ASIAN INFRASTRUCTURE INVESTMENT BANK

June 2, 2025

Sovereign-backed Financing

Project Document
P000452-Cambodia: Climate Adaptive Irrigation and Sustainable Agriculture for Resilience Project

Currency Equivalents
(February 28, 2025)

Currency Unit – Cambodia Riel (KHR)
KHR1.00 = USD0.00025
USD1.00 = KHR4,043

Borrower's Fiscal year
January 1 – December 31

Abbreviations

AIIB	Asian Infrastructure Investment Bank
AWD	Alternate Wetting-and-Drying
CAISAR	Climate Adaptive Irrigation and Sustainable Agriculture for Resilience
CSAA	Cambodian Standards on Auditing and Assurance
CPP	Community Participation Plan
DED	Detailed Engineering Designs
DPs	Development Partners
DRPs	Detailed Resettlement Plans
ERR	Economic rate of return
E&S	Environment and Social
ESCIA	Environmental, Social and Climate Impacts Assessment
ESCMP	Environmental, Social and Climate Management Plan
ESCMPF	Environmental, Social and Climate Management Planning Framework
ESP	Environmental and Social Policy
ESS	Environmental and Social Standards
FS	Feasibility Study
FM	Financial management
FRR	Financial rate of return
FWUCs	Farmer Water User Communities
GASIP	Gender Assessment and Social Inclusion Plan
GDP	Gross Domestic Product
GCF	Green Climate Fund
GIM	Grant Implementation Manual
GRM	Grievance Redress Mechanism
GHGs	Greenhouse gas emissions
Ha	Hectares
IFAD	International Fund for Agricultural Development
IPPF	Indigenous People Planning Framework
LARPF	Land Acquisition and Resettlement Planning Framework
MEF	Ministry of Economy and Finance
MoWRAM	Ministry of Water Resources and Meteorology
M&E	Monitoring and evaluation
OHS	Occupational health and safety
O&M	Operations and maintenance
NCDD	National Committee for Sub-national Democratic Development
NCDD-S	National Committee for Sub-national Democratic Development - Secretariat
PDWRAM	Provincial Department of Water Resources and Meteorology

PDS	Project Delivery Strategy
PIE	Project Implementation Entity
PIPs	Project Implementation Plans
PIU	Project Implementation Unit
PMU	Project Management Unit
POM	Project Operational Manual
PPM	Project-affected Peoples Mechanism
PPSF	Project Preparation Special Fund
RGC	Royal Government of Cambodia
SCADA	Supervisory control and data acquisition
SOP	Standard Operating Procedures
RoW	Right of Way
SECAP	IFAD's Social, Environmental and Climate Assessment Procedures
SEP	Stakeholder Engagement Plan
SFW	Special Fund Window
TSL	Tonle Sap Lake
ToRs	Terms of References

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1. Executive Summary

1. The Climate Adaptive Irrigation and Sustainable Agriculture for Resilience (CAISAR) Project offers a compelling opportunity for AIIB to deliver high-impact, climate-resilient infrastructure while strengthening long-term engagement with Cambodia under its Country Cooperation Framework. The USD240 million project, led by AIIB with co-financing from IFAD and GCF, supports the modernization of six irrigation schemes and introduces climate-smart agriculture and institutional capacity-building in selected climate-vulnerable provinces. AIIB's USD100 million equivalent sovereign-backed loan—complemented by support through the Special Fund Window—will finance climate-proofed irrigation systems and enhance water-use efficiency. The project stands out for its strong climate rationale, with 100% of AIIB financing classified as climate finance, and for deepening AIIB's operational collaboration with IFAD and GCF.

2. The project's design is grounded in robust environmental and social safeguards planning frameworks. The environmental and social risks and impacts of the project are assessed as Category B and are largely associated with the rehabilitation of existing infrastructure. An Environmental, Social, and Climate Impact Assessment (ESCIA) including Environmental, Social, and Climate Management Plans (ESCMPs) for irrigation subprojects, a Biodiversity Action Plan (BAP), and a Land Acquisition and Resettlement Planning Framework (LARPF) has been prepared to guide environmental and social planning, implementation, and monitoring for the project, all of which have been publicly disclosed. A Gender Action Plan (GAP) has also been prepared to ensure the participation of local women, promote gender equality, and ensure that the benefits of the project are equitably shared in the project areas. Land acquisition is minimal, and the voluntary land donation protocol builds on prior successful practice. Strong implementation arrangements—including a dedicated PMU under MoWRAM and a Project Steering Committee for inter-ministerial coordination-are complemented by ongoing institutional capacity building for safeguards planning, implementation, and monitoring. The project will also strengthen Farmer Water User Communities (FWUCs) in the project areas. Digital systems such as SCADA and flood early warning tools will enhance long-term water governance and resilience.

3. Given the complexity of multi-partner coordination and multi-level implementation, strong support and proactive supervision will be critical to ensure timely execution, maximize development outcomes, and position CAISAR as a model for climate-resilient agricultural development. However, several risks require close monitoring. While AIIB approval is scheduled ahead of GCF and IFAD (mid- to late 2025), this sequencing may affect implementation alignment. AIIB's procurement and financial management arrangements are sound, but staffing constraints at the PMU and potential delays in completing Detailed Engineering Designs (DEDs) could pose early-stage risks. Sustaining FWUC operations and ensuring adequate O&M financing—particularly at the tertiary level—will depend on effective tariff collection and capacity building, which remain challenging in Cambodia's rural areas. Overall, CAISAR presents strong strategic and developmental value for both AIIB and Cambodia, with implementation readiness and institutional measures in place to support successful execution.

Project No. and Name	P000452 Climate Adaptive Irrigation and Sustainable Agriculture for Resilience Project (CAISAR)		
AIIB Member	Cambodia		
Borrower	Kingdom of Cambodia	**Instrument type (Instrument subtype)**	Loan (Direct Sovereign)
Guarantor	Not Applicable	**Currency of Financing Requested**	RMB
Project Implementation Entity	Not Applicable	**Proposed Amount of AIIB Financing (USDm)**	USD100 Million (RMB 725,369,980)
Sector (Subsector)	Water (Irrigation and drainage)		
E&S Category and Comments	B		
Project Objective	The Project objective is to increase irrigation efficiency, strengthen climate resilience, and improve the livelihoods of smallholder farmers and vulnerable rural communities in selected provinces of Cambodia.		
Project Description	To achieve the Project objective, the Project will (i) apply climate adaptation solutions and sustainable water-use practices to increase irrigation efficiency at the farm and scheme level; (ii) rehabilitate and upgrade irrigation facilities to increase water availability in the dry season and improve flood-proofing and drainage facilities to reduce flood risks in the wet season; and (iii) facilitating project management activities to ensure high-quality project implementation. AIIB will serve as the lead financier for the Project, which will be co-financed jointly and in parallel by the International Fund for Agricultural Development (IFAD) and the Green Climate Fund (GCF). To support project preparation, AIIB has provided a USD4.7 million grant through its Project Preparatory Special Fund (PPSF). This funding is being utilized for detailed engineering designs (DEDs), procurement package support, and additional surveys required for feasibility studies.		
Lead Financier	AIIB	**Following other MDB's E&S Policy?**	No
Co-Financing Type	Parallel Co-financing, and Joint Co-financing	**Following other MDB's Procurement Policy?**	No
Implementation Period	June 01, 2025 - December 31, 2032	**Expected Loan Closing Date**	December 31, 2032
Risk (Low/Medium/High)	Medium		
Financing Plan	Total Project Cost: USD240 Million - AIIB Loan: USD100 Million - GCF Loan: USD40 Million - GCF Grant: USD40 Million - IFAD Loan: USD45 Million - Government: USD15 Million		
Policy Assurance	The Vice President, Policy and Strategy, confirms an overall assurance that the Bank is in compliance with the policies applicable to the Project.		

Risk	
Key risks	**Mitigation Measures**
Institutional Capacity • Limited experience and skills in implementing agencies. • Weak institutional capacity of PMU and PIU.	• Institutional and capacity-building programs for PMU, PIU, and FWUCs. • Deploy Project Management and PMICs to support PMU/PIU. • Engage individual experts to fill capacity gaps.
Procurement • Risk of inflation/exchange rate affecting tender participation. • Ineffective contract management due to lack of direct communication. • Potential collusion, interference in evaluation, and limited PMU staffing. • Non-compliance with E&S requirements.	• Broaden procurement outreach and enhance oversight. • Ensure conflict-free, trained tender evaluation committee. • Hire PMC firms and additional procurement staff if needed. • Allow direct communication between supervision consultants and contractors. • Provide continuous procurement and contract management training. • Incorporate ES requirements in procurement documents and enforce contractors' compliance during implementation.
Environment and Social • Potential negative ES impacts including involuntary resettlement. • Delays in land acquisition and compensation.	• ES impacts shall be managed following the provisions of the agreed ESCMPF and LARPF. The ESCMPF and LARPF have been prepared aligned with AIIB requirements. • MOWRAM to coordinate closely with design consultants and the General Department of Resettlement (GDR) to ensure timely land acquisition.
Overall Assessment: Medium	Adopt a proactive and flexible project management approach, strengthen institutional coordination, and monitor all risk areas throughout implementation.
Economic Capital (ECap) Consumption (USDm)	USD7.61

Strategic Alignment	
Alignment with AIIB's thematic priorities	Green infrastructure; Technology-enabled Infrastructure
Alignment with AIIB's strategies	Water Strategy

Key Outcomes	Indicator	Unit of Measure	Baseline (Year)	Target (Year)
Green infrastructure	Tons of GHG emissions reduced	Number	0 (2024)	Reduction of 213,501.58 tCO2-eq at the end of year 7 (2032)
Infrastructure Development for Irrigation and Drainage	Increase in average annual rice crop production	Number	2.0 tons/ha. paddy rice (2024)	4.0 tons/ha paddy rice (2032)
Technology-enabled Infrastructure	Beneficiaries (female/male) adopting improved and/or new climate-resilient livelihoods	Number	0 (2024)	192,000 persons (2032)
Infrastructure Development for Irrigation and Drainage	Increase in water use efficiency	Number	0 (2024)	75 percent (2032)

Other Key Financing Requirements	
Conditions of Effectiveness	Project Operations Manual has been prepared and submitted to the satisfaction of AIIB.
Key Conditions for 1st Disbursement	For subcomponent 3.4, the execution of the co-lenders' agreement with IFAD For subcomponent 3.4, the execution of the co-financier's (IFAD) financing agreement A Project Steering Committee established.
President	Liqun Jin
Chief Investment Officer	Rajat Misra, Acting Chief Investment Officer
Director General	Rajat Misra
Manager	Toshiaki Keicho
Team Leader	Rajesh Yadav, Senior Investment Officer
Back-up Team Leader	David Ginting, Investment Officer
Team Members	Asma Bachikh, Investment Associate Shodi Nazarov, Financial Management Specialist Jingrong He, Senior Procurement Specialist Kezia Paladina, Counsel Jinghui Li, Senior Admin Assistant Suu Tran Quy, Social Development Specialist Dale Fuertes Pham, Environment Specialist Julija Polycarp, Specialist Edith Zheng, Economic Analyst

2. Context

2.1 **Country and Macroeconomic Overview:** Cambodia has experienced rapid economic growth over the past decade, with an average annual growth rate of 7 percent.[1] This growth has significantly increased the country's Gross Domestic Product (GDP) per capita, which nearly doubled from USD950.5 in 2012 to USD1,759.6 in 2022. After the economy contracted by 3 percent in 2020 due to the COVID-19 pandemic, it rebounded with 3 percent growth in 2021, followed by 5 percent growth in 2022 and 2023. This recovery has been primarily driven by rapid industrialization, financial and trade liberalization reforms and a surge in exports, particularly labor-intensive manufacturing products such as garments and footwear. Exports grew from 54 percent of GDP in 2010 to 78 percent in 2022 while net Foreign Direct Investment (FDI) inflows increased from less than 3 percent of GDP in the early 2000s to over 11 percent in 2022. These trends highlight Cambodia's transition toward a more diversified and export-oriented economy.

2.2 The agriculture sector remains a vital part of Cambodia's economy, contributing 22.5 percent to GDP and employing over three million people, despite a gradual shift toward higher-productivity sectors. Dominated by rice cultivation, which covers 70 percent of the total cultivated area (approximately 4.5 million hectares), this sector is crucial for national food security and rural livelihoods.2 However, Cambodia faces critical challenges related to water security, with approximately 70 percent of the population lacking access to safe drinking water, of which 75 percent reside in rural areas. Limited irrigation infrastructure—only a fraction of agricultural land is irrigated—constrains productivity and resilience to climate variability. Investing in irrigation is essential to enable double or triple cropping, particularly for dry season rice. Currently, dry-season rice accounts for just 0.6 million hectares compared to 2.7 million hectares for wet-season rice. Expanding irrigation would boost agricultural output, create jobs, and reduce rural poverty.

2.3 Cambodia is highly vulnerable to climate change and disaster risks, ranking 149th out of 187 countries in the 2022 University of Notre Dame Global Adaptation Index (ND-GAIN Index), and being 12th most disaster-prone country globally from 1999–2018. As one of the few Least Developed Countries (LDCs) in Asia, Cambodia faces significant challenges, with natural disasters causing annual economic losses estimated at 0.7 percent of GDP in 2011.3 The country's World Risk Index of 15.8 percent reflects a very high disaster risk due to extreme natural events, driven by an exposure index of 27 percent and a vulnerability index of 59 percent.4 Climate projections indicate worsening conditions by mid-century, with more frequent heavy precipitation days during the rainy season, increasing from 2.4 to 4.9 days, and a rise in consecutive dry days, from 0.8 to 4.4 days. Additionally, the average monthly temperature is projected to increase by 1.83°C by 2040-2059 under the RCP8.5 scenario5. These changes threaten agricultural productivity, drinking water availability, and rural livelihoods, underscoring the urgent need for climate-resilient infrastructure and adaptive measures.

[1] Government of Cambodia. (2022). National Economic Statistics and Poverty Reduction Reports.
[2] Asian Development Bank (ADB). (2022). *Cambodia Agriculture Sector Review*.
[3] World Bank and GFDRR (2019). Disaster Risk Finance Country Diagnostic Note: Cambodia. https://www.gfdrr.org/en/publication/disaster-risk-finance-country-diagnostic-note-cambodia
[4] World Risk Report (2022). https://weltrisikobericht.de/wp-content/uploads/2022/09/WorldRiskReport-2022_Online.pdf
[5] World Bank. Climate Change Knowledge portal, Cambodia.

Sector Overview:

2.3.1 Water Sector. Cambodia has significant water resources, but their seasonal variability and uneven distribution pose challenges for sustainable management. The country receives an estimated 475 billion cubic meters (BCM) from the Mekong River system and 20 BCM from groundwater. The Mekong River and Tonle Sap Lake (TSL) are key water resources for Cambodia's agriculture, fish production, biological diversity, water transport, and hydropower. However, increasing climate variability, growing demand, and inadequate water infrastructure contribute to water stress in certain regions, particularly during dry seasons. Irrigated agriculture accounts for approximately 95 percent of the water used in the country. Around 80 percent of the country lies within the Mekong River and Tonle Sap basins, which increases exposure to floods, storms, and droughts. Identified hazards—including river floods, coastal floods, cyclones, and extreme heat—are assessed as high-risk across the entire country.

2.3.2 Limited and Inadequate water supply. The availability of irrigation water in Cambodia is constrained each year during the dry season due to extreme rainfall variability, flat topography, inadequate water storage, and the underdeveloped infrastructure limiting access to water. Approximately 70 percent of the population lacks access to safe drinking water, with 75 percent of them residing in rural areas. The river basins draining into the TSL have experienced severe water shortages, with monthly rainfall falling below 100 millimeters during the dry season (November to April). These river basins are likely to face hotter days and more rainless periods in the dry season due to climate change, with consequent impacts of significant increases in evapotranspiration from crops, and longer and more intensive agricultural droughts. The limited access to safe drinking water exacerbates vulnerabilities, particularly in rural areas. The poorly designed water infrastructure, compounded by the absence of consideration of climate change impacts in its design, hampers efficient water distribution and threatens ecohydrology by limiting the migration of fish and other aquatic species.[6] Another challenge is the inefficient and ineffective use of water, exacerbated by inadequate operations and maintenance (O&M) of the water infrastructure. Severe nationwide droughts from 2015 to 2016 not only impacted irrigation but also affected drinking water supplies, leading to significant water shortages in rural communities. During these droughts: (i) 37 percent of households reporting water shortages, (ii) 62 percent of households reporting income losses, and (iii) a 22 percent decline in household paddy and cassava production, both crops being vital to Cambodia's economy, providing food, employment, and export revenue. While rice remains the dominant crop (50 percent), cassava is emerging as a key export commodity.

2.3.3 Frequent floods. Like many monsoon-dependent countries, Cambodia is experiencing shifts in its monsoon calendar due to climate change, which is increasing the total number of drought days and shifting the start of the rainy season. Although annual rainfall is expected to increase, the number of days with rain is decreasing, and daily rain intensity is increasing, resulting in extreme rainfall events and flooding risks.[7] The World Resource Institute (WRI) rates the upper and lower Tonle Sap watershed as extremely high for water risk.[8] Cambodia is one of the world's most flood-exposed countries, with an estimated affected population of around 4 million people, or 25 percent of the population, and estimated annual losses of

[6] Fish still provide over 80 percent of protein in the national diet, and most harvested fish are migratory species and from the TSL.
[7] Cambodia Country Profile. World Bank and ADB. 2021.
[8] WRI 2023. Aquaduct https://www.wri.org/applications/aqueduct/country- rankings/?country=KHM&indicator=rfr

USD250 million.[9] A WB study estimates an increase of population exposed to floods by 2050 under RCP8.5 at 19 percent.[10] Projected climate change trends indicate more severe floods and droughts, which is expected to affect Cambodia's GDP by nearly 10 percent by 2050.[11] Although the annual flood pulse of the Mekong River and the TSL is essential for fisheries and ecological systems, extensive flash flooding during the wet season severely impacts the country.[12] Flooding not only disrupts agricultural activities but also contaminates local water sources, exacerbating the already critical issue of safe drinking water access in rural areas. Without proper flood control and drainage infrastructure, waterborne diseases become more prevalent, further affecting rural health and livelihoods. Vulnerable populations, particularly rural women, female-headed households, and the economically disadvantaged, are disproportionately affected by these floods. Serious flood damage has been attributed to (i) insufficient physical infrastructure for flood risk management; (ii) insufficient allocation of flood protection capacity within existing reservoir storages; (iii) poor flood forecasting, early warning, and preparedness systems; and (iv) limited investment and O&M funding for physical interventions.

2.3.4 Agriculture Sector. Agriculture plays a critical role Cambodia's economy, accounting for nearly 22 percent of GDP in 2022. The rural population represents 75.8 percent of the total national population. Rice, the dominant crop, is cultivated at an estimated 4.5 million hectares or 70 percent of the country's total cultivated area. Since 2020, climate change and the COVID-19 pandemic have caused a 10 percent decline in GDP.[13] Farming remains mostly subsistence-based and rain-fed, with low productivity. Only 7 – 8 percent of the total potential agricultural land area is fully irrigated. Furthermore, only 15 percent of the cultivated rice area is irrigated (compared to 28 percent in Thailand and 33 percent in Viet Nam), and 85 percent of the rice cropping area is vulnerable to changing rainfall patterns. The lack of water for irrigation is a crucial barrier for farmers to deal with climate-induced water shortages, and to cultivate more than a single crop per year - limiting their resilience and adaptive capacity. Studies suggest that shifting to irrigated cultivation could result in annual overall production increases of up to 40 percent. Other challenges include stagnating global agricultural commodity prices, rising labour costs and the limited scope for cropland expansion. The agriculture sector remains critical for poverty reduction in Cambodia, with women playing a significant role in the workforce. In 2021, women made up 39 percent of the agricultural workforce but owned only 12.4 percent of recorded land and received just 10 percent of agricultural extension services.

[9] Willner, S., Levermann, A., Zhao, F., Frieler, K. 2018. Adaptation required to preserve future high-end river flood risk at present levels. *Science Advances*. 10 January; and ADB and The World Bank Group. 2021. *Climate Risk Country Profile: Cambodia*
[10] Winsemius, Hessel C.; Jongman, Brenden; Veldkamp, Ted I.E.; Hallegatte, Stephane; Bangalore, Mook; Ward, Philip J. (2015). Disaster risk, climate change, and poverty: assessing the global exposure of poor people to floods and droughts (English). Policy Research working paper; no. WPS 7480. Washington, D.C.: World Bank Group
[11] Climate Risk Country Profile Cambodia. ADB 2021.
[12] The Mekong River and the TSL are connected by the Tonle Sap River.
[13] World Bank Group, 2015. Cambodia Economic Update, October 2015: Adapting to Stay Competitive. World Bank, Phnom Penh. http://hdl.handle.net/10986/22934

2.3.5 Government Sector Strategies.

2.3.5.1 **Water sector strategies.** The National Strategic Development Plan (NSDP) for 2019 to 2023 tasked the Ministry of Water Resources and Meteorology (MoWRAM) to implement Integrated Water Resource Management (IWRM). This Project aligns with the IWRM approach by not only addressing irrigation expansion but also recognizing the interconnected nature of water resources, agriculture, and rural drinking water needs. MoWRAM's 15-year program outlines a pathway to strengthen sustainable water resources management (WRM) by adapting to climate change impacts. The government developed its National Adaptation Plan in 2017 and updated its Nationally Determined Contribution (NDC) in 2020, outlining a series of adaptation actions across key sectors such as agriculture, livelihoods, poverty, biodiversity, and water resources, alongside mitigation targets. These efforts align with the Pentagonal Strategy – Phase I, which establishes a long-term vision for sustainable growth, employment, equity, efficiency, sustainability and environmental resilience, ultimately contributing to Cambodia Vision 2050.

2.3.5.2 **Agriculture sector strategies.** The NSDP 2019-2023 emphasizes the importance of inclusive and sustainable development, focusing on enhancing the resilience and productivity of the agriculture sector. To support this, the Agricultural Sector Master Plan 2030 was developed, aligning with the NSDP 2019-2023 to increase the competitiveness and sustainability of the sector by improving the irrigation system, land management, and market connectivity. Under the Pentagonal Strategy – Phase I, the government is committed to promoting agricultural production through research and development of climate-resilient crops, improved soil quality management, zoning and mapping of cultivation areas, and strengthening modern digital and intelligent agricultural techniques. Additionally, strengthening the rationalization of irrigation investments is a key priority to ensure water security for agriculture and rural development, supporting the broader objectives of Cambodia's long-term development vision.

2.4 **Addressing Key Development Challenges:** Addressing the development challenges caused by climate change is crucial for Cambodia's agriculture sector, as increasing weather variability and extreme events threaten both crop yields and the economic stability of rural communities. The Climate Adaptive Irrigation and Sustainable Agriculture for Resilience (CAISAR) Project, hereafter referred to as *The Project*, aims to address these challenges by modernizing the irrigation sector and enhancing farmers' resilience to climate-related risks. The Project is designed to align with AIIB's Water Strategy, emphasizing integrated water resource management (IWRM) and addressing the broader water sector context in Cambodia, including the Government's efforts to improve access to safe drinking water and mitigate potential negative impacts on rural populations. While the Project does not directly target rural drinking water infrastructure, its outcomes contribute to IWRM by improving overall water availability and management efficiency. The government's existing programs, such as the National Strategic Development Plan (NSDP) and National Adaptation Plan (NAP), include dedicated initiatives to address safe drinking water challenges. Aligned with the Royal Government of Cambodia's National Water Resources Management and Sustainable Irrigation Road Map, the Project focuses on installing climate resilient irrigation systems and promoting energy- and water-efficient technologies. By improving irrigation service efficiency and providing timely weather information, the Project intends to equip smallholder farmers with the knowledge and tools necessary to adapt their farming practices effectively.

2.5 A major barrier to sustainable agriculture development in this area is the lack of planning and maintenance for irrigation infrastructure, which reduces system efficiency. To address this, the Project will integrate smart irrigation technologies that collect and disseminate real-time weather data, optimizing water use and improving flood management. Additionally, the Project promotes sustainable business models to deliver affordable, climate smart water solutions tailored to local agro-ecological conditions. The Project's focus on sustainable water use, flood control, and resilience-building measures will help mitigate some indirect negative impacts, such as water shortages and contamination risks in rural areas. Furthermore, community engagement and institutional strengthening components will ensure that rural populations benefit from improved water governance. Through these activities, the Project will generate outcomes such as improved climate resilient water management practices and enhanced technical capacities among relevant institutions and Farmer Water Use Communities (FWUCs). Ultimately, the expected higher long-term goals include increased agricultural productivity, reduced vulnerability to extreme climate events, and improved livelihoods for rural communities in the Lower Tonle Sap basin. By addressing both infrastructure needs and knowledge gaps, the Project aims to build a climate-resilient agricultural sector, ensuring the long-term sustainability of Cambodia's rural economy in the face of ongoing climate challenges.

3. Rationale

3.1 **Project Objective.** The overall objective of the Climate Adaptive Irrigation and Sustainable Agriculture for Resilience (CAISAR) Project is to increase irrigation efficiency, strengthen climate resilience, and improve the livelihoods of smallholder farmers and vulnerable rural communities in selected provinces of Cambodia. The Project aims to make the agriculture sector in Cambodia climate resilient and sustainable through modernization of the irrigation sector by installing resilient irrigation systems. It will also enable farmers to adapt to climate risks and mitigate crop emissions through the use of energy- and water-efficient technologies and practices. The Project will provide timely weather information and improved market integration, ultimately enhancing the livelihoods of vulnerable rural groups in the target provinces of Cambodia.[14]

3.2 **Expected Beneficiaries.** The Project is expected to benefit farmers in Kampong Speu, Kampong Chhnang, Kandal, and Pursat provinces, and governmental agencies at both national and provincial levels involved in water resources planning, development and management, and project implementation. Communities involved in the economy of the Project area will be secondary beneficiaries. It is expected that the Project is anticipated to directly benefit about 562,000 rural people by enhancing the resilience of smallholders to climate change. Around 1.1 million people would benefit indirectly through the multiplier effects generated from the investments in enhanced smallholder farmers adaptation, market integration and improved irrigation systems, and strengthened early warning and climate information systems.

3.3 **Expected Results.** The Project is expected to generate the following results:

Component 1: Improved farm-level climate adaptation, resilience, and water use efficiency.
Component 2: Upgraded and Climate-proofed Water Infrastructure for Increased Resilience
Component 3: Strengthened Institutional and Regulatory Capacity for Low-emission Climate-resilient Development Pathways.

3.4 **Strategic Fit for AIIB.** The Project is fully aligned with AIIB's thematic priority of green infrastructure, technology-enabled infrastructure, and the guiding principles of the Bank's Water Sector Strategy by promoting sustainable infrastructure, integrated resource management, and adoption of innovative technologies. The Project is also consistent with AIIB's Digital Infrastructure Strategy as it plans to develop and operationalize remote sensing technologies to monitor the operational performance of the irrigation infrastructures, develop flood early warning systems, and generate weather and crop data to be used by irrigation operators and farmers. In addition, the Project will contribute to achieving the climate financing targets set out in the AIIB's Corporate Strategy.

3.5 **Paris Agreement Alignment (PAA) and Climate Finance.** In line with the AIIB methodology for assessing the alignment with the mitigation and adaptation goals of the Paris Climate Agreement, the Project is assessed as aligned. In terms of climate adaptation, the Project will improve the resilience of the population and assets against projected increasing

[14] The schemes locate in four provinces of Cambodia, namely Kampong Speu, Kampong Chhnang, Kandal, and Pursat provinces.

flood risks driven by climate change through the operation of new and/or climate-proofed, flood control infrastructure. In terms of climate mitigation benefits, the Project aims to reduce greenhouse gas emissions (GHGs) by using high-efficiency and low-carbon irrigation systems, shifting the energy source for pumping to renewable-based resources and introducing the cultivation of crops with lower methane emissions and piloting alternate wet-and-dry (AWD) techniques. In line with the joint multilateral development bank (MDB) methodology for tracking mitigation finance, it is estimated that 100 percent of AIIB investments (USD100 million) will contribute to support mitigation as most of GHG emission reductions are going to be achieved as a result of investments in Component 2. In line with the joint MDB methodology for tracking adaptation finance, it is estimated that USD48.15 million, 50 percent of costs for Component 2.1 of the Project cost will contribute to support adaptation.[15] Therefore, the total distribution of climate finance is as follows: USD48.15 million (adaptation), USD51.85 million (mitigation), of which USD48.15 million is accounted as dual benefits. Details on the assessment are provided in Section Climate Change and Annex 4.

3.6 **Co-Financing Arrangements and Alignment of Policy Application.** The Project is a collaborative initiative co-financed jointly and in parallel by the Asian Infrastructure Investment Bank (AIIB), the International Fund for Agricultural Development (IFAD), and the Green Climate Fund (GCF), with AIIB serving as the lead co-financier. Following AIIB's investment approval, GCF's funding proposal is set for its board approval in June 2025, followed by IFAD's board approval in September 2025. Given that Project preparation commenced prior to AIIB's GCF accreditation, components funded by GCF will be administered by IFAD. To ensure coherence and effectiveness in project implementation, the co-financiers have agreed on a common approach to assess shared environmental and social documentation and to coordinate across key areas such as procurement, financial management, safeguards, and reporting. This approach is grounded in clearly delineated roles and responsibilities and is further detailed in the Project Operations Manual and the project- level co-lenders' agreement between AIIB and IFAD.

3.7 The AIIB Environmental and Social Policy and Project-affected People's Mechanism (PPM) will apply to the components financed by AIIB, while IFAD and GCF will apply their respective policies to the activities they support. The Cofinanciers have worked on a harmonized and client-centric arrangement to minimize the administrative burden on the government and ensures that cross-cutting issues—such as environmental and social risk management and accountability—are consistently and effectively addressed. The coordinated application of policies not only facilitates smooth implementation and reinforces institutional responsibilities but also promotes the long-term sustainability and impact of the Project.

3.8 **Value Addition by AIIB.** AIIB's participation will strengthen the Project by contributing to the following aspects:

- AIIB serves as the lead co-financier and grant provider for project preparation, demonstrating its commitment to support the Royal Government of Cambodia (RGC)
- The Project Preparation Special Fund (PPSF) is the main source for overall preparatory work, facilitating key deliverables such as the Climate Vulnerability Assessment Report, Hydrology and Hydraulic Report, Livelihood and Vulnerability Analysis, Funding Proposal for the GCF, and Detailed Engineering Designs for the AIIB investment and overall Project.

[15] Accounting as dual benefits.

- AIIB's agility, efficiency, and flexibility in responding to the client's needs nurtured a long-term relationship with the Royal Government of Cambodia (RGC). The RGC regarded AIIB as one of the "first-to-go" development partners in the water sector.
- AIIB's Special Fund Window (SFW), which buys down applicable interest rates, provides the Cambodian government with greater flexibility in meeting the concessional requirement of its external borrowings.
- AIIB aligns the Project with its priorities of green and technology-enabled infrastructure, enhancing sustainability and innovation. Through its collaboration with IFAD and GCF, AIIB not only mobilizes additional resources but also reinforces its commitment to leveraging strategic partnerships for greater impact. This approach enhances climate resilience, strengthens rural economies, and improves the livelihoods of smallholder farmers and vulnerable rural communities.
- AIIB strengthens the Project's design, implementation, and effectiveness in promoting climate resilience and sustainable agriculture in Cambodia.

a. **Value Addition to AIIB.**

- The Project is part of the "Country Cooperation Framework" between Cambodia and AIIB, marking AIIB's first country programming arrangement in Cambodia. This will enhance AIIB's engagement with the Royal Government of Cambodia (RGC) and solidify long-term relationships with relevant ministries and agencies while also expanding AIIB's influence among development partners in the country while also expanding AIIB's influence among development agencies in the country.
- As the Bank's first project-level collaboration with IFAD and the GCF, the Project provides a valuable learning opportunity in climate financing, agricultural water management, and rural economic development. This collaboration supported AIIB's efforts toward GCF accreditation in 2024, enhancing its credibility and capacity in climate-focused investments.
- Component 1 of the Project, which focuses on agriculture-related activities such as AWD cropping techniques, goes beyond AIIB's core infrastructure mandate. However, it presents a strategic opportunity to gain experience in "soft" infrastructure by co-designing and implementing activities that enhance long-term sustainability.
- By collaborating closely with IFAD and the GCF, the Project allows AIIB to build internal capacity in areas such as climate adaptation, mitigation, irrigation, flood management, and climate-resilient infrastructure.
- These learnings will enhance the effectiveness of future projects and strengthen AIIB's role in supporting sustainable agriculture in vulnerable regions.
- The experience gained from this collaboration can guide AIIB in leveraging its GCF accreditation for future climate-related investments.
- The collaboration enhances AIIB's reputation as a trusted partner for co-financiers in delivering sustainable and climate-resilient infrastructure projects.

b. Lessons Learned. The Project design has integrated lessons drawn from both international best practices and the experiences of AIIB and IFAD operations. AIIB's Project team applies key lessons learned from relevant AIIB projects in irrigation, flood management, and water resources management. This includes early lessons identified from ongoing AIIB financed projects, such as the Metro Manila Flood Management Project in the Philippines and the West Bengal Major Irrigation and Flood Management Project in India. These lessons include:

- **Applying an integrated approach in addressing irrigation efficiency, flood protection, and water resource management.** The Project requires integration of water storage and distribution, improving farm-level water use efficiency, and

increasing the productivity of land and water. Therefore, the Project will invest throughout the system, from the water sources, irrigation intake, to the tail-end of the infrastructure network. The Project uses climate smart technologies and systems such as AWD and direct seeding to enhance water use efficiency in rice cultivation across the watershed, meeting the growing demand for local productivity while strengthening climate resilience.

- **Adopting a long-term perspective towards sustainable planning of operation and maintenance (O&M)**; The design process of the Project will include a gap assessment on the planning and operating capacity of the Ministry of Water Resources and Meteorology **(**MoWRAM), Provincial Department of Water Resources and Meteorology (PDWRAM) and relevant Farmer Water User Communities (FWUCs). Comprehensive training programs will be developed to enhance their capacity for sustainable O&M. Mechanisms such as water-user tariffs or irrigation service fees will be introduced to ensure sustained funding for infrastructure maintenance. Clear institutional roles and responsibilities will also be defined to prevent the deterioration of assets.
- **Comprehensive analysis and planning at scale are required for optimizing water resources management and flood risk reduction**. Assessments are needed to address and anticipate the impacts of climate change on irrigated systems, enabling informed investment decisions. The Project will carry out computational hydraulic modeling to evaluate impacts under various climate scenarios, incorporating the results into Project design. By harnessing innovative technologies, including remote sensing and early warning systems, the Project will enhance operational efficiency and strengthen climate resilience. Additionally, the Project will invest in climate smart monitoring to establish a sustainable mechanism for long-term asset management.
- **Improvement of agricultural yields through modern farming approaches:** Agricultural yield improvement depends not only on increasing irrigation water supply but also on adopting modern farming practices, including double/triple cropping, AWD water management techniques, shifting to high-value crops, and use of modern farming equipment. More extensive and intensive training on modern farming approaches must be provided to farmers in a sustained manner to ensure long-term adoption.
- **Comprehensive Monitoring and Evaluation:** A dynamic monitoring and evaluation (M&E) framework will be established with clear indicators to track water use efficiency, agricultural productivity, and climate resilience outcomes. Evaluations will be conducted at regular intervals to ensure accountability and facilitate timely course corrections, enabling adaptive management throughout the Project lifecycle.
- **Promoting Knowledge Sharing and Replication**: Best practices and lessons learned during the Project will be shared through knowledge-sharing platforms at the national and provincial levels to build capacity at all tiers. Special focus will be placed on engaging PDWRAM, which is responsible for the O&M of the main canal and associated infrastructure, to ensure sustainability. This knowledge-sharing approach will also facilitate replication in other regions and projects, fostering innovation and scalability of successful interventions.

4. Project Description

4.1 **Project Overview.** The Project originated from the RGC's National Water Resources Management and Sustainable Irrigation Road Map and Investment Program (2019-2023). The Project is designed to assist the Ministry of Water Resources and Meteorology (MoWRAM) with its strategic plans to modernize the irrigation sector. The overall goal of the Project is to make the agriculture sector in Cambodia climate resilient and sustainable.

4.2 The Project area is expected to comprise 32,056 hectares. The sub-projects under the Project will include the Ou Ta Paong (OTP) and Lum Harch along with four smaller sub-projects in the Krang Ponley Valley. The selected provinces covered by the Project have the highest population density, a high proportion of poor households, and a significant percentage of female-headed households.[16] The livelihoods of the poorest and most vulnerable people in the region depend mainly on agricultural production and water availability through precipitation, river flow, and irrigation schemes.

4.3 The Project has significantly benefited from AIIB's PPSF-funded upstream studies (USD4.7 million), which have supported key preparatory work, including the Climate Vulnerability Assessment Report, Hydrology and Hydraulic Reports, Livelihood and Vulnerability Analysis, a GCF Funding Proposal, and Detailed Engineering Designs (DEDs) for the AIIB-financed component. To address coordination complexities and delays in completing DEDs, the Project's Grant Agreement, signed between AIIB and the Kingdom of Cambodia, has been extended to December 31, 2026. With USD 3.2 million allocated for Phase 2, efforts are now focused on finalizing DEDs for key irrigation schemes, ensuring Project readiness for AIIB-identified investments.

4.4 **Project Components.** The overall project financed by AIIB, IFAD and GCF will include three components as follows:

Component 1. ***Farm-level Climate Adaptation and Resilience***

4.4.1 This component aims to enhance climate resilience among smallholder farmers by promoting climate-smart agricultural practices, improving market access, strengthening climate advisory services, and upgrading rural infrastructure.

- **Subcomponent 1.1:** Increased farmer capacity in climate-resilient agriculture – Focuses on training farmers in climate-adaptive techniques, supporting non-rice crops, and promoting sustainable irrigation practices.
  - Total: USD18.2M
  - Financiers: GCF Grant USD8.2M, IFAD Loan USD9.2M, Government of Cambodia In-Kind USD0.8M
- **Subcomponent 1.2:** Climate-adaptive value chains developed by 4Ps and increased access to finance – Strengthens agricultural value chains, promotes private sector participation, and enhances financial access for farmers and MSMEs.
  - Total: USD 4.0M
  - Financiers: GCF Grant USD 0.1M, IFAD Loan USD 3.7M, Government of Cambodia In-Kind USD 0.2M

[16] The Asia Foundation (2018). cambodia-atlas-on-gender-and-environment.pdf.pdf (opendevelopmentmekong.net)

- **Subcomponent 1.3:** Increased access to and use of climate information and advisory services for climate-responsive water-use and crop planning – Develops localized agro-meteorological advisory services and enhances early warning systems for climate risks.
  - Total: USD2.9M
  - Financiers: GCF Grant USD2.7M, Government of Cambodia In-Kind USD0.2M
- **Subcomponent 1.4:** Increased resilience of farm road infrastructure to climate change – Upgrades 90 km of farm roads for year-round market access and improved connectivity.
  - Total: USD15.2M
  - Financiers: IFAD Loan USD15.0M, Government of Cambodia In-Kind USD0.2M

Component 2. ***Upgrading and Climate-proofing Water Infrastructure for Increased Resilience***

4.4.2 This component focuses on rehabilitating and modernizing core water infrastructure for irrigation and flood risk management to enhance operational efficiency, climate resilience, and structural integrity. Investments will target six irrigation schemes instead of three, ensuring improved irrigation and drainage across a larger area. The key activities under this component will be structured into four subcomponents:

- **Subcomponent 2.1:** Irrigation schemes and ponds modernized – Focuses on rehabilitating and upgrading irrigation systems, including gravity-fed and solar-powered solutions, to enhance water availability and improve efficiency.
  - Total: USD102.2M
  - Financiers: AIIB Loan USD96.3M, Government of Cambodia In-Kind USD5.9M
- **Subcomponent 2.2:** Flood-proofed and improved drainage – Strengthens flood control and drainage infrastructure through embankments, nature-based solutions, and improved drainage networks to mitigate climate risks.
  - Total: USD56.8M
  - Financiers: GCF Grant USD17.6M, GCF Loan USD36.0M, Government of Cambodia In-Kind USD3.2M
- **Subcomponent 2.3:** Farmers Water User Communities (FWUCs) established and trained – Builds institutional capacity for sustainable water management and ensures inclusive participation of farmers in irrigation governance.
  - Total: USD5.0M
  - Financiers: GCF Grant USD2.3M, IFAD Loan USD2.2M, Government of Cambodia In-Kind USD0.5M
- **Subcomponent 2.4:** Water information system (CIEWS and SCADA) established and operational – Implements SCADA and real-time water information systems to support climate-adaptive irrigation planning and management.
  - Total: USD3.7M
  - Financiers: GCF Grant USD0.8M, IFAD Loan USD1.7M, Government of Cambodia In-Kind USD0.4M

Component 3. ***Strengthened Institutional and Regulatory Capacity for Low-emission Climate-resilient Development Pathways.***

4.4.3 This component focuses on strengthening institutional capacities of MoWRAM, MoE, and NCDDS to support climate-resilient water and agricultural management. It will enhance technical expertise, regulatory frameworks, and project management capabilities, ensuring sustainable climate action at both national and sub-national levels. The component will be structured into four subcomponents:

- **Subcomponent 3.1:** MoWRAM capacity development supported – Strengthens technical capacity in climate-resilient irrigation management, remote sensing, and water governance.
  - Total: USD 5.4M
  - Financiers: GCF Grant USD2.4M, GCF Loan USD1.9M, Government of Cambodia In-Kind USD1.1M
- **Subcomponent 3.2:** NDA and MoE strengthened – Supports Cambodia's National Designated Authority (NDA) in climate change policy, loss and damage strategy, and climate action monitoring.
  - Total: USD1.1M
  - Financiers: GCF Grant USD0.6M, GCF Loan USD0.4M, Government of Cambodia In-Kind USD0.1M
- **Subcomponent 3.3:** Strengthening of NCDDS – Enhances NCDDS capacity for climate adaptation, local governance, and project implementation at national and provincial levels.
  - Total: USD4.2M
  - Financiers: GCF Grant USD1.1M, GCF Loan USD0.9M, IFAD Loan USD1.4M, Government of Cambodia In-Kind USD0.8M
- **Subcomponent 3.4:** Project management and monitoring – Covers Project implementation costs, capacity building for PMU, and monitoring and evaluation mechanisms.
  - Total: USD13.2M
  - Financiers: GCF Grant USD4.1M, IFAD Loan USD 3.8M, AIIB Loan USD 3.76M, Government of Cambodia In-Kind USD 1.5M

4.5 **Project Description**. The Project aims to enhance irrigation efficiency, strengthen climate resilience, and improve the livelihoods of smallholder farmers and vulnerable rural communities in selected provinces of Cambodia. To achieve this objective, the Project will support modernization of the irrigation infrastructure by integrating climate-smart water management solutions and institutional capacity-building, which will strengthen efforts to increase irrigation efficiency at the farm and scheme level through climate adaptation solutions and sustainable water-use practices. In particular, the Project will (ii) rehabilitate, modernize and upgrade irrigation facilities to increase water availability in the dry season through the integration of climate-resilient irrigation systems that promote energy- efficient and water-efficient technologies and (ii) facilitate project management activities to ensure high-quality project implementation.

4.6 **Project's linkage to other similar projects in Cambodia.** In addition to the Project, one similar initiative- the Integrated Water Resources Management (IWRM) project has recently been approved, while another, the Climate Resilient Sustainable Irrigation and Watershed Development and Flood Management (CCRSIWDFM) project is under preparation in AIIB's project pipeline. All three projects address issues of irrigation water shortage during the dry season and flooding during the wet season, while covering different irrigation schemes across Cambodia. One of the subprojects under CAISAR (Ou Ta Paong scheme) is situated in the Pursat River basin, downstream of the Kbal Hong irrigation system, while the upper reaches of the Kbal Hong main canal and headworks are being rehabilitated through the IWRM project. These subprojects under CAISAR and IWRM are designed to be operated synergistically to optimize water usage. The headworks and part of the Kbal Hong main canal are funded under IWRM, while the remaining section of the canal will be rehabilitated through CAISAR until it reaches the Ou Ta Paong command area. This coordination between the two projects enhances synergy and provides an optimal basis for meeting the water requirements of Ou Ta Paong.

4.7 **Project Cost.** The estimated cost of the Project is USD240 million, with a USD100 million loan from AIIB, a USD40 million loan from GCF, a USD40 million grant from GCF, a USD45 million loan from IFAD, and a USD15 million contribution from Cambodia. Detailed cost estimates are included in the Project Operational Manual. To better support the Project preparation, AIIB provided USD4.7 million PPSF to prepare the FS and support the DEDs of civil work under and the GCF Funding proposal preparation.

4.8 **Financing Plan**. AIIB, IFAD and GCF will co-finance the Project jointly and in parallel. The AIIB portion of the financing will support the modernization of infrastructure for six irrigation schemes, improving water use efficiency and supporting project management and implementation consultants. A breakdown of the Project costs and financing plan are presented in Table 1 below and a more detailed one is presented in annex 2. The funding from Cambodia will be used for land acquisition, resettlement and compensation costs, taxes and duties, Project administration, and supporting consultants to the Project Management Unit (PMU). The remaining costs will be borne by the loans and grants of AIIB, IFAD, and GCF grants.

Table 1: Project Budget by Component and Funding Source

Components	**Total Cost (USD)**	**Funding Sources**					**Percentage share**
		GCF (Grant)	**GCF (Credit)**	**IFAD (Credit)**	**AIIB (loan)**	**Government (in kind)**	
Component 1	40.4	11	-	27.9	-	1.5	17
Component 2	167.7	20.8	36.8	3.8	96.3	10	70
Component 3	24	8.2	3.2	5.2	3.7	3.6	10
Contingency	8	-	-	8	-	-	3
TOTAL	**240.1**	**40**	**40**	**45**	**100**	**15.1**	
Proportionate Share (percent)		16.70	16.70	18.70	41.60	6.30	100

4.9 **Special Funds Window for Less Developed Members (SFW).** During AIIB's Appraisal Mission on December 17, 2024, the Borrower requested support from the SFW to provide concessional financing for the Project. As a Least Developed Country (LDC) in Asia, Cambodia faces significant fiscal constraints and climate vulnerabilities, with natural disasters causing annual economic losses of 0.7% of GDP. Ranked 149th in the 2022 ND-GAIN Index and 12th globally among disaster-prone countries, Cambodia's limited irrigation infrastructure and water security challenges—where 70% of the population lacks access to safe drinking water—underscore the need for concessional financing to enhance resilience and sustainable growth. The SFW request aligns with the approved Country Cooperation Framework between Cambodia and AIIB.

4.10 The proposed SFW allocation has been finalized following loan negotiations with the Borrower. Based on the updated amortization profile—an 18-year loan maturity, a 5-year grace period, and an average repayment maturity of 11.59 years and on the current disbursement schedule, the indicative buy-down amount for the 100-basis point interest rate buy-down is USD7,855,535. This reflects adjustments from earlier estimates and corresponds with the Borrower's selection of RMB as the loan currency. The buy-down provision has been appropriately incorporated into the draft negotiated loan agreement between the Borrower and the Bank.

4.11 **Implementation Arrangements and Readiness.**

4.11.1 **Implementation arrangements.** The Project implementation will follow the Royal Government of Cambodia's (RGC's) Standard Operating Procedures (SOPs) and the Project Operational Manual (POM) for the Project management, procurement, and financial management (FM). A Project Steering Committee (PSC) will be established for inter-ministerial coordination. The establishment of the PSC has been set as a disbursement condition. It will be chaired by the Minister of MoWRAM and comprise of senior officials from MoWRAM, the Ministry of Economy and Finance (MEF), the Ministry of Interior (MOI) which is responsible for the National Committee for Sub-National Democratic Development Secretariat (NCDD-S), Ministry of Agriculture, Forestry and Fisheries (MAFF), Ministry of Environment (MOE), and the Provincial Governor's Offices of Pursat, Kampong Chhnang, Kandal, and Kampong Speu provinces. An Inter-Ministerial Resettlement Committee (IRC), chaired by MEF, will manage resettlement and land acquisition issues as they arise. The National Project Coordinator of the Project Management Unit (PMU) will serve as a secretariat to the PSC.

4.11.2 The Ministry of Water Resources and Meteorology (MoWRAM) will implement the Project as the ministry responsible for sustainable water resource management and irrigation in Cambodia. MoWRAM has established a Project Management Unit (PMU) for the implementation of the Project and to coordinate all components and consolidate project planning and reporting. The PMU is led by the Secretary of State (MoWRAM) as the National Project Director (NPD) and managed by an appointed National Project Manager (NPM). The NPM will be responsible for overall project management and coordination. The PMU includes personnel from MoWRAM, the Department of Hydrology and River Works

(DHRW), and the Provincial Departments of Water Resources and Meteorology (PDWRAMs) of the selected provinces involved. The PDWRAMs will coordinate field activities with Farmer Water User Committees (FWUCs), while the Department of FWUC will appoint additional personnel at provincial and district levels to support FWUC operations. The PMU will directly implement Component 2 (irrigation infrastructure) and Sub-Component 3.1 (institutional strengthening).

4.11.3 The PMU is responsible for the overall management of the Project; it will coordinate directly with project stakeholders, support execution of day-to-day activities, and ensure the technical quality of the Project outputs, activities, financial management, procurement, monitoring and evaluation.

4.11.4 The National Committee for Sub-National Democratic Development Secretariat (NCDD-S) will be responsible for the implementation of Component 1 and will establish a Project Implementation Unit (PIU) and contract service providers at the provincial level as required. MEF will open a designated account in the name of MoWRAM.

(i) Procurement arrangements.

a. **Applicable Procurement Policy.** Procurement of contracts financed as a whole or in part by AIIB loan proceeds, where AIIB is the sole financier or the lead financier of the joint financed procurement (i.e. subcomponent 2.1 and 3.4 as provided in Annex 2), will be carried out in accordance with: (i) Procurement Policy (June 26, 2024); (ii) Directive on Procurement Instructions to Recipients (July 26, 2024); and (iii) the provisions stipulated in the Loan Agreement.

b. **Institutional Arrangements.** All procurement will be undertaken by the PMU housed within MoWRAM. The PMU will be responsible for the Project delivery strategy (PDS) and procurement plan (PP) preparation, procurement documents preparation and issuance, tender evaluation, contract award and signing, contract implementation and procurement guidance provision to provincial PIUs whenever necessary. PIUs established in selected provinces and NCDD-S will be working collaboratively with the MoWRAM PMU on procurement activities under their respective component or jurisdictions.

c. **Project Delivery Strategy (PDS).** A PDS has been prepared with detailed operation context assessment and market analysis. It concluded that open competitive tendering is the preferred procurement method to achieve economy and efficiency with transparency. The Project will adopt a balanced approach to include both international open competitive tendering contracts to attract more participants to achieve better price competition, as well as national competitive tendering contracts to give opportunity for small and medium sized participants, mostly from the local market. The overall procurement risk rating was medium with the implementation of mitigation measures.

d. **Advance Procurement and Retroactive Financing.** Retroactive financing up to 20 percent of the loan amount would be available for eligible expenditures incurred up to 12 months prior to the date of the Loan Agreement. The Procurement Plan sets forth the contracts expected to be signed before loan signing, together with the relevant Bank review procedures.

e. **Project Procurement Management System (PPMS).** PPMS will be used to prepare, clear and update Procurement Plans and conduct all procurement transactions for the Project.

(ii) FM arrangements: The PMU will be responsible for maintaining the Project's FM system for AIIB-financed components. The cash-based accounting system will be followed by Project accounting. The PMU will maintain Project accounts and have custody of supporting documents.

(iii) Project implementation plans: The Project is progressing with a focused strategy to ensure implementation readiness for the Project. DED-1 for the Krapeu Trom scheme is nearing completion, with tendering readiness planned for March 2025 and contracting expected by mid-2025. This milestone underscores the Project's commitment to timely implementation. Meanwhile, the revised DED-2 will prioritize all the remaining schemes, with preparation targeted for completion by early 2026 in a phase manner. The Project also emphasizes efficient procurement planning, with the Procurement Plan (PP) and Project Delivery Strategy (PDS) in the finalization stage to ensure tendering readiness. In parallel, efforts are underway to facilitate contractors' unencumbered access to project sites, optimize designs, and streamline approvals to prevent delays. This comprehensive approach, supported by capacity-building initiatives at the provincial level, ensures compliance with AIIB's requirements and facilitates an accelerated contracting and implementation process.

(iv) Implementation period. Implementation period is expected between June 2025 and December 2032. The seven-year implementation period from June 2025 to December 2032 is essential for effectively coordinating and executing the multifaceted components of the Project, which involves multiple development partners—AIIB, IFAD, and GCF—each with distinct financing structures and timelines. The phased preparation of detailed engineering designs (DEDs) and the simultaneous readiness of procurement strategies, alongside land acquisition and resettlement activities, necessitate a longer timeline to ensure the alignment of all parties' contributions. The varying loan effectiveness dates across the partners further require phased implementation, especially as IFAD and GCF prepare their respective investments following their loan effectiveness. The extended timeline allows for careful coordination of these complex activities while ensuring that environmental, social, and climate safeguards are fully integrated into the project's execution. Additionally, the capacity-building initiatives and institutional strengthening components require adequate time for the government of Cambodia and its stakeholders to build the necessary skills and frameworks for sustainable, long-term impact.

4.11.5 **Implementation readiness.**

(i) Procurement Readiness. The procurement process is advancing, with PDS and PP already prepared for finalization before loan negotiation as required by the Bank's procurement policy. Detailed engineering design (DED) contracts for respective schemes are at various stages. The most advanced one for Kropeu Trom scheme is approaching completion for speedy procurement documents preparation and tendering initiation in Q2 2025.

(ii) Environmental and Social frameworks to guide the planning, implementation and monitoring of environmental and social (ES) management (ES Management Planning Framework, Land Acquisition and Resettlement Planning Framework, and Indigenous People Planning Framework) have been prepared for the Project in consultations with stakeholders, relevant agencies and local authorities. Following the preparation of framework documents and finalization of the chosen subprojects, the Environmental, Social and Climate Impact Assessment (ESCIA) has been conducted, and Environmental, Social and Climate Management Plans (ESCMPs) for the subprojects have been drafted. Summaries in English of the framework documents, ESCIA report ESCMPs, as well as the Stakeholder Engagement Plan (SEP), Gender Assessment and Social Inclusion Plan (GASIP) have been disclosed on MoWRAM's websites in December 2024. Summaries of the documents in Khmer have been disclosed in easily accessible public places [17] within the Project communities in January 2025. The Environment and Social (ES) instruments of the Project have also been posted on AIIB's website in January 2025.

4.11.6 **Monitoring and Evaluation.** MoWRAM will be responsible for the overall coordination of Project monitoring. The Project Management and Implementation Consultants (PMICs) will be recruited to support the PMU in establishing or confirming baselines, monitoring the implementation process, checking the progress of the Project's results indicators (including construction, environmental and resettlement plans, and gender monitoring), and assessing achievements towards the Project's objectives. MoWRAM will prepare consolidated reports for the co-financiers through a duly notified sub-committee under the Project Steering Committee. AIIB, IFAD and GCF will jointly monitor the status of the Project implementation and result indicators through biannual implementation support missions.

4.11.7 **AIIB's Implementation Support.** As the lead co-financier, AIIB will proactively plan and coordinate with other partners on mission timing, objectives, and the key skills required for joint missions with IFAD and GCF, ensuring sufficient resources are allocated to the missions and reviews. A Co-lenders Agreement between AIIB and IFAD will be prepared to outline the policies applicable to project components, independent accountability mechanisms, and the respective roles and responsibilities of each organization. AIIB's PPSF, available until December 31, 2026, is being utilized to prepare the DEDs for the remaining sub-schemes as early as possible to ensure readiness for the AIIB component.

[17] These can be cultural houses of the villages, offices of communes, and information boards of the communities.

5. Project Assessment

A. Technical

5.1 **Project Design.** The Project aims to enhance agricultural productivity and climate resilience across a total command area of 32,056 hectares, spanning three sub-project command areas: Ou Ta Paong in Pursat Province, Lum Harch in Kampong Chhnang Province, and Krang Ponley in Kampong Chhnang, Kampong Speu, and Kandal Provinces. The Project is designed to address critical challenges posed by climate change, with a clear objective to improve irrigation efficiency, provide flood protection, and bolster the livelihoods of smallholder farmers and vulnerable rural communities across these selected provinces. The Project's integrated design incorporates:

- **Climate-resilient water and agricultural practices** to enhance on-farm productivity and sustainability.
- **Climate-proofed irrigation and flood control infrastructure** to mitigate the adverse impacts of extreme weather events.
- **Strengthened institutional capacity** to effectively plan, operate, and maintain irrigation systems and flood control measures in the context of a changing climate.

5.2 This comprehensive approach will directly benefit 120,000 households (approximately 562,000 rural people), with broader economic and social ripple effects expected to impact over 3 million people in the region positively. The Project is led by the Ministry of Water Resources and Meteorology (MoWRAM) and the National Committee for Sub-National Democratic Development Secretariat (NCDD-S), a GCF Direct Access Accredited Entity.

5.3 The Project has undergone comprehensive technical, financial, and environmental assessments to ensure its feasibility and successful implementation. AIIB, in collaboration with MoWRAM and provincial authorities, conducted rigorous evaluations during the project preparation phase to identify and prioritize irrigation schemes for modernization. These interventions were selected based on hydrological feasibility and dry-season water availability, ensuring year-round irrigation benefits, and the size of command areas and projected agricultural impact, maximizing benefits for smallholder farmers. The Project prioritizes interventions in climate-vulnerable areas, incorporating risk assessments to enhance resilience against droughts and floods.

5.4 Aligned with AIIB's priorities of green and technology-enabled infrastructure, the Project integrates climate-resilient irrigation systems and promotes energy- and water-efficient technologies to enhance sustainability and innovation. The design also reflects the Royal Government of Cambodia's National Water Resources Management and Sustainable Irrigation Road Map, ensuring consistency with national strategies for climate adaptation and agricultural development. The Project seeks to improve irrigation service efficiency and provide timely weather information, equipping smallholder farmers with knowledge and tools to adopt climate-smart farming practices effectively.

5.5 Additionally, environmental and social considerations have been incorporated to align with sustainable infrastructure best practices, while stakeholder-driven canal layout designs

ensure community participation and operational efficiency. The investment is further supported by cost efficiency and economic viability assessments, optimizing investment returns while ensuring long-term sustainability. The Project is also aligned with AIIB's Water Strategy, emphasizing Integrated Water Resource Management (IWRM) and addressing the broader water sector context in Cambodia, including efforts to improve access to safe drinking water and mitigate potential negative impacts on rural populations.

5.6 With a technically sound design, strong governance structures, and financing from AIIB and IFAD-GCF, the Project is well-positioned for effective implementation and long-term success. By integrating climate-smart water management solutions, flood resilience measures, and institutional capacity-building, the Project will strengthen Cambodia's water security, agricultural productivity, and climate resilience, ensuring sustainable benefits for rural communities.

5.7 **Operational Sustainability.** The Project is committed to ensuring the long-term operational sustainability of its investments by focusing on strengthening FWUCs, which play a critical role in the efficient and sustainable management of irrigation systems. As part of the rehabilitation of irrigation infrastructure and the establishment of flood protection and drainage systems in the three sub-projects, the Project will prioritize the formation of new FWUCs and the capacity enhancement of existing ones while also strengthening capacity of PDWORAM at the provincial through training and capacity building. These committees are crucial for managing water rights, allocation, and usage, particularly at the secondary and tertiary levels. By improving their capacities in operations and maintenance (O&M), water use efficiency, and service fee collection, the Project ensures that these organizations are well-equipped to maintain the infrastructure sustainably.

5.8 In addition to strengthening FWUCs, the Project will invest in training both women and men farmers in sustainable water management practices, climate adaptation strategies, and greenhouse gas (GHG) mitigation tools. This will support the goal of increasing agricultural productivity while minimizing adverse environmental impacts. The use of green technologies and improved water management practices will further enhance the resilience of the irrigation systems, making them more climate-proof and adaptable to changing environmental conditions.

5.9 By integrating these comprehensive strategies, the Project creates a framework for operational sustainability that empowers local communities and institutions to effectively manage and sustain climate-resilient water infrastructure. Through collaboration with key development partners, the Project ensures that these investments will deliver lasting benefits, enhancing water security, climate resilience, and agricultural productivity for the region's communities.

B. Economic and Financial Analysis

5.10 **Economic Analysis.** The Project aims to enhance irrigation efficiency, bolster climate resilience, and improve the livelihoods of vulnerable rural communities by modernizing critical infrastructure for irrigation and flood management. Component 2, co-financed by the Bank, focuses on rehabilitating and upgrading irrigation and drainage canals, ponds, and flood-

protection systems to mitigate climate risks and increase agricultural productivity. The economic analysis uses a cost-benefit approach, prioritizing two key benefits: increased crop productivity through improved water access and flood damage savings due to enhanced flood protection measures. On the cost side, it incorporates capital expenditure, annual O&M expenses, and periodic maintenance costs. The analysis estimates an Economic Internal Rate of Return (EIRR) of 17 percent and an Economic Net Present Value (ENPV) of USD69 million at a 9.5 percent economic discount rate, rising to an EIRR of 21 percent and an ENPV of USD107 million when accounting for GHG emission savings. These savings result from reduced emissions in flood rice cultivation due to improved irrigation systems and the adoption of sustainable agricultural practices. The carbon price applied follows the AIIB Cost-Benefit Analysis (CBA) guidelines, averaging USD95 per ton of CO2e during the analysis period.

5.11 The sensitivity analysis shows that the Project remains economically viable under adverse scenarios, including increased costs, reduced benefits, and delays, the worst-case scenario that yields a minimum EIRR of 10 percent and an ENPV of USD3.7 million. Beyond the quantified benefits, the Project is expected to contribute to additional gains such as enhanced water-use efficiency, reduced reliance on traditional energy sources, and opportunities for crop diversification. Improved drainage and flood mitigation systems are also expected to contribute to better community health by reducing waterborne diseases. Complementing this, the Project's co-financier, IFAD, conducted an economic analysis for Component 1, highlighting benefits like increased poultry and fisheries production, travel time savings, and value chain enhancements. Together, the combined analysis affirms the overall economic viability of the Project, resulting in an EIRR of 20 percent.

Financial Analysis.

5.12 The Project does not generate direct revenue from user fees; hence, a conventional financial analysis was not conducted. Its financial sustainability hinges on the RGC's commitment to providing timely and adequate budget allocations for the management, operation and maintenance (O&M) of irrigation infrastructure. The RGC has assured that sufficient funding will be allocated to sustain the modernized infrastructure, ensuring its long-term viability. To further strengthen sustainability, canal O&M plans will be formulated, incorporating Supervisory Control and Data Acquisition (SCADA) systems to optimize operations. Additionally, the Project will review existing institutional mechanisms within MoWRAM to monitor FWUC performance and O&M progress, ensuring that lessons from past challenges are integrated into future operations. The preparation of O&M plans for completed systems will be a key measure to ensure continued functionality.

5.13 At the farm level, sustainability depends on Farmer Water User Communities (FWUCs) effectively managing tertiary irrigation systems. To support this, the Project includes targeted capacity-building initiatives aimed at strengthening FWUCs, MoWRAM, and Provincial Departments of Water Resources and Meteorology (PDWRAMs) in managing, maintaining, and financing irrigation systems efficiently. By improving irrigation efficiency and increasing farm productivity, the Project aims to strengthen FWUCs' financial viability, ensuring resilience and sustained benefits for farmers. Furthermore, the institutional framework for irrigation management will be strengthened with adequate resources to ensure timely maintenance and system sustainability. A participatory approach will involve FWUCs and local stakeholders in O&M decision-making, fostering local ownership and responsibility.

5.14 The financial sustainability of the modernized irrigation schemes under Component 2 will be ensured through a structured O&M funding arrangement that combines government budget support and farm-level contributions. The Ministry of Water Resources and Meteorology (MoWRAM), through the Ministry of Economy and Finance (MEF), allocates approximately USD15–USD20 million annually for O&M of irrigation infrastructure, with a portion designated for FWUC support. MoWRAM will provide financial assistance to FWUCs for the first five years to facilitate a gradual transition to financial independence. Meanwhile, the Provincial Departments of Water Resources and Meteorology (PDWRAMs) will provide technical backstopping, while FWUCs will progressively assume full O&M responsibilities. Cambodia's water law mandates farmer contributions to O&M costs, currently set at USD8–USD10 per hectare per crop; however, actual collections remain below this threshold. Experience from the Department of Foreign Affairs and Trade (DFAT) funded Cambodia Agriculture Value Chain (CAVAC) project indicates that farmers have successfully contributed up to USD80 per hectare per crop for pumped irrigation schemes for routine maintenance. To enhance financial viability, the Project will pilot a structured irrigation service fee collection mechanism through FWUCs, ensuring sustainable O&M funding and reducing long-term dependency on government subsidies.

C. Fiduciary and Governance.

5.15 **Procurement**: The PMU has extensive experience working on MDB financed procurement. Currently, it has three procurement staff and four procurement consultants supporting two ongoing projects and two preparation projects. Lack of staffing was identified as one of the procurement risks. Technically, the PMU has the experience of handling highly complex procurement of large value through international open competitive tendering, but limited capacity of contract management due to heavy reliance on consultants in past projects. Details of the identified key procurement risks and the proposed mitigation measures are provided under Table 2: Summary of Risks and Mitigating Measures.

5.16 **Financial Management:** The FM assessment was conducted during the Appraisal stage. The review covered the PMU's accounting system, budgeting, fund flow, financial reporting, auditing, and internal controls. Based on the assessment, the Project's FM risk is Medium.

5.17 The government has implemented a budgeting program in all ministries and agencies, and budgets for investment projects are included as part of the budget of the relevant program. Externally financed projects will report to two major stakeholders: the government and the development partners (DPs). Therefore, the Project implementation teams will be instructed to prepare and provide the specific reports required by the government and DPs. Annual Work Plan and Budget (AWPB) documents shall be prepared for the proposed Project and submitted for approval to the General Department of International Cooperation and Debt Management (GDICDM) under MEF by November 30 each year. Based on the approved AWPB, PMU should prepare a detailed annual budget (by month) for monitoring purposes, which shall be shared with AIIB by November of each year.

5.18 MoWRAM has assigned one of its PMUs to supervise all MDB-funded projects and implement the Project. The PMU includes four financing officers seconded by MoWRAM and supported by one national FM consultant. The national FM consultant will perform most FM tasks while the officers exercise oversight and control functions. All staff members are in place and have adequate experience and capacity to implement the Project.

5.19 The Project will be guided by some specific policies of AIIB and IFAD and the SOP for FM developed by RGC that applies to official development assistance-funded projects, including the proposed Project.

5.20 The PMU uses Sage 50 Quantum Accounting Software to automate accounting undercurrent projects financed by MDBs. The data capture and mapping of this system allows customization of financial reports and is found suitable for the Project. A similar or the same program shall be used to automate accounting for the proposed Project. The Project Chart of Accounts will reflect expenditure types and sources of financing. MEF's National Accounting Committee issued Guidance on Implementing the Cambodia Public Sector Accounting Standards "Cash Basis of Accounting" for Externally Financed Projects in October 2020. In compliance with this, the Project shall adopt the cash basis method for budgeting, accounting, and reporting. The Project shall record financial transactions and maintain the main Project accounts and records in US Dollars. All prime financial reports must be in US Dollars.

5.21 To monitor project progress and financial performance, consolidated Interim Un-audited Financial Reports (IUFRs) will be prepared for the proposed project. NCDD-S will prepare its part of IUFR and send it to MoWRAM. The PMU will enter its part into the IUFR file and finalize the consolidation of the IUFR. MoWRAM will submit the consolidated IUFRs every calendar quarter throughout the Project. The format of IUFRs will be agreed upon with the MoWRAM, NCDDS, and IFAD before the Bank’s negotiations. It may include (a) Project Sources and Uses of Funds, (b) Uses of Funds by Project Activity, (c) Uses of Funds by Disbursement Category, (d) Designated Account Statements, and (e) Annex 1-Information about RGC in-kind contributions. IUFRs should be submitted to the Bank and IFAD within 45 days of the end of each quarter. The PMU shall submit the first report under the proposed Project after the end of the first calendar quarter of initial disbursement.

5.22 MoWRAM established its Internal Audit Department (IAD) in November 2006. The IAD was under the oversight and guidance of the General Department of Internal Audit of MEF (GDIA-MEF) until August 2023. The GDIA-MEF is responsible for developing and issuing guidelines for the internal audit function. The GDIA-MEF is also responsible for capacity building by providing continuous support and training. Since August 2023, the IAD reports to MoWRAM only and has twenty-seven staff members. The IAD designs its overall annual work program and selects the actual projects or sub-projects to be audited in coordination with MoWRAM management. The IAD does not typically conduct internal audits of projects financed by MDBs. The IAD’s staff capacity can be strengthened through training activities funded through the proposed Project. This option can be further discussed during the Project implementation between AIIB and MoWRAM.

5.23 MEF is responsible for appointing external auditors for all donor-financed projects. The audits are conducted following the Cambodian Standards on Auditing and Assurance (CSAA), which conforms with the International Standards of Auditing (ISA). An independent auditor will

conduct the external audit of the Project Financial Statements under ToR, which shall be acceptable to AIIB and IFAD. The audit costs are charged to projects and are borne by the respective financiers. For Project purposes, separate audit reports will be issued for AIIB and IFAD financing. The first report will include the audited financial statements for AIIB parallel-financed sub-components and a management letter. The second report will include the audited financial statements for IFAD parallel-financed components and a management letter. The second audit report will be consolidated, consisting of NCDD-S and MoWRAM implemented IFAD's financed components. The PMU will furnish audited financial statements (and any accompanying Management Letters) to AIIB and IFAD, respectively, no later than six months after the end of each fiscal year.

5.24 **Disbursements**: AIIB will handle project disbursements according to its disbursement procedures. The Project will use direct payment and advance procedures for AIIB financing. The PMU plans to use the advance method of disbursement for consultancy and operating expenses, while the direct payment method will be used primarily for work payments. The PMU will prepare Withdrawal Applications and supporting documents and submit them to AIIB through MEF. After receiving the signed applications from MEF, AIIB will make the payments for the AIIB portion directly. For now, the applications will be delivered by post; later, AIIB may introduce electronic submission. Further details will be described in the Disbursement Letter (DL).

5.25 There will be a separate Designated Account in reputable commercial bank agreed between and held jointly by MEF and MoWRAM, which will be delegated to and administered by MoWRAM. Before opening the account, the PMU will email AIIB to confirm the acceptability of the selected bank.

5.26 The RGC's funding will follow the standard RGC system for cash contributions to development projects. A separate bank account in USD for the government counterpart financing will be opened in the National Bank of Cambodia (NBC). Whenever the PMU needs to receive funds from the government counterpart financing, the PMU will prepare a cash request along with the cash forecast for 6 months or a replenishment request with paid expenses.

5.27 **Governance and Anti-corruption**: AIIB is committed to preventing fraud and corruption in the projects it finances. It places the highest priority on ensuring that projects AIIB finances are implemented in strict compliance with AIIB's Policy on Prohibited Practices (2016). The Policy on Prohibited Practices (2016) applies to all Bank-financed components of the Project. The Bank reserves the right to investigate, directly or indirectly through its agents, any alleged corrupt, fraudulent, collusive, coercive, or obstructive practices, and misuse of resources and theft relating to the project and to take necessary measures to prevent and address any issues in a timely manner, as appropriate.

5.28 **Cybersecurity**: The infrastructure financed is not considered as a Critical Infrastructure.

D. Environmental and Social

5.29 **Environmental and Social Policy and Categorization.** As some components of the Project will be parallel co-financed by AIIB, IFAD and GCF, the AIIB's Environmental and Social Policy (ESP, 2022), the IFAD's Social, Environmental, and Climate Assessment Procedures (SECAP) will be applied to the respective co-financiers' parts of the Project.[18] IFAD's SECAP will be applied for Component 1, Component 2.2, and Component 2.3 and AIIB's ESP will be applied for Component 2.1, as the parallel co-financed components of the Project. For the joint co-financing component between AIIB, IFAD and GCF (Component 3), AIIB's ESP will be applied as AIIB is the lead financing agency. As two safeguard policies will be applied to the Project, coordination between the financiers to manage the environmental and social (ES) risks and impacts of the Project have been discussed and agreed upon. The AIIB's Environmental and Social Standard 1 (Environmental and Social Assessment and Management) and the Environmental and Social Standard 2 (Involuntary Resettlement) are applicable for Components 2.1, as construction activities will cause land acquisition and resettlement of local people. The Project is not situated in the areas where Ethnic Minorities/Indigenous Peoples are present; therefore, the policies relating to ethnic minority/indigenous peoples of the co-financiers are not triggered.

5.30 The Project has adopted a common approach on alignment of the application of the ES policies of AIIB, IFAD, and GCF. Agreements among development partners emphasize a client-first approach, reducing complexity for the government while upholding environmental and social requirements and standards of the financiers. The alignment extends to coordinated Environmental, Social, and Climate Impact Assessments (ESCIA) and Environmental, Social, and Climate Management Plans (ESCMPs), the monitoring of ES management by the Project, and resolving ES-related issues, if any, during Project implementation. The ESCIA and ESCMPs for the schemes are prepared to meet the principles and requirements of all co-financiers and are co-reviewed by the ES teams of the financiers. The frequency of regular monitoring and joint financier reviews has been discussed and agreed upon. In addition, a unified ES reporting template will be harmonized for use to ensure that the ES aspects of the ES policies of financiers are covered in monitoring and reporting and avoid preparing and submitting different ES monitoring reports to different financiers. Clear roles and responsibilities have been defined, ensuring efficient coordination in project execution, including the conduct of missions, mid-term and completion reviews, and outcome assessments. A single project-specific Grievance Redress Mechanism (GRM) will be applied on the ground with sufficient resources allocated at both the provincial and PMU levels. However, if any affected household is not satisfied with the solution provided by the project-specific GRM, the Accountability Mechanism of the financier responsible for the component related to the ES complaint or grievance will be invoked. Information dissemination will be adequate and proper to ensure local people are informed about the appropriate accountability mechanisms, the co-financiers and their corresponding financed component(s). Monthly coordination meetings will facilitate ongoing alignment among financiers, tracking environmental and social compliance, discussing, and addressing emerging risks, and ensuring timely remedial actions. By fostering collaboration, mitigating risks, and enhancing long-term project sustainability, the investment streamlines both safeguards and operational procedures, ensuring efficiency and responsiveness in delivering development outcomes.

[18] As GCF delegates its finance to IFAD for administration, GCF's safeguards policy is not applied.

5.31 The Project is proposed to be Category B, as it has a limited number of potentially adverse ES impacts that are not unprecedented, few of which are irreversible or cumulative, and all of which can be successfully managed using good operational practices. It was initially classified as Category A for ES aspects due to anticipated impacts from the construction of new irrigation canals and dam rehabilitation works. An ESCIA conducted between August and December 2024 comprehensively examined direct, indirect, cumulative, and project-induced risks and impacts. Based on these findings, the Project team, in consultation with the PMU, applied the mitigation hierarchy by modifying the original concept design to avoid major ES impacts. The key design changes include eliminating dam rehabilitation works, avoiding the construction of new irrigation canals, excluding polder improvements, and refraining from building new ponds. The Project will focus solely on upgrading, rehabilitating, and modernizing existing irrigation infrastructure to enhance water productivity. Land acquisition and resettlement is estimated to affect a total of 71 households (HHs), with 63 HHs partially affected and eight (8) HHs physically displaced subject to detailed engineering designs finalization. No ethnic groups or Indigenous Peoples (IP) have been identified within the assessed Project's command areas.

5.32 The Project also includes a subcomponent for establishing and training Farmer Water User Communities (FWUCs), alongside capacity-building programs for farmers on water efficiency practices and further includes integrated pest management and low chemical cultivation training modules applicable to cropping conditions and capacities in the subproject, among other mitigation measures in the ESCMPs. These are important mitigants considering the Project context as depicted in baseline condition with issues on water quality in the subprojects from domestic, industries, and agricultural activities, among others. Moreover, the Tonle Sap Lake environment faces multiple external pressures, including industrial activities, urban expansion, household waste, animal husbandry, fisheries, and agricultural practices, as highlighted in various studies. The ESCIA incorporates measures to address potential cumulative impacts, with the PMU actively engaging stakeholders to mitigate risks to valued ES components identified in the rapid cumulative impact assessment.

5.33 **Environmental and Social Instruments.** To enable the MoWRAM and relevant government agencies to assess and implement the Project activities in conformity with the provisions of AIIB's ESP and applicable ESSs and IFAD's SECAP, framework documents have been developed in the early stages when concept design is still to be finalized, i.e., Environmental, Social and Climate Management Planning Framework (ESCMPF), Land Acquisition and Resettlement Planning Framework (LARPF), and Indigenous Peoples Planning Framework (IPPF).

5.34 The ESCMPF document outlines the principles, guidelines, and procedures to be followed to assess and address ES and climate risks and impacts; the provisions for disclosure of and consultation with the stakeholders; the requirements for the Project's GRMs; the description of the Project-affected People's Mechanism (PPM); the arrangements for implementation and monitoring; and the roles and responsibilities of the agencies involved in ES planning, implementation and monitoring for the Project.

5.35 The LARPF has been prepared to govern the land acquisition assessment, land acquisition and resettlement planning, implementation, monitoring, and institutional arrangements for the land acquisition and resettlement process for the Project. The provisions

of the LARPF follow the principles and requirements of the relevant government's laws and regulations on land acquisition and resettlement, and the AIIB's ESP and the ESS2 as well as the provisions of IFAD's SECAP. The LARPF has been approved by the Government (General Department of Resettlement - GDR under MEF), IFAD and AIIB in March 2024. Following the provisions of the approved LARPF, once the detailed engineering designs (DEDs) of the subprojects are available, the Detailed Resettlement Plans (DRPs) are to be prepared and finalized by the GDR of the MEF for implementation. DRPs will be prepared for construction contract packages to prevent delays in the commencement of the civil works due to delays in the finalization and approval of DRPs as well as the completion of compensation for the subprojects.

5.36 Land donation is considered by farmers in Cambodia as a contribution towards project benefits and is aligned with their traditions of community solidarity and shared prosperity. In the Government's policy on land acquisition and resettlement, voluntary land donation is envisaged. For the upgrading of tertiary and quarter canals under the Project, as only a narrow strip of agricultural land will be affected and this will not affect livelihoods of affected farmer households, voluntary land donation is applied. The eligible criteria for voluntary donation, the procedure of implementing donation, the Grievance Redress Mechanism (GRM) and monitoring arrangements for planning and implementation of voluntary donation have been reflected in the approved LARPF of the Project, which was prepared in accordance with the Government's Standard Operational Procedure for Land Acquisition and Resettlement, AIIB's ESP and IFAD's SECAP. The proposed procedure ensures that land donation is voluntary, transparent, conducted in meaningful consultations, and no affected household is worse off due to the donation of the affected land area for the Project. A Community Participation Plan (CPP) will be prepared for each province where voluntary donation happens and will be submitted to IFAD and AIIB for review and clearance. A pilot CPP will be planned and implemented so that necessary enhancements, if any, will be integrated in planning and implementation of voluntary donation in other project provinces. The roles and responsibilities of the agencies involved in planning, implementation and monitoring of voluntary land donation have been identified.

5.37 The Indigenous People Planning Framework (IPPF) has been developed with objectives to ensure that, if there are any indigenous peoples/ethnic groups living in the Project areas and/or are positively and negatively affected by the project, they are adequately and fully consulted, receive culturally appropriate benefits from the project and compensation for any losses, are provided with special assistance as per laws and policies, and receive adequate protection against project adverse impacts on their culture identities. This guiding document also sets out the requirements and steps for preparation, implementation, and monitoring of ethnic minority plans for the subprojects where impacts on ethnic groups are identified. The document has been finalized following the provisions of AIIB's ESP and the ESS3 and the requirements of the IFAD's SECAP.

5.38 Following the concept design of the Project, the ESCIA has been conducted and the ESCMPs draft versions have been prepared and are being finalized for the Project. For the regulatory instrument, the PMU will prepare the Environmental and Social Impact Assessment (ESIA) /Initial ESIA/Environmental Management Plan (EMP) based on Cambodia's *Ministry of Environment's (MoE) Prakas No. 021 PRK.BST (dated February 3, 2020)* or per consultation with the MoE on the required instruments and obtain approval before construction.

5.39 **Environment Aspects.** The Project has environmental risks and impacts, which are manageable with the implementation of good international industry practices, standards, procedures, guidelines, and design criteria. These have been identified and addressed in the ECSIA and ESCMP finalization. Below are details provided specifically for Components 1 and 2, followed by an overall approach to address potential issues during the construction and operation phases:

- **Component 1: Farm-Level Climate Adaptation and Resilience:** Project activity which will have potential risks and impacts is the improvement of 90 km of farm roads to be climate-resilient for improved access to market. However, these are existing roads thus risks and impacts are minimal compared to new roads. Negative impacts mainly come from the construction phase, which is short-term and localized with mitigation measures in the ESCMP.
- **Component 2: Upgrading and Climate-Proofing Water Infrastructure:**
  Sub-component 2.1: Modernization of Irrigation Schemes and Ponds: The Project applied the mitigation hierarchy, and major impacts were avoided during the ESCIA by informing the technical design. Further, modernization of the schemes will prioritize nature-based solutions (NBS) and the integration of energy-efficient technologies. Negative impacts mainly come from the construction phase which is short-term and localized with mitigation measures specified in the ESCMP.
  Sub-component 2.2: Flood-Proofing and Drainage Improvements: With the aim to improve disaster prevention and water management by strengthening embankments, river training systems, and farm-level drainage networks, the component design includes prioritization of application of NBS such as bio-engineering methods for stabilizing banks of canals. Potential risks and impacts are mainly from the construction phase, which are short-term and localized with mitigation measures in the ESCMP.
  Sub-component 2.3: Establishment and Training of Farmers Water User Communities (FWUCs): This includes the formation and training of FWUCs which will be responsible for managing and maintaining the irrigation systems at the distributary and tertiary levels. The FWUCs are crucial for managing water rights, allocation, and usage. This subcomponent addresses the potential risks of poor and inadequate O&M of the irrigation schemes. There are also potential nutrient management issues in canal and irrigation systems, which may lead to water quality degradation and eutrophication, impacts on aquatic ecosystems and human health, and potential conflicts in water utilization between downstream and upstream users. Mitigation measures include coordination and planning by MoWRAM and PDWRAM, provision of support to FWUCs, provision of training, and implementation of educational programs for farmer households, such as water efficiency practices and equitable share. Further, to address potential issues on pesticide and/or chemical fertilizer use, the integrated pest management and low chemical cultivation training modules applicable to cropping conditions and capacities in the subprojects will be conducted. Mitigation measures are specified in the ESCMP.

5.40 On the aspect of water sustainability, it is important to emphasize that a water balance study was completed during the feasibility study and will be further reviewed and incorporated while developing the DEDs for the remaining schemes. Prima facie, for medium and minor schemes, the focus is primarily on improving irrigation efficiency in conveyance and field application. For one major irrigation scheme, Ou Ta Paong, an additional withdrawal of about 20 to 25 cumecs from the DAMC and KHMC headworks on the Pursat River system will be

undertaken. Based on the river's hydrology, adequate water remains in the Pursat River, ensuring no adverse impact on other water bodies within the catchment or on communities dependent on fishing and agriculture. With the above, the Project may potentially impacts Tonle Sap Lake's biodiversity due to changes in baseline water flows from upstream to the lake. In addition to the Project's mitigation measures which include the formation of FWUCs as subcomponent (see discussion in the previous paragraph), the relevant measures in the ESCMP are adequate to address potential impacts on all subprojects. Furthermore, as highlighted earlier, aside from the Project, the Tonle Sap Lake environment faces multiple external pressures from industrial activities, urban expansion, household waste, animal husbandry, fisheries, and agricultural practices, among others. The ESCIA incorporates measures to address potential cumulative impacts, with the PMU actively engaging stakeholders to mitigate risks to valued ES components identified in the rapid cumulative impact assessment conducted as part of the ESCIA.

5.41 Further on biodiversity, there are no internationally recognized areas (Key Biodiversity Areas, Ramsar Sites, World Heritage) and no legally protected areas within 10km of all subprojects, with the exception of Ou Ta Paong subproject, which is within 1 km, at the boundary of the protected area Tonle Sap (a UNESCO-MAB Biosphere Reserve). Key to emphasize that the command areas in all subprojects are modified habitats-- except in a small part of the Lum Hach subproject where the main canal no. 5 (existing for more than 20 years), traverses through about 1.5 km of the Chan Trak Community Forest (a natural habitat; small, fragmented and degraded dry deciduous forest). In these modified habitats, human activity has modified the primary ecological functions and species composition in the areas. There is large proportion of nonnative species. Households are involved largely on agriculture such as seasonal rice farming, small-scale vegetable production, fishing, and livestock raising (poultry, ducks, etc.), among other activities.

5.42 While the habitats are modified, some significant biodiversity values likely exist at the northern end of Ou Ta Paong subproject, at its boundary with the Zone 3 of Tonle Sap (Zone 3 - agriculture and fishing activities are illegal). Likely occurrence since this was *based only on historical sightings months and years back* from locals and consultation with local experts, none were confirmed during baseline surveys. Species reportedly sighted were the critically endangered (CR) Milky Stork (*Mycteria cinerea*) – migratory and near threatened (NT) Greater Adjutant (*Leptoptilos dubius*) – non-migratory. And just outside the Ou Ta Paong, in Zone 3 were historical sightings of the endangered (EN) Long-tailed Macaque (*Macaca fascicularis*) and EN Indochinese Silvered Langur (*Trachypithecus germaini*) associated with the forest vegetation cover in Zone 3 suitable habitat for the species. However, no historical sightings within the command area and during the biodiversity surveys. Potential direct risk and impacts to these *likely occurring* species are illegal wildlife collection, possession, and trafficking by construction workers/personnel. While indirect impacts are expected from the change in water availability in the area and potential increase in agricultural runoff, inherent mitigation measures are already part of the project (Subcomponent 2.3). However, further mitigation measures are in place in the Biodiversity Action Plan (BAP) within the ESCIA following the mitigation hierarchy, and other related mitigation measures in the ESCMP per subschemes, for implementation by the PMU, PDWRAM, and contractors during rehabilitation works in the modified habitats, to name a few: (i) Code of Conduct/ethics against wildlife collection, possession and trafficking; (ii) Training and awareness materials on biodiversity conservation and human-wildlife conflict management; and (iii) Chance Finds Procedure for Biodiversity

Conservation to ensure appropriate action by contractor personnel in the event if any priority species are encountered during construction and rehabilitation activities.

5.43 On the potential risks and impacts on the natural habitat (above mentioned main canal 5 of Lum Hach subproject), these are addressed following the mitigation hierarchy. The avoidance of conducting rehabilitation works in the main canal 5 was raised to PMU prior, however rehabilitation works is key since the existing Lum Hach scheme operates with a deteriorated main canal, which suffers from capacity limitations due to breaches, flooding, and water logging. Since rehabilitation works in natural habitat cannot be avoided, then impacts should be minimized. If land clearance is required during rehabilitation works, this will be conducted following the Standard Operating Procedure (SOP) for Land Clearing and Rehabilitation. If will involve cutting or removal of trees, the contractor/s is required to obtain a permit, together with informing the PDWRAM, local authorities, and authorities that conduct inventory and replantation. Undertaking onsite restoration for any cleared areas is key which is under PMU responsibility during construction and operation to achieve no net loss requirements for natural habitat under the AIIB ESF. These measures, among others, are included in the BAP within the ESCIA, and other related mitigation measures in the ESCMP per sub scheme.

5.44 For earth materials required for construction, while quantity is not yet available at this stage, these will be sourced from borrow pits and have potential risks and impacts on flora and fauna and natural resources, such as degradation or loss of habitat, erosion, and landslide among others from poor selection and management. As part of the ESCMP, identification and selection criteria for borrow pits are required to be implemented by the contractor/s. Further, dredging activities and spoil disposal sites have similar risks and impacts if not properly managed, thus a Dredging Management and Spoil Disposal Sub-plan is detailed in the ESCMP.

5.45 Other construction phase impacts include noise generation and air emissions from, but not limited to, the hauling of earth materials from borrow sites to the subprojects, operation of concrete batching facilities (if needed), and operation of construction vehicles and machinery. There is also potential contamination of surface water and groundwater from construction stockpiles and materials, especially during the rainy season, fuel or oil spills, inappropriate discharge of domestic wastewater (from construction workers or worker camps) or construction wastewater, among others. Solid and hazardous waste generation is similarly expected, including the use of hazardous materials such as fuel and oil. These potential risks and impacts are typically localized, short-term, and low in magnitude, and mitigation measures are covered in the ESCMP.

5.46 **Social Aspects.** The impact of the Project is socially inclusive economic growth and livelihood improvements through improved irrigation and climate-resilient agriculture. It is expected that the Project would benefit 562,000 rural people directly by making smallholders more resilient to climate change and 1.1 million people would benefit indirectly through the multiplier impacts that are generated from the investments in enhanced smallholder adaptation, market integration and improved irrigation systems and strengthening of early warning and climate information systems. Functional Farmers Water User Communities (FWUCs) will be supported by the Project to optimize its function in the context of the water

distribution, to strengthen the governance system, and to promote irrigation management and sustainable agriculture in the project areas.

5.47 The Project would benefit women through (i) capacity building programs for MoWRAM and PDWRAM female staff, (ii) increased participation in water management through membership in FWUCs, and (iii) increased income from improved agricultural productivity. It is estimated that about 51 percent of direct beneficiaries by the Project are females. Rural poor, and other vulnerable households heavily rely on farming and fisheries for their subsistence, but they face challenges such as climate change-induced floods and droughts, as well as inadequate irrigation and water resources availability, which negatively impact their livelihoods. The Project is designed to bring benefits to the local farmers in general, while poor and vulnerable farmer households are the most direct beneficiaries of the Project.

5.48 The project implementation would require land acquisition from local households; however, the scope of land acquisition by the Project is insignificant. The ESCIA for the Project shows that an estimate of 71 households would have their lands acquired by the Project; of which, 63 households would be partially affected, and eight (8) households would be fully affected (physically displaced). Land acquisition and resettlement will be carried out following the relevant laws and regulations of the Government, the AIIB's ESP and the ESS2, the IFAD's SECAP and the agreed LARPF for the Project. Voluntary land donation is proposed for the minor land acquisition impact for upgrading and rehabilitation of tertiary and quarter canals under the Project.

5.49 The Indigenous Peoples (IP) impact assessment was conducted during the ESCIA. There is no ethnic minority identified recently living in the Project's areas nor the impacts by Project implementation on the local ethnic minority communities.

5.50 **Occupational Health and Safety, Labor and Employment Conditions.** There is a risk of injuries or fatalities among workers or members of the public from Unexploded Ordnance (UXO). A Certificate of UXO Clearance is required to be obtained from the Cambodian Mine Action Center before any site mobilization or construction activities, as required in the ESCMP.

5.51 During the construction phase, potential occupational health and safety (OHS) risks and impacts include but are not limited to, collision with moving machinery and vehicle, prolonged exposure to dust and exceeding levels of noise and vibration, working at heights, risk of fall and drowning, electrical safety, and OHS issues in worker camps (e.g., lack of provision of drinking water, poorly maintained latrines, and non-sanitary living quarters), among others. There are also potential risks and impacts to communities such as traffic safety from construction vehicles especially during hauling of earth materials from borrow sites to Project sites, unauthorized access to work areas which may result in injuries and accidents from contact with machinery and heavy equipment or fall from excavations and drowning in canals, and issues with worker camps from influx of workers such as potential negative interactions between workers and local community and transmission of sexually transmitted diseases, among others. Mitigation measures are included in the ESCMP.

5.52 All suppliers and contractors will be advised of the importance of implementing appropriate management measures to identify and address issues related to the ES provisions

of the ESCMP (and other ES management plans), including labor and working conditions and health and safety matters. Performance and compliance with the ESCMP and other ES management plans' requirements is an essential part of the bidding and contract document with contractors and suppliers. This compliance as well as representations and warranties to be provided to the Borrower by suppliers and contractors will be reflected in relevant agreements and contracts.

5.53 During the operation phase, poor and inadequate O&M of the irrigation schemes could cause impacts such as an increased likelihood of exposure to water-borne or water-related vector-borne diseases for community areas near poorly maintained canals. Mitigation measures are outlined in the ESCMP for the management of primary, secondary, and tertiary canals. Other potential risks and impacts during operation are, but are not limited to, falls and drowning into the canals, especially for vulnerable groups such as children, and infrastructure safety such as unauthorized access to offtake structures. For the workers of the local irrigation agencies responsible for the management of primary and secondary canals and the FWUCs for the tertiary canals, the OHS impacts include but are not limited to, physical hazards (such as working at height, falls, and drowning), biological hazards (potential exposure to water-borne or water-related vector-borne diseases, and chemical hazards (from exposure to pesticide/chemical fertilizers). The ESCMP outlines the corresponding mitigation measures.

5.54 **Stakeholder Engagement, Consultation and Information Disclosure.** The key stakeholders of the Project are categorized into government – including local authorities, beneficiaries, affected persons, civil society organizations (CSOs), non-government organizations (NGOs), private sector, and affected persons. The project implementing agency (MoWRAM), with support from its ES consultants and local authorities, has conducted three rounds of consultations with the main stakeholders (one round during the technical concept design, one round during the ES impact screening, and another round during preparation of the ES instruments). The consulted issues with stakeholders include (i) the design of the irrigation systems and other project's components; (ii) the potential risks and impacts of the Project; (iii) the possible measures to manage the impacts (avoid, if it is not possible to avoid, minimize/mitigate the impacts and compensate for the impacts); (iv) the project specific GRM; (v) the project implementation schedule, including the schedule for implementation of ES instruments; and (vi) the mechanism for consultation with and participation of local people and other stakeholders in all the Project activities. The consultation process has been well documented.

5.55 A Stakeholder Engagement Plan (with each key stakeholder – the designed outcome for engagement and communications, the information to be provided, the activities and communications to be undertaken, the timing of engagement and communications, responsibilities of involved agencies and resources, etc.) has been prepared and consulted with the stakeholders. The Stakeholder Engagement Plan (SEP) will be implemented and monitored to ensure the achievement of the objectives mentioned.

5.56 The prepared ES instruments (ESCPF, LARPF, IPPF, draft ESCIA, draft ESCMPs) and SEP and Gender Assessment and Social Inclusion Plan (GASIP) have been disclosed on the website of MoWRAM in December 2024. Summaries of the documents in Khmer language have been disclosed in the easily accessible public places of the project communities in January 2025. The ES instruments of the Project have also been posted on AIIB' website in

January 2025. The finalized ESCIA and ESCMPs, once available, will also be disclosed in the same manner.

5.57 The PMU under MoWRAM will have one social expert and one environmental expert allocated to manage and coordinate the ES management of the Project. The positions will work with the engaged ESCIA Consultant to ensure that the impact assessment is conducted properly and compliantly with the requirements of the financiers ES policies. The experts will also work with GDR under MEF and ES consultants of Project Management and Implementation Consultant (PMIC) for preparing the ES plans and with ES monitoring consultants to conduct ES monitoring and evaluation. PMICs will have ES experts in the team to assist MoWRAM and GDR to prepare the required ES plans following the provisions of the ESCPF, LARPF, and ESCMPs. During the Appraisal Mission, MoWRAM confirmed that sufficient support shall be provided for ES planning, implementation and monitoring, especially the budget for public consultations, compensation and resettlement, and implementation and monitoring of ES plans.

5.58 **Project Grievance Redress Mechanism.** A Project-level GRM has been proposed in consultations with the stakeholders and included in the ES instruments as well as the SEP. Summaries of the ES instruments and SEP in Khmer language (with the GRM as a part of it) were placed in the easily accessible public places of the project communities in January 2025. The documents with the GRM included have been disclosed on the websites of MoWRAM and AIIB. The proposed GRM is with steps for complainants to lodge their complaints/grievances verbally and or in written form. The procedure for grievance redressal is culturally appropriate and gender sensitive. Each stage of the procedure is with contact details of the focal person who is assigned to receive and file the complaint/grievance and timeframe for the case to be reviewed and responded. Records of grievances received, corrective actions taken, and outcomes shall be adequately maintained. The project-level GRM will be established and functional once the Project is approved by the financiers and the Government. GRM for the workers to cover the workplace-related complaints has been proposed in the ESCMPs. The GRM for workers will be finalized and in place before site mobilization by contracts.

5.59 **Bank's Project-Affected People's Mechanism**. If any complainant is not satisfied with the responses and/or measures provided following the Project-level GRM, complainants can lodge their case using the Independent Accountability Mechanism (IAM) of the financier of the Project component related to the complaint. Information on the IAM of the financiers will be disclosed to the Project communities so that the complainant, if any, can send their case to the IAM of the appropriate financier.

5.60 AIIB's Project-affected People's Mechanism (PPM) will be only applicable to Component 2.1 and Component 3.4. The PPM has been established by the AIIB to provide an opportunity for an independent and impartial review of submissions from Project-affected people who believe they have been or are likely to be adversely affected by AIIB's failure to implement its Environmental and Social Policy in situations when their concerns cannot be addressed satisfactorily through Project-level GRM or AIIB Management's processes. For information on how to make submissions to the PPM, please visit: https://www.aiib.org/en/about-aiib/who-we-are/project-affected-peoples-mechanism/how-we-assist-you/index.html

5.61 **Proposed Follow-Up / Monitoring and Supervision Arrangements**. Bank staff will provide comments and guidance to the ES consultant engaged by the PMU to finalize ESCIA and ESCMPs for the Project for consultations, disclosure, and implementation.

5.62 The ES specialists of the Project team will work with GDR under MEF and MoWRAM to ensure that the DRPs and the CPPs will be prepared, implemented and monitored compliantly with the provisions of the agreed LARPF. For the environmental instruments, PMU will prepare based on the Cambodia's *MoE Prakas No. 021 PRK.BST (dated February 3, 2020)* or per consultation with the MoE on the required instruments and obtain approval before construction and implemented accordingly. Particularly with voluntary land donation, the ES team of the Bank will monitor to ensure that meaningful consultations to be conducted with the affected households and donation is truly voluntary – affected households will get compensation for the impacts if they do not want to donate the affected land area. The consultation process with the affected households and communities will be well documented.

5.63 During the Project implementation, Bank staff will work with MoWRAM to ensure that the established GRM for stakeholders will be continued, communicating with stakeholders and project communities during implementation of the SEP- especially during preparation and implementation of the CPPs. A GRM log frame will be prepared, and training will be provided to the focal points of different levels of GRM to ensure that complaints or grievances, if any, are recorded, reviewed, responded, and resolved in the timely manner and monitored following the provisions of the established GRM. Bank staff will also work with MoWRAM, relevant agencies and the construction contractors – once commissioned, to ensure the GRM for the workers is in-place and functional for reviewing and addressing the project workplace concerns, including the gender-related concerns of the workers.

5.64 ES management by the Project will be internally monitored by the Project's executing and implementing agencies and other government agencies. Voluntary land donation planning and implementation will be monitored internally and externally (third-party monitor). Financiers of the Project will conduct monitoring missions every six (6) months. Progress and issues of ES management, including status of complaint and grievance settlements, if any, will be included in the Quarterly Project Progress Reports, and Semi-annual ES Monitoring Reports submitted by PMU to the Project financiers. Joint financiers will discuss and agree on one ES harmonized monitoring report template to be used by PMU for monitoring and reporting of ES management for the Project.

E. Climate Change

5.65 **Climate Change:** The Project supports climate change mitigation through the reduction of GHG emissions by using a new gravity-based irrigation system, replacing individual diesel pumps with electric pumping stations, piloting among others AWD techniques, and exploring opportunities to lease surfaces of irrigation canals and reservoirs for generating solar power for pumping. In terms of climate change adaptation, the Project will enhance the climate resilience of communities and agriculture production in the Project provinces by introducing climate smart measures, alternative livelihoods and value chain production which is fully consistent with the national and sectoral adaptation strategy and priorities of Cambodia. Mitigation and adaptation finance from this Project are in line with the

joint MDB methodologies. A climate risk and vulnerability assessment has been prepared for the Project, taking into account water resource availability and environmental flows with climate change impacts in the next 30 years.

F. Gender Aspects

5.66 **Gender Aspects.** A gender impact assessment has been conducted in June-September 2024, by social development consultant experts, engaged by AIIB in accordance with IFAD's Gender Policy, AIIB's ESP and ESS1. The assessment examines the livelihood activities of Project's subproject areas, covering existing gender norms and how these norms affect people's daily livelihood activities. For livelihood and income generation activities, the assessment focuses on the main income source for majority of target farmers (rice), and other secondary income sources (cash crops, animal husbandry) and to propose ways to address the gender gaps in adaptation capacity, the assessment examines the gender dynamics in rural livelihood activities (in the context of current climate change impact) - and explore opportunities to strengthening women's capacities in adapting to the future climate change impacts. Further, the potential impacts of the Project on women were assessed and measures to manage the potential impacts, as well as the measures to ensure women participate in and benefit from the project implementation and were prepared and consulted during the assessment. Inputs for the gender impact assessment were gathered from the poor, near-poor, women, men, elderlies, and others who participated in 630 individual interviews, 100 focus group discussions, and 18 community and governmental meetings during assessment.

5.67 The Project would bring various benefits to local women, especially for improvements of their skills and business, livelihoods, and community participation. Trainings will be provided with focuses on project target value chains for commodities such as rice, poultry, vegetable and fish that are appropriate to local women. Women will be encouraged to participate in project trainings that help them address the potential impact of climate changes which include adoption of water-saving alternate wet and dry, adopt new seed varieties (which are more pest resistant and drought tolerant), adopt sustainable intensification packages that reduce seed rate, fertilizers and pesticide to save agricultural input costs and increase crop yield. Women will be invited to take part in relevant trainings jointly with their husbands to support adoption of climate-smart technologies that also respond to their needs and preferences. In addition, promoting women's access to grant schemes as well as employment opportunities through value-chain development are the proposed measures to improve the livelihoods of the households. Women will participate in consultation activities and planning of irrigation infrastructures, value-chain development and early warning system. The project will also promote women's participation and leadership in FWUCs, which will be trained on how to enhance equitable access to water for women and other vulnerable groups. Furthermore, the Project will address gender inequality for those who are affected by climate change vulnerability such as floods and droughts. There are, however, four key barriers identified as current gender gaps and potential constraints to promoting new technology adoption for improved adaptation – include, traditional gender norms, burden of household chores, limited education and skills, and lack of local wage jobs and increasing migration.

5.68 The proposed gender strategy of the Project aims specifically at (i) alleviating women's workload, (ii) promoting women's economic empowerment, (iii) strengthening women's role in

decision-making both at the household and community level, (iv) avoiding, minimizing/mitigating the potential adverse impacts of the Project on woman; (v) promoting/enhancing potential positive impacts and benefits to local women; and (vi) ensuring participation of local woman in all the project activities. The GASIP has been developed and consulted with women and stakeholders, disclosed in subproject areas, and MoWRAM and AIIB websites. GASIP includes measures, targets and implementation and monitoring arrangements to achieve the mentioned objectives. The summary of GASIP is enclosed in Annex 6.

G. Operational Policy on International Relations

5.69 **International Waterways:** The OPIR applies to the Project as it involves the Mekong River, an International Waterway, as defined in paragraph 2.1(b) of the OPIR. The Project includes irrigation and flood control infrastructure in the catchments of Pursat River and small tributaries of the Boribo River, and the Krang Pronley River. These rivers discharge to the Tonle Sap/Great Lake of Cambodia. The Tonle Sap basin group is an integral part of the Mekong River Basin.

5.70 The Mekong River runs through Southwest China, Myanmar, Lao PDR, Thailand, Cambodia, and southern Viet Nam. In 1995, the Mekong Agreement was signed by the governments of Cambodia, Lao PDR, Thailand, and Viet Nam establishing the Mekong River Commission (MRC). The upper riparians of the Mekong, China, and Myanmar are not signatories of the Mekong Agreement but participate in some activities as observers and share some information via the MRC or other initiatives such as the Lancang-Mekong Cooperation mechanism which includes all six countries of the Mekong Basin. Transboundary rivers flow into Cambodia from all upstream riparians. Transboundary rivers flow out of Cambodia only to Viet Nam.

5.71 Notification to riparian states of the proposed Project's details is required under the OPIR unless one of the exceptions to notification specified in the OPIR applies. A hydrological study has been commissioned through PPSF funding to assess potential project impacts on transboundary flows.

5.72 The Project's additional water diversions from the Pursat River, small tributaries of the Boribo River, and the Krang Pronley River are not expected to cause any significant changes in the transboundary flows of the Mekong River from Cambodia to the Mekong Delta. The estimated annual flow variation is minimal, ranging from 0.03 percent to 0.04 percent, even in dry years and under future climate change projections. Based on a hydrological study conducted for this purpose, the Bank has determined that the Project will not have any material adverse effects on other riparians. Additionally, the Project is not expected to have a notable impact on sediment nutrient flux or water quality.

5.73 Therefore, notification of the Project to other riparian states, including Viet Nam, is not considered necessary under the Mekong Agreement of 1995 or AIIB's procedures. Following the exception in paragraph 3.3(c)(i) of the OPIR, since the Project is expected to have minimal or no effect on any of the other riparians, it is suggested that the notification requirement does not apply to the Project.

H. Risks and Mitigants

Table 2: Summary of Risks and Mitigating Measures

Risk Description	Assessment (H/M/L)	Mitigation Measures
Political and Governance • The country ranks low on the Corruption Perception Index and the agency has inadequate measures to address ethics and anticorruption issues.	Medium	• Political risk will be mitigated through a broader set of stakeholder engagement, information dissemination, education, and communication activities on the merits of the Project. Setting high fiduciary standards, separating powers on procurement and contract administration, and necessary checks will help prevent corruption practices.
Technical • Infrastructure investments do not deliver the intended level of flood protection due to construction quality. • Natural disasters damage the flood and irrigation structures and impact the sustainability of Project results. • Shortages in supply due to climate change (intensified drought) and overextraction of surface water at upstream		• Sound technical standards consistently applied in the engineering design, contractor and construction supervision TORs. • Non-structural measures, such as improved early warning systems, asset management systems, and FWUCs strengthening will be undertaken. • The Project will contribute to improving integrated water resource management in the identified river basin.
Institutional Capacity • Limited experience and skills in implementing agencies. • Weak institutional capacity of the PMU and PIU.	High	• Provide institutional and capacity-building programs for the PMU, PIU, and FWUCs in carrying out investment activities and long-term operation of the Project. • Put in place provisions for Project Management and PMICs to support the PMU/PIU in managing Project activities and engage individual experts to fill in any identified gaps.

Risk Description	Assessment (H/M/L)	Mitigation Measures
Procurement • (i) inflation and/or exchange rate fluctuation cause tenderer's qualification requirements beyond the tenderer's past contract value, therefore discouraging participation and resulting in insufficient competition; (ii) ineffective contract management due to the lack of direct communication between supervision consultant and contractors since all correspondence is issued by the PMU; (iii) potential collusion among tenderers due to limited participation; (iv) tender evaluation may be carried out with inappropriate interference; (v) insufficient PMU staff working on the Project may cause implementation delay; (vi) PMU staff lack of contract management capacity; (vii) contractor's noncompliance with environment and social requirements due to higher cost.	Medium	• (i) prepare tailored qualification criteria for experience and annual turnover such that tenderers of similar completed contracts can meet the criteria; (ii) authorize supervision consultant to have direct communication with contractors for efficient and effective contract management; (iii) circulate procurement notice widely to attract more tenderers and enhance transparency and supervision arrangements to avoid collusion; (iv) members of tender evaluation committee(TEC) should have no conflict of interest with tenderers. Additionally, pre-tender evaluation training should be provided to committee members to enhance impartiality and integrity requirements; (v) hiring Project Management Consulting (PMC) firms to support the PMU when needed; (vi) when necessary, hiring additional procurement staff/consultant to support the PMU; (vii) continuous training on procurement cycle management, especially contract management to PMU staff; and (viii) enforce environment, social health and security (ESHS) performance security in case of any non-compliance as agreed int he signed contract.
Financial Management • There is a risk that the implementing entity may delay preparing plans and budgets for the proposed Project due to the coordination effort required to consolidate agreed-upon budget figures from two lenders (AIIB and IFAD). • There is a risk that consolidated IUFRs will be delayed due to the	Medium	• Mitigation measures: These risks are manageable. Detailed mitigation measures have been proposed in the FM section's paragraphs. AWPB shall be submitted by November 30 each year, and a detailed annual budget (by month) shall be shared with AIIB by November of each year. • IUFRs should be submitted to AIIB and IFAD within 45 days of the end of each calendar quarter.

Risk Description	Assessment (H/M/L)	Mitigation Measures
involvement of a few parties (NCDDS, MoWRAM and PMU) in their preparation.		
Environment and Social • Negative ES impacts from the Project such as involuntary resettlement. • Delay of land acquisition and compensation.	Medium	• The ESCMPF that has been prepared in consultations with stakeholders and involved agencies provides the necessary technical guidelines in planning stage, and implementation and monitoring of ES risks and impacts of the Project following the requirements of AIIB's ESP and applicable ESSs, and the IFAD's SECAP. • The LARPF that has been prepared and approved by the Government, IFAD and AIIB provides detailed guidance on planning, implementation and monitoring of land acquisition and resettlement in compliance with the requirements of the financiers. • Draft ESCMPs have been prepared for the subprojects to manage the ES impacts of the subprojects. These detailed plans are being finalized in consultations with stakeholders. The plans will be implemented and monitored regularly by the PMU and the project financiers. • Early engagement with the GDR of the MEF at the preparation stage and mobilize the consultancy team to provide the necessary support for land acquisition planning and implementation. • Detailed Resettlement Plans (DRPs) will be prepared for construction contract packages to avoid delays of civil work commencements of the

Risk Description	Assessment (H/M/L)	Mitigation Measures
		subprojects due to delays of the finalization and approval of DRPs as well as compensation completion for the subprojects.
Stakeholders • Opposition from local communities and other key stakeholders could negatively impact the achievement of the Project's objective.	Medium	• Particular attention shall be given to local communities through extensive stakeholder consultations. The Stakeholder Engagement Plan has been prepared and disclosed - and will be implemented to ensure adequate consultation, monitoring, and transparency.
Overall	**Medium**	

Annex 1: Results Monitoring Framework

Project Objective:	The Project objective is to increase irrigation efficiency, strengthen climate resilience, and improve the livelihoods of smallholder farmers vulnerable rural groups in the selected provinces of Cambodia.										
Indicator Name	**Unit of measure**	**Base-line 2024-2025**	**Cumulative Target Values**						**End Target**	**Frequency**	**Responsibility**
			2026	**2027**	**2028**	**2029 Mid-term**	**2030**	**2031**	**2032**		
Project Objective Indicators:											
1. Tons of GHG emissions reduced[19]	Number	0	-	-	-	Reduction of 45,750.34 tCO2-eq	-	-	Reduction of 213,501.58 tCO2-eq at the end of year 7	Annual	MoWRAM
2. Increase in average annual rice crop production[20]	Number	2.0 tons/ha . paddy rice	-	-	-	3.0 tons/ha. paddy rice	-	-	4.0 tons/ha paddy rice	Annual	MoWRAM
3. Beneficiaries (female/male) adopting improved and/or new climate-resilient livelihoods[21]	Number	0	-	-	-	80,000 persons	-	-	192,000 persons	Annual	MoWRAM
4. Increase in water use efficiency[22]	Percent	0	-		-	25	-	-	75 percent	Annual	MoWRAM

[19] Methodology: This is achieved by employing the EX ACT Tool across all project phases - from initial ex-ante calculations through monitoring and final reporting (please refer "CAISAR_Monitoring_EX-ANTE_20.02.2025.XSLX").This approach guarantees consistent GHG accounting methods throughout the project lifecycle. For detailed EX-ACT Tool methodology instead, please refer to the "Methodology for GHG accounting" section of Annex 22 or EX-ACT Guidelines (FAO. 2022. Ex-Ante Carbon-balance Tool | EX-ACT – Guidelines. Second edition – Tool version 9. Rome. https://doi.org/10.4060/cc0142en)

[20] use standard methodologies for crop production assessment

[21] The methodology developed by IFAD tracks adoption rates of climate-resilient practices through household surveys, market analysis, and monitoring, considering participant influence and market conditions.

[22] The FAO methodology will be used to determine Water Use Efficiency (WUE) in irrigation by assessing the fraction of water effectively used by crops relative to the total water diverted. It is calculated as the product of conveyance efficiency (water transport in canals) and field application efficiency (water use in the field), enabling the quantification of overall irrigation efficiency.

Project Objective:	The Project objective is to increase irrigation efficiency, strengthen climate resilience, and improve the livelihoods of smallholder farmers vulnerable rural groups in the selected provinces of Cambodia.										
Indicator Name	**Unit of measure**	**Base-line 2024-2025**	**Cumulative Target Values**						**End Target**	**Frequency**	**Responsibility**
			2026	**2027**	**2028**	**2029 Mid-term**	**2030**	**2031**	**2032**		
Project Intermediate Indicators:											
5. Infrastructure flood-proofing and drainage improvements	Number	0	-	-	-	2 minor schemes	-	-	6 Schemes	Annual	MoWRAM
6. Beneficiaries (female/male) covered by new or improved early warning systems[23]	Number	0	-	-	-	192,000 persons	-	-	750,342 persons	Annual	MoWRAM
7. Number of irrigation schemes rehabilitated and modernized	Number	0	-	-	-	2 minor schemes	-	-	6 Schemes	Annual	MoWRAM
8. Number of FWUC established and trained	Number	4	-	-	-	6	-	-	11	Annual	MoWRAM
9. Number of MoWRAM staff trained	Number	0	-	-	-	150	-	-	280	Annual	Number
10. Percentage of farmers implementing climate resilient farming practices reports improved livelihood	Number	0	-	-	-	30%	-	-	80%	Annual	Number

[23] Based on the assumption that only farming households in all the selected provinces (computed as 375,171) will benefit from CIEWS, even though the early warnings on floods and droughts from the CIEWS app will benefit all households (691,846 households in the four provinces). Further, assume that information will be shared between male and female farmers within the household co-managing the agriculture activity (crop, fish, livestock), doubling the number of beneficiaries per farm household.

Annex 2: Detailed Project Description

1. Introduction

The Climate Adaptive Irrigation and Sustainable Agriculture for Resilience (CAISAR) Project is a vital initiative designed to enhance food security and improve climate resilience in Cambodia. With the growing threats posed by climate change, including extreme weather patterns such as floods and droughts, the Project focuses on modernizing irrigation systems, implementing climate-resilient agricultural practices, and strengthening institutional capacities. The total estimated budget for the Project is USD240 million, with the Asian Infrastructure Investment Bank (AIIB) acting as the primary financier, specifically supporting Subcomponent 2.1: Modernization of Irrigation Schemes and Ponds.

AIIB's investment in Subcomponent 2.1 is essential to the Project's success, as it targets critical infrastructure in six key irrigation schemes across the selected provinces of Cambodia. This initiative aligns with Cambodia's long-term development strategies, including Vision 2050 and the National Climate Change Strategy (2019–2030), ensuring that the Project addresses both immediate needs and long-term climate adaptation goals.

2. Project Components

The Project consists of three main components, each designed to tackle different aspects of climate adaptation, resilience, and agricultural productivity:

2.1 Component 1: Farm-Level Climate Adaptation and Resilience aims to enhance the climate resilience of smallholder farmers by promoting sustainable agricultural practices, improving water-use efficiency, and strengthening market linkages. The component focuses on equipping farmers with knowledge and tools to adopt climate-smart technologies, diversify cropping systems beyond rice, and integrate early warning systems for better climate risk management. Additionally, it emphasizes capacity building for relevant agencies to design and implement climate finance initiatives that support sustainable farming. These efforts collectively contribute to mitigating climate-induced risks, ensuring long-term agricultural productivity, and enhancing food security in the Project areas. These interventions, including through farmer field schools and other capacity building initiatives, would result in adoption of climate-resilient and low-emission practices and technologies for crops, fish and poultry to improve their productivity, reduce cost of production, improve farm income, reduce production loss, and/or diversify livelihood, leading to farmers adopting climate resilient livelihood options.

2.1.1 The component is structured around four key subcomponents: (i) Increased farmer capacity in climate-resilient agriculture, which provides training and resources to enhance adaptive farming techniques; (ii) Climate-adaptive value chains and financial access, aimed at strengthening market linkages and supporting MSMEs through Public-Private-Producer Partnerships (4Ps); (iii) Increased access to climate information and advisory services, which enhances the use of agro-meteorological data for informed water-use and crop planning; and (iv) Resilient farm road infrastructure, ensuring improved connectivity and market access for farmers. Together, these investments enable smallholder farmers to transition towards climate-adaptive farming systems while strengthening rural livelihoods.

2.2 Component 2: Upgrading and Climate-Proofing Water Infrastructure. This component focuses on enhancing climate resilience in Cambodia's agricultural sector by modernizing irrigation infrastructure, improving flood management systems, strengthening water governance, and integrating digital water management solutions. The goal is to optimize water availability, mitigate climate risks such as droughts and floods, and enhance agricultural productivity by ensuring sustainable, climate-proofed irrigation systems. Investments under this component will improve water-use efficiency, flood protection, and real-time water monitoring, ensuring farmers have year-round access to reliable water sources.

- Subcomponent 2.1: Modernization of Irrigation Schemes and Ponds – AIIB's financing is primarily directed toward this subcomponent, which focuses on rehabilitating and upgrading six major irrigation schemes across selected provinces:

    1. Ou Ta Paong Scheme (Pursat Province): Development of hydraulic zones, regulating structures, and modernized distribution networks to enhance gravity-fed and pumped irrigation, ensuring year-round water availability.
    2. Lum Harch Scheme (Kampong Chhnang Province): River training, one-stage pumping systems, and infrastructure adaptations to manage seasonal water fluctuations.
    3. Brambei Mom Scheme (Kampong Speu Province): Enhancements to reservoir functionality and connections to the Anlong Chrey Reservoir to ensure supplementary water supply during droughts.
    4. Krapeu Troum Scheme (Kampong Speu Province): Modernization of distribution systems and drainage infrastructure to address frequent flooding and waterlogging issues.
    5. Yotasast Scheme (Kampong Speu and Kampong Chhnang Provinces): Integration of basin-wide water management approaches to enhance irrigation coordination across neighboring schemes.
    6. Krang Bat Scheme (Kandal Province): Implementation of flood-proofing measures, including flood control infrastructure and efficient irrigation systems to mitigate climate risks.

    2.2.1 The modernization of these schemes will prioritize ecosystem-based solutions and integrate energy-efficient technologies, such as solar-powered pumping systems, where feasible. A participatory approach will ensure active involvement of local farmers, communities, and stakeholders in planning, implementation, and operations, beyond irrigation modernization, three additional subcomponents support the broader objective of climate-resilient water infrastructure:

- Subcomponent 2.2: Flood-proofing and drainage improvements – Strengthens embankments, river training systems, and farm-level drainage networks to reduce the impact of heavy rainfall, preventing waterlogging and safeguarding agricultural lands.
- Subcomponent 2.3: Establishment and training of Farmers Water User Communities (FWUCs) – Develops local capacity for irrigation system operation and maintenance, ensuring sustainable water governance and equitable water distribution at the farm level.

- Subcomponent 2.4: Water information system – Implements Supervisory Control and Data Acquisition (SCADA) technology for real-time water monitoring, optimizing irrigation scheduling, reducing water wastage, and improving overall resource management.

2.2.2 By combining infrastructure modernization, community-driven governance, and smart water management technologies, Component 2 will significantly enhance Cambodia's water security, reduce climate risks, and support long-term agricultural resilience.

2.3 Component 3: Strengthened Institutional and Regulatory Capacity for Low-emission Climate-resilient Development Pathways. This component aims to enhance the technical and operational capacity of key government institutions, including the Ministry of Water Resources and Meteorology (MoWRAM), the Ministry of Environment (MoE), and the National Committee for Sub-National Democratic Development Secretariat (NCDD-S). It focuses on building institutional resilience, improving policy frameworks, and integrating climate adaptation strategies into national and sub-national governance systems. Through training programs, capacity-building initiatives, and the adoption of climate-smart management practices, this component will strengthen the ability of government agencies to implement, monitor, and scale up climate-resilient development strategies.

2.3.1 The component is structured into four subcomponents:

- Subcomponent 3.1: MoWRAM capacity development supported – Enhances technical expertise in climate-resilient irrigation management, water governance, and digital monitoring systems. This includes the development of design manuals, training programs on water accounting, and the integration of remote sensing technologies to optimize water resource planning.
- Subcomponent 3.2: NDA and MoE strengthened – Supports Cambodia's National Designated Authority (NDA) in climate change policy, strengthening national monitoring systems, and drafting loss and damage strategies to enhance climate resilience.
- Subcomponent 3.3: Strengthening of NCDD-S – Builds capacity at the national and sub-national levels for climate-smart agriculture, decentralized climate governance, and local adaptation planning. This includes training in project management, resource mobilization, and policy formulation to integrate climate resilience into local development strategies.
- Subcomponent 3.4: Project managem2ent and monitoring – Covers operational support for the Project Management Unit (PMU) and ensures effective monitoring and evaluation (M&E) of project activities. It includes strengthening data collection systems, reporting mechanisms, and performance assessments to enhance accountability and long-term sustainability.

2.3.2 By strengthening institutional capacity, policy frameworks, and governance mechanisms, Component 3 will ensure the long-term sustainability of climate adaptation efforts, empowering government agencies to lead and expand climate-resilient initiatives beyond the Project scope.

3. Implementation Arrangements

3.1 The implementation of Component 2.1, funded solely by AIIB, will be managed by the Project Management Unit (PMU) under MoWRAM. The PMU will oversee engineering designs, procurement, construction, and rehabilitation of irrigation systems, ensuring alignment with AIIB's environmental, social, and financial guidelines. It will also facilitate stakeholder engagement, including the formation and training of Farmers Water User Communities (FWUCs) to support local involvement in irrigation management. Coordination with Provincial Departments of Water Resources and Meteorology (PDWRAMs) will be essential to ensure effective on-ground implementation and sustainability of the rehabilitated irrigation systems.

3.2 At the national level, a Project Steering Committee (PSC) will provide overall governance and inter-ministerial coordination. Chaired by MoWRAM, the PSC will include representatives from the Ministry of Economy and Finance (MEF), NCDD-S, Ministry of Agriculture, Forestry and Fisheries (MAFF), Ministry of Environment (MOE), and Governors from the Project provinces (Pursat, Kampong Chhnang, Kandal, and Kampong Speu). The sub-committee under PSC will convene annually to review progress, and ensure compliance with donor requirements. An Inter-Ministerial Resettlement Committee (IRC), led by MEF, will oversee land acquisition and resettlement-related issues where necessary.

3.3 AIIB's role as a lead co-financier includes joint project supervision with IFAD, ensuring compliance with international standards and evaluating project impact. AIIB's funds will be channeled through MEF to MoWRAM for investment in climate-resilient irrigation infrastructure.

4. Project Timeline

4.1 The Project is planned for implementation over seven years, from 2025 to 2032. Key milestones for AIIB financing include:

- **2024–2026**: Detailed design, procurement, and phased finalization of safeguards, ensuring comprehensive planning and compliance with environmental and social standards.
- **2025–2032**: Progressive construction, infrastructure upgrades, and capacity-building efforts, beginning with the Krapeu Trom scheme in 2025, followed by the remaining five schemes in 2026. This phased approach ensures a systematic and scalable implementation process across the entire project.
- **2032**: Final evaluations, system testing, and the formal handover of completed infrastructure, ensuring the sustainability and operational readiness of the systems.

4.2 By leveraging the financing, technical expertise, and unique capabilities of key donors—IFAD-GCF and AIIB—this investment will significantly enhance climate resilience, improve water resource management efficiency, and promote sustainable agricultural productivity in Cambodia, contributing to long-term development goals.

5. Detailed breakdown of project financing

Climate Adaptive Irrigation and Sustainable Agriculture for Resilience Project								
COMPONENTS, SUB-COMPONENTS, OUTPUTS AND ACTIVITIES	**Sub - component wise Financer**	**Total Cost (USD million)**	**Funding Sources**					
			GCF (Grant)	**GCF (Credit)**	**GCF (Total)**	**IFAD (Credit)**	**AIIB (loan)**	**RGoC (in kind)**
Component 1: Improving farm-level climate adaptation, resilience, and water use efficiency.	GCF/IFAD	**40.49**	**11.04**	**0**	**11.04**	**27.94**	**0**	**1.51**
Sub-component 1.1 Deployment of farm-level climate adaptation and water use efficiency measures	GCF/IFAD	18.26	8.22	0	8.22	9.5	0	0.54
Sub-component 1.2 Climate adaptive value chains developed by 4Ps and increased access to finance	GCF/IFAD	4.04	0.11	0	0.11	3.68	0	0.25
Sub-component 1.3 Improve enabling conditions, capacities and disaster risk management strategies	GCF	2.93	2.72	0	2.72	0	0	0.22
Sub-component 1.4 Rural roads	IFAD	15.25	0	0	0	14.76	0	0.49
Component 2. Upgrading and climate-proofing water infrastructure for increased resilience	**AIIB/GCF/ IFAD**	**167.71**	**20.8**	**36.81**	**57.61**	**3.8**	**96.26**	**10.03**
Subcomponent 2.1 Modernization of irrigation scheme and ponds	AIIB	102.19	0	0	0	0	96.26	5.92
Subcomponent 2.2 Flood-proofing and Drainage improvements	GCF	56.83	17.66	35.98	53.64	0	0	3.19
Subcomponent 2.3 Farmers Water User Communities (FWUC) established and trained.	GCF/IFAD	4.97	2.32	0	2.32	2.15	0	0.5
Subcomponent 2.4 Water information system established and operational	GCF/IFAD	3.72	0.83	0.83	1.65	1.65	0	0.42
Component 3. Strengthened Institutional and Regulatory Capacity for Low-emission Climate-resilient Development Pathways	**AIIB/GCF/IFAD**	**31.95**	**8.17**	**3.2**	**11.36**	**13.26**	**3.74**	**3.59**
Subcomponent 3.1 MoWRAM capacity development supported.	GCF	5.41	2.43	1.88	4.31	0	0	1.1
Subcomponent 3.2 Strengthening of NDA and MOE	GCF	1.1	0.56	0.4	0.95	0	0	0.15
Subcomponent 3.3 Strengthening of NCDDS	GCF/IFAD	4.18	1.09	0.92	2.01	1.43	0	0.74
Subcomponent 3.4 PMC and Others	AIIB/GCF/ IFAD	21.26	4.09	0	4.09	11.83	3.74	1.6
Contingency credit	IFAD	8	0	0	0	8	0	0
TOTAL		**240**	**40**	**40**	**80**	**45**	**100**	**15**

***

Annex 3: Economic and Financial Analysis

1. The Project is designed to boost irrigation efficiency, strengthen climate resilience, and improve the livelihoods of vulnerable rural populations. This economic analysis employs a cost-benefit approach, with a focus on Component 2 of the Project, which is co-financed by the Bank. Component 2 targets the development, rehabilitation, and modernization of key infrastructure necessary for irrigation and flood risk management. This includes rehabilitating and upgrading irrigation and drainage canals, ponds, and flood-protection systems, all of which are essential to mitigate climate risks and enhance agricultural productivity in the Project areas.

2. The improved irrigation efficiency is expected to increase crop productivity. Reliable access to water will allow farmers to manage crops more effectively, reducing drought-related yield losses and boosting overall agricultural output. Furthermore, the Project is also expected to reduce the frequency and severity of flood impacts on crops and property, which will be captured in the analysis through flood damage savings benefit. Thus, the analysis considers the increase in crop productivity and flood damage savings as the two primary benefits calculated. The analysis took a conservative approach by assuming that it will take a couple of years for the Project to fully realize its benefits in increased crop production due to the improved irrigation system, changes in seed and fertilizer, and adoption of better agricultural practices. Additionally, the possibility of temporary agricultural disruptions during constructions have also been factored into the analysis.

3. On the cost side, the analysis includes both capital expenditure for the infrastructure development and operations and maintenance (O&M) expenses needed to keep the infrastructure functioning optimally. The annual O&M is assumed to be 5 percent of the built infrastructure or the accumulative capital expenditure, and for every decade, there will be periodic repair costs, which include irrigation infrastructure periodic repairment costs assumed to be 20 percent of the civil works costs and the refurbishment cost of flood embankments. The refurbishment cost is conservatively estimated at USD0.6 million per km.[24]

4. The cost and benefit analysis estimates an Economic Internal Rate of Return (EIRR) of 17 percent and an Economic Net Present Value (ENPV) of USD69 million at 9.5 percent economic discount rate. When accounting for environmental externalities, specifically GHG emission savings, the EIRR increases to 21 percent, with the ENPV rising to USD107 million. These GHG emission savings stem from the reduction in flood rice emission through sustainable agricultural practices and the decreased reliance on water pumps due to improved irrigation system. The carbon prices applied follows the AIIB Cost-Benefit Analysis Guidelines, increasing from USD67 per tCO2e in 2025 to USD117 per tCO2e in 2055, with an average USD95 per ton of CO2e during the analysis period.

[24] World Bank project, Coastal Embankment Improvement Project – Phase I, 2013 – 2024. This estimate is considered conservative as embankment construction and maintenance in Bangladesh tend to be relatively costly.

Table 1. Annual Cost and Benefit Analysis Result

	Benefit			Cost			Net Benefit
	Crop	Flood	GHG	Direct Costs	Annual O&M	Periodic O&M	
2025	(322,739)	144,334	508,285	(3,337,936)		-	(3,008,055)
2026	(722,818)	1,052,703	1,046,916	(5,103,216)	(108,509)	-	(3,834,924)
2027	(1,337,508)	5,776,433	1,593,133	(20,135,649)	(305,283)	-	(14,408,873)
2028	(2,580,591)	15,069,925	2,184,868	(49,639,050)	(1,253,678)	-	(36,218,526)
2029	(3,676,936)	24,358,601	2,769,017	(56,486,582)	(3,677,243)	-	(36,713,143)
2030	(3,094,848)	27,549,444	3,413,857	(23,902,630)	(6,443,184)	-	(2,477,361)
2031	(579,707)	27,693,778	4,089,042	(1,420,987)	(7,579,928)	-	22,202,197
2032	2,736,154	27,693,778	4,733,881		(7,610,252)	-	27,553,561
2033	6,828,385	27,693,778	4,855,263		(7,610,252)	-	31,767,173
2034	11,265,900	27,693,778	4,976,644		(7,610,252)	(43,774,343)	(7,448,274)
2035	14,421,754	27,693,778	5,098,026		(7,610,252)	-	39,603,305
2036	15,476,634	27,693,778	5,219,407		(7,610,252)	-	40,779,567
2037	15,529,446	27,693,778	5,340,789		(7,610,252)	-	40,953,760
2038	15,529,446	27,693,778	5,462,171		(7,610,252)	-	41,075,142
2039	15,529,446	27,693,778	5,583,552		(7,610,252)	-	41,196,524
2040	15,529,446	27,693,778	5,704,934		(7,610,252)	-	41,317,905
2041	15,529,446	27,693,778	5,826,315		(7,610,252)	-	41,439,287
2042	15,529,446	27,693,778	5,947,697		(7,610,252)	-	41,560,668
2043	15,529,446	27,693,778	6,069,078		(7,610,252)	-	41,682,050
2044	15,529,446	27,693,778	6,251,150		(7,610,252)	(43,774,343)	(1,910,222)
2045	15,529,446	27,693,778	6,471,079		(7,610,252)	-	42,084,050
2046	15,529,446	27,693,778	6,594,337		(7,610,252)	-	42,207,309
2047	15,529,446	27,693,778	6,717,596		(7,610,252)	-	42,330,567
2048	15,529,446	27,693,778	6,902,484		(7,610,252)	-	42,515,455
2049	15,529,446	27,693,778	7,025,742		(7,610,252)	-	42,638,714
2050	15,529,446	27,693,778	7,210,630		(7,610,252)	-	42,823,602
2051	15,529,446	27,693,778	7,395,518		(7,610,252)	-	43,008,490
2052	15,529,446	27,693,778	7,580,406		(7,610,252)	-	43,193,378
2053	15,529,446	27,693,778	7,765,294		(7,610,252)	-	43,378,266
2054	15,529,446	27,693,778	7,950,182		(7,610,252)	(43,774,343)	(211,190)
						ENPV	$107,474,967
						EIRR	21%

5. A sensitivity analysis was also conducted by considering scenarios such as 10 percent reduction in benefits, a 10 percent increase in project costs, a one-year delay in project benefits, and a combination of all these adverse factors. The results, summarized in Table 2, show that the Project is most sensitive to the combined scenario where costs increase, benefits decrease, and project benefits are delayed simultaneously. Even under this worst-case scenario, the project achieves a 10 percent EIRR and an ENPV of USD3.7 million.

Table 2. Baseline Results and Sensitivity Analysis of the Project

	Baseline	+GHG	Sensitivity Analysis			
Cost (Percent)	100	100	110	100	100	110
Benefits (Percent)	100	100	100	90	100	90
Delay of benefits	On time	On time	On time	On time	1 year	1 year
EIRR (Percent)	17	21	14	14	13	10
ENPV (USDm)	69.6	107.5	51.2	44.2	45.1	3.7

6. Additional benefits not accounted for include enhanced water-use efficiency, reduced reliance on diesel or traditional energy sources through the integration of solar-powered pumps, and increased crop diversification opportunities. Moreover, the project is expected to contribute to improved community health by reducing waterborne diseases, thanks to better drainage systems and effective flood mitigation measures.

7. The Project co-financier, IFAD, conducted the economic analysis for Component 1, incorporating benefits such as increased poultry production, enhanced fisheries output, savings in travel time, and improvements in agricultural value chain. The analysis shows that the entire Project remains economically viable when all costs and benefits from all three components are considered, achieving an EIRR of 20 percent and an ENPV of USD162 million at the same economic discount rate.

Data and assumptions

8. The Project will cover six command areas: Ou Ta Paong, Lum Harch, Krapeu Trom, Yotasast, Steong Krang Bat, and Brambei Mom, totaling 32,056 hectares. Implementation will proceed in phases, with benefits accruing progressively based on the annual project costs.

Table 3. CAISAR Project Implementation Phases

	2025	2026	2027	2028	2029	2030	2031
Irrigation (Percent)							
Ou Ta Paong	2	2	9	31	39	17	0
Lum Harch	13	15	16	18	19	17	2
Krapeu Trom	3	11	33	33	17	2	2
Yotasast	3	11	33	33	17	2	2
Steong Krang Bat	2	9	27	27	27	7	1
Brambei Mom	2	2	9	31	38	16	1
Flood management (Percent)							
Ou Ta Paong	0	0	8	33	41	17	0
Lum Harch	0	0	9	33	41	17	0
Anlong Chrey	1	9	36	36	18	1	1
Brambei Mom	1	1	9	32	40	17	1

9. The projected increase in crop production is driven by two main factors: higher yields and crop diversification. The shift will expand from rice-only production to a mix of rice and vegetables. In the existing conditions (without the Project), Ou Ta Paong and Lum Harch already grow both rice and vegetables. The Project is expected to enhance the yield of both crops in these areas. Meanwhile, Krapeu Trom, Yotasast, Steong Krang Bat, and Brambei Mom currently produce only rice. The Project will diversify crop production in these areas by introducing vegetables such as cucumber, cabbage, and eggplant. Table 4 presents the projected yields for each crop in each scheme, with and without the Project.

Table 4. Crop Production With and Without Project

Irrigation Schemes	Crop	Without Project Yield (kg/ha) 1st harvest	2nd harvest	Annual total	With Project Yield (kg/ha) 1st harvest	2nd harvest	Annual total
Ou Ta Paong	Rice Wet Season 1 (Early maturing)	2,500	2,500	5,000	3,500	3,500	7,000
	Rice Wet Season 2 (Medium maturing)	2,500	-	2,500	-	-	-
	Rice Dry Season 1 (Early maturing)	3,000	-	3,000	4,000	-	4,000
	Vegetable 1 - Eggplant	13,000	-	13,000	20,000	-	20,000
	Vegetable 2 - Cucumber	15,000	-	15,000	21,000	-	21,000
	Vegetable 3 - Cabbage	8,000	-	8,000	12,000	-	12,000
Lum Harch	Rice Wet Season 1 (Early maturing)	2,000	-	2,000	4,000	2,300	6,300
	Rice Wet Season 2 (Medium maturing)	2,000	-	2,000	3,500	-	3,500
	Rice Dry Season 1 (Early maturing)	2,000	-	2,000	3,000	-	3,000
	Vegetable 1 - Eggplant	13,000	-	13,000	15,000	-	15,000
	Vegetable 2 - Cucumber	15,000	-	15,000	18,000	-	18,000
	Vegetable 3 - Cabbage	8,000	-	8,000	9,000	-	9,000
Kropeu Trom	Rice Short Wet Season 1 (Early maturing)	-	-	-	4,500	2,500	7,000
	Rice Short Wet Season 2 (Medium maturing)	2,500	-	2,500	5,000	-	5,000
	Rice Medium Wet Season 3 (Early maturing)	2,500	-	2,500	3,500	-	3,500
	Rice Late Wet Season	-	-	-	-	-	-
	Fruit 1 - Watermelon	-	-	-	15,000	-	15,000
	Legumes	-	-	-	1,500	-	1,500
	Fruit vegetable	-	-	-	10,000	-	10,000
Yotasast	Rice Wet Season 1 (Early maturing)	-	-	-	3,000	2,500	5,500
	Rice Wet Season 2 (Medium maturing)	2,000	-	2,000	2,300	-	2,300
	Rice Wet Season 3 (Late maturing)	2,000	-	2,000	2,300	-	2,300
	Vegetable 1 - Eggplant	-	-	-	15,000	-	15,000
	Vegetable 2 - Cucumber	-	-	-	17,000	-	17,000
	Vegetable 3 - Cabbage	-	-	-	9,000	-	9,000
Steng Krom Bat	Rice Wet Season 1 (Early maturing)	-	-	-	3,000	2,500	5,500
	Rice Wet Season 2 (Medium maturing)	2,000	-	2,000	2,300	-	2,300
	Rice Wet Season 3 (Late maturing)	2,000	-	2,000	2,300	-	2,300
	Vegetable 1 - Eggplant	-	-	-	15,000	-	15,000
	Vegetable 2 - Cucumber	-	-	-	17,000	-	17,000
	Vegetable 3 - Cabbage	-	-	-	9,000	-	9,000
Brambei Mom	Rice Wet Season 1 (Early maturing)	-	-	-	2,500	3,000	5,500
	Rice Wet Season 2 (Medium maturing)	2,000	-	2,000	2,200	-	2,200
	Rice Wet Season 3 (Late maturing)	2,000	-	2,000	2,200	-	2,200
	Vegetable 1 - Eggplant	-	-	-	14,000	-	14,000
	Vegetable 2 - Cucumber	-	-	-	16,000	-	16,000
	Vegetable 3 - Cabbage	-	-	-	8,500	-	8,500

10. The analysis considers crop production costs to estimate the net revenue from agriculture. These costs include seeds, land preparation, herbicides, fertilizers, and labor for land clearing, sowing, transplanting, spraying, manure and fertilizer application, water supply, and post-harvest activities like drying and packaging. Table 5 outlines the input costs (USD per hectare) for each crop and scheme, with and without the Project. Input costs with the Project are notably higher due to the increased demand for inputs driven by higher yields. This includes a switch to better-quality seeds, increased labor for maintenance and operations, and additional resources required for managing the higher production levels.

Table 5. The Economic Price of Crop Input by Scheme With- and Without- Project, USD/hectare.

Scheme	Crop	Without Project	With Project
Ou Ta Paong	Rice Wet Season 1	577	777
	Rice Wet Season 2	553	670
	Rice Dry Season	572	678
Lum Harch	Rice	553	670
Krapeu Trom	Rice	553	670
Yotasast	Rice	553	670
Steong Krang Bat	Rice	553	670
Brambei Mom	Rice	553	670
All	Eggplant	731	2466
	Cucumber	770	2167
	Cabbage	731	2418

11. The Project's flood damage savings benefit was estimated using the methodologies recommended by ADB's Integrated Flood Risk Management (IFRM) approach and the World Resources Institute (WRI). [25,26] The analysis relies on flood modeling maps provided by the team's hydrologist, detailing flood extents for return periods of 10, 25, 100, and 200 years. These flood maps were overlaid with population data from the *Global Human Settlement Layer* (2024), published by the European Commission.

12. Assuming an average household size of four people in Cambodia, the number of houses affected by flooding at each return period and flood depth was estimated. The replacement cost for a house was assumed to be USD10,000, as suggested by the field consultant. For each flood depth range, house damage was estimated using the following assumptions:

Table 6. House Damage by Flood Depth

Flood Depth (m)	Damage (Percent)
0 to 0.5	0
0.5 to 1	33
1 to 2	49
2 to 3	62
3 to 4	72
4 to 5	87
5 to 6	93
6 to 7	98
> 7	100

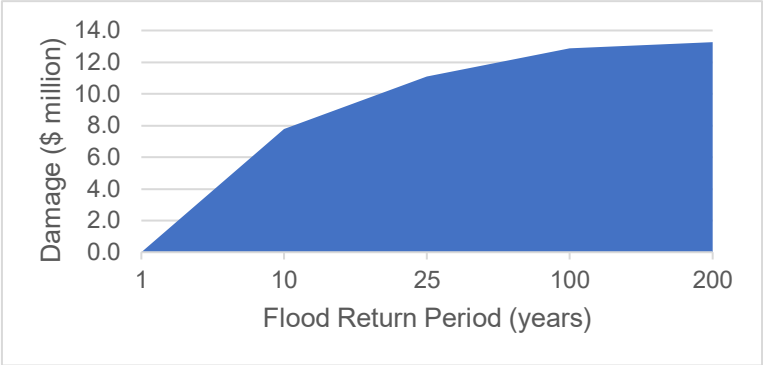
Source : Huizinga, J., de Moel, H. & Szewczyk, W. 2017.

13. Using this data, the Expected Annual Damage (EAD) function was calculated using Equation (1). EAD represents the average of all potential flood damages, computed as the sum of losses from individual flood events weighted by their probability of occurrence. Given that the Project aims to enhance flood resilience through river embankments, it is conservatively estimated, based on ADB (2022) guidelines, that the Project will eliminate flood risk for events with a return period of less than 10 years.

[25] Asian Development Bank, *A Guide to Integrated Flood Risk Management Economics*, TA 9634-REG: Strengthening Integrated Flood Risk Management, June 2022

[26] Ward, P.J., H.C. Winsemius, S. Kuzma, M.F.P. Bierkens, A. Bouwman, H. de Moel, A. Díaz Loaiza, et al. 2020. *Aqueduct Floods Methodology*. Technical Note. Washington, D.C.: World Resources Institute.

$$EAD = \int_{x=AEP\ with\ 0\ damages}^{x=PMF} x * f(x)dx \quad (1)$$



Annex 4: Paris Agreement Alignment

1. The Project is aligned with the goals of the Paris Agreement on both mitigation and adaptation. The Project addresses climate mitigation across various components by focusing on reducing GHG emissions and enhancing resource efficiency, specifically through increase in irrigation efficiency at the farm- and scheme-level and increase of water availability through rehabilitation and upgrade or construct of irrigation facilities. All the Project's activities fall under the universally aligned list for BB1 (mitigation) and are aligned with BB2 (adaptation) as specific climate adaptation solutions are applied to address the key climate risks for the Project, as well as supporting the building of resilience of the vulnerable communities of Cambodia.

Alignment against adaptation goals of the Paris agreement (BB2)

2. **Step 1- Climate vulnerability context**. The country is ranked 149th out of 187 countries in the 2022 ND-GAIN Index, also being the 12th most disaster-prone country among 172 countries between 1999–2018. Climate change and human activities threaten the productivity of the TSL and Cambodia's fisheries, crucial for many impoverished rural communities. By 2050, it is expected that there will be more severe floods and droughts which could affect the country's GDP by nearly 10 percent.

3. The main climate risks that this Project aims to address is flooding and extreme heat. Approximately 80 percent of the country is within the Mekong River and Tonle Sap basins, increasing exposure to floods, storms, and droughts. The World Resource Institute (WRI) rates the upper and lower Tonle Sap watershed as extremely high for water risk. Cambodia is one of the world's most flood-exposed countries, with an estimated affected population of around 4 million people, or 25 percent of the population, and estimated annual losses of USD250 million. The Tonle Sap Lake Basin, often referred to as the rice basket of Cambodia, undergoes cycles of severe droughts and floods. This has resulted in lower agricultural productivity and reduced cultivation for smallholder farmers. Similar to other monsoon-dependent countries, climate change is altering Cambodia's monsoon calendar, increasing total drought days and shifting the start of the rainy season. While annual rainfall is expected to increase, the number of days with rain is decreasing and daily rain intensity is increasing, resulting in extreme rainfall events and flooding risks. Furthermore, identified hazards are assessed as high across the whole country for floods, cyclones and extreme heat. By mid-century, climate change will result in more frequent heavy precipitation days in the rainy season, and an increase in the number of consecutive dry days. The median temperature is projected to increase by 1.83°C by 2040-59 under RCP8.5 (World Bank CCKP).[27]

4. **Projected impacts of climate change**. The country has a high reliance on the agriculture sector, which accounted for nearly 22 percent of its GDP in 2022. Since 2020, the negative impacts of climate change and the pandemic have led to a 10 percent loss in Gross Domestic Product (GDP).[28] In addition to negative climate impacts, stagnating global agricultural commodity prices, rising labour costs and the limited scope for cropland expansion in the country pose challenges for the agriculture sector. Relatively low yields, coupled with

[27] World Bank. Climate Change Knowledge portal, Cambodia. https://climateknowledgeportal.worldbank.org/country/cambodia
[28] World Bank Group, 2015. Cambodia Economic Update, October 2015: Adapting to Stay Competitive. World Bank, Phnom Penh. http://hdl.handle.net/10986/22934

frequent natural disasters, contribute to temporary food shortages for vulnerable communities. Livelihoods rely heavily on rain-fed agriculture and non-poor households are vulnerable to falling back into poverty in the event of extreme or frequent climate shocks.[29] Heat extremes will be more frequent in comparison to the reference period: 42 days by mid-century and reaching 62 days by the 2080s). The changes in precipitation and temperature patterns induced by climate change in the Project area could affect the climatic suitability of cereals, vegetables and starchy crops produced in the region.

5. Future projections of climate change in the Project area under the RCP4.5 scenario (Figure 2) indicate a temperature increase of 1.4-1.6°C by mid-century (2040-2070) and up to 2.2°C by the end of the 21st century (2070-2100) compared to baseline (1980-2005); the increase is much higher under RCP8.5 scenario (3.6°C, 2070-2100). Nights exposed to high temperatures are projected to become more frequent during the 21st century (+114 nights by mid-century and +151 nights by the 2080s).

Crop	Climate Exposure	Impacts	Source
Rice	High temperature, rainfall variations	low yields, loss of crop	IFAD CARD
Maize	High temperature, drought, rainfall variations	Reduced yields, water stress, loss of crop	IFAD CARD
Cassava	Drought, high temperature	Reduced yields, water stress	IFAD CARD
Soybeans	High temperature, drought, rainfall variations	Reduced yields, water stress	IFAD CARD
Sugar cane	High temperature, rainfall variations	Droughts, decreased yields, water stress	IFAD CARD
Vegetables	Temperature extremes, water availability	Reduced yields, increased pest pressure, loss of crop	Alvar-Beltan et al (2022)[30]
Fruits	Temperature extremes, water availability	Reduced yields, increased pest pressure, loss of crop, fruit fall.	

6. **Step 2- Proposed climate adaptation solutions/measures.** Through the proposed project interventions, AIIB will modernize the irrigation sector by installing resilient irrigation systems and enable farmers to adapt to climate risks and mitigate crop emissions through use of energy- and water-efficient technologies and practices, timely weather information and improved market integration.

7. The resilience of the farmers will be achieved through improvements in water efficiency by upgrading and climate-proofing of water infrastructure which will focus on modernization of irrigation schemes and ponds, flood-proofing and drainage improvements, and the establishment and training of Farmers Water User Communities (FWUC). Specific adaptation measures also include climate-resilient water and agricultural practices to enhance on-farm productivity and sustainability, climate-proofed irrigation and flood control infrastructure to mitigate the adverse impacts of extreme weather events, and strengthened institutional capacity to effectively plan, operate, and maintain irrigation systems and flood control measures in the context of a changing climate.

[29] https://docs.wfp.org/api/documents/WFP-0000147767/download/?_ga=2.188002408.1116277075.1681899242-636470978.1669479646

[30] Alvar-Beltan, J. et al 2022. Climate change impacts on irrigated crops in Cambodia https://doi.org/10.1016/j.agrformet.2022.109105

8. **Step 3. Alignment with national adaptation strategies, goals.** The Project is consisted with the national adaptation plans of the country, specifically, the Government has formulated the Cambodia Climate Change Strategic Plan (CCCSP)- 2014-2023. This was the first ever comprehensive national policy document responding to climate change issues that occur in the country. Each relevant ministry has also developed associated action plans (CCAPs). The Government has also updated its Nationally Determined Contributions (NDC) in 2020. It includes a set of adaptation actions and mitigation actions and targets, which this Project is addressing through direct mitigation impacts and support for building resilience of vulnerable communities.

9. **Climate impact**. The reduction of GHG emissions is linked primarily to more efficient use of energy and water resources irrigation systems, extension and advisory to farmers on intermittent flooding (e.g., AWD), early warning and climate-informed advisory services, and high-efficiency smart irrigation systems. Reduction in GHG emissions is resulting from changes in the cropping pattern, adoption of intermittent flooding in rice cultivation, switching to solar pumps and reduction in use of diesel pumps, which will result in financing of irrigation systems via Component 2. The Project is expected to generate GHG mitigation as a result of reducing emissions from agriculture practices by -1,001,400 tCO2-e over 20 years.

10. It is expected that the Project will benefit 750,342 persons rural people directly by making smallholders more resilient to climate change, the total number of beneficiaries includes farmers directly benefiting from the component 2 through the use of improved irrigation infrastructure, as well as those farmer households that will be covered by the early warning systems and 1.1 million people would benefit indirectly through the multiplier impacts that are generated from the investments in enhanced smallholder adaptation, market integration and improved irrigation systems and strengthening of early warning and climate information systems.

11. **Climate finance estimation**. Based on the joint MDB methodology for tracking mitigation and adaptation financing, the Project is calculated as 100 percent climate finance[31], with USD100 million estimated as mitigation finance, and USD48.15 million estimated as adaptation finance[32]. The Project has clear objectives of improving resilience of vulnerable communities, designed to address critical challenges posed by climate change, with a clear objective to improve irrigation efficiency, provide flood protection, and bolster the livelihoods of smallholder farmers and vulnerable rural communities across these selected provinces.

[31] Reported as 51.85 percent climate mitigation and 48.15 percent as dual benefits (both mitigation and adaptation)
[32] Categorized as type 2 activity with dual objectives of addressing climate resilience and improving crop productivity

Annex 5: Gender Equality and Social Inclusion

1. The Gender Action and Social Inclusion Plan (GASIP) has been prepared aligned with the logical framework of the Project. This aims to ensure the activities proposed in the GASIP are in-line with overall Project design and promote gender mainstreaming in all possible investment areas. In addition, GASIP has been developed based on empirical evidence gathered from the Project area, in-country and international experience in gender mainstreaming. Gender actions are proposed on the basis of (i) analysis of gender gaps, (ii) constraints to gender mainstreaming, (iii) opportunities to overcome such constraints, and (iv) having assessed information on the potential impacts of the Project on gender issues. Key priorities (for promoting gender mainstreaming) are identified for the Project -- to pave the way for proposing various gender activities that are integrated into Project investment. The below provides a summary of proposed actions that will be done to mainstream gender into Project activities under three (3) project components. This GASIP is a living document and will be updated in the first year of Project implementation to take into account the final Project design, including proposed agricultural extension support as well as the infrastructure investment.

Project activities	Responsive Activities	Indicators	Base-line	Mid-line	End-line	Responsible institutions	Timeline	Notes
	Activity 1	**Percentage of female beneficiaries** • Of which Percentage of beneficiaries who are youth • Percentage of beneficiaries living below the poverty line. • Percentage of beneficiaries who are IP	**0** 0 0 0	**35%** 20% 10% 5%	**40%** 25% 10% 5%	PMU	Year 1	
	Activity 2	Number of gender and social inclusion training provided per year to relevant stakeholders: at least once per year per province	1	15		PMUs' social inclusion (gender, youth, IP)		
COMPONENT 1: IMPROVING FARM-LEVEL CLIMATE ADAPTATION, RESILIENCE AND WATER EFFICIENCY **OUTPUT:** • Climate resilient crop water management practices at farm level enabled • Climate resilient value added, and market led agriculture investment secured • Enabling conditions facilitated and capacities for climate resilient on farm water management and agriculture practices improved								
Sub-Component 1.1 Deployment of farm-level climate adaptation and water use efficiency measures								
Activity 1.1.1 Preparing community-based action plans for adapting to climate resilient crop-water management practices and their monitoring **Activity 1.1.2** Implementing climate-smart technologies in crop water management in line with the prepared action plans (LLL, DSR, AWD, SRI, IPM, straw management, and other none-rice crops **Activity 1.1.3** Supporting diversification from rice to non-rice crops **Activity 1.1.4** Critical farm infrastructures.	Women farmers from both couple and WHHs are actively involved in community-based action planning and decision-making over technology adoption and infrastructure.	❖ Average % female PARTICIPATING in each of the planning meetings ❖ Average % female ATTENDING each awareness raising activities on new technologies ❖ Average % female ATTENDING each training to adopt introduced technologies ❖ Average % female making decision over adoption of new technologies that are labour-saving and suitable to their production Average % female ADOPTING technologies that are labour-saving and suitable to their production, ❖ Average % HHs ADOPTING one new non-rice crop (diversification)	10%	20%	40%			

Project activities	Responsive Activities	Indicators	Base-line	Mid-line	End-line	Responsible institutions	Timeline	Notes
Sub-Component 1.2 Climate adapted, value added, and market led agricultural investment								
Activity 1.2.1 Commodity selection with GoKC priorities as set in the Agricultural Development Plan **Activity 1.2.2** Public – Private – Producer – Partnership Facility (4PF) that crowd in, de-risk, and co-finance investment with MSMEs and farmers in support of climate-sensitive commodity development and rural employment generation **Activity 1.2.3** Leveraging of capital for investment to stimulate the financial sector to invest in climate change adaptation and value chain development activities in the project area	A participatory gender and social inclusion assessment of value-chains is carried out to identify opportunities for women and youth's participation in value-chain development and 4PF. 4PF arrangements are selected taking into account employment generation impact for women, men and vulnerable groups training women and youth in business skills development, processing etc.	❖ Percentage of women/youth having loan access ❖ Percentage of women/youth who are trained in financial literacy/ business skills development ❖ Percentage of women/youth who establishe agri-business/rural enterprises ❖ Percentage of women/youth accessing grant scheme ❖ Percentage of female-headed households participating in value chains supported under the project ❖ Percentage of women participating jointly with their husband in value chain supported under the project ❖ Percentage of women/youth gaining employment in VC development and 4PF						
Sub-Component 1.3 Improve enabling conditions, capacities and disaster risk management strategies								
Activity 1.3.1 support the establishment of agricultural centres of excellence in partnership with the private sector for the dissemination of improved sustainable agricultural techniques	Partnership is established with WDCs and other service providers for dissemination of sustainable intensification	❖ Number of MOAF staff trained on the use of gender tools and approaches						

Project activities	Responsive Activities	Indicators	Base-line	Mid-line	End-line	Responsible institutions	Timeline	Notes
Activity 1.3.2 Building institutional capacity of MOAF for planning and extension of climate smart technologies in agriculture **Activity 1.3.3** Preparing water, climate information and agricultural early warning systems to assist farmers in agriculture planning	packages among rural women. MOAF Extension workers are trained on the use of gender tools and approaches (GALS?), also including attention to issues of joint decision-making and equitable workload							
Component 2: Upgrading and Climate-Proofing Water Infrastructure for Increased Resilience **OUTPUT:** • Flood proofing and functional drainage system operational • Irrigation System modernized with climate resilient technologies • Capacity of FWUC on water management increased								
Sub-Component 2.1 Modernization of irrigation scheme and ponds								
Increasing water availability and storage capacity for irrigation while decreasing the destructiveness of floods on downstream locations; and Implementing crop diversification and new activities to increase farming incomes such as fish farming or duck breeding **Activity 2.1.1** technical analysis, field survey and preparing plan for system upgrading	Technical analysis, implementation of infrastructure upgrading and preparation of O&M plans are carried out in consultation with women and youth.	❖ Average women/youth/ethnic minorities participating in consultation activities						

Project activities	Responsive Activities	Indicators	Base-line	Mid-line	End-line	Responsible institutions	Timeline	Notes
Activity 2.1.2 Implementation of infrastructure upgrading **Activity 2.1.3** Preparing canal O&M plans including application of ICT and SCADA for operation.								
Sub-Component 2.2 Flood-proofing and Drainage improvements								
Improving disaster prevention and protection of farmlands and assets by establishment of early warning systems and helping to improve capacities of the existing drainage networks and flood embankments. **Activity 2.2.1** Establish flood monitoring, information, and early warning systems **Activity 2.2.2** Strengthen and construction of flood control and drainage infrastructures. It will be implemented in an integrated manner with component 2.1 activities	Training on early warning system is delivered to women.	❖ Percentage women/youth/ethnic minorities participating in training on early warning system						
Sub-Component 2.3 Establishments and training of Farmers Water User Communities								
Activity 2.3.1 Formation of institutional strengthening of the FWUC **Activity 2.3.2** Build technical capacities of FWCU for canal O&M **Activity 2.3.2** Prepare long term financing plan for WUS	FWCU develop gender and social inclusion plans, to promote the user rights of women and vulnerable groups and support women's participation and	❖ Percentage of FWUC developing gender and social inclusion plans ❖ Percentage FWUC with women in leadership position. ❖ Women/youth trained in O&M						

Project activities	Responsive Activities	Indicators	Base-line	Mid-line	End-line	Responsible institutions	Timeline	Notes
and support its implementation.	leadership in water governance Training of women/youth/vulnerable groups in O&M	❖ Women/youth participating in O&M						
Component 3: Institutional strengthening **OUTPUT** • Improved capacity of MoWRAM, NDA and stakeholder, and enhanced project sustainability • Enhanced project sustainability								
Sub-Component 3.1 Capacity Support for MOWRAM								
Activity 3.1.1 Preparation of climate resilient design manuals for irrigation and train staff **Activity 3.1.2** Building capacities on application of ICT and RS technologies, data management **Activity 3.1.3** capacity building in water Accounting and Auditing	Train MOWRAM staff on gender and social inclusion	❖ Number of climate resilient design manuals for irrigation with attention to gender and social inclusion ❖ Number of training on gender and social inclusion delivered to MOWRAM staff						
Sub-Component 3.2 Strengthening of NDA and NCDD								
Activity 3.2.1 Strengthening the national climate policies and Strategic plans: Initiate the development and promote the implementation of legal instruments, policy, strategic plans, and action plans for climate change rapid response, develop	Promote the participation of women's organizations in policy dialogue activities and GHG mitigation strategies.	❖ Number of policy consultations with women's organizations ❖ Knowledge products on gender developed for evidence-based policy dialogue						

Project activities	Responsive Activities	Indicators	Base-line	Mid-line	End-line	Responsible institutions	Timeline	Notes
sustainable GHG mitigation strategies **Activity 3.2.2** Enabling national M&E systems for monitoring and evaluating national climate actions **Activity 3.3.3** Build capacity of the MOE (NDA), NCDD and other relevant stakeholders to design and manage the climate financing projects.								

Annex 6: Country Credit Fact Sheet

Recent Economic Developments

1. Cambodia, a lower-middle-income country with a population of around 17.0 million, has an income per capita of USD2750. In 2024, economic growth is estimated to have increased to 5.5 percent (from 5.0 percent in the previous year), driven by robust growth in agriculture and garment export, as well as a continued recovery in the tourism sector. However, activity in the construction and real estate industries slowed.[33]

2. Inflation exceeded 5 percent in 2022, primarily driven by high fuel and fertilizer costs. However, since then it has declined decisively to below 1 percent in 2024, reflecting broad-based decreases across nearly all price categories, declining global commodity prices and subdued domestic demand growth.

3. The fiscal deficit expanded from a near balance in 2022 to 2.8 percent in 2023 due to extended social support, spending on the 2023 South-East Asia Games and the general election, as well as lower tax revenues from softer growth and larger exemptions. Capital expenditure also fell along delays in infrastructure projects. The deficit is projected at 3.0 percent in 2024 and is expected to gradually decline to around 2.0 percent in 2025 and beyond.

4. The very large current account deficits of 2021-22 shifted to a surplus of 1.3 percent in 2023, largely due to gold import restrictions and stronger trade performance.[34] However, the current account balance is expected to swing back to a deficit of 3.3 percent in 2024, as robust import growth outpaces strong exports. International reserves have improved and remain broadly adequate, providing sufficient coverage. External debt has been stable, at round 35 percent of GDP, and the exchange rate has been stable too.

Economic Indicators	2022	2023	2024*	2025*	2026*	2027*
Real GDP growth (percent change) /1	5.1	5.0	5.5	5.8	6.2	6.1
CPI Inflation (average, percent change)	5.3	2.1	0.7	2.1	3.2	3.0
General government overall balance	-0.3	-2.8	-3.0	-2.1	-2.0	-1.9
General government gross debt	25.0	25.7	26.5	26.9	26.6	26.5
Current account balance	-18.8	1.3	-3.3	-3.6	-3.6	-3.5
External debt	34.8	35.6	35.8	35.5	35.5	35.5
Gross international reserves (months of imports)	7.1	7.4	7.7	7.8	8.0	8.1
Exchange rate (KHR/USD, EOP) /2	4,107	4,071	4,017	4,032		

Note: * denotes projections; in percent of GDP, unless indicated otherwise. Data Source: IMF WEO Oct 2024; IMF country report 24/36; IMF press release 24/349. 1/ Projections start from 2023. 2/ FX rates from Refinitiv as of January 13th, 2025.

Outlook and Risks

5. Looking ahead, IMF projects 5.8 percent growth in 2025 and around 6 percent growth in the medium-term, supported by sustained growth in the manufacturing sector, both garment and non-garment, and continued inflows of FDIs.[35] Downside risks include external short-term risks and domestic vulnerabilities such as declining asset quality in the banking sector and potential weaknesses in the real estate sector.[36]

[33] IMF Press Release 24/349
[34] Gold imports in Cambodia have often been large, but those for 2021 and 2022 were exceptional (IMF country report 22/371).
[35] ADB "ADB Maintains Cambodia Growth Forecast for 2024 and 2025," ADB News, September 27, 2024
[36] AMRO "Enhancing Resilience and Accelerating Reforms: Cambodia's Path to Post-Pandemic Growth", September 20, 2024

6. The fiscal deficit is projected to continue to narrow in line with the authorities' commitment to scaling back temporary support measures. Public debt to GDP is projected to remain stable, at around 26-27 percent of GDP, well below the official threshold of 55 percent. According to the IMF, the risk of debt distress remains low, although there are vulnerabilities from shocks to exports and growth.

7. The current account deficit is projected to stabilize at 3.6 percent of GDP in the medium term. External debt should remain contained (below 40 percent of GDP) but is sensitive to shocks in the current account balance.

8. In May 2024, Moody's affirmed the Cambodia's B2 credit rating and revised the outlook from negative to stable. This revision reflects the improvement in external position, along with the recovery in tourism and FDIs. (Neither Fitch nor S&P have ratings for Cambodia).