to ensure continued consultation

ESS	Triggered (Yes/No)	Implications for the sub-project/ project
ESS-2 Labor-and-Working-Conditions	Yes	The project will have the following types of workers: **i) Direct workers:** (People employed or engaged directly by KERA project **ii) Contract Workers:** workforce deployed by Civil contractors and other contractors employed in this project, to perform work related to the core function of the project regardless of location **iii) Primary supply workers:** People employed or engaged by project's primary suppliers. Statutory requirements for labour and working conditions, labour management practices and the occupational Health safety of workers need to be followed in the project and all activities associated with it
ESS-3 Resource-Efficiency-and-Pollution-Prevention-and-Management	Yes	The project is built around improving water efficiency in agricultural practices. The project also emphasizes Integrated Nutrient Management and Integrated pest management techniques. It would not procure any chemical fertilizers or pesticides under the project budget. Organic farming practices are encouraged in agriculture, thus reducing sources of pollution from the project. Estimating GHG would not be possible at this time in the project as all subprojects and interventions are not yet known. System for waste management from processing facilities will be in place. This would be covered as part of the ESCP
ESS-4 Community-Health-and-Safety	Yes	Project involved construction of larger and mini agri park, repairing of field channel
ESS-5 Land-Acquisition-Restrictions-on-Land-Use-and-Involuntary-Resettlement	No	No private land acquisition would be undertaken under this project. The Agri parm and aggregation center, food processing park would be constructed on government land free from encroachers and squatters.
ESS-6 Biodiversity Conservation	Yes	The project would not take up any interventions in protected or critical habitats. In the case of modified habitats, in the vicinity of protected or critical habitats, the project has developed a series of guidance.
ESS-7 Indigenous Peoples	Yes	This standard is relevant as the project will work in the tribal blocks. However, no adverse impact is envisaged on tribal land or communities.
ESS-8 Cultural Heritage	Yes	The screening criteria in the project make it mandatory to ensure that none of the sub-projects is located within 200 m of any ancient monuments and/or archaeological site(s) or any site of socio-cultural importance. This standard, however, is relevant as there may be tangible and intangible cultural heritage in tribal areas and the possibility of a chance to find during implementation.
ESS-9 Financial Intermediaries	Yes	Project is exploring potential commercial financing options directed via commercial banks acting as financial intermediaries (FIs). The ESMS of FIs including stakeholder engagement mechanism will be reviewed and gap filling measures, if any, will be proposed and reflected in the ESCP.
Environmental and Social Directive for Investment Project Financing	Yes	**Applies to Bank** in addressing E&S aspects of this project

ESS	Triggered (Yes/No)	Implications for the sub-project/ project
Bank Directive Addressing Risks and Impacts on Disadvantaged or Vulnerable Individuals or Groups	Yes	**Applies to the project.** The E&S Screening procedure adopted for this project and presented in the ESMF identifies all E&S risks, including impacts on biodiversity, vulnerable groups, and cultural heritage.
World Bank's Guidance note on managing the risks of adverse impacts on communities from temporary project-induced labour influx, 2016	Yes	A Labour Management Procedures has been prepared and will be customized for each of the sub-project requiring a labour force. A labour management procedure has also been developed for managing various types of labour.
General EHS Guidelines, April 2007, IFC	Yes	**Relevant** Project involves construction of civil infrastructure, common processing centre, promotion of agri and food based MSME, crop cluster development which may pose environmental risk on community, labour workers.

Assessing the nature, scope, and proposed place of the upcoming interventions, and the possible risk and impact on the adjacent environment as well as the effect of the environment on the project, the environmental and social risk is anticipated to be moderate. Conversely, the risk linked to Sexual Exploitation and Abuse or Sexual Harassment (SEA/SH) is estimated to be low. Therefore, the overall project is classified as having moderate environmental and social risk.

4.6. Country's E&S Regulation Vs. ESS of the World Bank

Table 5: Comparison of Country's Environmental Regulations and WB ESF and Gap Filling Measures

WB ESS	Equivalent National Environmental Regulations	Policy Gaps vs ESS and gap filling (redressal) Measures
ESS1: Assessment and Management of Environmental and Social Risks and Impacts	▸ The Environment (Protection) Act -1986 ▸ The Wildlife (Protection) Act 1972, ▸ Forest (Conservation) Act 1980 ▸ Eco Sensitive Zone (ESZs) Notifications by MOEF&CC ▸ Environmental Impact Assessment Notification-2006 & subsequent amendments ▸ Water (Prevention and Control of Pollution) Act, 1974, 1988; ▸ Environmental (Protection) Act, 1986 Rules with amendments till date ▸ Air (Prevention and Control of Pollution) Act, 1981, 1987; ▸ Noise Pollution (Regulation and Control Act) 2000 and amendment till date ▸ Solid Waste Management Rules, 2016 ▸ Hazardous & Other Waste (Management and Trans-boundary Movement) Rules, 2016 ▸ The E-Waste (Management) Rules, 2016, ▸ Construction & Demolition, Waste Management Rules, 2016 ▸ Motor Vehicles (Amendment) Act 2019 ▸ Guidelines to Regulate and Control Ground Water Extraction in India (With effect from 01.06.2019),	Gaps exist regarding assessments, consultations, monitoring and ESCP. The following additional measures are required: ▸ Conduct an environmental and social screening of the subprojects, and prepare sub-project specific E&S instruments such as ESMP where necessary; ▸ Undertake stakeholder engagement and disclose appropriate information in accordance with ESS10; ▸ Develop an ESCP, and implement all measures and actions set out in the legal agreement including the ESCP; and ▸ Conduct monitoring and reporting on the environmental and social performance of the project against the ESF.

WB ESS	Equivalent National Environmental Regulations	Policy Gaps vs ESS and gap filling (redressal) Measures
	▸ National Building Code 2016 and relevant standards of the Bureau of Indian Standards (BIS), ▸ Energy Conservation Building Code 2017.	
ESS2: Labour and Working Conditions	▸ The Building and Other Construction Workers (Regulation of Employment and Conditions of ▸ Service) Act 1996 and the Building and Other Construction Workers Welfare Cess Act, 1996 (BOCWW Cess Act) ▸ Contract Labour (Regulation & Abolition) Act 1970, ▸ Minimum Wages Act 1948, Payment of Wages Act 1936, ▸ Child Labour (Prohibition & Regulation) Act 1986, ▸ Bonded Labour System (Abolition) Act, 1976 ▸ Inter-State Migrant workmen's (Regulation of Employment & ▸ Conditions of Service) Act 1979 ▸ Employees Compensation Act 1923 ▸ Employees P.F. and Miscellaneous Provision Act 1952 (since amended) ▸ Maternity Benefit Act 1961 ▸ Sexual Harassment of Women at the Workplace (Prevention, Prohibition and Redressal) Act, 2013 ▸ Payment of Wages Act 1936 ▸ Equal Remuneration Act 1976 ▸ Payment of Bonus Act 1965 ▸ Inter-State Migrant workmen's (Regulation of Employment & Conditions of Service) Act 1979 ▸ Employer's Liability Act, 1938 ▸ Employees State Insurance Act 1948 ▸ The Personal Injuries (Compensation Insurance) Act, 1963	▸ The National and state legal provisions almost cover all requirements in ESS2 except relating to community workers and a functional GRM for different types of workers. ▸ Hence, a separate Labour Management procedures (LMP) document has been prepared to cover above requirements. ▸ The project specific OHS management measures as a part of LMP will use appropriate good practices/standards (such as WBG EHS guidelines) which will be followed in conjunction with requirements defined under various Indian legislations.
ESS3: Resource Efficiency, Pollution Prevention and Management	▸ Water (Prevention and Control of Pollution) Act, 1974, 1988; ▸ The Environmental (Protection) Act, 1986 Rules with amendments till date ▸ Air (Prevention and Control of Pollution) Act, 1981, 1987; ▸ Noise Pollution (Regulation and Control Act) 2000 and amendment till date ▸ Solid Waste Management Rules, 2016 ▸ Hazardous & Other Waste (Management and Trans-boundary Movement) Rules, 2016 ▸ The E-Waste (Management) Rules, 2016, ▸ Construction & Demolition, Waste Management Rules, 2016 ▸ Motor Vehicles (Amendment) Act 2019 ▸ Guidelines to Regulate and Control Ground Water Extraction in India (With effect from 01.06.2019),	The majority of ESS3 requirements are addressed by the existing regulations and indirectly for resource efficiency, pollution prevention and management aspects. Further, provisions need to be made to commensurate mitigation measures as: ▸ To assess the resource requirement and implement technically and financially feasible measures for improving efficient consumption of energy, water and raw materials, as well as other resources. ▸ Resource efficiency and pollution prevention to be assessed and minimize/control the release of

WB ESS	Equivalent National Environmental Regulations	Policy Gaps vs ESS and gap filling (redressal) Measures
	▸ National Building Code 2016 and relevant standards of the Bureau of Indian Standards (BIS), ▸ Energy Conservation Building Code 2017 ▸ Fertilizer (Control) Order, 1985 ▸ Insecticides Act, 1968	pollutants to air, water and soil due to routine and non- routine circumstances, and with the potential for local impacts.
ESS 4: Community Health and Safety	▸ Air (Prevention and Control of Pollution) Act, 1981; ▸ Water (Prevention and Control of Pollution) Act, 1974, for Pollution- Prevention-and Management; ▸ The Noise Pollution (Regulation and Control) Rules, 2000 ▸ Solid Waste Management Rules 2016 ▸ Hazardous & Other Waste (Management and Trans-boundary Movement) Rules, 2016 ▸ Construction & Demolition, Waste Management Rules, 2016 ▸ Harmonized Guidelines and Space Standards for Barrier Free Built Environment for Persons with Disability and Elderly Persons 2016, ▸ Occupational Safety, Health and Working Conditions Code 2019	While acts and rules cover for all of ESS 2 and ESS 4 requirements, gaps exist for community - community exposure to health issues. The gaps need to be addressed through suitable provisions in ESMPs. Also, contractor obligation as part of ESMP for Community health and safety to include need for labour influx management, air and noise pollution control, proper disposal of wastes, sewage and water, etc
ESS 5: Land Acquisition, Restrictions on Land use and Involuntary Resettlement	▸ The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013	This ESS 5 is not applicable to KERA project. ▸ However, Gap exists specifically related to clear identification of non-titleholders as PAPs; cut off dates for non-titleholders; and valuation of structures with depreciation. ▸ These gaps are addressed with suitable provisions in RPF.
ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	▸ Biological Diversity Act, 2002, ▸ Wildlife Protection Act 1972 (WLPA), ▸ The Forest (Conservation) Act, 1980 and amendments and The Forest (conservation) Rules 1981 and amendments, State Forest Acts, ▸ Eco Sensitive Zone (ESZs) Notifications by MOEF&CC ▸ Wetland (Conservation and Management) Rules 2017	▸ The National and state legal provisions almost cover all requirements in ESS6. ▸ The Project will adopt a negative list excluding Natural/critical habitats, eco-sensitive zones, Ramsar sites etc. areas right at the screening stage and any sub-project falling under these habitats will be excluded. ▸ Overall project level biodiversity management measures will planned and implemented through E&S screening and ESMPs where necessary to cover ESS 6 requirements.
ESS 7: Indigenous Peoples/Sub-Saharan African Historically	▸ Article 366 (25) of the Constitution of India ▸ Article 244(1) of Constitution of India - The Fifth Schedule under Article 244(1) of a subsequent Act of Constitution "Scheduled	While PESA Act requires clear communities acceptance vide a Gram Sabha resolution on the proposed activity with a pre-defined quorum of

WB ESS	Equivalent National Environmental Regulations	Policy Gaps vs ESS and gap filling (redressal) Measures
Underserved Tradition Local Communities	Areas" as such areas as the President may by order declare to be Scheduled Areas after consultation with Governor of that State. ▸ STs and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 ▸ Panchayats (Extension to the Scheduled Areas) Act, 1996	participation, ESS 7 requires ascertaining Free Prior and Informed Consent under three circumstances – impacts on land, cultural heritage and if requiring relocation. FPIC does not require unanimity and may be achieved even when individuals or groups within Indigenous Peoples/ groups explicitly disagree. Hence, in such cases both Gram Sabha resolution and FPIC under these three circumstances will be required.
ESS 8: Cultural Heritage	▸ Ancient Monuments and Archaeological Sites and Remains Act, 1958	Provisions from the act meets the ESS 8 requirements. ESS 8 will be applicable only if any of the sub project directly or indirectly impacting any cultural heritage or chance finds during the construction of sub-projects
ESS 9: Financial Intermediaries		
ESS10: Stakeholder Engagement and Information Disclosure	▸ Environmental Impact Assessment Notification-2006 and subsequent amendments ▸ RFCTLARR Act 2013 ▸ Right to information Act 2005	▸ There is a provision of public hearing in EIA Notification 2006 and also RFCTLARR Act 2013 mandates consultations with affected persons. ▸ However, the statutory process does not require preparation of a SEP or equivalent document as well as conducting meaningful consultations and information disclosure, that is accessible to all stakeholders. Measures to address the gap include – preparation of SEP wherein process of stakeholder consultations and engagement with all stakeholders – affected, other interested and physically disadvantaged information disclosure about project activities; feedback and GRM

5. POTENTIAL ENVIRONMENTAL & SOCIAL RISKS AND STANDARD MITIGATION MEASURES

5.1. Categorization of Project Activities

Proposed project activities can be grouped into two types based on potential negative impact. There are many intangible activities which falls under study, training/ capacity building, awareness programme, demonstration on climate resilient agriculture, piloting of AWD, crop advisory services, setting of Methane gas estimation lab, Carbon Credit selling, e-portal development, productive alliance support, DPR preparation work does not have any negative impact on environment. However, there may be social issues only related to beneficiary selection. Project will adopt inclusive strategy to give assured benefit to vulnerable group - women, widow, disadvantage, tribal, landless and etc. As all these activities does not pose any environmental or social risk and impact, any specific ESMP is not required for these such activities except adoption of issue specific mitigation measures. Potential impact mapping and its mitigation measures (ESMP) is devised only for those activities which has potential negative environmental or social risk & impact. Only those activities having potential negative impacts are discussed in subsequent sections and management plan are devised accordingly.

5.2. Environment and Social Risks and Impacts identified by each ESS

The E&S risks and impacts, described will be managed through an Environmental and Social Management Framework (ESMF), including the Stakeholder Engagement Plan, Labour Management Procedures (LMP), Integrated Pest and Nutrient Management (IPNM), Indigenous Peoples Planning Framework (IPPF) and Environment and Social Commitment Plan (ESCP) during planning, design and implementation stages. The ESMF includes an exclusion / negative list that prohibits project financing and support to activities i) within wildlife sanctuaries, national parks, eco sensitive zones, critical biodiversity areas, Ramsar sites and other wetlands important from biodiversity point of view; ii) involving significant physical displacement; iii) causing adverse impacts on customary tribal lands, natural resources and cultural properties; and iv) opposition of tribal leaders as well as community institutions. The ESMF also includes procedures for undertaking E&S screening of sub-projects and for preparing site-specific Environmental and Social Management Plans (ESMPs), based on the generic ESMPs provided in the ESMF as guidance.

ESS1 - Assessment and Management of E&S Risks and Impacts

This standard is applicable to the project. Civil construction activities for establishing agri parks, Common Processing Centres (CPC), Agri Business Centres (ABC), and canal renovations. The scope of these activities is small to medium, with limited environmental and social footprints, mainly comprising small constructions and upgrading/improvement works. The activities are anticipated to occur on existing land parcels owned and managed by the Department of Agriculture, Government of Kerala. The replantation process introduces the use of potentially hazardous materials, such as pesticides. An Environmental and Social Management Framework (ESMF) has been developed, encompassing an upstream assessment of environmental and social risks and impacts based on a sample of proposed project activities and template Environmental and Social Management Plans (ESMPs) corresponding to subprojects/activities. The management of environmental and social risks and impacts will be overseen through the ESMF, including the, Stakeholder Engagement Plan, Labour Management Procedures (LMP), and Environment and Social Commitment Plan (ESCP) during the planning, design, and implementation stages. The ESMF incorporates an exclusion/negative list prohibiting project financing and support for activities within wildlife sanctuaries, national parks, eco-sensitive zones, critical biodiversity areas, Ramsar sites, and other wetlands important from a biodiversity perspective. It also restricts support for activities causing significant physical displacement, adverse impacts on customary tribal lands, natural resources, and cultural properties, as well as activities opposed by tribal leaders and community institutions. The ESMF includes procedures for

E&S screening of sub-projects and the preparation of site-specific Environmental and Social Management Plans (ESMPs) based on generic ESMPs provided as guidance. It outlines guidance for community consultations and participation in the design and implementation of investments, along with provisions for training project staff and communities on E&S issues. Given the project's implementation in tribal areas, key requirements of ESS7, including the Stakeholder Engagement Plan, institutional arrangements, grievance mechanisms, and intervention planning, are incorporated into the ESMF. Additionally, the Stakeholder Engagement Plan (SEP), Labour Management Procedures (LMP), Indigenous Peoples Planning Framework (IPPF), and Integrated Pest Management (IPM) plan have been prepared under the ESMF. The World Bank Group's Environment, Health, and Safety Guidelines (EHSG) are adhered to while developing the ESMF and other Environmental and Social Framework (ESF) instruments.

ESS2 - Labour and Working Conditions

ESS2 (Environmental and Social Standard 2) is pertinent to the KERA project due to its employment of direct, contracted, and primary supply workers at various stages of preparation and implementation.
Labor and working condition-related risks and impacts arising from the construction of Agri parks, CPCs, and ABCs encompass safety concerns such as injuries, accidents, and, in severe cases, fatalities occurring during civil construction and other project activities. Occupational health and safety hazards faced by workers, including those associated with working at heights, operating equipment and machinery, and exposure to air and noise pollution. Short-term effects resulting from exposure to dust and elevated noise levels during work activities Additionally, concerns involve inadequate accommodation facilities at workforce camps, including insufficient sanitation and health amenities, non-payment of wages, employment discrimination (e.g., sudden termination, unfavorable working conditions, wages, or benefits), and the potential for sexual harassment at the workplace. Health risks to labor, particularly relating to communicable and transmittable diseases. Replantation endeavors are anticipated to enhance agricultural operations, potentially leading to heightened utilization of fertilizers and pesticides by both farmers and plantation workers. There is a likelihood of the use of hazardous substances, such as pesticides, without proper Personal Protective Equipment (PPE). Additional concerns encompass non-payment of wages, employment discrimination (e.g., sudden termination, unfavorable working conditions, wages, or benefits), potential incidents of sexual harassment at the workplace, and health risks for labor associated with communicable and transmittable diseases. Furthermore, generic risks applicable to all types of workers include unclear terms and conditions of employment, discrimination, denial of equal opportunity in hiring and promotions, incentives, and training opportunities, as well as the refusal of workers' rights to form labor organizations. An absence of a grievance mechanism for labor to address and seek redressal for their grievances and issues is also recognized as a potential risk.

Given the prevalent reliance on external migrant labor in the state's construction sector, the ESMF has scrutinized the legal framework governing labor management. The evaluation recommends measures to ensure labor safety and fair treatment, providing PPE kits encompassing the formulation of a worker-specific Grievance Redress Mechanism (GRM) that is also attuned to Social and Environmental Assessment (SEA) and Sexual Harassment (SH) considerations. The Labour Management Procedure (LMP) prepared as a part of Environmental and Social Management Framework (ESMF) for the project ensures the incorporation of provisions related to Occupational Health and Safety (OHS), a Code of Conduct for Workers addressing SEA-SH concerns, prohibition of child labour, labour working conditions, GRM and delineates the responsibilities of contractors in the proposed mitigation measures. Labor Management Procedures have been developed proportionate to the estimated deployment and commensurate with identified risks, with detailed inclusion in the Environmental and Social Management Framework (ESMF). The Integrated Pest and Nutrient Management Plan (IPNM) is delineated within the Environmental and Social Management Framework (ESMF), providing comprehensive guidance for the storage, handling, and disposal of pesticides. It encompasses directives on Good Agriculture Practices, recommended dosages for fertilizers and pesticides, and the incorporation of biological controls as part of the plan.

ESS3 - Resource Efficiency and Pollution Prevention and Management

ESS3 holds relevance in the context of civil construction activities associated with the establishment of agri parks, CPCs, ABCs, and canal renovations. These activities are poised to generate solid waste and wastewater, involve water usage, and contribute to dust generation through the operation of construction equipment, materials transporting vehicles, and DG sets etc. Furthermore, sewage and wastewater may be produced at construction worksites and labor camps. All these proposed facilities will release environmental pollutants during operation stage.

The process of replantation introduces another set of concerns, given the use of potentially hazardous materials like pesticides. There exists the risk of negative impacts on soil and groundwater due to contamination through leaching, especially if there is excessive application of fertilizers and pesticides that are not adequately managed. To mitigate these localized and potentially limited impacts, standard management procedures are outlined in the Environmental and Social Management Framework (ESMF) and generic/site-specific Environmental and Social Management Plans (ESMPs) are prepared in the ESMF. The ESMF includes best practices in the handling, application, storage of fertilizers and pesticides and Good Agriculture Practices. An Integrated Pest and Nutrient Management (IPNM) approach is prepared in the ESMF to minimize the reliance on pesticides. The Integrated Pest and Nutrient Management Plan (IPNM) is delineated within the Environmental and Social Management Framework (ESMF), providing comprehensive guidance for the storage, handling, and disposal of pesticides. It encompasses directives on Good Agriculture Practices, recommended dosages for fertilizers and pesticides, and the incorporation of biological controls as part of the plan. This approach also includes measures to monitor and ensure that the usage of pesticides classified as extremely hazardous (World Health Organization's Hazard Class 1a: highly hazardous; Class 1b: Hazard, Class II: Moderate risk or falling under Annexes A and B of the Stockholm Convention are avoided. Compliance with national legislation governing pesticide use is also highlighted in the Integrated Pest and Nutrient Management (IPNM).

ESS4 - Community Health and Safety

The establishment of Agriparks, ABCs, CPCs, and canal renovations may pose risks and have impacts on community health and safety. These potential consequences include minor occurrences such as waterlogging, dust emissions, and elevated noise levels during construction. Additionally, concerns extend to more significant issues like soil erosion, accidents resulting from inadequate traffic management at construction sites, and the emergence of odors and mosquitoes due to untreated sewage disposal from labor camps, disposal of C&D wastes etc. Risks are anticipated to arise from improperly scheduled construction activities, inadequate disposal of sewage and wastewater, and indiscriminate dumping of construction waste etc. Furthermore, the replantation of crops carries health risks to the community, including chronic and acute exposure to pesticides, bioaccumulation of pesticides in the food chain, food safety issues etc. Issues may arise from unhygienic conditions, improper chemical use, and pesticide spraying in unfavorable weather conditions such as during strong winds. Kerala typically relies on non-local/migrant labor for construction, the current project's specific site deployment is not expected to significantly impact host communities.

The assessment of Social and Environmental Assessment (SEA) and Sexual Harassment (SH) related risks to the community is deemed low from the consultations held. This is attributed to the substantial presence of female extension workers employed by the DoA and the extensive support received from the Kudumbasree women's collective in extension activities. Consultations with the local community and discussions with women's groups in the project areas indicate a lack of high levels of SEA/SH risks.

ESS6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources

The proposed project's primary focus is on fostering the primary production activities of small-scale producers, particularly in the cultivation of plants and harvesting living natural resources. This necessitates adherence to the principles outlined in Environmental and Social Standard 6 (ESS6) for sustainable management. The Environmental and Social Management Framework (ESMF) includes screening criteria

that comprise an exclusion/negative list, preventing activities in critical natural habitats and eco-sensitive zones with species of critical biodiversity values. Activities within notified critical habitats, sanctuaries, national parks, Ramsar sites, etc., are explicitly ruled out under the KERA project. Replantation activities are not anticipated to have any direct adverse impact on flora and fauna. IPNM is prepared as part of ESMF for judicious use of Pesticides and switching to biological controls for Pest Management etc. Construction activities related to Agri parks, CPCs, and ABCs primarily with no foreseen direct adverse effects on biodiversity and natural habitats. Additionally, the environmental and social screening and assessment processes have yielded findings that inform the incorporation of site-specific Environmental and Social Management Plans (ESMPs). These plans include appropriate mitigation measures, if deemed necessary, to prevent adverse impacts on the natural habitat.

ESS7 - Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities

ESS7 is relevant since KERA will be implemented in tribal areas. FGD's were conducted with local tribal communities in tribal dialects to explain the project objectives, benefits, risks, and impacts and seek informed feedback on proposed interventions. The project interventions will benefit tribal communities and no adverse impacts on tribal communities are anticipated from the consultations held. The DoA will undertake a social assessment exercise that would involve targeted social analysis of project risks and impacts on tribal communities, including constraints and barriers in accessing agriculture extension, inputs and information services. The project will ensure inclusive, simple, accessible and culturally appropriate delivery of services to tribal farming communities. Activities involving physical displacement of tribal households, adverse impacts on tribal livelihoods, their lands and cultural heritage are not supported by project activities and are included in the negative list of activities in the ESMF.An Indigenous Peoples Planning Framework (IPPF) has been formulated and incorporated into the Environmental and Social Management Framework (ESMF). The E&S screening is integrated to guarantee that the proposed interventions do not have adverse effects on community conserved areas, sacred groves, or customary practices. Program investments will not support activities that result in the physical displacement of tribal households, negatively impact tribal livelihoods, or affect their lands and cultural heritage.

ESS8 - Cultural Heritage

The standard is pertinent to the project, which spans the entire state. Although the project involves limited physical investments in lands already designated for agriculture and allied purposes, a significant portion of the state's agriculture is centered around homesteads. There is a potential for some project interventions to be in proximity to areas of cultural significance or along access routes, potentially impacting local cultural heritage, cultural resources, and customary practices in both tribal and non-tribal areas. While comprehensive impacts will be evaluated during screening and the preparation of Environmental and Social (E&S) instruments, community consultations will be conducted as a measure to mitigate such risks.

Identified impacts on cultural heritage and chance discoveries will be addressed in accordance with national legal requirements, as well as procedures and guidance outlined in Environmental and Social Standard 8 (ESS 8). The contractor will take reasonable precautions to prevent their workers or any other individuals from removing or damaging any such articles or artifacts. Protocols for handling chance finds and notifying authorities are developed as part of the Environmental and Social Management Framework (ESMF) and are included in the Environmental and Social Management Plans (ESMPs).

Cultural properties with documented and significant cultural value that are at risk from project interventions will be excluded. Other assets of similar nature will undergo assessment and local consultations, and procedures outlined in the ESMF will be followed for their management.

ESS9 - Financial Intermediaries

ESS9 is relevant at this stage as the project is exploring potential commercial financing options directed via commercial banks acting as financial intermediaries (FIs). The ESMS of PFIs including stakeholder engagement mechanism will be prepared and reviewed and gap filling measures, if any, will be proposed and reflected in the ESCP.

ESS10 - Stakeholder Engagement and Information Disclosure

An inclusive Stakeholder Engagement Plan (SEP) consistent with ESS10 requirements was prepared, approved, and disclosed. The SEP establishes a systematic approach for consultation and helps promote an inclusive and participatory approach for stakeholder engagement. It also includes multiple channels of communication and engagement with key stakeholders, stakeholder meetings, review meetings, web disclosure, and beneficiary feedback mechanisms throughout the life of the project. The SEP will also include strengthening of an accessible and inclusive grievance redress mechanism that would be rolled out. Finally, the SEP will be updated as and when necessary, during project implementation. Extensive consultations were held in 9 districts with stakeholders potentially affected by the proposed interventions. These identified stakeholders were Tribal farmers, Women self-help groups, *Kudumbasree* groups, *Padasekhara*, SC, ST farmers, Tenant farmers, FPO's, PRI members etc. A Consultation checklist was used to get stakeholder feedback, constraints, and concerns on the proposed KERA interventions. SEP was prepared in accordance with ESS10. The SEP maps the component wise key project stakeholders, assesses likely stakeholder impacts, roles and interest related to the project interventions, their type of engagement or information needs and mode of engagement. All project related E&S documents will be disclosed on the Borrower's website. The PMU under the Department of Agriculture and Farmers Welfare, Govt. of Kerala will be overall responsible for implementation of the SEP.

5.3. Mapping of Project activities with potential Negative Impact

It is anticipated that the execution of the project will have both positive and negative impacts, environmentally and socially, on various receptors such as soil, air, surface water, workers' health and safety, local community, sensitive receptors, flora and fauna, farmers, among others. Most impacts are reversible, but some, such as effects on surface water and soil quality due to the leaching of chemical pesticides and fertilizers, as well as chemicals from food processing units and testing laboratories, may cause longer-term changes.

The table below specifically lists only those sub-components and activities that might have a negative impact. For each of these, potential environmental and social risks and impacts have been identified and paired with suitable mitigation measures.

Table 6: Project component and activity wise potential negative impacts

Activity	Anticipated E&S Risk and Impact	Mitigation Measures
Component 1: Climate Resilience and Mitigation in Agriculture		
Sub-component 1A: Developing improved climate resilient technologies and practices – across 14 Districts in 22 crops		
	Poor crop selection could lead to crop failure or reduced yield	Consulting agricultural experts, local agricultural extensions in choosing the most suitable crop; Traditional and pest resistant varieties, Avoid hybrid varieties Regular training on CSA practices;
	Lack of PoP implementation knowledge; Economic viability; Limited Flexibility due to 'one-size-fits-all' solution	Ensure regular updating of the PoP based on the latest research, provide targeted training and resources to farmers, incorporate flexibility and adaptations in the PoP to suit individual farm conditions, and consider local socio-economic contexts while recommending practices.

Activity	Anticipated E&S Risk and Impact	Mitigation Measures
	Risk of inclusion of hazardous pesticides (WHO banned) in the PoP	Update PoP on regular basis and replace WHO banned pesticides[21] with safer alternatives in the PoP; Train farmers on safe pesticide use and alternatives on regular interval
	Selection of Green as well as women friendly Technology	Factor into sustainability, Adaptability, energy efficiency, Women Friendly, cost-effective, durability while selecting green technologies for climate resilient farming
	Difficulty in understanding the content of IEC material; Missing any key communication channel/ failed to reach target audience;	Translate at least all key content/ information in local vernacular language for easy and clear understand of target groups; Identify all key communication channel and ensure dissemination through it.
Sub-component 1B: Capacity development of extension and advisory service providers and farmers– across 14 Districts		
Sub-component 1C: Enhancing climate and weather data based crop management		
Training	Failure to wider dissemination objective due to selection of lead trainer and stakeholders who don't have community level acceptance or influence	▸ Include master trainers (for ToT) from each types of stakeholders and include training member (receiver) from all types and class of stakeholders.
Solarization of Krishi Bhavan;	Involvement of Child labour in solar value chain	▸ Establish clear guidelines for suppliers and contractors, emphasizing zero tolerance for child labor.
	Shock hazards or fire caused by faults in the wiring or lightning; ground faults;	▸ Maintain effective earthing of solar PV system
	Auto tracking of panels	▸ Use auto-tracking in solar panel to increase power output
	Excess water use by free energy	▸ Use a smart water meter to monitor water usage.
	At the end of their lifespan, solar panels / electronic & IOT devices become e-waste	▸ Proper recycling and disposal are necessary to minimize the environmental impact of solar panel waste.
Purchase of electronic, electrical devices Purchase of IT equipment & IOT Establishment ICT infrastructure at Krishi Bhavan and Plant Health Clinics	Dismantling of old electronic and IT asset Throwing away old IT assets leads to a loss of valuable resources that could be recovered through recycling. Improper disposal of e-waste can lead to the release of hazardous substances like lead, mercury, cadmium, and brominated flame retardants into the environment, contaminating soil, water, and air.	▸ Prior to recycling or disposing of IT assets, ensure that all data is securely wiped from storage devices to protect sensitive information. ▸ Conduct a thorough inventory of all IT assets and assess their condition, functionality, and potential for reuse or recycling. ▸ Explore options to refurbish and reuse IT assets within the organization.

[21] list of pesticides classified under WHO categories Ia, Ib, and II: https://iris.who.int/bitstream/handle/10665/332193/9789240005662-eng.pdf?sequence=1

Activity	Anticipated E&S Risk and Impact	Mitigation Measures
Establishing IT infrastructure in 1000 nos. of Krishi Bhavan		▸ Sell or send it only to authorized dismantler or recycler[22]
Renovation and Expansion of Krishi Bhavan buildings; building upgradation of Training Agencies (Civil Construction) and construction of soil testing lab; construction of Kerala Agro Climate Research Centre	Potential risks and impacts on environmental health and safety (EHS), waste management, and labor-related concerns	The Generic Environmental and Social Management Plan (ESMP) for the proposed infrastructure creation, laid down in Annexure II.A, will be implemented during the design, pre-construction, and construction phases. This will be done in conjunction with the Labor Management Procedure detailed in Annexure III.
Upgrade / new Testing Lab (Residue, Soil, etc.)	**Building designs and construction** Dearth of space, poor ventilation and illumination, lack of basic facilities may lead to uncomfortable working conditions.	▸ The laboratories should have sufficient space, ventilation, lighting, regular supply of essentials like quality water. Stack rooms, store rooms etc. should be spacious and well ventilated.
	Electricity supply and safety Inconsistent and erratic power supply, together with voltage variances, can pose serious risks to both the grade of operation and safety procedures	▸ Regular and stabilized electricity supply (220-230 volts) preferably green and captive should be ensured. ▸ Provision of standby source for power supply to sensitive and costly equipment. ▸ Properly ground all power sources to safeguard both people and equipment.
	Safeguards Lack of safeguards poses risk of exposure to harmful chemicals and accidents.	▸ An efficient hood system is necessarily required at laboratories in order to remove various toxic and hazardous fumes from the work place generated during use of organic solvent/or during acid digestion ▸ The top surface of working bench should be made of acid and alkali resistant materials ▸ All the laboratories should be equipped with fire fighting facilities, first aid kit, look into the feasibility for provision of eye wash fountains, safety showers etc. There should be adequate number of exit doors in case of emergency. ▸ Fire safety instructions should be displayed in the form of posters in the wall and all the students, technicians, housekeeping staff should be oriented on immediate

[22] KSPCB authorised e-waste dismantler and recycler: Sahya Solutions Group of Waste Management; 3/310, Badayil Estate, Meloram P.O, Peruvanthana

Activity	Anticipated E&S Risk and Impact	Mitigation Measures
		response to accidental burns, acid spills, fire etc. ▸ Design SOP with clear mention of detail step by step procedure, safety instruction, Quality Assurance and Quality Control protocol, roles and responsibility and ensure that that work processes are conducted in a controlled and consistent manner ▸ Store chemicals in designated areas with proper ventilation, containment, and safety measures to prevent spills and leaks. ▸ Ensure that all chemicals are stored in appropriate containers, correctly labeled with clear and accurate information. ▸ All the hazardous substances should be labeled with precautions for the user.
	Training and Inspection	▸ Conduct regular training programs for laboratory staff on best practices for chemical handling, waste management, and disposal procedures. ▸ Conduct regular inspections to identify any leaks, spills, or potential sources of pollution.
	Waste disposal Soil and water pollution due to careless disposal of laboratory waste / chemicals into unsecured drains and thoughtless disposal of empty containers	▸ Establish guidelines and procedures for the safe disposal of chemicals and empty containers. ▸ The labs should have provisions for safe disposal of hazardous wastes ▸ Provide clearly marked containers for the collection and proper segregation of different types of chemical waste. ▸ There should be a plan for separate collection of hazardous wastes which should be properly treated or disposed
Sub-component 1D: Supporting low carbon rice in Palakkad and Thrissur (with IRRI and KAU and CWRDM) with a pilot for emission reduction payments to supplement incomes		
Low carbon paddy cultivation	**Transition Challenges** Farmers may struggle with the transition from traditional methods to low carbon paddy cultivation techniques	▸ Encourage farmers to implement changes gradually over time. ▸ Establish farmer support groups or cooperatives to foster a sense of community among the farmers, ▸ Provide adequate awareness training and orientation on low carbon paddy cultivation
Assistance for laser land levelling	Laser-leveling involves the movement and reshaping of soil, which can damage topsoil and microbiology.	▸ Remove topsoil and preserve them for later reapplication on the leveled surface.

Activity	Anticipated E&S Risk and Impact	Mitigation Measures
		▸ Minimize soil compaction by carefully controlling the movement and reshaping of soil during laser-leveling. ▸ Avoid excessive traffic or machinery movement over the soil, especially when it is wet, to prevent compaction and damage to soil structure. ▸ Use microbial inoculants or beneficial soil amendments to reintroduce and support soil microbiology.
Strengthening of Irrigation Infrastructure - Repairing of concrete lining, cleaning of canal bed *in 600 km long canal*	Potential risks and impacts on environmental health and safety (EHS), waste management, and labor-related concerns.	Generic ESMP for proposed infrastructure creation given in Annexure II.B shall be updated for each sub-package and implemented along with the Labour Management Procedure given in Annexure III

Activity	Anticipated E&S Risk and Impact	Mitigation Measures
Component 2: Enhancing Small-holder Commercialization for Value Addition		
Sub-component 2A: Support to Productive Alliances between Farmer Producer Companies and Partnering Agribusiness		
Crop Cluster Development Programme - Implementation	Crop clusters often require assured irrigation, which can deplete local water resources and lead to water scarcity in dry regions; Use of fertilizers and WHO banned[23] or ICAR banned[24] pesticides in crop production can lead to water pollution through runoff, which can contaminate rivers, lakes, and groundwater; Intensive cultivation practices can lead to increased soil erosion, particularly on slopes. This erosion can result in the loss of valuable topsoil and affect soil fertility, productivity, and water-holding capacity. Crop clusters contribute to greenhouse gas emissions through the use of fossil fuels in farming activities, such as machinery operation and transportation. Practices like land clearing and the application of synthetic fertilizers release nitrous oxide and carbon dioxide into the	▸ Promote the adoption of efficient irrigation practices, such as drip irrigation or micro-irrigation systems, which can significantly reduce water consumption by delivering water directly to plant roots. ▸ Encourage the implementation of water conservation measures, such as rainwater harvesting and water re-use systems, to supplement irrigation ▸ Raise awareness among farmers, local communities, and stakeholders about the importance of water conservation and sustainable irrigation practices. ▸ Promote the adoption of integrated pest management (IPM) practices that prioritize natural pest control methods and minimize the use of synthetic pesticides. ▸ Encourage the adoption of conservation tillage practices, such as no-till or reduced tillage, which

[23] list of pesticides classified under WHO categories Ia, Ib, and II: https://iris.who.int/bitstream/handle/10665/332193/9789240005662-eng.pdf?sequence=1

[24] List of pesticides banned in India: Pesticides / Formulations Banned In India | ICAR-Indian Institute of Spices Research

	atmosphere, which are potent greenhouse gases. Loss of Biodiversity and Genetic Erosion. Crop clusters often require a large workforce, which can lead to issues related to labor conditions and workers' rights. Workers may face low wages, long working hours, unsafe working conditions. Burning of crop residues to kill weeds Marginalized communities may struggle to access land, water, and other resources necessary for their livelihoods. Loss or erosion of traditional farming practices, knowledge systems, and cultural heritage of local communities. This can lead to a loss of identity, cultural disconnection, and erosion of traditional sustainable practices. Intercropping Intensive use of agrochemicals in crop clusters can have negative health impacts on neighboring communities.	minimize soil disturbance and help maintain soil structure. ▸ Promote the implementation of terracing and contour farming techniques, particularly on sloping lands, to reduce the erosive effects of water runoff. ▸ Promote the use of energy-efficient machinery and equipment in farming operations, such as tractors, irrigation systems, and processing facilities. ▸ Practice solarization process instead of crop residue burning to kill weeds and prepare plot ▸ Encourage the adoption of renewable energy sources, such as solar panels or wind turbines, to meet the energy needs of crop clusters. ▸ Select most beneficial different combinations of companion crops. ▸ Promote practices that minimize land clearing, such as agroforestry systems or land-use planning that prioritizes the preservation of natural vegetation ▸ Establish and maintain seed banks to preserve a wide range of varieties. ▸ Establish and maintain pollinator-friendly habitats within and around agricultural areas, such as wildflower strips, hedgerows, or butterfly gardens. ▸ Provide training and support to farmers on the proper use of IPM techniques to reduce reliance on agrochemicals and minimize health risks. ▸ Adopt Safe handling and application of agrochemicals as per precaution guidance
Investment in Agri Business Centres	**Construction Stage** Potential risks and impacts on environmental health and safety (EHS), waste management, and labor-related concerns	The Generic Environmental and Social Management Plan (ESMP) for the proposed infrastructure creation, laid down in Annexure II.A, will be implemented during the design, pre-construction, and construction phases. This will be done in conjunction with the Labor Management Procedure detailed in Annexure III.
	Operation Stage Extraction of ground water for processing, cleaning, or cooling of agricultural products can impact water availability and	Proper waste management practices, such as recycling, composting, or appropriate disposal, are crucial to minimize environmental impacts.

	ecosystems, particularly in areas with water scarcity. Basic Amenities ABC generates organic waste, packaging materials, and waste from cleaning and processing operations. Odour pollution from generated food waste if not disposed in regular interval;	▸ Provision of all time drinking water facilities, separate toilet provision, cleaning and bathing provision shall be provided. ▸ Regular disposal of waste and cleaning, maintain good housekeeping, hygiene standards in ABC ▸ Implement an on-site composting facility to manage and compost organic waste
Financial assistance to FPO for establishment of Custom hiring Centre, Common Facility Centre	Business plan Screening to ensure compliance with ESMF Chance of exclusion of women farmers, Permit/ License from SPCB, FSSAI, Input Supply CHCs generates waste in the form of used oil, lubricants, filters, and other machinery components. Generates agricultural residues, organic waste from processing, and packaging. Proper waste management practices, such as composting, recycling, or appropriate disposal, are essential to minimize environmental impacts. Energy efficient rating, BEE rating, regular servicing, first aid, same as component 1 c Impact due to farm mechanization, garbage generated from the aggregation, storage, processing Odour pollution from generated food waste if not disposed in regular interval; Packaging Use of Preservative, adhesive Effluent generation and management	▸ Business plan submitted by FPO should address basic E&S issues and management measures. While evaluating business application, women/ disadvantage applicant may be given some relaxation ▸ Each business plan should have dedicated section on identified E&S risk and mitigation measures ▸ Check the participation of women members in BoD while processing business plan ▸ FPO should have valid license for supply of agri inputs (fertilizers, pesticides, seeds) ▸ PFO involved in food processing shall obtain Food safety licenses from FSSAI ▸ Explore the possibility of solarization ▸ Install safety measures like CCTV cameras, secure entrance and exits, security personnel etc. ▸ Provide safety facility like fire extinguishers, emergency exits, first aid kits, and other safety equipment. ▸ Provide Basic amenities like drinking water, separate toilet, well ventilated office space etc ▸ The machineries / instruments to be procured / installed should have ISI mark and atleast 3star BEE rating. ▸ Purchase of MRL tested raw materials as feasible ▸ Maintain good housekeeping, hygiene standards in CPC ▸ Go for eco-friendly packaging wherever feasible. Manufacturing and expiry date shall be printed in the packaged product. ▸ Minimize the use of chemical preservative and adhesive or else

		keep it within the safe permissible limit ▸ Avoid using azo-dyes or else use only approved food colorings ▸ Provide clearly labeled and designated storage areas for different types of waste, such as used oil, lubricants, filters, and other machinery components. ▸ Identify local or regional recycling facilities that accept used oil, lubricants, and filters and sale to them. ▸ Identify and engage with local waste management services or disposal facilities to ensure the proper and safe disposal of non-recyclable waste. ▸ Implement an on-site composting facility to manage and compost organic waste ▸ STP and / ETP shall be installed and operated efficiently as per the condition stipulated in Consent of Operate ▸ Possibility of recycling of treated effluent shall be explored during operation stage. Treated water may be reused in the process itself, gardening and landscaping purpose
Sub-component 2B: Rejuvenation of the small-holder tree crops sector and leveraging long-term finance through partial credit guarantee with Nabsanrakshan		
Replantation and Sustainable cultivation	Potential risks and impacts on environmental health and safety (EHS), waste management, and labor-related concerns	The Generic Environmental and Social Management Plan (ESMP) for replantation, laid down in Annexure II.C shall be updated for each sub-package and implemented during the design, pre-construction, construction and operation phases. This will be done in conjunction with the Integrated Pest and Nutrition Management Practice detailed in Annexure IV
Sub-component 2C: Increasing Land Utilization		

Activity	Anticipated E&S Risk and Impact	Mitigation Measures
Component 3: Strengthening Agribusiness, Agri-tech Start-ups and Food and Agriculture SMEs		
Sub-component 3A: Support for emerging high-growth agri-food SMEs. (PIU- DoI - MSME)		
Sub-component 3B: Support to the Kerala Start-Up Mission (PIU) to launch additional start-ups in the agri-food space		
Financial assistance to FPO for establishment of Custom hiring Centre, Common Facility Centre	Business plan Screening to ensure compliance with ESMF Chance of exclusion of women farmers,	▸ Business plan submitted by FPO should address basic E&S issues and management measures. While evaluating business

	Permit/ License from SPCB, FSSAI, Input Supply CHCs generates waste in the form of used oil, lubricants, filters, and other machinery components. Generates agricultural residues, organic waste from processing, and packaging. Proper waste management practices, such as composting, recycling, or appropriate disposal, are essential to minimize environmental impacts. Energy efficient rating, BEE rating, regular servicing, first aid Impact due to farm mechanization, garbage generated from the aggregation, storage, processing Odour pollution from generated food waste if not disposed in regular interval; Packaging Use of Preservative, adhesive Effluent generation and management	application, women/ disadvantage applicant may be given some relaxation ▸ Each business plan should have dedicated section on identified E&S risk and mitigation measures ▸ Unit involved in food processing shall obtain Food safety licenses from FSSAI ▸ Explore the possibility of solarization of the process ▸ Install safety measures like CCTV cameras, secure entrance and exits, security personnel etc. ▸ Provide safety facility like fire extinguishers, emergency exits, first aid kits, and other safety equipment. ▸ Provide Basic amenities like drinking water, separate toilet, well ventilated office space etc ▸ The machineries / instruments to be procured / installed should have ISI mark and atleast 3star BEE rating. ▸ Purchase of MRL tested raw materials as feasible ▸ Maintain good housekeeping, hygiene standards in CPC ▸ Go for eco-friendly packaging wherever feasible. Manufacturing and expiry date shall be printed in the packaged product. ▸ Minimize the use of chemical preservative and adhesive or else keep it within the safe permissible limit ▸ Avoid using azo-dyes or else use only approved food colorings ▸ Provide clearly labeled and designated storage areas for different types of waste, such as used oil, lubricants, filters, and other machinery components. ▸ Identify local or regional recycling facilities that accept used oil, lubricants, and filters and sale to them. ▸ Identify and engage with local waste management services or disposal facilities to ensure the proper and safe disposal of non-recyclable waste. ▸ Implement an on-site composting facility to manage and compost organic waste

		▸ STP and / ETP shall be installed and operated efficiently as per the condition stipulated in Consent of Operate ▸ Possibility of recycling of treated effluent shall be explored during operation stage. Treated water may be reused in the process itself, gardening and landscaping purpose
	Consent to Establish and Operate	Obtain Consent from State Pollution Control board before operation
Sub-component 3C: Support to food parks – investing in 3 large-scale Agri-parks, 2 smaller Agri-parks and 5 common processing centres (CPCs)		
	Potential risks and impacts on environmental health and safety (EHS), waste management, and labor-related concerns	The Generic Environmental and Social Management Plan (ESMP) for the proposed infrastructure creation, laid down in Annexure II.A shall be updated for each sub-package and implemented during the design, pre-construction, construction and operation phases. This will be done in conjunction with the Labor Management Procedure detailed in Annexure III.

5.4. Overview of Environmental and Social Management Plans (ESMPs)

A brief overview of different types of management plans with their status and future action plan is tabulated in Table 7. Contract package specific ESMP shall be developed by respective RPMU/ PIU with support from safeguard specialist at PMU.

Table 7: Overview of ESMP

Name of the ESMP	Timeframe for development	Responsibility for development	Approved By	Key features of the ESMP
Project ESMP	Developed (presented in Chapter 5 of this document).	Developed by PPT, DoA with support from ESMF Consultant.	PMU	Provides mitigation measures specific to each project activity under component. ▸ ESMP Includes mitigation plans on the following: ▸ Activity specific ESMP given in Table 6 ▸ LMP, IPNM, IPPF given at Annexure III, IV and V; ▸ Generic EMP given in Annexure – IIA, IIB and IIC need to be strengthen further as per contract package. ▸ Addendum ESMP for CERC component need to be developed as per the guideline given in Annexure VII, in case of CERC is triggered
Contract package ESMP	To be developed for each subsequent contract package parallel to the contract package development.	RPMU/ PIU with support from safeguard specialist at PMU.	PMU	Provides mitigation measures specific to the contract package with relevant links to the items in the Bill of Quantities and to the contract conditions. ▸ Generic ESMP for 1) Infrastructure creation, 2) rehabilitation of irrigation infrastructure and 3) Replantation activity given in Annexure IIA, IIB

Name of the ESMP	Timeframe for development	Responsibility for development	Approved By	Key features of the ESMP
				and IIC shall be strengthen further inline with the contract package ▸ First five (5) package specific ESMP shall be prepared and vetted through the safeguard specialist of the World Bank

6. ENVIRONMENTAL & SOCIAL MANAGEMENT FRAMEWORK

6.1. Background of ESMF

Environmental and Social Management Framework (ESMF) is a tool for use by a project proponent to identify and address the potential environmental and social impacts and risks of a project across all stages from planning stage to its implementation and post- implementation operations. Keeping this in view, the present ESMF has been developed for use by DoA and implementing agencies (Line Departments) during various stages of the KERA. A step-by-step methodology has been provided that can be followed during implementation of various components under the KERA. In development of the ESMF, a standard list of activities & E&S risks and impacts identified from the project screening templates of the subprojects have been developed which would be generally applicable to all the subprojects under the KERA. Under the ESF of the World Bank, ESS1 is the overarching ESS, which shall be used to determine the relevance of each of the ESS 2 to 8 and ESS 10, based on the identified standard list of activities.

As the exact details of most of the subproject where civil construction works and other project activities will be undertaken under KERA, are not yet confirmed with specific project details, an ESMF has been prepared. The ESMF consists of the set of mitigation, monitoring and institutional measures and associated procedures to be undertaken during the design, pre-construction, construction and functional stages of the Agri-Park, Agri-Business Centre, Common Processing Centre, Repairing of Canal Infrastructure, Renovation of Govt. Building to eliminate, offset or reduce adverse environmental impacts and risks.

6.2. Application of ESMF

ESMF will be applied to the overall project through a two-stage process as described below:

Stage I: Undertaking Environmental and Social Screening of all subprojects of Agri-Park, Agri-Business Centre, Common Processing Centre, Repairing of Canal Infrastructure, Replantation, Agri. Wholesale Market Development under KERA using environmental and social checklists to identify environmental and social (E&S) risks and impacts.

Stage II: Prepare Specific ESMPs depending on sub project specific activities.

DoA through its PMU will assess the sub-projects according to the same risk categories described in ESS1 and manage, supervise, and monitor the environmental risks and impacts of the subprojects through the project life cycle. Thus, preparation of subproject specific Environmental and Social Management Plans (ESMPs) will be guided by the E&S Screening Criteria from the ESMF. All subprojects will be required to develop site-specific Environmental and Social Management Plans (ESMPs), taking into consideration the Bank's Environmental, Health, and Safety Guidelines (EHSGs); ESSs, and national and state regulations to define specific mitigation and prevention measures to prevent and reduce risks and impacts.

The following step by step process will be adopted for the successful implementation of ESMF and the respective ESMPs Figure 8. Project authority will develop work packages, activities in each package, detail scope under each package in line with the process provided in Figure 8. All non-permissible activities proposed under KERA shall be considered during formulation of work packages. Any of the project activities attracting any non-permissible activity or proposed project activity which is triggering any non-permissible condition shall be dropped.

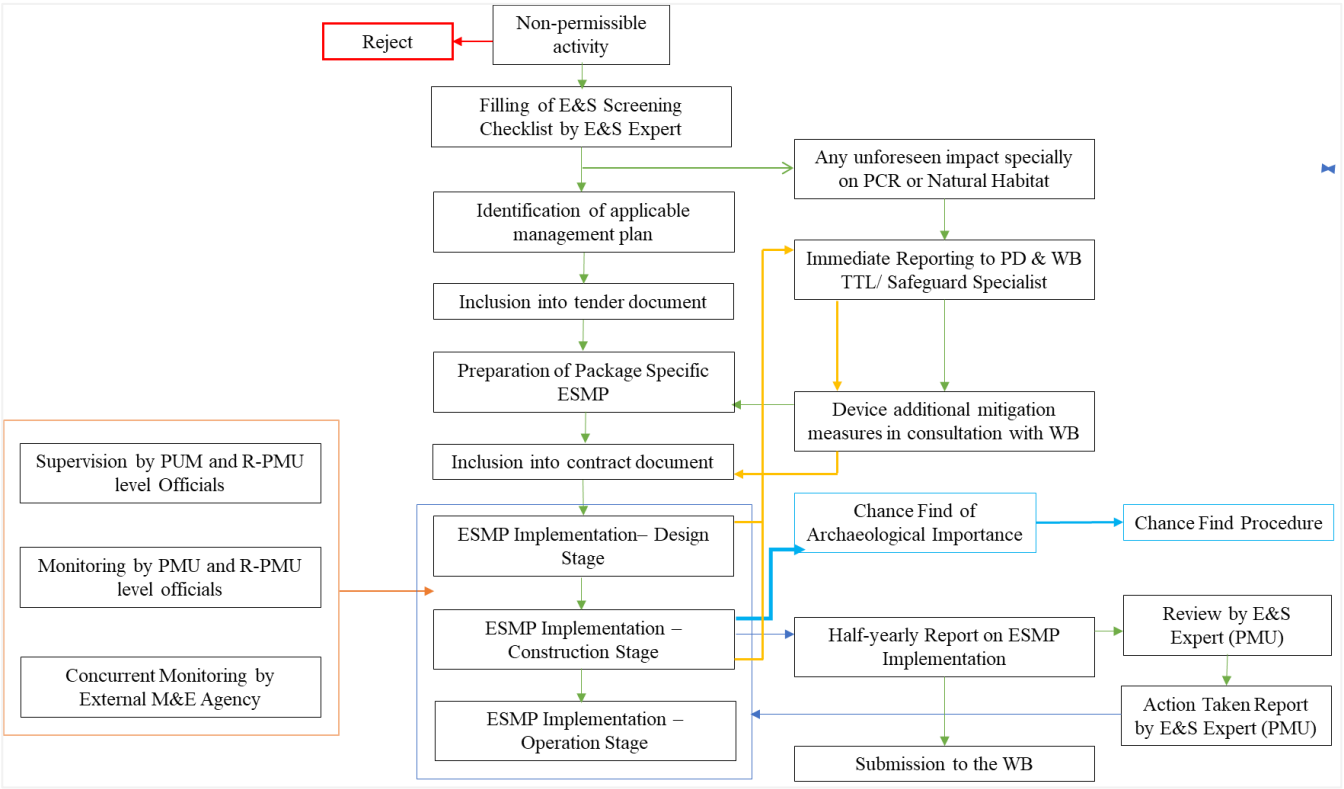

Figure 8: ESMF Implementation process

6.2.1. Scope of ESMF

The ESMF is intended to ensure efficient environmental and social management during the proposed activities to be undertaken under KERA. The ESMF contains:

1. Non-permissible Activities
2. Screening of Sub-projects
3. Preparation and implementation of Environmental and Social Management Plans (ESMPs) meeting the requirement of World Bank's ESSs and other specific plans.
4. Institutional Arrangements
5. Capacity Building
6. Monitoring and Reporting

6.3. Non-permissible Activities

Activities that could lead to irreversible and significant negative impacts will not be financed by the project. A list of these activities is given below as per the E&S assessment undertaken. Further, activities could be added to this list based on actual project implementation experience:

Table 8: List of non-permissible activities under KERA

SN.	List of Non-Permissible Activities
a.	Any activity located within a notified Protected Area and Eco Sensitive Zone (ESZ)[25]
b.	Any activity within forest area or critical natural habitat
c.	Any activity located within a Sites of Conservation Importance[26]
d.	Any activity that converts or leads to conversion and/or degradation of significant areas of critical natural habitats (areas officially protected) and/or Sites of Conservation Importance and designated forest areas
e.	Any activity that promotes or supports use of pesticides that are banned by the Government of India[27] and pesticides of class Ia, Ib & II as per WHO[28]
f.	Purchase or use of pesticides, insecticides, herbicides and other dangerous chemicals; asbestos and other investments detrimental to the environment.
g.	Any activity involving construction within 100 meters[29] from an archaeological site/monument
h.	Any activity involving use of Asbestos Containing Materials (e.g., AC pipes for irrigation, AC sheets for roof)
i.	Convert prime agricultural land to non-agricultural use or impair the agricultural productivity of prime agricultural land
j.	Any activity involving land acquisition and / resettlement issue under RFCTLARR Act 2013
k.	Any activity involving land alienation or land pooling
l.	Any activity that violates the provisions of applicable National and State laws and of International Treaties and Conventions where India is a signatory.
m.	Area expansion for rubber cultivation
n.	Construction of new canals and new branch canals

Each sub-project will be checked to confirm that it does not include any activity listed on the Negative/ Exclusion List of Activities. This applies to all subprojects including civil construction works supported under the project. The contract documents of Agri-Park, Agri-Business Centre, Common Processing Centre, Repairing of Canal Infrastructure, Replantation, Agri. Wholesale Market Development under KERA will include necessary clauses to exclude support for any activities in the Negative/ Exclusion List of Activities. The screening checklist should be filled up by the DPR consultants for sub-projects involving civil works, For replantation, canal repairing, renovation of office buildings, the Screening exercise will be performed by the respective RPMU/ PIU. These Screening reports will be reviewed and endorsed by the PMU.

The responsibility for checking and ensuring that the none of the activities listed in the 'Negative/Exclusion List of Activities' is supported under the KERA lies with PMU, RPMU and PIUs. The Environment Experts of PMU and RPMU/ PIUs will check:

- all Detailed Project Reports (DPRs) and contract documents of subproject, and,
- all activities to ensure that they do not contain any activities on the Negative/Exclusion List of Activities.

[25] Demarcated area under ESZ: Document Portal -- Government of Kerala
[26] Sites of Conservation Importance in Kerala, refer to
< http://www.wiienvis.nic.in/Database/ConservationAreas_844.aspx >
[27] List of pesticides banned in India: Pesticides / Formulations Banned In India | ICAR-Indian Institute of Spices Research
[28] List of Pesticides in WHO classes Ia, Ib & II: The WHO Recommended Classification of Pesticides by Hazard and Guidelines to Classification 2019
[29] In case of archaeological sites/monuments, the prohibited area is 100 mts and the regulated area is 200 mts.

6.4. Environmental and Social Screening of Sub-projects

A screening procedure is prepared and implemented in order to identify any environmental risks/impacts associated to any subproject. The E&S screening would be undertaken for each sub-project for Agri-Park, Agri-Business Centre, Common Processing Centre, Repairing of Canal Infrastructure, Replantation, Agri. Wholesale Market Development under KERA.

Approach to Screening: E&S screening would be carried out comprising sub-project information, locations, proposed interventions and activities, proximity from forest, environmentally sensitive locations, bio-reserve, national parks, wildlife statuary, wet lands, etc.; applicability of laws, regulations and clearances & permits to be required; identification of E&S risks and impacts; and to classify the sub-project based on risk level (low, moderate or substantial and high) and finally, presenting conclusion on risk category, need for the preparation of sub-project specific ESMP. All sub-projects will have specific ESMPS. If the screening reveals that the sub-projects have aspects as defined in the negative list of activities, the same will not be undertaken.

The E&S Screening for all subproject and activities under KERA would be undertaken using project E&S screening templates given at Annexure 1 to identify nature and extent of E&S risks and impacts for different types of proposed activities. Environmental and Social screening shall be carried out before preparation of DPRs by the environmental & social experts of the DPR Consultants through physical site visits/transect walk and will be made after thorough understanding of environmental settings at and around the subproject sites. The E&S screening checklists will be checked and verified by environmental and social expert of PIUs. The Bank will review a selection of sub-projects, through desk review /site visits and provide suggestions and guidance for improvements, if required. In the case of substantial risk categories of sub-projects, the Bank will review and approve all E&S checklists.

E&S screening exercise will be carried out for 100% subprojects by DPR consultants/ Environmental and Social Experts of RPMU/ PIUs. The PMU will review the E&S screening checklists and will send the checklist to World Bank for reviewing its completeness, correctness and compliance and approval.

6.5. Preparation of ESMPs

Based on the risk classification of subprojects for Low to Moderate Risk, a site specific ESMP shall be developed at design stage of the sub-project by the DPR consultants wherein specific plans e.g. LMP, Vegetation Waste Management Plan, Labour Camp Management Plan, etc will be included. The site specific ESMPs (based on generic) shall comprise set of actions that need to be completed by RPMU/ PIUs and by the contractors of the sub projects. The contractor specific actions of ESMPs including LMP, Waste Management Plan, shall be annexed in the bid document and shall be part of contract agreement with the contractors.

For all sub projects, DPR consultants/PIUs would be required to prepare site specific ESMP that would include camp management, labour influx management plan, LPM/ OHS measures etc., depending on the relevance of ESS 2-8. This ESMP shall be ready before the sub project bids are issued and relevant plans would be included in the bid documents.

The preparation of environmental management instrument, proportionate to the risks, as specified herein this ESMF is stated as a requirement in the Environment and Social Commitment Plan. All such ESMPs and other relevant plans will be reviewed by PMU, KERA and shared with the World Bank for approval before the same are included in the respective bid documents. The Bank will review the selection of sub-projects, through desk review /site visits and provide suggestions and guidance for improvements, if required.

6.5.1. Procedures for Preparation and Implementation of ESMPs

A site-specific ESMP will be prepared for each subproject. The ESMP will provide details on: (a) the planned activities (b) the potential environmental and social impact of each activity – with details on quantities where

applicable (c) measures to mitigate negative E&S impacts (d) measures to enhance positive environmental impacts (e) entity with responsibility for implementation of the identified mitigation and enhancement measures.

The two key steps to be followed are:

1. Preparation of the site-specific ESMP for each sub project based on the Generic ESMPs provided in Annexure IIA, IIB and II C
2. Integration of the ESMPs into the Bid and Contract Documents.

To facilitate preparation of the site-specific ESMPs, the following are provided as guidance documents:

- Project component wise Generic ESMPs have been provided in Annexure IIA, IIB and II C for use as a guidance document,

Table 9: process flow for ESMF of KERA

Project Phase	Project Activity	Tasks	Responsible Entities
Pre- planning	Selection of Subprojects	▸ Check and ensure that the none of the activities listed in the Negative/ Exclusion List of Activities are supported under the KERA. ▸ Screen all subprojects/ activities to ensure that they do not contain any activities on the Negative/ Exclusion List of Activities.	RPMU/ PIUs and DPR Consultants
Planning Phase	Screening of Subprojects	▸ Screening of subprojects to be done using a pre-defined E&S checklist; ▸ Completing the checklist in consultation with concerned RPMU/ PIUs/ Department; ▸ The internal verification on accuracy and coverage of risks and impacts.	Prepared by DPR Consultants and reviewed/ accepted by RPMU/ PIU
Planning Phase	Preparation of Site specific Environmental and Social Management Plan	▸ Ensure Site specific ESMP provides detail on the planned activities; ▸ The potential E&S impact & risks from each activity; ▸ Measures to mitigate negative E&S impacts and risks; ▸ Measures to enhance positive environmental impacts; ▸ Ensure all the key risks/impacts are adequately addressed and that provision has been made to meet the costs involved.	Prepared by DPR Consultants and reviewed/ accepted by PIU and PMU
Construction & Operation Phase	Implementation of ESMP	▸ Implementation of mitigation measures and ESMP	Contractors
		▸ Provided orientation on the mitigation measures and ESMP	PMU and RPMU/ PIU
		▸ Supervise, monitor, reporting and documentation of implemented ESMPs.	PIUs and RPMUs

6.6. Review and Clearance of Sub-project ESMP

Site specific Environmental and Social Management Plan prepared by PIU/ PSA and vetted through RPMU and PMU for first five (5) contract package either from 1) Agri-park, 2) Canal Rehabilitation shall be submitted to the World Bank and get it approved by them for proceed further. Tender shall be floated only after getting final clearance from the WB safeguard team regarding fulfillment and effectiveness of these five ESMP. EOI or tender shall be floated only after incorporating bank approved site specific ESMP.

6.7. Environmental and Social Instruments to Meet Requirements of Applicable ESSs

The anticipated environmental and social risks and impacts identified in Chapter V shall be addressed through the following mitigation and management plans as per appliable ESSs of The World Bank.

6.7.1. ESMPs (As per ESS1, ESS2, ESS3, ESS4, ESS8):

ESMPs separately for project activities will include provisions for addressing risks relating environmental, health & safety aspects; construction debris, solid and other waste management; gaseous pollutants and noise generation from DG set, construction machines and vehicle movement for transporting construction materials; air, water noise pollution control; pollution prevention and environmental quality management, health and safety of project workers and nearby community, any risks of labour influx, such as communicable and non-communicable diseases; construction and workers camp management, construction site management, work zone safety, traffic management, etc for each sub project. This will be site specific ESMP for subproject identified as low to moderate risk (as per E&S Screening). Project component-wise generic ESMPs for civil construction works for Agri-Park, Agri-Business Centre, Common Processing Centre, Repairing of Canal Infrastructure, Replantation, Agri. Wholesale Market Development are given in Annexure III to Annexure VII.

6.7.2. Labour Management Procedures (LMP) (As per ESS2)

LMP lay down and spell out the requirements relating to health and management for labour, provision of terms and conditions of employment; promoting of non-discrimination and equal opportunity; worker's organization etc. and finally a mechanism to redress grievances mechanism to the direct and contracted workers. Labour Management Procedures are presented (as a separate document).

6.7.3. Biodiversity Management Measures (ESS 6)

In the project area, many subprojects are situated in the vicinity of forest and ecological conservation areas. However, most of subprojects are out of the forest and conservation areas; therefore, diversion of forest land is not likely to be required in any of the sub-projects.

6.7.4. Integrated Pest and Nutrient Management Plan (ESS 1 and ESS 3)

The project will support agriculture and plantation (Coffee, Coconut, Cardamom and Rubber) activities to increase the produce from selective crops and therefore excess use of pesticides is anticipated. There are multiple impacts and challenges associated with pesticide use. These include: pollution of ground and surface water resources; killing of fish and other aquatic life; development of pest resistance due to overuse of pesticides; public health issues associated with chronic and acute exposure to pesticides; bioaccumulation or bio-concentration of pesticides in food chain; food safety issues; poisoning from improper use of pesticides by farmers and farm assistants; impact from improper disposal of pesticide containers; accidental or incidental introduction of invasive species; limited capacity of farmers to adequately manage pesticides.

IPNM is prepared with the specification of crop specific measures right from site preparation, nursery to harvesting state. It is given in Annexure – V.

6.7.5. Stakeholder Engagement Plan (SEP) (ESS 10)

Standalone document on SEP has been prepared and disclosed for meaningful consultations and accessible, functional and responsive GRM for key stakeholders.

6.7.6. Linkage to the ESCP

The Environmental and Social Commitment Plan (ESCP) sets out material measures and actions, any specific documents or plans, as well as the timing for each of these. The ESCP which will be part of legal agreement and will be signed by Implementing Agency (IA), will require the IA to comply with the provisions of any other E&S documents required under the ESF and referred to in the ESCP, such as the Environmental

and Social Management Plans (ESMPs), Labour Management Procedures (LMP), Integrated Pest and Nutrient Management Plan (IPNMP), Stakeholder Engagement Plan (SEP), etc. The ESCP will be prepared based on the ESMF and the findings of engagement with stakeholders. It will clearly spell out the plans to be prepared with timeframe and responsibility. Adherence to the aforementioned ESMF processes and provisions will therefore be ensured through the ESCP.

6.7.7. Updating ESMF

This ESMF will be an "up-to-date" or a "live document" enabling revision, when and where necessary. Unexpected situations and/or changes in the project or subcomponent design would therefore be assessed and appropriate management measures will be incorporated by updating the Framework to meet the requirements of country's legislations and Bank ESF. Such revisions will also cover and update any changes/ modifications introduced in the legal/ regulatory regime of the country/ state. Also, based on the experience of application and implementation of this framework, the provisions and procedures would be updated, as appropriate in consultations with the World Bank and the implementing agencies/departments. The finalized version of updated ESMF will be submitted to WB for its review and approval.

6.7.8. Inclusion of ESMP in Bid Document

The ESMP should be finalized and approved by the project Environmental and Social Safeguard Expert at PMU before finalizing the bid documents, and subsequently incorporated. This is required to fully reflect the sections of the ESMP relevant to the contractor in the bid document. This would include:

a. *Mitigation table:* In the Mitigation table, the text describing each measure should not include/repeat what is already covered under the technical specifications, which is being cross-referred. The description should focus on "what" and "where" of the mitigation / enhancement measure as the "how" of the measure is covered under the specification.

b. *Monitoring table*: There are certain environmental quality, health and safety and labour monitoring requirements for the contractor. While developing the monitoring requirements table, those that pertain to the contractor should be clearly separated in the bid document.

c. *Cost table*: The items pertaining to the contractor should be clearly separated from those that are to be incurred by any other government agency or supervision consultant.

PMU will also review the various permissions and approvals to be obtained. In order to proceed with the signing of contracts. PMU to ensure the following are completed (i) all environmental permission and approvals from relevant authorities (ii) Training and capacity building activities initiated and (iii) stakeholder consultations have been conducted as required.

In addition, contract documents will include references to various Legal provisions/ acts and clauses relating to the environmental and social performance, (compliance with ESMP), labour management, occupational health and safety management, and the implementation of the same will be monitored by Environmental and Social Specialist at PMU.

6.8. Monitoring

Project authority shall do concurrent monitoring of ESMF implementation and submit half-yearly monitoring report to the World Bank inline with the reporting structure outlined in Annexure IX. An Environmental & Social Monitoring Plan has been framed for implementation and post implementation phases covering frequency of supervision, indicators to be measured and responsibility of supervision which is given in Table 10. A responsibility matrix for monitoring along with frequency of monitoring is given in Table 10 ,

Table 10: Project component wise monitoring parameters

Project Component	Monitoring Parameters	Frequency	Monitoring Responsibility
Component 1	Number of times PoP revised and its consistency pest managment. No. of farmers received PoP training along with the number of PoP adopted; No. of green technology introduced; Number of farmers practicing intercropping; Area coverage under AWD;	Half-yearly	RPMU
Component 2	Additional coverage under micro-irrigation; Number of farmers received training on IPNM and adopted soil test as per PoP; Vermicompost pit constructed vs its functional condition; Number of female beneficiaries STP installed in CPC and its functionality	Half-yearly	RPMU
Component 3	Number of business plan proposal submitted by women vs approved. Number of unit obtained FSSAI license; Capacity and functionality of STP; Soil investigation before construction of Agri-park Number of trees fell down and replanted; Permission / license obtained; Availability of EHS expert Number of grievance address vs registered; Number of units carried out Maximum Residue Limits (MRL) test	Half-yearly	RPMU

7. CAPACITY BUILDING PLAN FOR ESMF

The capacity building program for the officials of PMU-KERA and other line departments at state, district and block & GP level shall be as follows:

- Orientation program should be organized at the State level for all relevant stakeholders at state level involved in the implementation, supervision and monitoring of the ESMF. The orientation programme shall be organised, one prior to start of the project and then during the mid-term review.
- Next level of orientation on Implementation, Monitoring & Supervision of ESMF shall be arranged at District level inviting key district level officials who will be involved in ESMF implementation, Monitoring & Supervision work. The orientation programme shall be organised, one prior to start of the project and then during the mid-term review.
- The next level of training should be arranged for lines departments members at district and block level. This shall be organized once in a year to acquaint all experts associated with the implementation, supervision and monitoring of ESMF/ ESMP.
- Community level training workshops on orientation/ sensitization on ESMF also will be conducted inviting leader of all community institution such as FPO/ SHG, Kudumbasree group and selected beneficiaries. The workshop shall be organised, one prior to start of the project and then during the mid-term review.

The orientation, training plan for the target group, implementing and resource organizations are given in Table 11.

Table 11: Capacity building plan on ESMF implementation

Type of Training	Target Group	Frequency	Mode of Training	Resource organization
STATE LEVEL				
Orientation/ Sensitization on ESMF; ESMF Monitoring Mechanism	PMU- PD, JPD, EE (Monitoring), Environmental Expert, Line Dept.- Joint Director Agriculture, SE (MI)	One at launch of project and one refresher training at mid- term	Presentation, Lectures	Institutions and External Agencies
Implementation of ESMF	PMU- PD, JPD, EE (Monitoring), Environmental Expert	One at launch of project and one refresher training at mid- term	Presentation, Lectures	Institutions and External Agencies
DIST. & BLOCK LEVEL				
Orientation/ Sensitization on ESMF; Implementation of ESMF; ESMF Monitoring Mechanism	District Technology Manager (DTM), Assistant Technology Manager (ATM), PD ATMA, EE	One at launch of project and one refresher training at mid- term	Presentation, Lectures	Institutions and External Agencies
IPNM Plan (Updating skills and knowledge on IPM and INM)	PD ATMA Farmers	One in each of the districts/ every year/ in district where there are interventions	Presentation, Field Demonstrations, lectures, group discussions, case studies	KAU, Agri Entrepreneurs etc.
EMP on Civil Works	EE, PAO, PD ATMA Contractor/ Beneficiary	One in each of the districts/ every year/ in district where	Presentation; Lectures	Institutions and External Agencies

Type of Training	Target Group	Frequency	Mode of Training	Resource organization
		there are interventions		
Community Level Training Workshops on Orientation/ Sensitization on EMF	Leader of all community institution such as FSHG/ Farmer Group/ Kudumbasree group	One in each of the districts/at launch of project and one refresher training at mid- term	Presentation, Lectures, Group Discussions	PIU and PSA

8. TENTATIVE BUDGET

Overall EMF budget is presented in the following table.

Sno.	Particulars	Total Cost in lakhs
1	Preparation of ESMF	42
3	PIU Training -E &S	20
4	Contract Training	20
5	District Community Training	30
6	FPO Training	10
7	Training -MSME and Start up on E&S	20
8	IEC for E &S	145
9	Knowledge events, exposure visits and studies	50
10	Tribal Plan Preparation	15
11	Tribal Plan Implementation support	30
12	Implementation of tribal Development Plan	100
13	GRM	25
14	E&S innovation and pilot interventions under TP (including green innovations) - Farmer FPOs, GAP, GHP, labour health welfare etc.	100
15	Stakeholder Engagement Plan - Implementation	50
16	Operational expenses of E&S - travel, monitoring and training and by experts	200
	Total	**857**

9. INSTITUTIONAL ARRANGEMENT

The Department of Agriculture (DoA), Government of Kerala (GoK) is the nodal agency for this KERA project.

Department of Agriculture will implement the KERA project in coordination with other relevant departments/ directorates such as Department of Irrigation, Department of Industries (DoI), Kerala Agriculture University and Kerala Industrial Infrastructure Development Corporation (KINFRA). A Project Management Unit (PMU) that will be established under the DoA will coordinate across the departments.

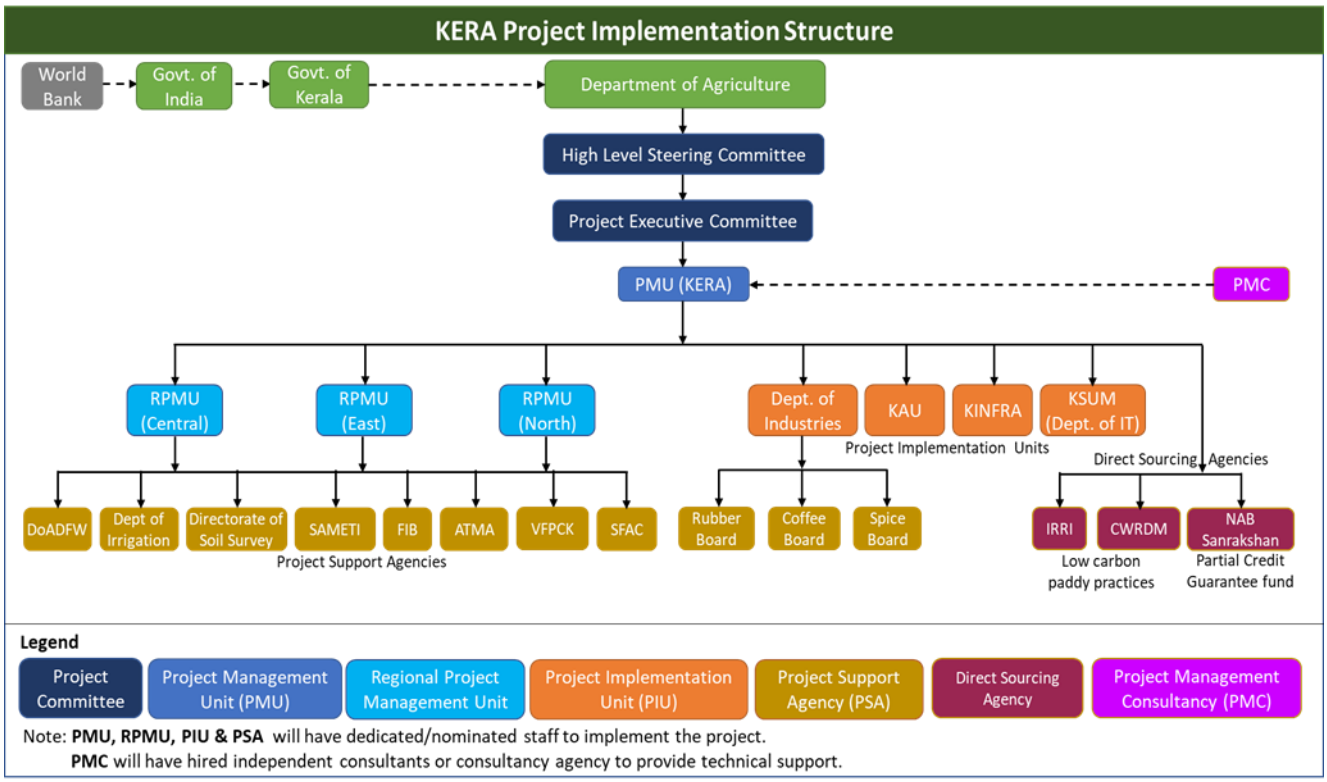

Figure 9: KERA project Implementation Organogram

DoA would be the nodal department for the implementation of KERA Project. To manage and oversee implementation of the project, a dedicated Project Management Unit (PMU) and three (3) Regional Project Management Units (RPMUs) will be constituted. The PMU will be headed by a Project Director in the rank of APC and the RPMUs will be headed by Deputy/ Assistant Director of DoA (under KERA). In addition to the dedicated PMU and three (3) RPMUs, four PIUs (i.e. KAU, KINFRA, MSME and Startup Mission) and nine (9) PSA will be constituted for implementing field works of the project exclusively. The overall institutional arrangement for the implementation of the project is outlined in Figure 9.

PMU will be responsible for overall planning and implementation of the entire project. The PMU and RPMUs will have different sub-units for their effective functioning. The PMU and RPMUs will be staffed with the engagement of consultants, experts and various other categories of contractual staff to support the project.

9.1. ESMF Implementation arrangement

Department of Agriculture (DoA) will be responsible for overall planning and implementation of the entire project. It will ensure that ESMF is followed during project implementation. The project management consulting (PMC) firm to be engaged under the proposed loan will have one (1) Environmental Expert and one (1) Social Safeguard Expert and two (2) E&S associates at PMU level and one (1) E&S Nodal Person from PMU. One (1) Environmental Officer and one (1) Social Officer at each RPMU level. Environmental and Social Safeguard Expert at PMC will directly report to PD and E&S associates placed at PMC will report to respective senior expert placed at PMU. These experts will assist PMU and RPMU in implementing and monitoring environmental and social mitigation measures as per ESMP. Safeguard experts at PMU together will also assist PMU in preparing half-yearly safeguards monitoring reports as required by the World Bank. Environmental and social Officer at RPMU level will report to respective Deputy/ Assistant Directors. The overall implementation arrangement is given in Figure 9.

9.2. Reporting System of ESMF

The reporting system will be bottom-up and feedback mechanism will be in a top-down approach in the implementation framework. The RPMU will prepare report on ESMP safeguards implementation of half-yearly basis (Report outline is given in Annexure- IX which should be revised as relevant). The Environmental Expert and Social Safeguard Expert at the PMC level will review the reports and prepare the action taken report on Half-yearly basis and appraise to the PD-KERA. The Deputy/ Assistant Director at RPMU, based on the review of the environment safeguard measures taken at the project level, should discuss with the PD-KERA at PMU on critical issues for decision. Expert and Social Safeguard Expert at PMU, after review of the report, may seek further clarification from RPMU/ PIU on critical aspects. Finally, half-yearly compliance report will be submitted to the World Bank.

9.3. Grievance Redressal Mechanism

For KERA, a 3-tier grievance redress mechanism is proposed. At the PMU Level the grievance system will be headed by the Project Director and will be responsible for the overall functionality of the Project GRM. The GRM's at the R-PMU level will have Regional Director of RPMU/ Deputy/ Principal Agriculture Officer as Grievance Redressal Officers. The lowest level of GRM will be in the project GP and will be the responsibility of Assistant Director of Agriculture. The concerned Grievance Redressal Officer will be responding to grievance/query through phone calls, meetings and letters, in order to resolve issues. If needed, site visits will be undertaken to appraise the exact nature of stakeholder concerns. The Complainant will be made part of the grievance resolution process and kept updated of the resolution process through phone calls and formal letters. Information material on GRM will also inform the stakeholders about grievance escalation hierarchy that would help the complainant to escalate any unresolved issues to higher level officers, as well as the existing state level GRM channels of government portal and grievance committee chaired by the district collectors. The grievance redress process will be a continuous, transparent and participatory process that would be an integral part of the project's accountability and governance agenda. The GRM mechanism will be notified within three months of project effectiveness.

The project level GRM will be headed by the Project Director (PMU). Social Safeguard Expert at the PMU will act as convenor for GRM. Social Safeguard Expert at PMU shall assist the PD to monitor the overall Project GRM and co-ordinate with all the R-PMUs. The project website will also have a link where grievances can be filed by the citizens.

GP level GRO's in consultation with the Asst. Director, DoADFW (Block) will directly address all grievances related to the project affected persons (PAPs), project workers and community members. Grievance Registers will be maintained at District/Block levels and also at each worksite to record, track and report on the inflow of stakeholder grievances, enquiries and feedback. Status of Grievances received and resolved will be track through the project MIS as well as monthly progress reports from the Districts and Blocks. All unresolved grievances will be escalated to the PMU level GRM. The

aggrieved will have the option to send their grievances to the project GRM or to the state level public GRMs.

In addition, separate site level grievance mechanism will also be created aimed at local communities and workers. These will include complaints and suggestion boxes, complaint registers at site for workers, site level display of contact numbers of local, nodal persons from the contractor and the implementing agency.

10. STAKEHOLDER ENGAGEMENT, DISCLOSURE, AND CONSULTATIONS

10.1. Consultation Carried out as part of Project Formulation

During project preparation, the KERA project preparation team and the ESMF consulting team supported by district agriculture teams undertook multiple rounds of public consultations which are summarised below. The overall objective of such consultations was to document the feedback, concerns and suggestions of the stakeholders with specific reference to the planned interventions of the KERA project. The consultation meetings were organized basically to a) share project objectives and proposed project interventions with the identified stakeholder groups and b) to consult with the stakeholders and document their concern, with particular reference to social and environmental impacts of the proposed project interventions.

The ESMF team conducted two rounds of community-level stakeholder consultation, following a step-by-step process.

In the first round, which took place from 8th October to 14th October, 2023, the team conducted focused group discussions (FGDs) with small groups. The ESMF consulting team was divided into two groups to facilitate FGDs in nine (9) blocks across the nine (9) project districts. In the second round, a larger audience representing different stakeholder groups was invited to a single platform at the Gram Panchayat (GP) level for detailed consultation. This round of community-level consultation occurred in 15 Gram Panchayats/locations spread across seven (7) blocks in the four (4) target districts, from 26th October to 2nd November, 2023.

September 2023. Initially, The ESMF preparation team consulted with the Project Preparation Team (PPT), Project Management Unit (PMU), and the Department of Agriculture and Farmers Welfare (DoA) to gain an understanding of the KERA project interventions. Subsequently, a reconnaissance visit was conducted on September 9th, 2023, to two locations. During the visit, consultations were carried out with one Farmer Producer Organisation (FPO) and several individual farmers to gather their inputs and insights.

From 4th to 7th October, 2023, the ESMF team conducted initial consultations, FGDs and KIIs with key implementing agencies at the state level, including the Department of Agriculture, KINFRA, Department of Irrigation, Soil Survey & Soil Conservation Department, and NABARD Office. The ESMF team was divided into two groups and mobilized to different directions to carryout field visit and community level consultation at project locations. Each team had local language translators to facilitate effective communication with the stakeholders. During their visits, the teams covered a total of nine (9) blocks from the nine (9) project districts and conducted focused group discussions (FGDs) with various community groups, including ten (10) farmer/grower groups, five (5) Farmer Producer Organizations (FPOs), two (2) Self Help Group (SHG) groups, one (1) Rubber Producer Society (RPS), and three (3) trader/supplier/Agri-entrepreneur groups. Additionally, the ESMF team also consulted with relevant district/block level offices and research institutes as part of their data gathering process. Annexure 2 of the report includes a summary of the discussions along with photographs of the participants attending the consultations.

26th October to 2nd November, 2023, The ESMF team, along with three field researchers, carried out community-level consultations in selected four (4) project districts. These districts were chosen based on key criteria, including representing 1) various agro-ecological zones & agro-ecological units, 2) tribal-dominated and non-tribal areas, 3) different crop cultivation areas (paddy, coffee, cardamom, coconut, rubber), and 4) diverse geographical features (coastal, hilly, plain). Additionally, districts with proposed physical infrastructure like agri-parks, Agri-business Centres, Common Processing Centres and canal

repairing were considered. Prior to the consultations, stakeholders were provided with information about the meeting time, place, visiting team, and agenda. Respective district-level agriculture offices were communicated with via email to ensure smooth functioning of the consultations. A total of eight (8) stakeholder consultations with larger groups and seven (7) consultations with vulnerable/marginalized groups were conducted in fifteen (15) Gram Panchayats/locations across seven (7) blocks in the four (4) target districts. Each sample GP had two (2) stakeholder consultations, **one** with a larger group consisting of farmer groups, Primary Agriculture Co-operative Societies (PACS), Panchayati Raj Institution (PRI) members, Farmer Producer Organizations (FPOs), and Farmers Interest Groups (FIGs). The **other** consultation was specifically with vulnerable and disadvantaged groups, including agricultural laborers, *Kudumbasree* groups, women land titleholders, SC/ST households, tenant farmers, labour cooperatives, and the elderly. Additionally, the ESMF team conducted separate focused group discussions with various stakeholders, including the Kerala Institute of Local Administration (KILA) and ATFAM Farmer Producer Organization (FPO) running a millet processing centre in Agali, Palakkad; Agri-entrepreneurs and traders/suppliers at the Wayanad Market area and KINFRA Small Industries Park in Kalpetta, Wayanad, as well as the Mayyil Rice Producer Company FPO in Irikkur, Kannaur.

10.2. Implementation of SEP Measures

A dedicated SEP for this project is prepared based on the identified need of different stakeholders. Project information, contents of the ESMPs will be shared with relevant stakeholders in an accessible manner at the designing stage of the sub-project to capture their view and suggestion. Feasible suggestion received from stakeholders will be factored into the sub-project designing. Community level consultation will be organized in accordance with the SEP of KERA.

10.3. Information to be Disclosed

The following documents shall be disclosed on the website of DoA and kept in the office of the DoA, PIUs and/ or other project agencies as applicable

1) ESMF with LMP, IPNM, IPPF for KERA and non-technical executive summary in Malayalam language
2) Standalone document on SEP and ESCP
3) ESMPs,
4) Other plans mentioned in ESMF documents,
5) Half-yearly Progress Report on ESMP implementation, and

11. ANNEXURE I: E&S Screening Checklist

Screening process will help project authority to take decision of adoption of permissible activities and related impact specific to activities proposed under project package. Project authority shall screen each project package as per following format. Screening exercise will define applicability of different management plan developed to manage anticipated adverse impact. Any package involving any non-permissible activity shall not be considered for execution and mitigation measures proposed against each identified impact shall be followed during project implantation. Environmental screening will also help project authority in identifying any unforeseen impact on CPR like temple, mosque, burning ghat, archaeological and historical significance site and natural habitat.

Table 12: Screening Checklist (Planning Stage)

	Name of activity/ Subproject	**:**	
	District	:	
	Block & GP	:	
	Name of the Proposed project activity		1) Construction of Agri-park/ Common Processing Centre/ Agri Business Centre 2) Canal Repairing 3) Replantation
	Average annual Rainfall in the district (mm)	:	
	Proposed Land classified as?	:	Agriculture Land/ Revenue land/ Common Land/ Waste Land / Private Land/ Forest Land Any other__
	Current Practice?	:	Cultivation/ Barren/ Residential Use
	Owner of the Land?	:	Govt./ Private/ Purchased/ Donated/ Leased
	Presently in possession of?		Govt./ Private/ Community
	Survey Number as per land record ? (Include cadastral map with all corner lat & long)	:	
	Proposed Area in Acre/ Length (put ✓)	:	_____ Acre/ Km. (put ✓)
	Is the area flood prone, subject to inundation etc?	Yes/ No	
	Terrain condition		Hilly/ Plain/ Sloppy/ Undulated
	Presence of surface water source in proximity?	Yes/ No	If absent, what is the plan to meet the requirement
	Availability of water during summer season	Yes/ No	If now, how the water requirement is met
	Does this area fall in Alienated land?	Yes/ No	Provide Details
	Does it involve extraction of Ground Water for which permission is needed?	Yes/ No	
	1) Agri-park, Common Processing Centre, Agri-business Centre, ***2) Canal Repairing***		
	Presence of protected area within 1km radius (if present, it will not be financed)	Yes/ No	**Features Name** / **Arial Distance** in Metre _____Protected Forest _____National Park _____Wildlife sanctuary _____Ramsar Site

			Other _____
	Will there be any impact on ecologically sensitive site, i.e., national park, wildlife sanctuary?	Yes/ No	If yes, describe it additional Mitigation measures to be framed
	Is the project located along designated wildlife migratory route?	Yes/ No	If yes, provide details of rit additional Mitigation measures to be framed
	Will there be any risk/ impact/ disturbance to forests and/or protected areas?	Yes/ No	If yes,[30] please describe.
	Are there cultural, historic, religious site/buildings within 500 meter of the facility?	Yes/ No	If yes, will there be any risk/impact? Please describe
	Are there any activities located within 200m of a ASI site or monument	Yes/ No	If yes, name the establishment; ASI norms should be followed
	Presence of sensitive receptor (School, Hospital, Park) within 300 meter?	Yes/ No	If yes, name the establishment What kind of impact is perceived?
	Will there be any requirement of tree felling?	Yes/ No	Provide details of type and number of tree
	Is there any natural drain located within active work zone?	Yes/ No	If yes, list the numbers, species, 89pprox.. girth/size/age
	Soil investigation carried out	Yes/ No	If yes, include the report
	Are there any encroacher/ squatters living on the land proposed	Yes/ No	If Yes, give details
	Are there any private or Community structures on the land proposed	Yes/ No	If yes, give details
	Is the land being used as common property resources – such as water supply structure; sanitation structures; power supply infrastructure etc. or approach way	Yes/ No	(If Yes, please write details about the structure and its use by local residential/ commercial/ institutions)
	Is there any encumbrance/ pending litigation on proposed land	Yes/ No	(If Yes, provide details)
	Do the site has independent/ free approach/ access from the road	Yes/ No	If no, what is the alternate plan
	Quantity of debris / demolition waste expected to be generated?		_____ Tons
	Will there be following types of impact? □ Blockage of natural drain □ Removal and disposal of toxic and/or hazardous substances	Yes/ No	If yes, follow EMP for civil works of this report.
	Will any of the activity potentially cause □ Impacts to religious site/Sacred place/Burial place? □ Impacts to trees restricted by Forest Department? □ Impacts to wildlife habitat? (bird, reptile, insect, fish)	Yes/ No	If yes, the activity should be modified to avoid impacts on these sensitive environmental areas.
	Has there been a site identified to safely dispose waste from civil work?	Yes/ No	If No, site should be identified in consultation with stakeholders.
	How long the construction work will continue?		___ months

[30] In such cases it would be necessary to reject rehabilitation works in the catchments, if doing so would provoke negative environmental impacts that could not be avoided or mitigated, the activity must be rejected/excluded.

	How many labour will be involved during construction?			**Male**	**Female**	**Total**
			Local			
			Migrant			
			Total			
	Is there a requirement for Labour Camp to be set up for labour accommodation	Yes/ No	If yes, the camp and its access roads should not be set up on forest land or any environmentally sensitive habitat.			
	Souring of raw materials (stone, gravel, sand, timber) from verified sources	Yes/ No	Source Location Name: Road Distance: Mode of transportation			
	Does any of the activities require consent from the Pollution Control Board? (such as establishment of Batching Plant, Crusher)	Yes/ No	If yes, has consent been taken?			
	Will it involve dewatering	Yes/ No	If yes, where the excess water will be drained?			
	Will there be any closure of irrigation supply	Yes/ No	If yes, please provide location, duration etc			
	3) Replantation					
	Which plantation crop do you grow in this piece of land					
	Does this involve cutting of shed tree?					
	Do you practice intercropping?	Yes/ No	Name of the companion crop?			
	Availability of assured irrigation facility?					
	What is the extent of plantation area?					
	Does your plot affect by animal attack?	Yes/ No	Name of animal, Season of attack			
	What is the average annual yield		____ Ton			
	Is there any existing mortgage loan against this plantation area/ land?					
	How old this plantation is?		____ years			
	Do you have soil test report / soil health card?	Yes/ No	If yes, collect it			
	Will selected activities increase the use of pesticides and fertilizers	Yes/ No	If yes, has the requisite IPNM awareness and trainings been provided to farmers?			

12. ANNEXURE – IIA: Generic ESMP for Proposed Infrastructure

Parameter	Mitigation	ESS	Responsibility
Project Planning and Design Stage			
Building Design Aspect	▸ Adopt the concept of passive solar design of buildings using architecture design approaches that minimise energy consumption in buildings by integrating conventional energy -efficient devices such as fans, lighting fixtures with the passive design elements such as building orientation, landscaping, efficient building, appropriate fenestration and etc as per ECBC 2017.	▸	▸
Storm Water Management	▸ Storm water management should be ensured during design. ▸ Natural flow of existing storm water channel should not be altered or diverted ▸ Storm water channel will be designed based National Building Code of India 2016.		
Rainwater Harvesting	▸ Based on hydrogeological investigations, rainwater harvesting structures should be designed as per CGWA guidelines.		
Identification of source of water	▸ Source of water required during construction as well as operation phase should be identified		
Permission of ground water withdrawal	▸ Permission of ground water withdrawal from Ground Water Authority shall be obtained.	ESS 1 and ESS 3	
Waste Water treatment measures and quality of Potable Water	▸ Provision of pre-treatment by each individual unit and common effluent treatment shall be provided in the design layout as applicable.	ESS 1, ESS 3 and ESS 4	
Water Conservation	▸ Low flow fixtures /sensors to be used for water conservation.	ESS 1 and ESS 3	
Toilets for workers	▸ Nos of toilets for workers shall be as per NBC 2016	ESS 1 and ESS 3	
Disposal of Sewage	▸ Properly designed septic tanks connected with dedicated sewer line will be constructed for treatment and disposal of sewage	ESS 1, ESS 3 and ESS 4	
Provision of Solid Wastes Composting	▸ Organic waste composter (OWC) shall be constructed at the site for biodegradable wastes treatment. The manure generated from composter may be used for landscaping as well as commercial purpose.	ESS 1, ESS 3 and ESS 4	
Labour Camp site selection and Arrangement	▸ Identify the site for construction camp in consultation with the individual owners in case of private lands and the Gram Panchayat / concerned Dept. in case of government land. Preference should be given to uncultivated fallow land / Government land during site selection; ▸ The camp site shall be identified and located not less than 500 meters from the local habitation / village. ▸ In case, no Government land / fallow and unutilised Govt. land is available and where use of private land is the only alternative, necessary arrangements should be worked out with the private owner of the land for setting up of facilities during the construction. The arrangement should have both facility creation and site restoration (post-construction stage) component.		

Parameter	Mitigation	ESS	Responsibility
	▸ The contractor shall obtain documents highlighting arrangements made with the private land owner / local GP / concerned Govt. Dept. for land use for construction, i.e., (1) Written No-objection certificate; (2) Extent of land required and duration of the agreement; (3) Photograph of the site in original condition; (4) Details of site restoration after completion. ▸ It should be ensured that there is no use of Asbestos Containing Materials (ACM) in the construction of the camp. ▸ Identification of potable drinking water source/s and seeking permission from local authority / GP for accessing the source.		
Waste Management Plan	▸ Preparation of guidelines for locating waste disposal sites for toxic and non-toxic wastes; ▸ Identify existing landfill sites, if available, for disposal of toxic materials; ▸ In case no existence of landfill sites in the district, identification of landfill site located in nearby district by RPMU/ PIU	▸	▸
	▸ Site specific plan should be prepared to minimise waste generation, its possible reuse, recycling and disposal; ▸ Identify the type of wastes as well as sources of waste during construction and suggest options for possible reuse; ▸ Waste disposal plan should be a part of the bid document as special condition of contract which should be abided by the contractor.	▸	▸
Pre-Construction			
Display of project Information Board	Project Information Board with important phone number will be displayed prominently at the project site.	ESS 1, ESS 2	
Consent for batching plant	▸ Consent to Establish and Consent to Operate will be obtained from KSPCB, if contractor establishes batching plant. ▸ In the event of procuring, aggregate and sand from third party, the contractor shall ensure that these stone and sand quarries are legal and have valid clearances.	ESS 1, ESS 3	Contractor
Labour camp facilities	▸ At labour camp, the contractor shall provide well ventilated accommodations, bed / bed roll for the workers, electricity supply, water supply, kitchen, separate toilet and bathrooms for ladies and gents, etc. as per The Building and Other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996	ESS 1, ESS 2	Contractor
Other Construction Vehicles, Equipment and Machineries	▸ All vehicles, equipment and machinery to be procured for construction work will conform to the relevant Bureau of Indian Standard (BIS) norms/CPCB standards. The discharge standards promulgated under the Environment Protection Act, 1986 and Motor Vehicles Act, 2019 will be strictly adhered to. ▸ Acoustic enclosure fitted DG set will be used at the project site as per regulations. ▸ The contractor shall maintain records of Pollution Under Control (PUC) certificates for all vehicles used during the contract period, which will be produced to RPMU/ PIU for verification whenever required.	ESS 1, ESS 3 and ESS4	Contractor
Labour Requirement	▸ The contractor preferably will use unskilled/ semiskilled/ skilled labour from local area to give the maximum benefit to the local community.	ESS 2	Contractor
Appointment of Environment & Safety Officer	▸ The contractor shall appoint qualified and experienced Environment, Health & Safety Officer (EHSO), who will dedicatedly work and ensure implementation of ESMP including occupational health and safety issues at the camp and construction work sites.	ESS 1, ESS 3	Contractor

Parameter	Mitigation	ESS	Responsibility
Stakeholder information and communication	Local people shall be informed and oriented about the project component/ activity and consulted thoroughly to take their opinion/ suggestion in project designing.		
Impact on fauna	The contractor and its workers will be educated / sensitized on endangered/ vulnerable species and its protection measures;		
Impact on public utility services/ amenities and disruption of services (Transformer, Tube well, Electric pole, Light post)	Field verification and finalization of number of utility service structure to be relocated, with an aim to minimise disruption of public utility services. Causing issuance of advance notice to the concerned service providers regarding relocation of public utility, service, structures and depositing the fund to the concerned authorities as per their quotation. Informing local community on such relocation in well advance. Providing safe temporary access routes for local people during the construction period.		
Dust, air and noise pollution; littering during transportation	Identification of sensitive receptors like school, health centre and playground within 100 meter radius of construction site		
Site Clearance	Enumeration survey of tree present in the project locations and determining the number of tree to be cutdown; obtaining tree felling permission along with permission for compensatory afforestation from District Forest Officer.		
Generation and disposal of earth material due to digging activity;	Soil material shall be used for filling and levelling purpose.		
Waste Management	▸ Identify the activities during construction, that have the potential to generate waste and work out measures for the same in the construction schedule to be submitted to the RPMU/ PIU; ▸ Identifying the location for disposal of non-toxic wastes in consultation with the local GP / Dept. authorities. Priority should be given to existing waste disposal sites, if available. ▸ Orientation of workers, supervisors and other persons associated with construction work on waste management principles, waste disposal mechanism, safety and security measures during waste disposal, management of disposal sites etc.	▸	▸
Hazardous waste management plan	▸ The contractor shall implement safe and environmentally sound management practice for handling of hazardous and other wastes. ▸ The hazardous and other wastes generated at any of project site shall be sent or sold to an authorised recycler or shall be disposed of in an authorised disposal facility. ▸ Disposal of any toxic materials shall be in nearby existing landfill sites complying with Hazardous and other Wastes (Management and Transboundary Movement) Rules, 2015.	▸	▸
Chance of finding Archaeological property	▸ While excavating, if any fossils, coins, articles of value / antiquity and remains of archaeological interest discovered on the site shall be the property of the Government and shall be dealt with as per the provisions of the relevant legislation. ▸ The Contractor shall take reasonable precautions to prevent his workforce or any other persons from damaging or removing any such articles. If any articles found shall be brought to the notice of the concerned DPMU official and shall seek the direction of ASI before contractor recommencing the work.		

Parameter	Mitigation	ESS	Responsibility
Construction			
I. Construction Work			
Procurement of raw material and its storage	Materials required for construction are of specified quality and are only procured from authorized suppliers. Use of PPC cement in all civil measures. Earmark the storage area of construction material. Provide bed-lining at storage area; Regular water sprinkling at storage area; Removal of residual material after construction work		
Biodiversity Conservation and Management	▸ The project staff and workforce will be appropriately made aware about the importance of biodiversity and shall be advised not to indulge in any illegal activity including hunting of wildlife. ▸ No dumping site will be identified in the protected areas and no waste dumping (even temporary) will be permitted in these areas. ▸ Natural vegetation will be conserved to the best possible extent during land preparation, and native species will be used in compensatory afforestation in consultation with the DFO. ▸ Hunting or poaching of Vulnerable species and Snake shall be strictly restricted. On observation, any such species shall be allowed to migrate in nearby area. ▸ Not using any threatened/ near threatened species for commercial purpose;	ESS 1, ESS 6	Contractor
Disposal of Surplus Earth	▸ Earth excavated at construction site will be used for filling and leveling at the site. Surplus earth will be collected and transported to pre identified disposal area.	ESS 1, ESS 3	
Barricading of construction zone	▸ The construction site will be barricaded by tin sheets with safety sign boards.	ESS 1, ESS2	
Transportation of Construction Materials	▸ All vehicles delivering construction materials to the site shall be covered to avoid spillage of materials and air pollution. ▸ The unloading of construction materials at the construction sites will be limited to day time only to avoid accidents. ▸ Screens of hessian cloth, agro-net and such other barricading materials are to be erected around stock piling sites, so that generation of the dust in the vicinity of construction site can be minimised to a great extent.	ESS 1, ESS 3	
Paint and White Washing	▸ Lead containing paints will not be used at the site. ▸ Paint and solvents should be used with the lowest possible VOC content. ▸ Oil based paints and paints containing metals should be avoided. ▸ Keep all paint and solvent containers closed when not in use to minimize evaporation and prevent spills. ▸ Limit use of thinner to the maximum extent possible. ▸ Use cleaning solvent the maximum numbers of times before disposal.	ESS 1, ESS 3, ESS4	
Safety of Workers	▸ The contractor will make sure that during the construction works all relevant provisions of the Building and Other construction workers (regulation of employment and conditions of services) Act 1996 and Labour Management Procedures are adhered to. ▸ The contractor will comply with all the precautions as required for ensuring the safety of the workers as per the country' labour regulations and International Labour Organisation (ILO) Convention No-62 as far as those are applicable to this contract.	ESS 2	

Parameter	Mitigation	ESS	Responsibility
	▸ Precautions need to be taken in construction camps are like (1) no leaching of oil and grease into water bodies or water sources take place; (2) non-disposal of wastewater into water bodies, streams, etc., without any treatment; (3) collection and appropriate disposal of solid wastes on regular basis; (4) hygienic condition of the toilet, its regular maintenance and keeping it clean and (5) availability of first-aid care provision in the camp, (6) display of emergency numbers (fire, police, ambulance, medical hospital etc,) in a common place visible to others.		
Risk From Electrical Equipment(s)	▸ The contractor shall take all required precautions to prevent danger from electrical cables, wires and equipment and ensure that: a) All electrical installations and wirings shall be barricaded in manner that ensure safety of workers, equipment. b) Necessary fencing, illumination and proper insulation of the electrical lines shall be ensured by the contractor for safety workers. c) All electrical equipment/cables/ wires to be used in the construction shall have to confirm to the relevant BIS specifications/ codes. d) The contractor will ensure that electrical equipment/ cables/ wires are free from manufacturer defect and maintained in good working order through regular supervision, monitoring and repair/replacement from time to time. e) Insulation mat and canopy will be provided to electrical panels in open area. f) Bone skull danger sign will be provided at all 440-volt electrical equipment and panels.	ESS 1, ESS 2, ESS 4	
Occupational Health and Safety at the Work Sites.	▸ The safety procedures for specific jobs will be prepared and implemented. ▸ Required Personal Protective Equipment (PPE) will be provided by the contractor to the workers engaged in construction works. ▸ Required warning signs, barricades, etc will be provided by the contractors. ▸ Proper barricading will be provided along the construction site.	ESS 1, ESS 2	
Water Conservation During Concrete Curing and Construction	▸ Keeping in view the use of large quantities of water in curing, measures for reducing water demand during construction should be followed. ▸ Curing water should be sprayed on concrete structures, free flow water should not be allowed for curing. After liberal curing on the first day, all concrete structures may be painted with curing chemical to save water. ▸ Concrete structures should be covered with thick cloth /gunny bags and then water should be sprayed on them. This will avoid water rebound and will ensure sustained and complete curing. Ponds should be made using cement and sand mortar to avoid water flowing away from the flat surface while curing. ▸ Use of potable water during construction should be minimized.	ESS 1, ESS 2	
C. Pollution Control			
C1 Water Pollution			
Water Pollution from Construction Wastes	▸ The contractor shall take all precautionary measures to collect and dispose-off construction wastes/debris generated from construction site. ▸ All solid or hazardous wastes (if any) will be collected and disposed in environmental sound manner.	ESS 1, ESS 3	

Parameter	Mitigation	ESS	Responsibility
	▸ Sewage generated from the construction site should be disposed in septic tank followed by soak pit.		
Wastewater from Labour Camp	▸ Wastewater generated from the sanitary facilities of labour camp and work sites will be treated in septic tank followed by soak pit. ▸ Proper mobile or fixed toilets fitted with septic tank will be provided at camp and construction sites.	ESS 1, ESS 2, ESS 3	
C2 Air Pollution			
Dust and Gaseous Pollution	▸ Mitigation measures would principally include storing of materials/earth stockpiles at designated places, sprinkling of water into the materials stockpiles and limited period of storage at each construction zone. ▸ Watering frequency during periods of high risk (e.g. high winds) shall be increased. ▸ The contractor will procure the construction plant and machinery, which will conform to the pollution control norms specified by the MoEFCC/CPCB/TSPCB. ▸ Regular maintenance of machinery and equipment will be carried out and vehicular pollution check will be made mandatory. ▸ LPG will be used as fuel for cooking of food at construction labour camp instead of used of fuel wood. ▸ Vehicles transporting garbage & demolition wastes, earth, sand, aggregate, etc will be covered with tarpaulin sheets to control windblown dust from vehicles.	ESS 1, ESS 2, ESS 3	
Emissions from Construction Vehicles, Equipment and Machineries	Ensure that excavators, tractors and other machinery hired for excavation and land levelling and development works are in good condition and are well serviced, and the operators are experienced and well trained. ▸ The contractor will ensure that all vehicles, equipment and machineries to be used for construction works are regularly maintained and confirm that pollution emissions levels comply with the relevant emissions requirements of CPCB and/Motor Vehicles Rules. The contractor will submit PUC certificates for all vehicles used for the sub project. ▸ Proper engine tuning of machinery/equipment/ transport vehicle to avoid the exhaust emissions; ▸ DG set will be provided a chimney with vertical opening having adequate height as per CPCB guidelines (Height of stack in meter = Height of the building + 0.2 √KVA).		
C.3 Noise Pollution			
Noise from vehicles, compaction rollers, concrete mixers and construction equipment	▸ The contractor will ensure the following: a) All construction activities shall be restricted to day time hours only. Construction activities shall not be carried during night (10.00 P.M to 06.00 A.M) b) The plants and equipment used in construction (including those of sub-Contractors) shall strictly conform to the MoEF&CC/ CPCB noise standards and shall have latest noise suppression mountings. All vehicles and machineries should have a valid Pollution Under Control (PUC) certificate. c) All vehicles and equipment used in construction work will be fitted with muffler or silencers. d) Servicing of construction vehicles and machinery will be done regularly and during routine servicing operations, the effectiveness of exhaust	ESS 1, ESS 2, ESS 3	Contractor

Parameter	Mitigation	ESS	Responsibility
	silencers will be checked and if found defective, these shall be replaced. Regular inspection, maintenance and lubrication of the construction vehicle and equipment. e) Only acoustic enclosures fitted DG set will be allowed at the construction site and camp site. f) Avoid night time traffic particularly near communities.		
C.4 Waste Generation & Disposal			
Construction Debris	▸ Construction wastes will comprise of broken bricks, dry cement, discarded timber, metal pieces, empty cement bags, glass, paint/varnishes containers, electrical wastes, used oil, etc. These wastes should be segregated into recyclable and non-recyclable waste. ▸ Recyclable waste shall be stored in the covered area and shall be sold to authorized vendors regularly. Non-recyclable waste shall be disposed at approved debris site in covered vehicles or reuse for land filling purposes. These wastes' disposal must comply with the Construction and Demolition Waste Management Rules 2016 requirement for its disposal.	ESS 1, ESS 3	
Hazardous Wastes	▸ Used / spent oil generated from maintenance of construction machines and DG sets shall be disposed through use oil recyclers.	ESS 1, ESS 3	
Solid Waste (Municipal and other Waste)	▸ Municipal solid wastes will be generated from labour camp and construction site. These solid wastes will be disposed as per Solid Waste Management Rules 2016. Dustbins for recyclable and non-recyclable wastes shall be provided in labour camp areas. ▸ Recyclable wastes shall be sold to authorized vendors. Biodegradable wastes shall preferably be composted. Concept of reduce, re-use and recycle shall be followed at site. The non-recyclable, nonsalable and nonbiodegradable wastes shall preferably be disposed at a marked landfill site.	ESS 1, ESS 3	
D. Personnel Safety			
Personal Safety Measures for Labours and Staff	▸ The contractor shall provide necessary personnel protective equipment and take suitable personal safety measures for labours and staff: a) Full body protection clothing, protective footwear, hand gloves and goggles to workers employed handling cement concrete, b) Construction workers will be provided high visibility vests, c) Ear plugs to workers exposed to high noise levels, d) Hard hat or helmets to workers, where there is danger of falling objects from height, e) Hand gloves, helmets, protective footwear/safety shoes, protective goggles, nose masks, high visibility vests etc (as required) will be provided to the workers employed in construction works, f) Safety belts will be used by workers while working at height, g) The contractor will comply with all the precautions as required for ensuring the safety of the workmen as far as those are applicable to this contract. h) The contractor will make sure that during the construction work all relevant provisions of The Building and other Construction Workers (regulation of Employment and Conditions of Services) Act, 1996 are adhered to.		
First Aid and Emergency Management	▸ Emergency numbers will be displayed at the camp and construction sites,		

Parameter	Mitigation	ESS	Responsibility
	▸ First Aid boxes will be made available at the camp and construction sites, ▸ Designated vehicles, which can be used as ambulance during emergency, will be available at construction sites as per requirement.		
E. Labour Camp Management			
Facilities for Labourers	▸ The contractors will follow all relevant provisions of The Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 for construction and labour camp. ▸ An educated person in the camp site should be oriented on administering first aid treatment and the box should be placed under his/her command. Arrangement should be made by which she/he would be available at the time of requirement. ▸ In case of any eventuality which demand hospitalization, transport facility should be provided using available project vehicle or immediate transportation through ambulance service to nearby health facility. ▸ The Contractor will maintain well-ventilated living accommodation and sanitation facilities to workers in functional and hygienic manner. ▸ Workers will be provided with beds/bunk beds with mosquito nets and no worker will be allowed to sleep on the ground. ▸ Fans and proper ventilation (turbine type ventilators) will be provided in labour accommodation rooms. ▸ Regular cleaning and sweeping will be ensured at the labour camp site. ▸ Fuel wood will not be allowed for cooking at the labour camps. LPG cylinders with gas fire box will be provided at labour camp by the contractor. ▸ Clean and cool drinking water will be made available for workers by the contractors. ▸ If required, check water quality and undertake necessary measures as applicable to correct anomalies in water quality that may be indicated in the water quality tests. Drinking water quality should meet Drinking Water Standard IS: 10500-2012. ▸ Ensure drainage arrangements are adequate and fully functional and no stagnation of water takes place. ▸ Necessary medical facilities will be provided to workers by the contractors. ▸ Separate toilets/bathrooms, wherever required, will be provided for male and female, marked in vernacular. ▸ Periodic visit by a qualified medical doctor (PHC/CHC/SDH etc.) to the campsite for health check-up of workers.		
HIV/AIDS Prevention Measures	▸ Necessary HIV/AIDS prevention awareness measures will be taken at the labour camp by the contractor. ▸ Time to time HIV/AIDS awareness training/programme will be organized by the Environment & Safety Officers of the contractor.		
Sanitation and Sewage System at Labour Camp	▸ The Contractor will ensure that: a. The sewage disposal arrangement for the camp will be designed, built and operated in such a fashion that no health hazard and pollution occur at the camp site or nearby areas, b. Adequate water supply will be ensured in bathrooms, toilets and urinals, c. Ensure adequate number of toilets/urinals are available and they are fully functional	ESS 1, ESS 2	

Parameter	Mitigation	ESS	Responsibility
	d. Separate toilets should be provided for men, women and physically challenged. e. Night soil will be disposed of on regular interval. f. Ensure adequate drainage and sewerage arrangements (including soak pits and septic tanks, if present) are available and fully functional g. All taps and plumbing fittings in toilets should be functional and leakage-free h. Water stagnation or waterlogging should not be allowed to take place.		
Wastes Collection and Disposal from labour camp	▸ The contractor will provide garbage bins in the camp and construction sites. It will be ensured that these are regularly emptied and disposed off in a hygienic manner as the Solid Waste Management Rule 2016. ▸ Burning of any kind of wastes will not be allowed at the camp and construction sites. ▸ Solid (paper, plastic, polyethylene, etc) wastes generated at the construction site, plant & camp sites, will be collected in covered waste bins and segregated as biodegradable (food waste, paper, etc) and non-biodegradable (plastic, polyethylene bag, etc) wastes. Polyethylene/plastic wastes will be stored in empty cement bags and to be sent for recycling through scrap dealer. Biodegradable (food waste, paper, etc) solid waste will be disposed in compost pit. ▸ Vermicompost pit will be provided for disposal for biodegradable wastes.	ESS 1, ESS 3	
Fire Safety and Emergency Response Measures	▸ At the construction site, necessary fire extinguishers will be provided at especially for electrical fire and general fire. ▸ Emergency phone numbers will be displayed prominently at the construction site. ▸ Cardiopulmonary resuscitation (CPR) chart will be displayed and training will be provided for the same. ▸ For emergency, vehicle will be available at the site, which can be used as ambulance to carry injured person to hospital.	ESS 1, ESS 2, ESS 4	
H. Contractor's Demobilization			
Clean-up Operations, Restoration and Rehabilitation	▸ The clean-up and restoration operation will be implemented by the contractors prior to demobilization. The Contractors will clear all temporary structures; dispose all garbage, night soils and POL (Petroleum, Oil and Lubricants) wastes in environmental sound manner. ▸ All construction area including camp, and any other area used or affected due to the construction work will be left clean and tidy at the contractor's expense to the entire satisfaction to the PIU. ▸ At the completion of construction, all construction camp facilities shall be dismantled and removed from the site. ▸ The camp site shall be restored to a condition in no way inferior to the condition prior to commencement of the works. ▸ Various activities to be carried out for camp site restoration are like (1) cleaning / removal of oil and fuel contaminated soil and its disposal in approved waste disposal areas. (2) construction campsite shall be grassed and planted with trees as per the restoration design; (3) Sealing / filling up of soak pits and septic tanks; (4) disconnection of electricity supply; (5) disposal of all garbage in the disposal site only (site approved by local authority).	ESS 1, ESS 3, ESS 4	

Parameter	Mitigation	ESS	Responsibility
Worker Occupational Health and Safety	Engage experienced contractor with requisite licenses and well-trained workers for the construction works. Contractor having well established Occupational Health & Safety (OHS) Policy to guide the construction activities. The selected contractor will have adequate training on first aid to treat minor ailments. Regular OHS trainings (Monthly) to construction staff. Periodic health-check-ups (monthly) of all laborers employed at the project site;. Obligatory insurance of contractor's staff and laborers against accidents. Contingency measures in case of accidents; Provision of first aid facilities and emergency vehicle. However, major cases will be referred to the nearest hospital or health centre; Ensure use of PPEs by all construction workers; Provision of healthcare and medical care services in case of sickness. Enforcing wearing fire/flame resistant cloth and aprons during cutting and welding operation; Ensuring use of PPEs such as welding helmet, hand goggles, Respirators specially during cutting and welding operation; Ensuring use of hand and forearm protecting leather gloves; safety goggles; steel-toed safety shoes; and upper foot guards to protect the instep area from impact or compression.		PMU / RPMU/ PIU Contractor
Provision of safe and hygiene drinking water	Contractor shall make arrangement for required quantity with desirable quality of drinking water at each working site Potable water shall be provided to workers at all time. The contractor has to make his own arrangements for meeting water required for construction ensuring that water availability and supply to nearby communities remain unaffected.		Contractor
Worksite toilet blocks	Provide temporary and separate toilet blocks for male and female workers at each work site; toilet block shall be sufficiently away from any water coerce to ensure that it's do not mixed with water; Educated workers against open defecation or "free range" defecation. Avoid constructing sanitation or other facilities that will use and store harmful materials at flood-prone areas. Chose dry sanitation options or closed disposal systems, instead of wet ones such as septic tanks or detention ponds		
Storage, handling of hazardous materials	Bulk purchase of fuel material shall be avoided and store safely in double line containment with provision of bed lining		Contractor
Compensatory Tree Plantation	To compensate loss of tree and to improve the local aesthetic value, compensatory tree plantation will be carried out. Maintaining bio-diversity in CA and avoid mono species plantation;		
Disposal of Construction waste	Code of practice shall strictly be followed while handling construction waste. Residual construction material shall be stored separately and cleaned immediate after completion of work; construction site shall be cleaned before rainy season;		
Plastic and Metal waste	Provide waste bins on site for collection and disposal of plastic waste, cans and food waste. These bins shall be frequently emptied at approved dump sites. Plastic waste shall be collected and stored separately and sold to authorised recycler; Plastic (HDPD, plastic) and metal waste shall be collected and stored separately and sold to authorised recycler		

Parameter	Mitigation	ESS	Responsibility
Disposal of Vegetation waste	Avoid burning of vegetation waste on site. Allow local community to take wood, Twings & Bough, Leaves, Branch, Shrub Stem, Stumps, Roots, Wood Chips and Logs for domestic use, animal fodder or for composting. Dumping of leafy material into borrow pit for natural decomposition		
Noise pollution due to construction work and its impact on workers and community health	Heavy noise emitting equipment shall be fitted with silencer. Noise barrier shall be provided to generator set.		
	Construction workers shall be provided with PPEs (earmuff) to minimise health impact due to noise pollution		
Dust and air pollution due to flying of stacked up earth; littering during transportation	Regular water sprinkling arrangement on silt material specially during hot-summer season to maintain soil moisture and minimise dust pollution;		
	At soil staking site in proximity of sensitive receptors, at least air quality monitoring during construction period shall be carried out.		
Air Pollution due to Burning of weeds, shrub stems, stumps, roots, twigs and leave	Contractor shall not adopt practice of burning weeds, shrub stems, stumps, roots, twigs and leaves in open place;		
	Discourage local community in burning of weeds, shrub stems, stumps, roots, twigs and leaves in open place;		
Soil Instigation	Soil Investigation shall be carried out to know the soil type and its stability which ultimately helps in determining requirement of foundation type.		
Impact on Physical and Cultural Resource (PCR)	Avoidance strategy to eliminate any such impact shall be adopted first. In case of unavoidable circumstances, the design/ DPR should be modified such that a strategy of avoidance is adopted.		
Chance find of archaeological, paleontological, historical significance	While excavating, if any fossils, coins, articles of value / antiquity and remains of archaeological interest discovered on the site shall be the property of the Government and shall be dealt with as per the provisions of the relevant legislation. The Contractor shall take reasonable precautions to prevent his workforce or any other persons from damaging or removing any such articles. If any articles found shall be brought to the notice of the concerned RPMU official and shall seek the direction of ASI before contractor recommencing the work.		Contractor/ RPIU
Community Health and Safety: Chance of road accidents	Material transport in closed containers or covered with canvas (Tarpaulin) sheets. Cases of road accident will be referred to nearby healthcare centre after primary first aid by contractor; Public consultation to maintain community integrity and social links; Public awareness campaigns through displaying sign board at site and haulage routes; The contractor will use warning signs at vantage points to indicate ongoing works. The contractor will guard all construction site with caution tapes.		Contractor

Parameter	Mitigation	ESS	Responsibility
	Restriction on movement of machinery on the designated haulage routes for transportation of materials; The contractor will ensure that all haulage trucks comply with the approved speed limit of 30km/hr within the communities along the haulage road; The contractor will adjust haul times to ensure trucks do not move to the communities during mornings when school children may be crossing the road to school and during closing time. The contractor will enforce proper security at the project site during works to limit entry of unauthorized persons, non- working persons, particularly children to the project site; Adequate signage to manage traffic at sites, haulage and access roads;		
Damage to access roads/ infrastructure	Restore any damaged roads/ infrastructure to it's previous stage with full satisfaction of local community Regular repair of damaged roads throughout the construction period.		Contractor
Mobility inconvenience to the local community	New roads provided in the designs will be constructed first to serve as alternative roads for the transport of materials obtained in-situ. This will ease pressure on existing community roads. Safe alternative access routes shall be provided for access ways that are obstructed/ destroyed during construction works. Passage ways and walkways should be kept free of materials, scraps or obstructions Erect signposts at vantage points to manage traffic, guide community members through safe alternative access ways during construction works Provide sirens in vehicles to avoid any collision with human/animals Repair and maintain damaged sections of the road located at project site throughout the construction period. The contractor will ensure that all haulage trucks hired/contracted are in good condition to prevent breakdowns on roads. Not allowing parking of the vehicle in areas which may create inconvenience in mobility such as blind turning point or meeting point of village road with the embankment.		
	Appropriately and immediately cover trenches and/or excavations after they have served their purpose to prevent accidents and collection of stagnant water which could serve as a breeding ground for disease causing vectors.		
Conflict with local water demand	The contractor has to make his own arrangements for meeting water required for construction ensuring that water availability and supply to nearby communities remain unaffected.		
Operation Stage			
Soil and water contamination	Restriction on repair of vehicles and equipment in working sites without impermeable top soil cover at the repairing site. Ensuring proper storage and disposal of used oil etc.; Adoption of good housekeeping practices at workshop areas; Avoiding waste oil spill into soil and adjoining water source; Appropriate arrangements such as usage of concrete base and drip pans to avoid spills during fuelling/oil change. Oil interception chamber shall be provided at waste water discharge point No waste effluents shall be released to the nearby water body.		
Pollution Control	All wastewater meets the 'CPCB General Standards' prior to disposal; Dispose toxic and non-biodegradable wastes at locations specified by the government / local body.		

Parameter	Mitigation	ESS	Responsibility
	No burning of generated wastes (wood, timber, leaf litter, plastic wastes, etc.).		
e-wastes	e- wastes generated during the lifecycle of the facility will be disposed through e-waste recyclers as per e- waste Management Rules, 2016.	ESS 1, ESS 3	
Solid Waste (Municipal and other Waste)	▸ Municipal solid wastes will be generated from constructed facility. These solid wastes will be disposed as per Solid Waste Management Rules 2016. Dustbins for recyclable and non-recyclable wastes shall be provided within the campus. Recyclable wastes shall be sold to authorized vendors. Biodegradable wastes shall preferably be composted. Concept of reduce, re-use and recycle shall be followed at site. The non-recyclable, nonsalable and nonbiodegradable wastes shall preferably be disposed at a marked landfill site.	ESS 1, ESS 3	
Effluent from cleaning and processing operations Basic Amenities Odour pollution	Proper waste management practices, such as recycling, appropriate disposal, are crucial to minimize environmental impacts. ▸ Provision of all time drinking water facilities, separate toilet provision, well ventilated office space, cleaning and bathing provision ▸ Regular disposal of waste and cleaning, maintain good housekeeping, hygiene standards		
Permit/ License from SPCB, FSSAI, Input Supply Generation of used oil, lubricants, filters, and other machinery components Organic Waste Energy efficient rating, BEE rating, regular servicing, first aid Use of Preservative, adhesive Effluent generation and management	▸ MSME involved in food processing shall obtain Food safety licenses from FSSAI ▸ Install safety measures like CCTV cameras, secure entrance and exits, security personnel etc. ▸ Provide safety facility like fire extinguishers, emergency exits, first aid kits, and other safety equipment. ▸ The machineries / instruments to be procured / installed should have ISI mark and atleast 3star BEE rating. ▸ Go for eco-friendly packaging wherever feasible. Manufacturing and expiry date shall be printed in the packaged product. ▸ Purchase of MRL tested raw materials as feasible ▸ Explore the possibility of solarization ▸ Minimize the use of chemical preservative and adhesive or else keep it within the safe permissible limit ▸ Avoid using azo-dyes or else use only approved food colorings ▸ Provide clearly labeled and designated storage areas for different types of waste, such as used oil, lubricants, filters, and other machinery components. ▸ Identify local or regional recycling facilities that accept used oil, lubricants, and filters and sale to them. ▸ Identify and engage with local waste management services or disposal facilities to ensure the proper and safe disposal of non-recyclable waste. ▸ Implement an on-site composting facility to manage and compost organic waste ▸ Ensure efficient operation of STP and / ETP as per the condition stipulated in Consent of Operate ▸ Possibility of recycling of treated effluent shall be explored during operation stage. Treated water may be reused in the process itself, gardening and landscaping purpose		

13. ANNEXURE – IIB: Generic ESMP for Irrigation Canal Repairing

Parameter	Mitigation	ESS	Responsibility
Project Planning and Design Stage			
Stakeholder information and communication	▸ Local people shall be informed and oriented about the project component/ activity and consulted thoroughly to take their opinion/ suggestion in project designing.		
Labour Camp site selection and Arrangement	▸ Identify the site for construction camp in consultation with the individual owners in case of private lands and the Gram Panchayat / concerned Dept. in case of government land. Preference should be given to uncultivated fallow land / Government land during site selection; ▸ The camp site shall be identified and located not less than 500 meters from the local habitation / village. ▸ In case, no Government land / fallow and unutilised Govt. land is available and where use of private land is the only alternative, necessary arrangements should be worked out with the private owner of the land for setting up of facilities during the construction. The arrangement should have both facility creation and site restoration (post-construction stage) component. ▸ The contractor shall obtain documents highlighting arrangements made with the private land owner / local GP / concerned Govt. Dept. for land use for construction, i.e., (1) Written No-objection certificate; (2) Extent of land required and duration of the agreement; (3) Photograph of the site in original condition; (4) Details of site restoration after completion. ▸ It should be ensured that there is no use of Asbestos Containing Materials (ACM) in the construction of the camp. ▸ Identification of potable drinking water source/s and seeking permission from local authority / GP for accessing the source.		
Waste Management Plan	▸ Preparation of guidelines for locating waste disposal sites for toxic and non-toxic wastes; ▸ Waste disposal plan should be a part of the bid document as special condition of contract which should be abided by the contractor.	▸	▸
Pre-Construction			
Display of project Information Board	Project Information Board with important phone number will be displayed prominently at the project site.	ESS 1, ESS 2	
Consent for batching plant	▸ Consent to Establish and Consent to Operate will be obtained from KSPCB, if contractor establishes batching plant. ▸ In the event of procuring, aggregate and sand from third party, the contractor shall ensure that these stone and sand quarries are legal and have valid clearances.	ESS 1, ESS 3	Contractor
Labour camp facilities	▸ At labour camp, the contractor shall provide well ventilated accommodations, bed / bed roll for the workers, electricity supply, water supply, kitchen, separate toilet and bathrooms for ladies and gents, etc.	ESS 1, ESS 2	Contractor

Parameter	Mitigation	ESS	Responsibility
	as per The Building and Other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996		
Other Construction Vehicles, Equipment and Machineries	▸ All vehicles, equipment and machinery to be deployed for construction work will conform to the relevant Bureau of Indian Standard (BIS) norms/CPCB standards. The discharge standards promulgated under the Environment Protection Act, 1986 and Motor Vehicles Act, 2019 will be strictly adhered to. ▸ Acoustic enclosure fitted DG set will be used at the project site as per regulations. ▸ The contractor shall maintain records of Pollution Under Control (PUC) certificates for all vehicles used during the contract period, which will be produced to RPMU/ PIU for verification whenever required.	ESS 1, ESS 3 and ESS4	Contractor
Labour Requirement	▸ The contractor preferably will use unskilled/ semiskilled/ skilled labour from local area to give the maximum benefit to the local community.	ESS 2	Contractor
Appointment of Environment & Safety Officer	▸ The contractor shall appoint one nodal Environment, Health & Safety (EHS) person, who will ensure implementation of ESMP including occupational health and safety issues at the camp and construction work sites.	ESS 1, ESS 3	Contractor
Impact on fauna	The contractor and its workers will be educated / sensitized on endangered/ vulnerable species and its protection measures;		
Impact on public utility services/ amenities and disruption of services (Electric pole, Light post)	Field verification and finalization of number of utility service structure to be relocated, with an aim to minimize disruption of public utility services. Causing issuance of advance notice to the concerned service providers regarding relocation of public utility, service, structures and depositing the fund to the concerned authorities as per their quotation. Informing local community on such relocation in well advance. Providing safe temporary access routes for local people during the construction period.		
Dust, air and noise pollution; littering during transportation	Identification of sensitive receptors like school, health centre and playground within 100 meter radius of construction site		
Site Clearance	Enumeration survey of tree present in the project locations and determining the number of tree to be cutdown; obtaining tree felling permission along with permission for compensatory afforestation from District Forest Officer. Shrub stems, stumps, roots shall be uprooted properly to eliminate any chance of void under PCC lining		
Generation and disposal of earth material due to bed cleaning activity;	Soil material shall be used for filling and levelling purpose.		
Waste Management	▸ Identify the activities during construction, that have the potential to generate waste and work out measures for the same in the construction schedule to be submitted to the RPMU/ PIU; ▸ Identifying the location for disposal of non-toxic wastes in consultation with the local GP / Dept. authorities. Priority should be given to existing waste disposal sites, if available. ▸ Orientation of workers, supervisors and other persons associated with construction work on waste management principles, waste disposal	▸	▸

Parameter	Mitigation	ESS	Responsibility
	mechanism, safety and security measures during waste disposal, management of disposal sites etc.		
Hazardous waste management plan	▸ Disposal of any toxic materials like used oil, lube oil and etc shall be in nearby existing landfill sites complying with Hazardous and other Wastes (Management and Transboundary Movement) Rules, 2015.	▸	▸
Chance of finding Archaeological property	▸ If any fossils, coins, articles of value / antiquity and remains of archaeological interest discovered on the site shall be the property of the Government and shall be dealt with as per the provisions of the relevant legislation. ▸ The Contractor shall take reasonable precautions to prevent his workforce or any other persons from damaging or removing any such articles. If any articles found shall be brought to the notice of the concerned RPMU official and shall seek the direction of ASI before contractor recommencing the work.		
Construction			
I. Construction Work			
Procurement of raw material	▸ Materials required for construction are of specified quality and are only procured from authorized suppliers. ▸ Use PPC cement in all civil works.		
Biodiversity Conservation and Management	▸ The project staff and workforce will be appropriately made aware about the importance of biodiversity and shall be advised not to indulge in any illegal activity including hunting of wildlife. ▸ No dumping site will be identified in the protected areas and no waste dumping (even temporary) will be permitted in these areas. ▸ Natural vegetation will be conserved to the best possible extent during land preparation, and native species will be used in compensatory afforestation in consultation with the DFO. ▸ Hunting or poaching of Vulnerable species and Snake shall be strictly restricted. On observation, any such species shall be allowed to migrate in nearby area.	ESS 1, ESS 6	Contractor
Disposal of Surplus Earth	▸ Earth excavated at construction site will be used for filling and leveling at the site. Surplus earth will be collected and transported to pre identified disposal area.	ESS 1, ESS 3	
Barricading of construction zone	▸ The construction site shall be barricaded by tin sheets with safety sign boards ▸ Screens of hessian cloth, agro-net and such other barricading materials are to be erected around stock piling sites, so that generation of the dust in the vicinity of construction site can be minimised to a great extent	ESS 1, ESS2	
Transportation of Construction Materials	▸ All vehicles delivering construction materials to the site shall be covered to avoid spillage of materials and air pollution. ▸ The unloading of construction materials at the construction sites will be limited to day time only to avoid accidents.	ESS 1, ESS 3	
Safety of Workers	▸ The contractor shall make sure that during the construction works all relevant provisions of the Building and Other construction workers (regulation of employment and conditions of services) Act 1996 and Labour Management Procedures are adhered to. ▸ The contractor will comply with all the precautions as required for ensuring the safety of the workers as per the country' labour regulations and International Labour Organisation (ILO) Convention No-62 as far as those are applicable to this contract.	ESS 2	

Parameter	Mitigation	ESS	Responsibility
	▸ Precautions to be taken in construction camps are like (1) no leaching of oil and grease into water bodies or water sources take place; (2) non-disposal of wastewater into water bodies, streams, etc., without any treatment; (3) collection and appropriate disposal of solid wastes on regular basis; (4) hygienic condition of the toilet, its regular maintenance and keeping it clean and (5) availability of first-aid care provision in the camp, (6) display of emergency numbers (fire, police, ambulance, medical hospital etc,) in a common place visible to others.		
Occupational Health and Safety at the Work Sites.	▸ Required Personal Protective Equipment (PPE) shall be provided by the contractor to the workers engaged in construction works. ▸ Required warning signs, barricades, etc shall be provided by the contractors. ▸ Proper barricading shall be provided along the construction site.	ESS 1, ESS 2	
Water Conservation During Concrete Curing and Construction	▸ Measures for reducing water demand during construction should be followed. ▸ Concrete structures should be covered with thick cloth /gunny bags and then water should be sprayed on them. ▸ Use of potable water during construction should be minimized.	ESS 1, ESS 2	
C. Pollution Control			
C1 Water Pollution			
Water Pollution from Construction Waste	▸ The contractor shall take all precautionary measures to collect and dispose-off construction wastes/debris generated from construction site. ▸ All solid or hazardous wastes (used oil) shall be collected and disposed in environmental sound manner.	ESS 1, ESS 3	
Likelihood of flooding in neighboring agricultural fields due to dewatering processes,	▸ Canal lining and bed cleaning shall be carried out when the canal bed is dry. ▸ Else, earthen bund shall be constructed for dewatering of active work zone; ▸ Canal water shall not be pumped out for dewatering purpose to nearby agricultural field to avoid any kind of crop damage ▸ Crop compensation shall be paid to affected farmers on occurrence of crop damage due to dewatering. ▸ In case canal water is pumped out for dewatering the following do and don'ts will be followed: ▸ Ensure that the pumped-out water will not deteriorate the water quality of the receptor water bodies. ▸ Undertake prior consultation, secure agreement and give adequate notice to other users of receptor water bodies. ▸ Don't let the water out onto roads, areas close to habitations that are prone to water logging, etc.	ESS 1, ESS 3	
Possibility of crop damage owing to disrupted irrigation supply.	▸ Contractor shall submit work plan with canal closure timeline for each restoration site to RPMU at-least before 45 days of any crop season; ▸ Restoration plan shall not be approved by RPMU, if not submitted at-least 45 days prior to any crop season; ▸ Subsequent to receive and approve of work plan, farmers should be informed about canal closure plan at-least before 30 days of any crop season. Canal closure notice board shall be displayed at local panchayat/ irrigation office.		

Parameter	Mitigation	ESS	Responsibility
Wastewater from Labour Camp	▸ Waste water generated from the sanitary facilities of labour camp and work sites shall be treated in septic tank followed by soak pit. ▸ Proper mobile or fixed toilets fitted with septic tank shall be provided at camp and construction sites.	ESS 1, ESS 2, ESS 3	
C2 Air Pollution			
Dust and Gaseous Pollution	▸ Mitigation measures would principally include storing of materials/earth stockpiles at designated places, sprinkling of water into the materials stockpiles and limited period of storage at each construction zone. ▸ Watering frequency during periods of high risk (e.g. high winds) shall be increased. ▸ The contractor shall deploy the construction machinery, which conforms to the pollution control norms specified by the MoEFCC/CPCB/KSPCB. ▸ Regular maintenance of machinery and equipment shall be carried out and vehicular pollution check shall be made mandatory. ▸ LPG shall be used as fuel for cooking at construction labour camp instead of used of fuel wood. ▸ Vehicles transporting garbage & demolition wastes, earth, sand, aggregate, etc shall be covered with tarpaulin sheets to control windblown dust from vehicles.	ESS 1, ESS 2, ESS 3	
Emissions from Construction Vehicles, Equipment and Machineries	▸ The contractor shall ensure that all vehicles, equipment and machineries to be used for construction works are regularly maintained and confirm that pollution emissions levels comply with the relevant emissions requirements of CPCB and/Motor Vehicles Rules. The contractor will submit PUC certificates for all vehicles used for the sub project. ▸ Proper engine tuning of machinery/equipment/ transport vehicle to avoid the exhaust emissions;		
C.3 Noise Pollution			
Noise from vehicles, compaction rollers, concrete mixers and construction equipment	The contractor shall ensure the following: ▸ a) All construction activities shall be restricted to day time hours only. Construction activities shall not be carried during night (10.00 P.M to 06.00 A.M) ▸ b) Machineries and equipment used in construction (including those of sub-Contractors) shall strictly conform to the MoEF&CC/ CPCB noise standards and shall have latest noise suppression mountings. All vehicles and machineries should have a valid Pollution Under Control (PUC) certificate. ▸ c) All vehicles and equipment used in construction work shall be fitted with muffler or silencers. ▸ d) Servicing of construction vehicles and machinery shall be done regularly and during routine servicing operations, the effectiveness of exhaust silencers shall be checked and if found defective, these shall be replaced. Regular inspection, maintenance and lubrication of the construction vehicle and equipment. ▸ e) Only acoustic enclosures fitted DG set will be allowed at the construction site and camp site. ▸ f) Avoid nighttime traffic particularly near communities.	ESS 1, ESS 2, ESS 3	Contractor
C.4 Waste Generation & Disposal			

Parameter	Mitigation	ESS	Responsibility
Construction Debris	▸ Construction wastes will comprise of broken bricks, dry cement, discarded timber, metal pieces, empty cement bags, glass, used oil, etc. These wastes should be segregated into recyclable and non-recyclable waste. ▸ Recyclable waste shall be stored in the covered area and shall be sold to authorized vendors regularly. Non-recyclable waste shall be disposed at approved debris site in covered vehicles or reuse for land filling purposes. These wastes' disposal must comply with the Construction and Demolition Waste Management Rules 2016 requirement for its disposal. ▸ Code of practice as suggested in Orissa Public Works Department Code Volume –II (OPWD Code, vol-II) shall strictly be followed while handling C&D waste. Residual construction material shall be stored separately and cleaned immediate after completion of work; construction site shall be cleaned before rainy season;	ESS 1, ESS 3	
Hazardous Wastes	▸ Used / spent oil generated from maintenance of construction machines and DG sets shall be disposed through use oil recyclers.	ESS 1, ESS 3	
Solid Waste (Municipal and other Waste)	▸ Municipal solid wastes shall be generated from labour camp and construction site. These solid wastes shall be disposed as per Solid Waste Management Rules 2016. ▸ Dustbins for recyclable and non-recyclable wastes shall be provided in labour camp areas. ▸ Recyclable wastes shall be sold to authorized vendors. Concept of reduce, re-use and recycle shall be followed at site. The non-recyclable, nonsalable and nonbiodegradable wastes shall preferably be disposed at a marked landfill site.	ESS 1, ESS 3	
D. Personnel Safety			
Personal Safety Measures for Labours and Staff	The contractor shall provide necessary personnel protective equipment and take suitable personal safety measures for labours and staff: a) Full body protection clothing, protective footwear, hand gloves and goggles to workers employed handling cement concrete, b) Construction workers will be provided high visibility vests, c) Ear plugs to workers exposed to high noise levels, d) Hard hat or helmets to workers, where there is danger of falling objects from height, e) Hand gloves, helmets, protective footwear/safety shoes, protective goggles, nose masks, high visibility vests etc (as required) will be provided to the workers employed in construction works, f) Safety belts will be used by workers while working at height, g) The contractor shall comply with all the precautions as required for ensuring the safety of the workmen as far as those are applicable to this contract. h) The contractor shall make sure that during the construction work all relevant provisions of The Building and other Construction Workers (regulation of Employment and Conditions of Services) Act, 1996 are adhered to.		
First Aid and Emergency Management	▸ Emergency numbers will be displayed at the camp and construction sites, ▸ First Aid boxes will be made available at the camp and construction sites, ▸ Designated vehicles, which can be used as ambulance during emergency, will be available at construction sites as per requirement.		

Parameter	Mitigation	ESS	Responsibility
E. Labour Camp Management			
Facilities for Labourers	▸ The contractors will follow all relevant provisions of The Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 for construction and labour camp. ▸ An educated person in the camp site should be oriented on administering first aid treatment and the box should be placed under his/her command. Arrangement should be made by which she/he would be available at the time of requirement. ▸ In case of any eventuality which demand hospitalization, transport facility should be provided using available project vehicle or immediate transportation through ambulance service to nearby health facility. ▸ The Contractor will maintain well-ventilated living accommodation and sanitation facilities to workers in functional and hygienic manner. ▸ Workers will be provided with beds/bunk beds with mosquito nets and no worker will be allowed to sleep on the ground. ▸ Fans and proper ventilation (turbine type ventilators) will be provided in labour accommodation rooms. ▸ Regular cleaning and sweeping will be ensured at the labour camp site. ▸ Fuel wood will not be allowed for cooking at the labour camps. LPG cylinders with gas fire box will be provided at labour camp by the contractor. ▸ Clean and cool drinking water will be made available for workers by the contractors. ▸ If required, check water quality and undertake necessary measures as applicable to correct anomalies in water quality that may be indicated in the water quality tests. Drinking water quality should meet Drinking Water Standard IS: 10500-2012. ▸ Ensure drainage arrangements are adequate and fully functional and no stagnation of water takes place. ▸ Necessary medical facilities will be provided to workers by the contractors. ▸ Separate toilets/bathrooms, wherever required, will be provided for male and female, marked in vernacular. ▸ Periodic visit by a qualified medical doctor (PHC/CHC/SDH etc.) to the campsite for health check-up of workers.		
HIV/AIDS Prevention Measures	▸ Necessary HIV/AIDS prevention awareness measures will be taken at the labour camp by the contractor. ▸ Time to time HIV/AIDS awareness training/programme will be organized by the Environment & Safety Officers of the contractor.		
Sanitation and Sewage System at Labour Camp	The Contractor will ensure that: a. Adequate water supply shall be ensured in bath rooms, toilets and urinals, b. Separate toilets should be provided for men and women. c. Night soil shall be disposed of on regular interval. d. Ensure adequate drainage and sewerage arrangements (including soak pits and septic tanks, if present) are available and fully functional.	ESS 1, ESS 2	
Wastes Collection and Disposal from labour camp	▸ Provide garbage bins in the camp and construction sites. ▸ Burning of any kind of wastes shall not be allowed at the camp and construction sites.	ESS 1, ESS 3	

Parameter	Mitigation	ESS	Responsibility
H. Contractor's Demobilization			
Clean-up Operations, Restoration and Rehabilitation	▸ The Contractors shall clear all temporary structures; dispose all garbage, night soils in environmental sound manner. ▸ The camp site shall be restored to a condition in no way inferior to the condition prior to commencement of the works. ▸ Various activities to be carried out for camp site restoration are like (1) cleaning / removal of oil and fuel contaminated soil and its disposal in approved waste disposal areas. (2) Sealing / filling up of soak pits and septic tanks; (3) disconnection of electricity supply; (4) disposal of all garbage in the disposal site only (site approved by local authority).	ESS 1, ESS 3, ESS 4	
Worker Occupational Health and Safety	▸ Engage experienced contractor with requisite licenses and well-trained workers for the construction works. ▸ The selected contractor should have adequate training on first aid to treat minor ailments. ▸ Periodic health-check-ups (monthly) of all laborers employed at the project site; ▸ Obligatory insurance of contractor's staff and laborers against accidents. ▸ Provision of first aid facilities and emergency vehicle. However, major cases will be referred to the nearest hospital or health centre; ▸ Ensure the use of PPEs by all construction workers; ▸ Provision of healthcare and medical care services in case of sickness. ▸ Ensuring use of PPEs such as welding helmet, hand goggles, Respirators specially during cutting and welding operation		PMU / RPMU/ PIU Contractor
Provision of safe and hygiene drinking water	▸ Potable water shall be provided to workers at all time. ▸ The contractor has to make his own arrangements for meeting water required for construction ensuring that water availability and supply to nearby communities remain unaffected.		Contractor
Worksite toilet blocks	▸ Provide temporary and separate toilet blocks for male and female workers at each work site; toilet block shall be sufficiently away from any water coerce to ensure that it's do not mixed with water; ▸ Educated workers against open defecation or "free range" defecation. ▸ Avoid constructing sanitation or other facilities that will use and store harmful materials at flood-prone areas. ▸ Chose dry sanitation options or closed disposal systems, instead of wet ones such as septic tanks or detention ponds		
Storage, handling of hazardous materials	▸ Fuel like diesel, petrol, lubricant shall be stored in double line containment with provision of bed lining		Contractor
Compensatory Tree Plantation	▸ Compensatory tree plantation shall be carried out to compensate loss; ▸ Maintaining bio-diversity in CA and avoid mono species plantation;		
Disposal of Construction waste	▸ Code of practice shall strictly be followed while handling construction waste ▸ Residual construction material shall be stored separately and cleaned immediate after completion of work; ▸ Construction site shall be cleaned before rainy season;		
Plastic and Metal waste	▸ Provide waste bins on site for collection and disposal of plastic waste, cans and food waste. These bins shall be frequently emptied at approved dump sites. ▸ Plastic waste shall be collected and stored separately and sold to authorized recycler;		

Parameter	Mitigation	ESS	Responsibility
Disposal of Vegetation waste	▸ Avoid burning of vegetation waste on site. ▸ Allow local community to take wood, Twings & Bough, Leaves, Branch, Shrub Stem, Stumps, Roots, Wood Chips and Logs for domestic use, animal fodder or for composting. ▸ Dumping of leafy material into borrow pit for natural decomposition		
Noise pollution	▸ Heavy noise emitting equipment shall be fitted with silencer. Noise barrier shall be provided to generator set ▸ Construction workers shall be provided with PPEs (earmuff) to minimise health impact due to noise pollution		
Dust and air pollution	▸ Regular water sprinkling arrangement on silt material specially during hot-summer season to maintain soil moisture and minimise dust pollution;		
Air Pollution due to Burning of weeds, shrub stems, stumps, roots, twigs and leave	▸ Contractor shall not adopt practice of burning weeds, shrub stems, stumps, roots, twigs and leaves in open place; ▸ Discourage local community in burning of weeds, shrub stems, stumps, roots, twigs and leaves in open place;		
Impact on Physical and Cultural Resource (PCR)	▸ Avoidance strategy to eliminate any such impact shall be adopted first. ▸ In case of unavoidable circumstances, the design/ DPR should be modified such that a strategy of avoidance is adopted.		
Chance find of archaeological, paleontological, historical significance	▸ If any fossils, coins, articles of value / antiquity and remains of archaeological interest discovered on the site shall be the property of the Government and shall be dealt with as per the provisions of the relevant legislation. ▸ The Contractor shall take reasonable precautions to prevent his workforce or any other persons from damaging or removing any such articles. If any articles found shall be brought to the notice of the concerned RPMU official and shall seek the direction of ASI before contractor recommencing the work.		Contractor/ RPIU
Community Health and Safety: Chance of road accidents	▸ Public consultation to maintain community integrity and social links; ▸ Material transport in closed containers or covered with canvas (Tarpaulin) sheets. ▸ Cases of road accident will be referred to nearby healthcare centre after primary first aid by contractor; ▸ Public awareness campaigns through displaying sign board at site and haulage routes; ▸ The contractor shall use warning signs at vantage points to indicate ongoing works. The contractor shall cover all construction site with caution tapes ▸ Restriction on movement of machinery on the designated haulage routes for transportation of materials; ▸ The contractor shall ensure that all haulage trucks comply with the approved speed limit of 30km/hr within the communities along the haulage road; ▸ Adequate signage to manage traffic at sites, haulage and access roads;		Contractor
Damage to access roads/ infrastructure	▸ Restore any damaged roads/ infrastructure to it's previous stage with full satisfaction of local community ▸ Regular repair of damaged roads throughout the construction period.		Contractor
Mobility inconvenience	▸ Safe alternative access routes shall be provided for access ways that are obstructed/ destroyed during construction works.		

Parameter	Mitigation	ESS	Responsibility
to the local community	▸ Passage ways and walkways should be kept free of materials, scraps or obstructions ▸ Repair and maintain damaged sections of the road located at project site throughout the construction period. ▸ Not allowing parking of the vehicle in areas which may create inconvenience in mobility such as blind turning point or meeting point of village road with the embankment.		
Conflict with local water demand	▸ The contractor has to make his own arrangements for meeting water required for construction ensuring that water availability and supply to nearby communities remain unaffected.		

14. ANNEXURE – IIC: Generic ESMP for Replantation

14.1. Best Practices

Best practices in plantation crops focus on maximizing productivity, ensuring environmental sustainability, and promoting social responsibility within the agricultural sector. From cultivation techniques to pest and disease management, the adoption of these practices contributes to the long-term viability of plantation farming. This involves integrating modern technologies, precision agriculture, and ecological considerations to strike a balance between productivity and environmental conservation.

Management	Basic Cultural Practices
Removal of Old Tree	
	▸ Restrict tree cutting only during daytime and non-monsoon season ▸ Preserve shed trees while removing old trees ▸ Avoid burning of weeds, stems, stumps, roots, twigs and leave which causes air pollution ▸ Use of PPE kits during tree cutting ▸ Proper land levelling immediate after tree cutting to restrict soil erosion ▸ Removal of stump and roots of old trees ▸ Avoid overloading of timber in transportation truck ▸ Implement erosion control measures, such as terracing, contour farming to minimize soil erosion and degradation during and after replantation.
Pre-planting	
Common Practice	▸ Removal and destruction of alternate host weeds ▸ Apply manures and fertilizers as per soil test recommendations. ▸ Sow the ecological engineering plants ▸ Field sanitation, rogueing ▸ Deep summer ploughing of fields to control resting stages of insect pests. ▸ The land should be divided into blocks of convenient size by laying out footpaths and roads in between. Uprooting and in situ burning should clear the ground level bushy growth. ▸ Sow/plant sorghum/maize/bajra in 4 rows all around cumin crop as a guard/barrier crop for cardamom
Nematodes and soil borne pests	▸ Use virgin soil for preparation of nurseries. ▸ Nurseries should be located far away from infested plantations. ▸ Gap filling should be practiced every year. ▸ Use of less susceptible, tolerant cultivars or hybrids of coconut and intercrops in infested areas. ▸ Avoid use of banana as a shade crop in coconut nurseries. ▸ Application of cow dung, FYM, oil cakes and green manure to the basins. ▸ *Crotolaria juncea* may be cultivated in the basin and interspaces and used as green manure for coconuts ▸ Incorporate leaves and tender stem of *Crotolaria juncea, Pueraria javanica* and *Glyricidia maculata* into the soil in Sep-Oct. for coconuts ▸ Practice green manuring and intercropping with redgram for the control of root rot for cardamom ▸ Apply neem cake @ 100 Kg/acre at the time of transplanting for reducing capsule borer damage for cardamom

Management	Basic Cultural Practices
Nursery	▸ Select good mother palm for obtaining seedlings i.e. it must be of 20 years of age, yield more than 80 nuts/annum for coconuts ▸ Seed treatment with acid or similar chemicals improves germination. Acid scarification with 25 per cent nitric acid for 10 minutes to break the seed coat will enhance germination for cardamom. ▸ Fumigate the beds with 2% formalin (10 liters per bed) 10 days before sowing for cardamom. ▸ After extraction of seeds wash through water to avoiding mucilage and mix with wood ash for shade drying in cardamom ▸ Bed size should be 6 m in length, 1 m width and 20 cm height after timely sowing and planting for cardamom. ▸ 30-50 g seeds should be recommended per bed for cardamom ▸ Select the suckers of high yielding varieties suiting to the location. ▸ Select the virus free planting material, vegetative propagation through suckers is the best method. ▸ Prepare beds as in primary nursery ▸ For Cardamom fumigate the beds with 2% formalin (10 l per bed) 10 days before sowing ▸ Shade pandals should be provided before transplanting of cardamom. ▸ Mulching the bed with dry leaves will help to conserve soil moisture in Cardamom. ▸ Regular watering during dry months, weeding, application of fertilizers, control of pests and diseases.
Damping off	▸ Do not re-use old nursery soil ▸ Avoid excess humidity in the nursery ▸ Disinfect soil prior to seeding ▸ If the disease appears, affected seedlings and those surrounding them should be destroyed
Plantation Stage	**Common cultural practices:** ▸ Choose companion crops that have lower susceptibility to pests and pathogens compared to the cash crop. ▸ Schedule the planting of rubber trees during the rainy season to take advantage of the natural rainfall. ▸ Enhance parasitic activity by avoiding chemical spray, when 1-2 larval parasitoids are observed. ▸ Remove and destroy collateral/alternate hosts such as castor, ginger, turmeric in the immediate vicinity. ▸ Maintain optimum plant density. ▸ Ensure adequate shade of 65-70% in endemic areas and irrigate the crop before attaining critical period for cardamom ▸ Mulching the plant basins with green leaves and other organic materials during summer months conserves and maintains the population of native beneficial microflora. **Mechanical practices:** ▸ Handpick the gregarious caterpillars and the cocoons which are found on stem and destroy them in kerosene mixed water. ▸ Use yellow sticky traps @ 4-5 trap/acre for cardamom. ▸ Use light trap @ 1/acre and operate between 6 pm and 10 pm for cardamom ▸ Install pheromone traps @ 4-5/acre for monitoring adult moths activity (replace the lures with fresh lures after every 2-3 weeks) for cardamom. ▸ Encouragement of golden backed woodpecker and crow-pheasant in the plantation and erect of bird perches @ 20/acre to attract birds of economic importance in biological control

Source: Smallcardamom.pdf (niphm.gov.in)

14.2. WEED MANAGEMENT

Weeds remove substantial amount of nutrients and moisture from the soil besides increasing the incidence of pests and diseases in crop by serving as alternate host. Weed management is an integral aspect of modern agriculture, essential for sustaining optimal crop productivity. Weeds, that compete with cultivated crops for resources, sunlight, and nutrients, can significantly impact agricultural yields if left uncontrolled. Effective weed management strategies aim to mitigate these challenges while promoting sustainable and environmentally friendly agricultural practices. Weeds are the number one pest and can reduce the productivity of tea by 10 – 50% depending on the intensity of growth, extent of competition, weed species and the competitive ability of cloning. Grassy weeds reduce the productivity of tea and coffee by 21%, while broad leaved weeds accounts for 9-12%[31]. Borreria sp. (button weed), Chromolaena odorata (siam weed), Lantana aculeate (lantana), Mimosa pudica (touch- me-not), Clerodendron sp., Mikania micrantha (mile-a-minute), Sida sp., Imperata cylindrica, Pennisetum sp. (Napier grass), Axonopus sp. (carpet grass), Paspalum sp., Digitaria sp. (tropical crab grass), Cynodon dactylon (bermuda grass) etc. are commonly grown weed found in rubber cultivation firm. Maintenance of a luxuriant ground cover in the early phase of plantation can minimize the weed infestation to a great extent. Weed should be removed as per following recommended process:

Stages of Plantation	Management Practice
Pre-planting	▶ Keep boundaries of plantations weed free to prevent dispersal of weed seed. ▶ Removal and destruction of alternate host weeds ▶ Field should be well prepared by tillage operations and after tillage; the underground reproductive propagules of weeds must be collected and destroyed. ▶ Digging out of tubers and rhizomes of weeds is discouraged to prevent re-infestation from fragmented underground propagules. ▶ Fill the pit with FYM, red earth and sand mixture for coconuts ▶ Prepare beds of 1-1.5 m width and of convenient length with 75 cm space between beds for coconuts ▶ Liming the soil to pH 6.0-7.0, as well as reducing nitrogen levels in the soil, significantly reduces wilt for coconuts
Nursery	▶ Keep the nursery weed free by hand pulling of the weeds. ▶ Grow resistant/tolerant varieties ▶ Use healthy, certified and weed seed free seeds/suckers/planting material. ▶ Destruction of infested plants ▶ Do not use the same site repeatedly for raising the seedlings ▶ Raise nurseries away from main plantations to reduce possibilities of infestation and reinfestation from the nearby infested plantations. ▶ Provide adequate drainage facilities. ▶ Mixing of well decomposed cattle manure and wood ash with the top layer of the soil will help the seedlings to establish well and to grow vigorously ▶ Use vegetative mulches to avoid weed growth in nursery. ▶ Weeds should be removed manually as and when required

31 https://www.researchgate.net/publication/339325990_Lecture_25_Weed_management_in_Plantation_crops_tea_and_coffee/link/5e4bb663a6fdccd965af1bc7/download?_tp=eyJjb250ZXh0Ijp7InBhZ2UiOiJwdWJsaWNhdGlvbiIsInByZXZpb3VzUGFnZSI6bnVsbH19

Stages of Plantation	Management Practice
	▶ There are two main types of herbicides in Rubber, the preemergent and post-emergent herbicides. Pre-emergent herbicide includes Diuron (Karmex, Klass) (class III): 2.5 kg in 700 litres; Post-emergent herbicides include 1. Glyphosate (Class III) (Glycel, Weed off or Round up): 2 litres in 400 litres (2-3 rounds at 3 months interval). For spraying herbicides, knapsack sprayers with flood jet nozzle (No.WFN 40) or controlled droplet applicators (CDA) are used. ▶ Common Practice for Coffee plantation is clearing of heavy vegetation and large rocks prior to planting coffee and selective retention of evergreen trees providing filtered shade at a spacing of 9 - 12 m is desirable. Use of resistant/tolerant varieties – Arabiaca Varieties Sln 795, Sln 7, Sln 9, Sln 10, HRC (Hawaian Red Caturra) and Chandragiri (Hawaian Red Caturra) and Chandragiri. Robust Varieties like Sln 274, Sln 3, Peridenia, C x R ▶ Specific Weed Management for Coffee plantation include closer spacing of plants, inter-planting with temporary shade trees (Gliricidia, Erythrina), use of quick growing planting materials will help uniform ground coverage and thereby reducing the weed growth.
Planting stage	▶ Plant cover crop to avoid ground exposure. ▶ Use weed free compost and straw mulches. ▶ Collect and destroy crop debris. ▶ Provide irrigation at critical stages of the crop. ▶ Avoid water logging. ▶ Regulate shade in thickly shaded areas. ▶ Avoid water stress during flowering stage. ▶ Plant green manure crop between rows. ▶ Fill gaps with healthy disease-free materials. ▶ Closer spacing of plants, inter-planting with temporary shade trees *(Gliricidia, Erythrina)*, use of quick growing planting materials will help uniform ground coverage and thereby reducing the weed growth. ▶ Use of spade for weeding is to be avoided as it will loosen the soil and cause soil erosion. ▶ The weeded materials may be used for mulching. ▶ Slash weeding by use of power mower in the inter row space. ▶ Three rounds of hand tool weeding during May, September and December/January for Cardamom **Common mechanical practices:** ▶ Collect and destroy disease infected and insect infested plant parts. ▶ Collection and destruction of eggs and early-stage larvae. ▶ Handpick the older larvae during early stages of crop. ▶ The infested shoots may be collected and destroyed.
Young plantations	▶ Slash weeding is recommended before flowering of weeds.
Reproductive stage	▶ Hand weeding around collar region of young bushes is always safe and it should be done. ▶ Care should be taken so that the weeds do not flower and seeds infest the new areas.

Source: Smallcardamom.pdf (niphm.gov.in) ; niphm.gov.in/IPMPackages/Coconut.pdf; Weed control (celkau.in); Source: Coffee.pdf (niphm.gov.in)

14.3. RODENT PEST MANAGEMENT

Rodent management is a critical aspect of agricultural practices, particularly in plantation crops where the impact of rodent damage can be substantial. Rodents are known to feed on crops, damage infrastructure,

and potentially spread diseases, posing a considerable threat to both yields and the overall health of plantation ecosystems.

Cultural control:	 Lesser bandicoot  Southern palm squirrel	▸ Disturb and destroy the habitat (burrows) of the rodents by practicing clean cultivation ▸ Minimize the alternate food sources and secured habitation by removing the weeds and crop residues in/ around the fields and timely harvest of seeds will reduce the rodent damage.
Mechanical control:		▸ Practice burrow smoking using paddy straw or other natural smoking materials in 'ANGRAU/NIPHM burrow fumigator' for 2-3 minutes for each Bandicoot burrow.
Biological control:		▸ Encourage the establishment of natural predator like barn owls by establishing barn owl perches/ wooden boxes in and around the crop fields.
Chemical control:		▸ Ecodon, a caster oil based repellent is effective against rodents. It is effective against porcupines for one month and rats for 15 days which is applied @1:10[32]. ▸ Chemicals which make the rat sterile are Furadantine @0.02g andcolchicine@0.14 g. These are generally used as mixture of one tablet of furadantine and half tablet of colchicine in the wheat floor to make both sexes sterile

Source: Smallcardamom.pdf (niphm.gov.in)

Rodents damage tender nuts by forming characteristic holes. Shed nuts can be seen at the base of the palm.

Rodent Pest	Control Method	Remedial Measures
Palm civet, Black rat, Indian gerbil, The lesser bandicoot	**Cultural control:**	▸ Rodents damage tender coconut nuts by forming characteristic holes. Shed nuts can be seen at the base of the palm. ▸ Practice clean cultivation/maintain weed free fields which reduces the harbouring/ hiding points for rodents. ▸ Practice trapping with locally available traps using lure @ 8-10 traps/acre. In areas, where *Rattus rattus* is a problem, wonder traps/multi-catch traps work better and enable to trap more animals into a single trap. ▸ Identify live rodent burrows and smoke the burrows with burrow smoker for 2-3 minutes ▸ Erect owl perches @ 5-6/acre to promote natural control of rodents ▸ Practice clean cultivation/maintain weed free fields which reduces the harbouring/ hiding points for rodents. ▸ Practice trapping with locally available traps using lure @ 8-10 traps/acre. In areas, where *Rattus rattus* is a problem, wonder traps/multi-catch traps work better and enable to trap more animals into a single trap. ▸ Identify live rodent burrows and smoke the burrows with burrow smoker for 2-3 minutes ▸ Erect owl perches @ 5-6/acre to promote natural control of rodents
	Chemical control:	▸ An effective chemical method of control is the use of multiple dose permissible anticoagulants. These baits are prepared by mixing broken rice, jaggery, paraffin wax and anticoagulant. in the ratio of 12:1:6:1. First, the rice, jaggery and anticoagulant are mixed in a tray of convenient size. In another vessel paraffin wax is melted. The molten wax is then poured over the bait mixture in the tray, mixed properly and spread evenly. Once the

[32] Source: https://orienvis.nic.in/indexx.aspx?langid=1&slid=1073&mid=2&sublinkid=342

		smooth surface is formed the slightly hardened mixture is cut into blocks of 4x4x2 cm.

Source: https://cpcri.icar.gov.in/filemgr/webfs/publication/CP2596.pdf
https://niphm.gov.in/IPMPackages/Coconut.pdf

14.4. DO's AND DON'Ts

Sl. No.	Do's	Don'ts
1	Deep ploughing is to be done on bright sunny days during the months of May and June. The field should be kept exposed to sun light at least for 2-3 weeks.	Do not plant or irrigate the field after ploughing, at least for 2-3 weeks, to allow desiccation of weed's bulbs and/or rhizomes of perennial weeds.
2	Grow only recommended varieties.	Do not grow varieties not suitable for the season / the region.
3	Always treat the seeds with approved chemicals/bio-pesticides for the control of seed borne diseases/pests.	Do not use seeds without seed treatment with bio-pesticides/chemicals.
4	Sow in rows at optimum depths under proper moisture conditions for better establishment.	Do not sow seeds beyond 5-7 cm depth.
5	Apply only recommended herbicides at recommended dose, proper time, as appropriate spray solution with standard equipment along with flat fan or flat jet nozzles.	Pre-emergent as well as soil incorporated herbicides should not be applied in dry soils. Do not apply herbicides along with irrigation water or by mixing with soil, sand or urea.
6	Maintain optimum and healthy crop stand which would be capable of competing with weeds at a critical stage of crop weed competition	Crops should not be exposed to moisture deficit stress at their critical growth stages.
7	Use NPK fertilizers as per the soil test recommendation.	Avoid imbalanced use of fertilizers.
8	Use micronutrient mixture after sowing based test recommendations.	Do not apply any micronutrient mixture after sowing without test recommendations.
9	Conduct AESA weekly in the morning preferably before 9 a.m. Take decision on management practice based on AESA and P: D ratio only for coffee	Do not take any management decision without considering AESA and P: D ratio for coffee
10	Install pheromone traps at appropriate period.	Do not store the pheromone lures at normal room temperature (keep them in refrigerator).
11	Release parasitoids only after noticing adult moth catches in the pheromone trap or as pheromone trap or as per field observation	Do not apply chemical pesticides within seven days of release of parasitoids
12	In case of pests which are active during night spray recommended biocides/ chemicals at the time of their appearance in the night.	Do not spray pesticides at midday since; most of the insects are not active during this period.
13	Spray pesticides thoroughly to treat the undersurface of the leaves, particularly for mites, scales, thrips, etc. and for Bordeaux spray for Coffee	Do not spray pesticides only on the upper surface of leaves.
14	Apply short persistent pesticides to avoid pesticide residue in the soil and produce.	Do not apply pesticides during preceding 7 days before harvest for coffee
15	Follow the recommended procedure of trap or border crops technology.	Do not apply long persistent on trap crop, otherwise it may not attract the pests and natural enemies.

Source: Coffee.pdf (niphm.gov.in)

15. ANNEXURE III: LMP

16. ANNEXURE IV: IPNM

17. ANNEXURE V: IPPF

18. ANNEXURE VI: Gender Action Plan

During the social assessment, consultations were organised with different stakeholders to understand the gender issues and possible measures that can help women in ensuring their participation in the overall process. The assessment helped to identify certain key issues pertaining to women and their involvement in agriculture and Agri-business activities.

18.1. Key Issues / Challenges

During assessment, it is observed that while participation of women in different development activities have been poor in general, their association in agricultural decision making remains marginal. Though, their contribution is significant in different stages of farm activities, still their contribution has been ignored to a great extent. In cultivation practice, role of women has been negligible or almost nil. In the labour front, the wage rate paid to the women agricultural workers are comparatively less than their male counterpart. Though Government has been taking required measures for giving land rights to women in shape of registering land jointly with the male counterpart, still in most of the earlier record of rights, male in most cases are title holder. This creates an imbalance as far as land holding is concerned. Access to market by women is also limited due to factors like social stigma, low quantum of sellable produce, distance of the market place from the village etc. However, in primary level value addition (drying, cleaning, grading and sorting), their involvement is quite significant at domestic front.

Women workers face many problems in agricultural and allied sector, which hinder their growth and act as the main obstacles in their path of progress. All these problems have made women to stay at subsistence level women and lead a low status life. The assessment finds that (1) hardly any women holding of agricultural productive resources such as land, animals, and machinery, (2) association of women with the decision-making process, either inside or outside home in limited and negligible, (3) women perform all un-mechanized agricultural tasks and perform multiple tasks, which add more burden to them, (4) women workers suffer from high illiteracy rate among them and drop-out of schools. Women earn fewer wages than men, especially in joint, informal and private sector. Specific gender issues that have significance for the project, as assessed in the project locations are;

1. Poor economic condition compels women to work in agricultural field as agricultural labourers, construction labour and etc;
2. Less availability of agricultural labourers, compel women of the farming households to work as agricultural labourer in own field for a longer duration;
3. Income from agricultural engagement, as agricultural labourer has been less in comparison to their male counterpart;
4. Other source of engagement of women in rural areas is limited to livestock, petty business and related works. Low or no education is primarily attributed to this along with less exposure;
5. Engagement of women in agribusiness and value addition activities is also limited;
6. Occupational health hazards due to prolonged duration of engagement during farm activities, construction work and allied sector;
7. Women normally do not use personal safety equipment and hence exposed to insecticide / pesticides that are applied on agricultural field, dust & noise generated during construction work. It is also equally applicable for male members;
8. Low awareness on agricultural technologies, hence its adoption;
9. Decision in agricultural operation like selection of crop types, application of other inputs and its selection, marketing of produces etc. are mostly confined to male members and participation of women in decision making is limited;
10. Insignificant or no role of women in irrigation management;
11. Poor access to extension services and institutional facilities;

12. Few women holding productive resources such as land, animals, and machinery.
13. Women earn less wage for the same duration of work, especially in informal / private sector;
14. Poor market information and hence high dependency on local market for sale of commodities;
15. Women's role in functioning of the PP is limited, whereas some selected women participate more actively in women SHGs; Active participation in community institutions is limited to a few women and large section either do not participate or remain passive;
16. Limited institutional platform of women to have a better bargain for their produces and market access. Role of women SHGs in this aspect is limited though recently producer groups are being formed for the purpose;
17. Access to formal financial credit institution for agricultural activities is limited for women farmers and hence limited investment in agriculture;
18. Low land holding and hence low production and insecure livelihood;
19. Poor Capital Investment capacity for agricultural and allied activities;
20. Lack of required infrastructure facility, marketing channel and credit facilities;
21. Participation / attendance of women in trainings / meetings / workshops is very less as a result access to knowledge base, more particularly to post-harvest management remains limited;

18.2. Project Strategies

Women constitute a significant percent of workforce in agriculture and allied sector, however they are not geared up for higher skills and knowledge required for climate resilient agriculture and related package of practices. Most operations in agriculture undertaken by women are often causes drudgery and reduces efficiency. The project will take feasible and implementable actions, that will support greater participation of women. The project will focus on women specific issues across different project components that would help women for a better participation and decision making along with benefitting from the project interventions. The project approach, therefore, would be more inclusive in nature. The project will use the operational definition of women farmers[33] in its intervention plan by which they will not be left out. In all the project activities, across the components, such strategies will be taken that help the women to participate and access project benefits. The project level gender development strategy is presented in Table 13. Looking at the issues pertaining to women, more particularly women associated with agriculture and allied sector, project will take following measures, in an inclusive manner.

Gender planning is the approach for advancing gender equity and equality in the society. It involves incorporating gender perspective into policies, plan, programmes and projects to ensure that these impact women and men in an equitable way. However, below-mentioned strategy could be useful for mainstreaming the gender in the project and its activities.

Screening and Identification: Identification of vulnerable women headed households / women farmers / women workers that are primarily dependent upon agriculture and allied activities for their livelihood. A feasible and executable action plan will be prepared for households of such categories, within the scope of the project, after due analysis of their needs and preferences.

Participation in Governance of Community Organisations: Ensuring active participation of women in local institutions, such as PP, FPO, SHG and etc, following mandatory inclusion criteria. Each FPO should have at-lest one women director in its board of directors. The FPC, may also take woman member as independent director in the company along with the inclusion of women farmers as members.

[33] Operational definition of women farmers refers to women having land in her name and directly associated in the agricultural activities and substantially involved in farm related decision-making process.

Strengthening Women Producer Group: Based on the feasibility and requirement, existing Women Producer Groups (WPG) / women SHGs promoted under other government schemes like Kudumbasree (SRLM) will be provided with necessary inputs for improving their functioning in line with the mandate group. The WPGs (if exists in the project area) shall be treated at par with any other FPO, in terms of provisioning of project benefits. In case of requirement, existing WPG/s will be tied up with other local FPO / WPG based on their nature of business engagement (if type of business of WPG and FPOs are same or in related areas).

Capacity Development: Special capacity building measures will be taken for women farmers to acquaint them with the climate resilient agricultural practices. To design the training module, specific capacity building needs of the women farmers will be assessed and the curriculum is to be designed accordingly. In the exposure visits, which is part of capacity development initiative of the project, representation of women will be ensured. The project will develop required technology kits for promoting knowledge and skill on different aspects related to farming practices (agriculture / horticulture), training on food processing.

Identifying the right training and extension needs of women is one of the most important steps. The project, through its partner entities, will facilitate in giving women more access to meetings, trainings, exposure visits and demonstrations and organizing training programmes based on the needs of the women. Local / village-based trainings to be organized as per the convenience of the women. Peer group-based training methods (farmer-to-farmer) and participatory training methods would be further helpful for the women farmers.

Drudgery Reduction: Reduction of drudgery of women, engaged in agriculture and allied sector, will be taken up by supporting them with women friendly farm machinery / tools. The Custom Hiring Centres (CHCs) will have such tools available for hiring of women farmers. In this regard project will have consultation with the ICAR related to women friendly farm machineries.

Credit Access: The project, through local institution (SHG / SHG Federations FPO), will facilitate linkage of women producer groups (if so exists in the project area) to formal credit sources in order to enable them to take up agri-business activities (in case, such groups willing to participate in the process and identified as potential entity to take up agribusiness activities).

Support for Livelihood Improvement: In order to improve the economic condition of the vulnerable women farmers, the project will facilitate them for adopting supportive livelihood options. Such identified households (identified during planning process) will be supported with livelihood improvement avenues, such as high value crop cultivation, agri-enterprises and other feasible agro-based livelihood activities. Looking at the interest of the women and their collectives in project area, wherever feasible, they will also be involved in managing agro-processing units.

Standardization of Women Specific Field Practices: Certain climate resilient agricultural practices that are women friendly, will be promoted whereby it will improve their productive engagement with reduced drudgery. Identification and improvement of farming systems suited to farmwomen will be taken up in collaboration with the technical institutions. The experience of National Research Centre for Women in Agriculture (NRCWA) can be used for this purpose. Based on their intense involvement in vegetable cultivation or in field crops, supportive activities in the area of vermicomposting, preparation of natural plant pesticides etc. can be taken up individually or through group approach and linked to other farmers of the locality. The project will extend support in identification of gender implications in farming systems approach and adopt women specific technologies under different production systems.

Technology Promotion: Involvement of women farmers will be encouraged in agricultural technology promotion such as seed treatment, IPNM / IPM, organic farming, organic inputs / bio-fertilizer production unit, natural resource conservation etc., based on the scope of the project.

Improved Agricultural Tools and Implements: Agricultural tools and implements are usually designed to match the physical requirement and capacities of men and the women have difficulties in operating these

tools and implements. Appropriate set of tools for work in the field will not only improve her work efficiency but also reduce drudgery. Project will give attention to the needs of the women farmers with regard to farm tools and implements. The National Research Centre for Women in Agriculture (NRCWA) project ergonomically evaluated fifteen equipment out of which 11 equipment namely seed treatment drum, Naveen dibbler, wheel hoe, improved sickle, tubular maize sheller, groundnut decorticator, hanging type cleaner, fertilizer broadcaster, CIAF seed-cum-fertilizer drill, PAU seed drill and hand ridger were found suitable and appreciated by farm women. Such equipment would be popularized/promoted among the farm women.

Table 13: Approach and Strategy for Greater Balance and Women Participation in the Project

Project Stages	Project Approach and Strategy	Expected Outcome
Preparatory Phase	1. Discussion with women of the project area in general with exclusive emphasis on women farmers/ women entrepreneur (Agri and allied) by project component and activities. 2. Preparing a priority list of actions, based on the identified issues and interest of women. 3. Preparing component specific gender plan, covering all project aspects / components for better inclusion of women in different activities that are feasible for their greater participation.	1. Key intervention areas are identified and guiding note prepared for improved participation of women in general and women farmers / entrepreneur, in particular. 2. List of actions finalized for implementation to ensure greater participation of women
Implementation Phase	1. Implementing priority actions that are finalized during preparatory phase; 2. Ensuring greater participation of women / farming women / women entrepreneur in activities / sub-activities taken up under different component / sub-components of the project; 3. Taking measures, adhering to the scope of the project, to build the capacity of women farmers in agricultural technologies, marketing, institution management etc., as per the project requirements; 4. Ensuring measures that are legally binding like equal and minimum wage norm, prevention of women harassment at work place, membership of women in different community organizations like PP, FPO, and SHG; 5. Monitoring of actions taken under the project for inclusion of women by project component / sub-components and initiating corrective measures accordingly; 6. Documenting success and learning from different initiatives undertaken by the project that ensures greater participation of women and dissemination of lessons learned to greater audience.	1. Participation of women / women farmers in different activities implemented under the project; 2. Reduced gender biasness and inclusive target to bring gender equity. 3. Inclusion of women and their active involvement ensured with better operational and management capabilities; 4. Parity in wage (equal work equal pay) payment ensured and legal provisions are abided by.

18.3. Gender Based Violence

To minimize or restrict gender-based discrepancies / violence, contractor shall take following measures at camp site as well as work site.

1. Establishment of workers camp site at least 500 meter away from local habitation to reduce chances of human trafficking and harassment of local women; establish 24 hours security at each camp site to restrict entry of outsider within camp boundary;
2. Provide separate toilet for women workers
3. Mandatory and repeated training and awareness raising for the workforce about refraining from unacceptable conduct toward local community members, specifically women;
4. Informing workers about national laws that make sexual harassment and gender-based violence a punishable offence which is prosecuted;
5. Introducing a Worker Code of Conduct as part of the employment contract including sanctions for non-compliance, manual scavenging, engagement with local residents, child labour engagement, discrimination, harassment of co-workers including women and those belonging to SC and STs and other minority social groups,
6. Contractors adopting a policy to cooperate with law enforcement agencies in investigating complaints about gender-based violence, child labour engagement etc.;
7. Training programs on HIV/AIDS and other communicable diseases for the workers & staff of contractor/s;

19. ANNEXURE VII: OUTLINE OF ADDENDUM ESMF FOR CERC

This chapter provides the environmental and social framework for KERA Project Component 5: Contingent Emergency Response Component (CERC). This component would finance the implementation of emergency works, rehabilitation and associated assessments, at the Government's request in the event of a disaster.

1. Contingent Emergency Response Component

This component establishes a Contingent Emergency Response (CERC) with zero allocation at project approval. It allows for rapid project restructuring in the event of a disaster in Kerala, enabling quick recovery support from the World Bank.

2. Objective of CERC

Objective of the CERC is to support immediate priority activities which will take less than 18 months time to implement. CERC Component should avoid activities or subproject with complex environmental and social aspects (for example resettlement). Table 10.1 below provides possible list of activities can be supported under the component.

3. Potential Activities that the CERC Could Finance

The activities to be supported under the component are not known at this stage. However, Activities financed under the contingent component will be limited to the provision of critical goods, services, works, Training and Emergency Operation. The location of the contingency work will depend on the affected areas of the disaster, and it can be any part of the country. Project component will be finalized only after evaluation of damaged caused by any disaster in the project area.

19.1. An outline of the addendum ESMF for CERC component is outlined below.

- **Project Description (to be financed under CERC)**

Proposed activities under the contingent component will be limited to the provision of critical goods and

services, as well as repair or reconstruction of damaged infrastructure outlined in the positive list of the CERC Operations Manual.

- **Estimate of Damage**

This Section will describe the cost of damage in terms of monetary value under the provision of Positive list of goods, services and works.

- **Potential Environmental and Social (ES) Risks**

- **Negative List of Activities**

19.2. Environmental and Social Management Framework Process

When the CERC component is activated, the relevant government agencies with a coordination mechanism with DoA, PMU, RPMU, PIU will carry out the following steps:

Step 1: *Application of the ES Screening Form*. Develop and use of screening form to screen the subprojects from the E&S point of view. Negative list of activities under CERC will also be applied. Given that the CERC objective is to support immediate priority activities, the activities or subprojects with resettlement issues will be avoided. The E&S screening form will also include the overall evaluation of the baseline E&S landscape.

Step 2: *Identification of ES issues and preparation of mitigation plans.* Based on the results from Step 1, the implementing agency will prepare an ESMP for the CERC subprojects describing the works/activities and mitigation measures to be conducted during detailed design, bidding/ contract, repair/restoration, and closure plans, considering the magnitude, scope, and nature of the emergency. The CERC ESMP will address waste management issues following the guidelines provided in Appendix L. The contractor will be required to ensure that all hazardous wastes are safely and appropriately managed during the implementation of the subproject. Consultation with local authorities and communities will be made during this stage.

Step 3: *WB clearance and GoI approval*. The screening and management plan will require appropriate government and the World Bank clearance (pre or post). It will be further reviewed when CERC will be triggered.

Step 4*: Implementation and M&E.* The approved ESMP will be implemented according to the agreed implementation arrangement.

Step 5*: Completion and Evaluation*. Once the CERC subproject has been completed, the implementing agency will monitor and evaluate the results before closing the contract. Any pending issues and/or grievance must be solved before the subproject is considered fully completed. The implementing agency will submit the completion report describing the compliance of safeguard performance and submit it to WB when required.

20. Annexure- VIII: Model Environmental Code of Conduct (ECoP)

1.introduction

This Environmental Code of Conduct (ECoP) will oblige all Contractor's Personnel (including sub-contractors and day workers) to abide by following practices, as a minimum. Additional obligations may be imposed during project implementation to respond to particular concerns of the region, the location and the project sector or to specific project requirements. Contractor may also impose any additional or strengthen code of conduct on his workers/ staff.

The ECoP should be written in plain language and signed by each worker to indicate that they have:

O received a copy of the code;
O had the code explained to them;
O acknowledged that adherence to this Code of Conduct is a condition of employment; and
o understood that violations of the Code can result in serious consequences, up to and including dismissal, or referral to legal authorities.

A copy of the code of conduct will be displayed at prominent locations easily accessible to the community and project affected people. Name and contact number of the authorised representative of the contractor competent to attend the grievances of the local community or project affected persons should also be provided on the display board, in languages comprehensible to the local community, Project Manager's Personnel, and Employer's Personnel.

2.Model Environmental Code of Conduct (ECoP)

2.1 **None of the Employees of the Contractor and the Subcontractor shall be involved in the following activities**:

- Burning of vegetation waste in open space.
- Unauthorized storage of inflammable substances or harmful non-desired chemical/ pesticide in labour camp or work site.
- Harm or disturbance (including hunting/ poaching) to any endangered or threatened species or sacred groves.
- Harm or disturbance to any culturally significant site.
- Unauthorized removal of timber.
- Disposal of solid or liquid wastes in canal, water bodies, streams, etc
- Illicit or criminal activities including sexual harassment of women or children (prohibit use of language or behavior, in particular towards women and/or children, that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate).
- Violence including sexual and/or gender-based violence (for example acts that inflict physical, mental or sexual harm or suffering, threats of such acts, coercion, and deprivation of liberty
- Exploitation including sexual exploitation and abuse (for example the prohibition of the exchange of money, employment, goods, or services for sex, including sexual favours or other forms of humiliating, degrading behaviour, exploitative behaviour or abuse of power).
- Use of illegal substances and consumption of intoxicating materials
- Discrimination in dealing with the local community (including vulnerable and disadvantaged groups), Project Manager's Personnel, Employer's Personnel and also among themselves on the basis of family status, ethnicity, race, gender, religion, language, marital status, age, disability (physical and mental), sexual orientation, gender identity, political conviction or social, civic, or health status
- Open defecation
- Retaliation of workers who report violations of the Code, if that report is made in good faith.
- Fishing practice in local or community pond

2.2 The Environmental Code of Conduct shall ensure:

- Compliance with applicable laws, rules, regulations, consent conditions and the measures specified in the Contractor's ESMP
- Compliance with applicable health and safety requirements to protect the Contractor's own employees or subcontractors (e.g. by wearing prescribed personal protective equipment at worksites or during undertaking any activity in relation to execution of work), local community (including vulnerable and disadvantaged groups), Project Manager's Personnel and the Employer's Personnel (e.g. taking all precautions to prevent avoidable accidents and promptly reporting to the Engineer/Employer on any accident that might have occurred at worksite)
- Regular interaction with the local community, members of the local community before initiation of work as well as during project implementation period. Public consultation to maintain community integrity and social links.
- Convey attitude of respect to affected person as well as regional culture and traditions
- Protection of children (persons less than 18 years of age) (including prohibitions against sexual activity or abuse, or otherwise unacceptable behaviour towards children, limiting interactions with children, and ensuring their safety in project areas)
- Use specified sanitary facilities provided by their employer and not any open areas
- Avoidance of conflicts of interest (such that benefits, contracts, or employment, or any sort of preferential treatment or favours, are not provided to any person with whom there is a financial, family, or personal connection)
- Respecting reasonable work instructions (including regarding environmental and social norms)
- Protection and proper use of property (for example, to prohibit theft, carelessness or waste)
- Duty to report violations of this Code
- Store chemicals appropriately with proper labelling and promptly inform to relevant agencies on accidental spill or incident

21. Annexure- IX: Format for PMU's Half Yearly E&S Management Monitoring Report

Chapter I: Project Background:

1.1 Project Overview and Contextual Relevance
1.2 Project Development Objectives
1.3 Project Components and Activities
1.4 Environmental and Social Management Framework

Chapter II: Regulatory Requirement and Compliances

2.1 Environmental Regulatory Requirements and Compliances (Project Specific)

2.1.1 Consent to Establish and Consent to Operate under Air & Water Pollution
2.1.2 Letter of Authorization for handling hazardous Waste (if applicable)
2.1.3 Tree cutting permission from DFO
2.1.4 Agreement letter with Pvt. Land owner for borrowing earth (if required)
2.1.5 GP Clearance for establishment of Labour Camp
2.1.6 PUC Compliance / Certificate from RTO
2.1.7 Authorization / Permission of Material Supplier
2.1.8 Any other compliances that are required

2.2 Social Regulatory Requirements and Compliances

2.2.1 Labour License
2.2.2 Any other compliances that are required

Chapter III: Environmental Performance

3.1 Soil Pollution
3.2 Water Pollution
3.3 Noise Pollution
3.4 Waste Management / Sediment Disposal & Management
3.5 Pest Management
3.6 Management of Flora and Fauna / Local Bio-diversity
3.7 Physical Cultural Resources, its Protection and Management

Chapter IV: Social Performance

4.1 People's Understanding and Awareness of the Project
4.2 Gender Inclusion
4.3 Tribal Inclusion and Safeguards
4.4 Project Impact on Vulnerable Groups
4.5 Safety and Security of Workers

Chapter V: Monitoring and Supervision

5.1 Monitoring of Environmental Parameters and Measures Taken
5.2 Monitoring of Social Parameters and Measures Taken