Project Administration Manual

Project Number: 44429-013
June 2017

India: Climate Adaptation in Vennar Subbasin in Cauvery Delta Project

ABBREVIATIONS

AEE	-	assistant executive engineer
ADB	-	Asian Development Bank
DSS		decision support system
EIA	-	environmental impact assessment
EMP	-	environmental management plan
FICC		field implementation coordination committee
GDP	-	gross domestic product
GOTN	-	Government of Tamil Nadu
IEE	-	initial environmental examination
LOC	-	letter of credit
NCB	-	national competitive bidding
NGO	-	nongovernment organization
PIU	-	project implementation unit
PMU	-	project management unit
PSC	-	project steering committee
QCBS	-	quality- and cost based selection
SOE	-	statement of expenditures
SPS	-	Safeguard Policy Statement
TOR	-	terms of reference
WRD	-	Water Resources Department

CONTENTS

Project Administration Manual Purpose and Process

The project administration manual (PAM) describes the essential administrative and management requirements to implement the project on time, within budget, and in accordance with the policies and procedures of the government and Asian Development Bank (ADB). The PAM should include references to all available templates and instructions either through linkages to relevant URLs or directly incorporated in the PAM.

The Government of Tamil Nadu (the state government), acting through its Water Resources Department (WRD) (the executing agency) is wholly responsible for the implementation of the project, as agreed jointly between India as the borrower and ADB, and in accordance with Government and ADB's policies and procedures. ADB staff is responsible to support implementation including compliance by the the executing agency of their obligations and responsibilities for project implementation in accordance with ADB's policies and procedures.

At Loan Negotiations the borrower, State, WRD, and ADB shall agree to the PAM and ensure consistency with the Loan Agreement. Such agreement shall be reflected in the minutes of the Loan Negotiations. In the event of any discrepancy or contradiction between the PAM and the Loan Agreement, the provisions of the Loan Agreement shall prevail.

After ADB Board approval of the project's report and recommendations of the President, changes in implementation arrangements are subject to agreement and approval pursuant to relevant government and ADB administrative procedures (including the Project Administration Instructions) and upon such approval, they will be subsequently incorporated in the PAM.

I. PROJECT DESCRIPTION

A. Rationale

1. Tamil Nadu is one of the most water-stressed states in India, with a per capita availability of water resources of 900 cubic meters per year (m^3/year) compared with a national average of 1,545 m^3/year and a water stress threshold of 1,700 m^3/year.[1] The mean annual rainfall is 912 millimeters, of which 48% comes from the erratic northeast monsoon (October to December) and 32% from the southwest monsoon (June to September). Of the 17 major river basins in Tamil Nadu, the Cauvery Basin is the largest. The Cauvery River flows through the states of Karnataka, Kerala, Tamil Nadu, and the Karaikal enclave of the Union Territory of Puducherry. Around 54% of its catchment area lies within Tamil Nadu.

2. The Cauvery delta lies on the east coast of Tamil Nadu and is referred to as the "rice bowl of Tamil Nadu." About 73% of the delta's population of 4.8 million is engaged in farming and fishing, and is dependent on water resources for their livelihoods. However, the availability of water resources in the delta is unreliable and flooding is common during the erratic northeast monsoon. District Revenue Department records estimate damage caused by floods in 2004–2013 at $70.4 million. Meanwhile, climate change projections indicate an intensification of floods as rainfall increases during the monsoon and sea levels rise. Storm rainfall is predicted to increase by 19%. In coastal areas, flooding will increase because sea levels are projected to rise from 0.29 meters (low scenario) to 0.87 meters (high scenario) by 2100, compared with a 1990 baseline.[2] Rising temperatures will increase crop water demand and evaporative losses. By 2050, maximum temperatures will rise by 1.0°C–1.5°C, according to climate projections, and minimum temperatures will increase by a larger 2.0°C–3.0°C.[3] The climate models demonstrate drier conditions from January to May.

3. The sharing of Cauvery waters among the states has been disputed since the 1890s, and in February 2013, the Supreme Court of India upheld the water allocation decision that the Cauvery Waters Dispute Tribunal had made in 2007. Tamil Nadu was allocated 58% of the surface water resources of the basin. Despite high levels of water stress, recurrent flooding, and increasing risks of climate change, the long-standing dispute prevented investments toward improving the irrigation and drainage systems in the delta beyond essential maintenance. Therefore, the irrigation and drainage systems are dilapidated and unable to effectively convey irrigation and floodwaters. This led to inequitable distribution of irrigation water, with upstream farmers benefiting, and increased flooding due to overtopping or breaching of embankments. Some of the tail-end areas no longer have access to irrigation water. Malfunctioning tail-end regulators led to seawater ingress along channels. In the lower reaches of the delta, the availability of fresh groundwater is limited as a result of variable recharge and saline aquifers. Communities along the lower coastal reaches of the delta are particularly disadvantaged since they have access to neither fresh groundwater nor fresh surface water. This negatively affects the agricultural production in the area. In 2012, because of a poor southwest monsoon, the paddy production in the Cauvery delta was only 825,500 tons—compared with an annual average of 1.6 million tons in 2009–2014. Climate change is expected to exacerbate such vulnerabilities, so the need to upgrade the infrastructure is urgent, as is better water management to meet the present and future needs.

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[1] Press Information Bureau, Government of India. 2012. Per Capita Water Availability. News release. 26 April. http://pib.nic.in/newsite/erelease.aspx?relid=82676

[2] ADB. 2014. *Relative Sea Level Rise Scenarios for the Cauvery Delta Zone in Tamil Nadu, India*. Consultant's report. Manila (TA 8166-IND).

[3] ADB. 2013. *Climate Data and Future Scenarios.* Consultant's report. Manila (TA 8166-IND).

4. At the field level, water use is generally inefficient because of high distribution and field losses, low priority given to water conservation, and highly consumptive crops. Rising temperatures and uncertainties related to future rainfall demonstrate a need for stronger water management. It is essential to support the information systems with robust monitoring networks, good data archiving, and an interface to enable better decision-making in water resource management.

5. Following the 2013 Supreme Court decision, the Water Resources Department (WRD) within the Public Works Department prepared the Cauvery Modernization Proposal, which includes the rehabilitation of most of the flood control and irrigation infrastructure, and improvements to on-farm irrigation systems in the Cauvery delta.[4] The four main irrigation systems in the delta are Lower Coleroon Anicut, Cauvery, Vennar, and Grand Anicut. Of the four, the Vennar system is considered to be the most critical in terms of vulnerability to flooding and in need of improvements.

6. **The Vennar System.** Irrigation to the delta is supplied from the Cauvery River at the Grand Anicut, where the Cauvery River bifurcates into Cauvery and Vennar. The irrigation systems in the delta have evolved over centuries, whereby natural rivers were adapted to serve as irrigation canals and drains. The result is a complex network of natural and built canals and drains. Most of the regulatory structures in the Vennar system are more than 100 years old and some are fully dilapidated. Shoals formed in the center of the channels hinder the free flow of water, and some tail-end command areas no longer receive surface water. Existing embankments are damaged or weak. At the operational level, water distribution is not systematic and is based mainly on the judgment of WRD staff in response to requests from farmers. At the farm level, the application of irrigation water is inherently inefficient.

7. The Government of Tamil Nadu has requested Asian Development Bank (ADB) financing to upgrade the Vennar system. On-farm irrigation systems will be improved through another project to be financed by the state government and other development partners. The proposed project is consistent with ADB's country partnership strategy, 2013–2017 for India,[5] which seeks to overcome water insecurity and help communities adapt to climate change, and to promote efficient and sustainable water management in agriculture. The proposed project is aligned with the aims of the Government of India's National Water Policy,[6] Twelfth Five Year Plan,[7] and National Water Mission.[8] The project is also consistent with the state government's Twelfth Five Year Plan, 2012–2017,[9] which includes improving water use efficiency by modernizing irrigation systems and bolstering service delivery. The project is aligned with ADB's strategic and sector goals as articulated in (i) ADB's Strategy 2020 and its midterm review;[10] (ii) the Water for All

[4] Water Resources Department. Tamil Nadu: Improvements and Rehabilitation of Irrigation Systems in the Cauvery Basin for Efficient Water Management. Unpublished.
[5] ADB. 2013. *Country Partnership Strategy: India, 2013–2017.* Manila.
[6] Government of India, Ministry of Water Resources. 2012. *National Water Policy*. Delhi.
[7] Government of India, Ministry of Finance, Planning Commission. 2012. *Twelfth Five Year Plan, 2012–2017: Faster, More Inclusive and Sustainable Growth*. Delhi.
[8] Government of India, Ministry of Water Resources. 2009. *National Water Mission*. New Delhi.
[9] Government of Tamil Nadu, State Planning Commission. 2012. *Twelfth Five Year Plan: Tamil Nadu, 2012–2017.* Chennai.
[10] ADB. 2008. *Strategy 2020: The Long-Term Strategic Framework of the Asian Development Bank, 2008–2020*. Manila, and ADB. 2014. *Midterm Review of Strategy 2020: Meeting the Challenges of a Transforming Asia and Pacific*. Manila.

policy;[11] (iii) the Water Operational Plan, 2011–2020;[12] and (iv) the Operational Plan for Integrated Disaster Risk Management, 2014–2020.[13] They all aim to reduce the water demand–supply gap in water-scarce areas, foster integrated water resource management, improve water governance and delivery of services, improve resilience to climate change, integrate disaster risk reduction in development, and reinforce the intersection between disaster risk management and climate change adaptation.

B. Impacts and Outcome

8. The impacts will be (i) coastal districts are protected from cyclones and flooding exacerbated by climate change;[14] and (ii) innovative and inclusive economic growth, including agricultural growth, in Tamil Nadu is accelerated.[15] The outcome will be that climate-resilient water management in the Vennar system is improved.

C. Outputs

9. The outputs of the project are: (i) flood risk management and irrigation infrastructure upgraded, and (ii) improved water and flood risk management systems established.

10. **Output 1: Flood risk management and irrigation infrastructure upgraded.** Structures will be improved according to new design guidelines that consider climate change impacts. More-resilient flood management structures will reduce the frequency and impact of flooding. The civil works involve (i) resectioning, and strengthening the embankments of, six main channels totaling 235 kilometers to improve their resilience and flood conveyance capacity; (ii) improving conveyance of three straight cuts between the Vedharanyam canal and the sea;[16] (iii) constructing 4 new regulators, reconstructing 10 dysfunctional regulators, and repairing 13 damaged regulators; (iv) doing work (new, upgrades, and repairs) on 133 irrigation head sluices off-taking from the main channels; (v) upgrading 20 bed dams and grade walls within the main channels; (vi) upgrading 136 other minor irrigation and drainage structures; and (vii) upgrading 13 pump stations through new pumps and electrical systems and repairs to pump houses.

11. **Output 2: Improved water and flood risk management systems established.** This output will deliver nonstructural interventions designed to (i) improve decision-making on water resources, and (ii) manage flood risks and flood events. Initiatives to be developed under item (i) are: (a) greater participation by stakeholders in the planning and delivery of water services through the formation of channel stakeholder groups; (b) better assessment of water resources through the installation of additional equipment to monitor and measure rainfall, surface water, groundwater, tide levels and flows; (c) development of a decision support system that would provide system status information and enable more accurate water allocation planning and more effective asset management; and (d) training for WRD officers on more effective management of water resources. Flood risks and flood events will be managed by (i) installing flood forecasting and warning systems, and (ii) mapping flood risks. The output also includes a feasibility study,

[11] ADB. 2003. *Water for All: The Water Policy of the Asian Development Bank.* Manila.
[12] ADB. 2011. *Water Operational Plan, 2011–2020.* Manila.
[13] ADB. 2014. *Operational Plan for Integrated Disaster Risk Management, 2014–2020.* Manila.
[14] Government of Tamil Nadu. 2012. Vision Tamil Nadu, 2023: Strategic Plan for Infrastructure Development in Tamil Nadu. Chennai.
[15] Government of Tamil Nadu, State Planning Commission. 2012. *Twelfth Five Year Plan: Tamil Nadu, 2012–2017.* Chennai.
[16] The straight cuts allow the floodwaters of the three channels that fall into the Vedharanyam canal to be discharged directly to the sea, instead of flowing through the Vedharanyam canal, which cannot fully drain the combined floodwaters.

and the detailed design of similar improvements in the remainder of the Vennar and Cauvery systems that may be financed under a subsequent project.

a. Improved decision making on water resources

12. Initiatives to be developed are: (i) greater participation by stakeholders in the planning and delivery of water services through the formation of informal channel stakeholder groups; (ii) improved assessment of water resources through installation of additional rainfall, surface water level, groundwater level, tide level monitoring, and flow measurement sites, (iii) development of a Decision Support System (DSS) which would provide system status information, enable enhanced water allocation planning and facilitate improved asset management, and (v) training for Water Resources Department officers in improved management of water resources.

i. Participation

13. Channel level stakeholder groups will be established for the six channels where infrastructure improvements will be made. Stakeholder groups will be created in the Pandavaiyar, Vellaiyar, Harichandra nadhi, Vedharanyam, Adappar and Valavanar channels.

14. The membership of each stakeholder group will include officials from the District Departments (WRD, Agriculture, Fisheries, district revenue office, and Environment) and representatives of the farmer communities and elected representatives of the area.

15. Each stakeholder group will have 5 government officials and a minimum of 15 farmers of the region, comprising of not less than 3 women (if participation of active women land owners is not feasible, then women from farming families will be included), and representatives from marginal farmers, small farmers, and large farmers. The district revenue officer will act as the group's Chairperson. The two vice-chairpersons will be (i) one farmer representative nominated through consensus from among the member-farmers and (ii) an official from department of agriculture. The farmer representative will hold office for a period of one year by rotation. The assistant executive engineer (AEE), WRD from the division concerned will be the member secretary, who will be responsible to convene the group and forward the decisions of the group to higher authorities for necessary actions.

16. The principal objectives of the channel stakeholder groups will be to (i) discuss progress of the project, identify issues and suggest remedial actions, (ii) propose quantities and timings of normal surface water flows down the channel for irrigation to maximize productivity and equity of water distribution and minimize waste, (iii) recommend the use of water resources in each channel catchment during times of water shortage to minimize crop losses, (iv) coordinate local responses during floods, and (v) identify maintenance works required.

17. The channel stakeholder groups will meet at least four times between June and January each growing season and twice during construction season.

ii. Improved assessment of water resources

18. A network of digital telemetric rainfall, river, groundwater and tide monitoring stations will be installed in the Vennar system with connectivity to the DSS. The rainfall and river monitoring stations will be installed at selected head, cross and tail-end regulators. The groundwater stations will be located at existing observation wells. The stations will capture and store data digitally and

transmit at regular intervals to the appropriate databases in the DSS. Details of the DSS are provided in Appendix B.

19. From the DSS, the data are available on demand to WRD engineers for the assessment of current flows in the channel and water levels in the aquifers and comparison with the current irrigation requirements in the command areas associated with the channel. This would enable adjusting surface water deliveries from head works to farm off takes to meet actual needs considering groundwater availability and recent rainfall.

20. A program of direct flow measurements at each regulator using flow meters will verify the theoretical stage-discharge ratings of the regulators or replace them with more accurate empirical ratings covers all flow conditions. The flow meters will be portable Acoustic Doppler Current Profilers which will provide accurate direct measurements of discharge. Improved ratings for the regulators will increase the accuracy of assessments of surface water availability in the system.

iii. Decision Support System

21. A simple DSS comprising surface water and groundwater databases containing hydrometeorological, hydrological and hydrogeological data, and irrigation command area (ayacut) information will be developed in the Vennar system. This DSS will be accessible to WRD staff through a user-friendly computer interface allowing them to inspect up-to-date river levels, flows, water demands in the catchments and their associated ayacuts and to adjust surface water deliveries to actual needs considering groundwater availability and recent rainfall. The DSS will also incorporate an asset management component to enable improved monitoring of infrastructure condition, repair requirements, and maintenance scheduling.

iv. Capacity development

22. Capacity development initiatives will include on the job training and organized training for WRD officers and training for farmers on improved agricultural practices. Refer Appendix E for details of the training program.

b. Improved Management of Flood Risks and Flood Events

23. Improved management of flood events and risks will be delivered through: (i) establishment of flood forecasting and warning systems, and (ii) flood risk mapping.

i. Flood forecasting and warning systems

24. The network of digital telemetric rainfall, river, groundwater and tide monitoring stations to be installed to provide real time data for water resources monitoring purposes (see paragraph 18) will also serve to detect, forecast, warn and monitor flood conditions.

25. Flood forecasting and warning systems will be developed for each channel using water level triggers derived from (i) statistical correlations and travel times between monitoring sites and flood zones, (ii) hydraulic models of the catchments that forecast water levels in the flood zones from observed or forecast rainfall, and (iii) rainfall depth, area and duration curves for the catchments etc.

26. Water level triggers at key regulators that correspond to critical water levels and incipient overtopping in downstream flood zones will be determined from analysis of existing river level data and the known onset of flood conditions. Flood forecast and flood warning triggers will be

programmed into the DSS so that WRD decision makers can be alerted to the risk of flooding and the potential need to issue targeted flood warnings through the District Disaster Management Authorities and District Collectors offices to the public and mobilize emergency services to the most vulnerable locations.

ii. Flood risk mapping

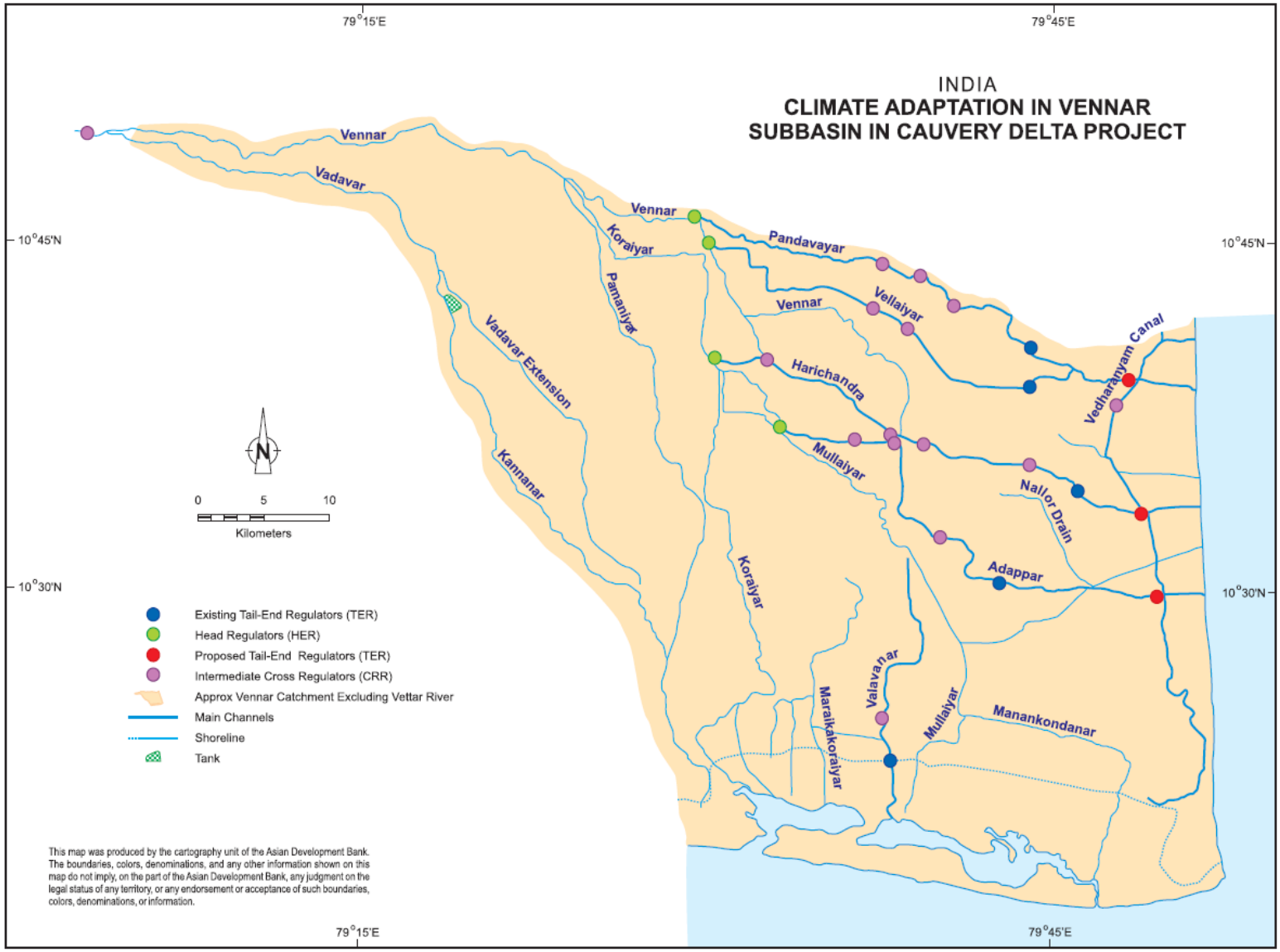
27. This will include updating of flood risk maps[17] and post flood mapping and surveys. Except for the inspections of structures and embankments, that are carried out by WRD immediately after floods or as part of routine annual asset management surveys, no formal records are kept of the impacts of flooding, specifically the physical extent and duration of flooding. Such information is invaluable in assessing flood risk and in designing interventions to mitigate those risks.

28. To collect this additional data, the scope of the post-flood surveys by WRD will be expanded to include the extent, depth, duration, velocity and direction of flow on the flood plains. This information will be used by WRD modelers to increase the understanding of flood frequency and refine and extend the configuration and calibration of the flood models, flood warning systems and flood risk maps produced. WRD staff will be trained to undertake such surveys and update flood maps.

29. The flood maps will be used by WRD to (i) refine the flood forecasting and warning systems by developing geographically targeted forecasts and warnings which will assist DDMAs to deploy emergency services accurately and efficiently, (ii) identify high risk areas which require additional flood mitigation measures, and (iii) support flood disaster planning by the DDMAs.

[17] Flood risk maps for 25, 50 and 100 year return floods with and without climate change were prepared under the project preparatory technical assistance

Figure 1: Project Area



Source: ADB.2014. *Climate Adaptation through Subbasin Development Program.* Consultant's Final report. Manila (TA 8166-IND).

II. IMPLEMENTATION PLANS

A. Project Readiness Activities

Table 1: Project Readiness Activities

Indicative Activities	Responsible Agency	2015								2016							
		May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	April	May	June	July	Aug
Advance contracting actions																	
WRD to submit official request to ADB seeking approval for advance contracting		x															
ADB Management approval for advance contracting		x															
Undertake environmental assessment study to obtain CRZ clearance							x	x	x								
Obtain environmental clearances (as per national regulations)	EA										x						
Initiate bidding process for two works packages (Vellaiyar and Pandavaiyar)	EA					x											
Award the contracts for Vellaiyar and Pandavaiyar	EA										x						
Implementation of Pandavaiyar and Vellaiyar contracts											x	x	x	x	x		
Obtain government and ADB approval for resettlement plans	EA,ADB										x						
Initiate recruitment of NGO to implement resettlement plan	EA								x								
Award the contract for NGO consultancy services to implement resettlement plan																x	
Implementation of the resettlement plan																	x
Initiate recruitment of 5 of the PIC consultants (individuals)	EA									x							
Mobilize the five individual consultants	EA											x					
Initiate recruitment of remaining PIC consultants and independent resettlement monitoring expert												x					
Mobilize remaining PIC consultants and independent resettlement monitoring expert																x	
Initiate bidding process for remaining four works packages and the pumps package											x						
Award contracts for remaining four works and pumps packages																	x
Initiate recruitment of internal audit firm															x		
Establish project management and implementation units	EA	x											x				
Loan negotiations	GOI, EA and ADB												x				
ADB Board approval	ADB														x		
Loan signing	ADB and GOI															x	
Government legal opinion provided	GOI, State, EA															x	
Government budget inclusion (complete)	State																
Loan effectiveness	EA, GOI, ADB																x

ADB = Asian Development Bank, CRZ = coastal resources zone, EA = executing agency, GOI = Government of India, NGO= nongovernment organization
Source: Asian Development Bank

B. Overall Project Implementation Plan

Table 2: Overall Project Implementation Plan

Activity	2016				2017				2018				2019				2020			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Output 1																				
Implementation of resettlement plan																				
Civil Works																				
Implementation of Package 1 (Vellaiyar)																				
Implementation of Package 2 (Pandavaiyar)																				
Procurement of Package 3																				
Implementation of Package 3 (Harischandra nathi)																				
Procurement of Package 4																				
Implementation of Package 4 (Adappar)																				
Procurement of Package 5																				
Implementation of Package 5 (Vedharanyam)																				
Procurement of Package 6																				
Implementation of Package 6 (Valavanar)																				
Procurement of pumping stations																				
Implementation of pumping stations																				...
Project Management																				
Implementation of Project Implementation Consultancy services																				
Resettlement external monitoring specialist																				
Recruitment of Audit firm for internal audit																				
Contract for Audit firm for internal audit																				
Output 2																				
Recruitment of PTAC consultants																				
Consultancy contract																				
Procure equipment of DSS																				
DSS Development, improving flood forecasting and commissioning																				
Preparation of follow on project																				
Recruitment of survey firms for topography survey																				
Conduct Topography survey																				
Asset survey by WRD																				
Preparation of Feasibility studies																				

Contracting Implementation (full time) Implementation (intermittent)

III. PROJECT MANAGEMENT ARRANGEMENTS

A. Project Implementation Organizations: Roles and Responsibilities

Table 3: Project Implementation Organizations: Roles and Responsibilities

Project Implementation Organizations	Management Roles and Responsibilities
Government of Tamil Nadu acting through its Water Resources Department (WRD) (Executing Agency)	• Establish the Project Management Unit in Trichy and Project Implementation units in Thiruvarur, Nagapattinam, and Thiruthuraipoondi. • Overall responsibility for executing the project and ensuring achievement of project objectives • Prepare annual work plan and budget and ensure counterpart fund availability • Monitor and ensure timely compliance of loan covenants and environmental and social safeguards and facilitate implementation of corrective actions as required • Manage project finances and accounts, arrange for financial audits and implement recommended financial management improvement actions. • Ensure all stakeholders are effectively consulted and information disseminated as required during project implementation.
Project Steering Committee (PSC)	The PSC will be established in the State with Principal Secretary, Public Works Department as chair. The committee members will include Project Director, Engineer in Chief WRD, Chief Engineer Plan Formulation, WRD, Chief Engineer Groundwater WRD, Chief Engineer Trichy, heads of key stakeholder departments (Department of Finance, Revenue Department, Department of Agriculture, Department of Fisheries, Department of Highways and Minor Ports, Department of Environment and Forest, Department of Rural Development and Panchayat Raj), and Director State Water Resources Management Agency. Functions of the PSC will be to: • Meet semi-annually or more frequently as needed • Provide policy guidance and support for project implementation • Facilitate inter-departmental coordination for implementation at the state level • Facilitate co-ordination with central government ministries and departments • Oversee compliance to covenants of loan agreements and central government requirements • Approve annual project plans • Monitor project progress including achieving development objectives and safeguard compliance
Field Implementation Coordination Committee (FICC)	An FICC will be established at the district level Thiruvarur and Nagapattinam,. The committee will be chaired by the district collector and will include, Project Managers (the 3 EEs), Heads of relevant stakeholder departments (district). The mandate of the committee will be: • Monitor progress at field level

	• Ensure coordination at field level among various departments • Take up any unresolved issues to PSC • Meet once quarterly or more frequently as needed
Technical Advisory Committee	The committee will be chaired by the Engineer in chief, WRD and include Chief Engineer Plan formulation, Director State Water Resources Management Agency, Chief Engineer, Ground water division, and Chief Engineer, Trichy The responsibilities of the committee will be: • Provide overall technical oversight to the project • Approve any deviations to project scope, costs and design • Meet as frequently as required
Project Management Unit (PMU)	The PMU will be located in the WRD Regional Office in Trichy under a full time Project Director (PD), of chief engineer rank, with overall responsibility for execution of the project. • The PD will liaise directly with ADB. • The core functions of the PMU include: (i) design and planning, (ii) procurement of goods, works and services, (iii) contract supervision and quality assurance control, (iv) project finance management, (v) implementation of environmental and social safeguards, and (vi) project monitoring and evaluation. • The specific functions of the PMU include: (i) preparation of overall implementation plan and annual work programs and budgets, (ii) procurement of all goods, works and services, (iii) review and monitoring overall progress include contractors performance and ensure timely implementation of project activities, (iv) ensure all necessary requisite government approvals are in place, (v) ensure timely implementation of safeguard implementation plans, (vi) supervise and guide the PIUs, (vii) maintain project financial records and accounts and ensure timely submission of documents to ADB, (viii) ensure compliance of loan covenants, (ix) establish and maintain a project performance management system (PPMS), (x) submit quarterly progress reports, annual progress reports, semi-annual resettlement monitoring reports, and annual environmental monitoring reports to ADB and government, and (xi) submit the project completion report to ADB.
Project Implementation Units (PIU) at the executive engineers offices	Five PIUs will be established in Thiruvarur, Nagapattinam, Thiruthuraipoondi, Thanjavur-Cauvery and Thanjavur-Vennar. Day to day management of the PIUs will be undertaken by the Executive Engineers/Project Managers of the five divisions. The PIUs are also under the supervision of the SE, lower Cauvery basin circle, Thanjavur. The core functions of the PIU will include: (i) construction supervision, (ii) contract management, (iii) quality assurance control, (iv) monitoring of implementation of resettlement and environmental management plans, (v) conducting stakeholder consultations and (vi) addressing any project related grievances.
Project Implementation Consultants	A team of seven individual consultants will support the PMU in overall coordination and implementation of civil works under the project. In addition an individual will be appointed as the external resettlement monitor.
Project Technical Advisory consultants	A firm of 25 person-months international and 74 person-months of national consultants will support the PMU in implementing output 2

	and preparing a subsequent follow on project for the remainder of the Cauvery delta
ADB	Review overall project implementation including compliance with ADB guidelines, loan agreement and project agreement

ADB = Asian Development Bank, EE = executive engineer.
Source: Asian Development Bank

B. Key Persons Involved in Implementation

Executing Agency

Government of Tamil Nadu acting through its Water Resources Department	Mr. M. Palanikumar Project Director and Chief Engineer, Water Resources Department Telephone: 00-91-4312332287 Email address: cetrydb@hotmail.com Office Address: Pudukottai Road, Post Box No 803, Subramaniapuram, Tiruchirappalli- 620020

Asian Development Bank

India Resident Mission	Mr. Kenichi Yokoyama Country Director 4 San Martin Marg Chanakyapuri New Delhi 110021, India P.O. Box 5331 Chanakyapuri HPO, India Telephone: +91-11-2410-7200 Fax: +91-11-2687-0955
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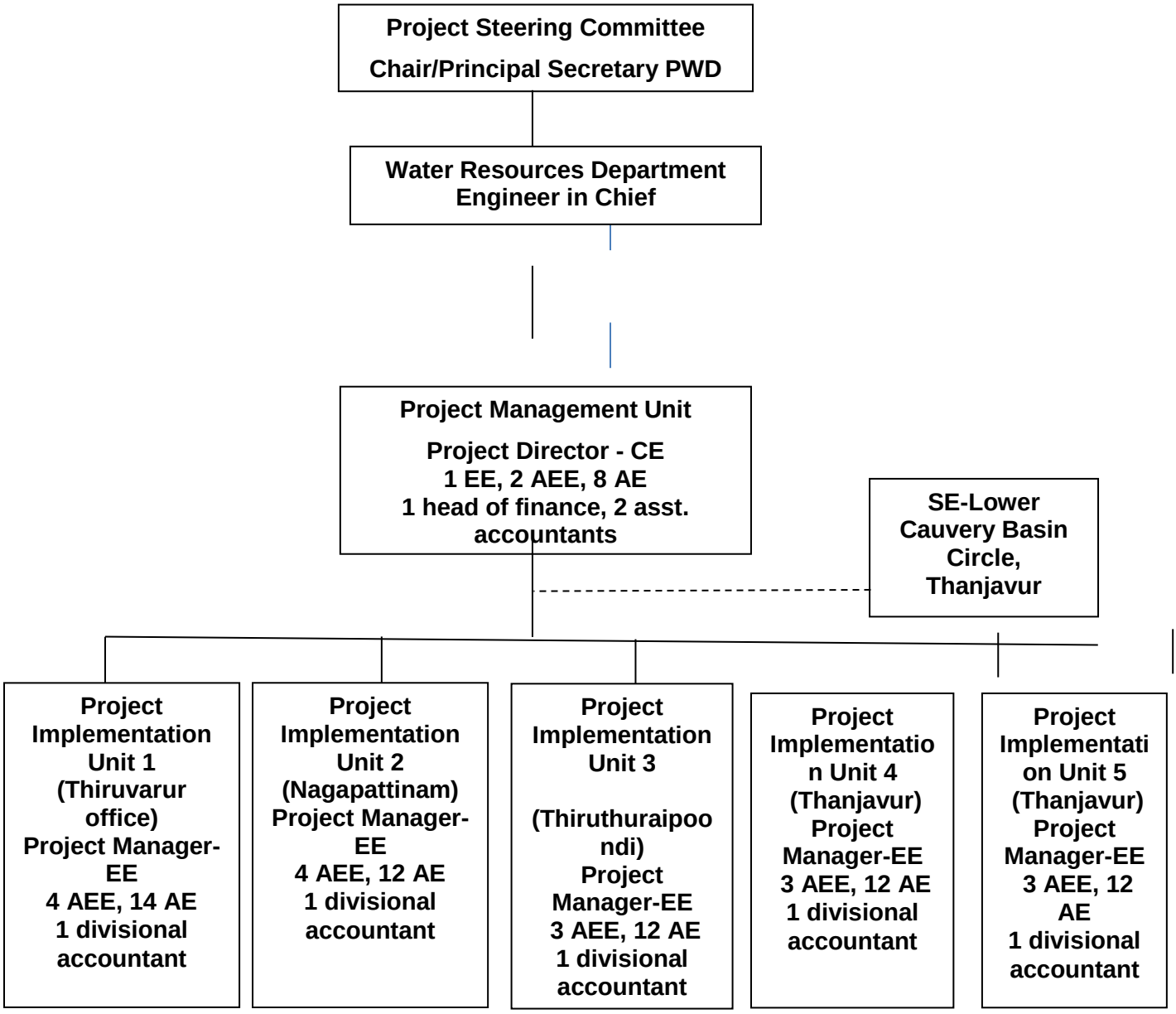
Mission Leader	Ms. Cindy Malvicini Project Implementation Specialist Telephone: +63-2-632-5927 Email: cwmalvicini@adb.org

C. Project Organization Structure

30. The organizational structure is shown in Figure 2.

Figure 2. Project Organizational Structure



AE = assistant engineer, AEE = assistant executive engineer, EE = executive engineer, PWD = public works department, SE = superintending engineer

31. The proposed project management staffing is shown in Table 4.

Table 4: Proposed Project Management Staffing

Task	PMU-Trichy	Project Implementation Units
Overall project management	Project Director of CE rank	Project Manager of EE rank in each PIU
Design and Planning	Existing design and planning wing of CE Plan formulation office Chennai	
Procurement	1 EE[b], 1 AEE, 2 AEs technical staff	
Finance and Administration[a]	1 head of Finance (divisional accountant rank) supported by 2 assistant accountants	1 Divisional accountant from AG's office for each EE's office.
Quality Assurance	Existing quality assurance wing within the WRD	
Construction Supervision	EE[b] and 3 AEs	3 AEEs (per EE's office), 11 AEs (Thirivarur), 9 AE's (Nagapattinam), 12 AEs (Thiruthuraipoondi)
Environment and social safeguards	1 AEE[c], 1 AE	1 AEEs and 2 AEs each for Nagapatinam and Thiruvaru (trained as resettlement officers) 1 AE each for Nagapatinam and Thiruvarur trained as an environment officer (for environment monitoring)
MIS/DSS manager	1 AE	
Public relations/Liaison officer	1 AEE[c], 1 AE	

CE = chief engineer, EE = executive engineer, AEE = Assistant executive engineer, AE = Assistant engineer, MIS = management information system, DSS = decision support system

Note:

[a] PMU will be responsible for submission of withdrawal applications and reporting requirements including annual audit report and financial statements. The PIU will be responsible for safekeeping/retention of supporting documents

[b] EE procurement will also oversee construction supervision

[c] the AEE responsible for resettlement and environmental monitoring will also look after public relations

32. In addition, WRD has committed the following staff resources to support the preparation of a follow on project for the remainder of the Cauvery Delta.

Table 5: Proposed Government Staffing to Prepare Follow on Project

Activity	WRD staffing resources
Topographic survey of channels and establishment of ground control points for flood plains	Supervision of Topographic Surveys in remainder of Vennar and Cauvery- 2 AEE
Asset survey Collect data on all flow regulators and structures including:	2 Assistant engineers leading 2 teams for three months

- Location - Type - State and maintenance issues - Dimensions - Operation - Performance Includes a review of existing registers and a site survey	
Design Includes: - Assessment of structures - Channel alignment - Additional surveys - Geotechnical survey and analysis	4 AEs for 48 months
Prepare detailed cost estimates	12 AEs for 4 months each
Detailed project report preparation	2 EEs supported by 4 AEEs
Preparation of bid documents	Procurement team of the PMU

EE = executive engineer, AEE = Assistant executive engineer, AE = Assistant engineer

IV. COSTS AND FINANCING

A. Cost Estimates Preparation and Revisions

33. This section describes the project costs, categories, and components to be financed by ADB and the Borrower/State. Loan proceeds will be disbursed according to the ADB's *Loan Disbursement Handbook* (2015, as amended from time to time), and subject to the provisions of the loan and project agreements. The project is estimated to cost $144 million (Table 6).

Table 6: Investment Plan
($ million)

Item	Amount
A. Base Cost[a,b]	
Output 1: Flood management and irrigation infrastructure upgraded	126.6
Output 2: Management systems established	4.2
Sub Total(A)	**130.8**
B. Contingencies[c]	6.2
C. Financing Charges during implementation[d]	7.0
Total (A+B+C)	**144.0**

Note: Number may not sum because of rounding.

a Includes taxes and duties of $900,000 to be financed from government resources in cash contributions. Irrigation related works are exempt of tax as per Government of India notification dated 1/3/2015.

b At end-2015 prices which is valid until June 2016.

c Physical contingencies of 3% computed for civil works and zero for all other items. Price contingencies computed at 2% on local currency costs using ADB domestic cost escalation factors for FY 2015-19 as at October 2015, includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.

d Includes interest and commitment charges. Interest during construction for ADB loans has been computed at the 5 year forward London interbank offered rate plus spread of 0.5% and with an average maturity of 19 years, and additional maturity premium of 0.2%. Commitment charges for the ADB loan are at 0.15% of the undisbursed amount.

Source: Asian Development Bank estimates

34. The government has requested a loan of $100 million from ADB's ordinary capital resources to finance the project. The loan will have a 25-year term including a grace period of 5 years, 12.74% annuity repayment method, and annual interest rate determined in accordance with ADB's London interbank offered rate (LIBOR), a commitment charge of 0.15% per year and such other terms and conditions as set forth in the loan and project agreements. The government has requested that repayment will follow the annuity method repayment option. Based on these loan terms and repayment method, the average loan maturity is 19 years and the maturity premium is 0.2%. The government will make the loan proceeds available to the State and through the State to WRD, promptly and on terms and conditions mutually acceptable to ADB and the government. The financing plan is provided in Table 7. The counterpart financing is provided by Government of Tamil Nadu.

35. The government will make available the loan proceeds to the state government on a back-to-back basis and through the state government to WRD. The state government will bear the foreign exchange risk on the ADB loan in accordance with the policy of the government. Detailed cost estimates by expenditure category and detailed estimates by financier for the project are presented in Tables 8 and 10.

Table 7: Financing Plan

		Investment Project
Source	**Amount ($ Million)**	**Share of Total(%)**
Asian Development Bank	100.0	69.4
Government [a]	44.0	30.6
Total	**144.0**	**100.0**

[a] Government of Tamil Nadu

B. Detailed Cost Estimates by Expenditure Category

Table 8: Detailed Cost estimates by Expenditure Category

		$ Million	% Base Costs
A)	**Investment Costs[a,c]**		
1)	Civil Works	110.2	84%
2)	Equipment	1.9	1%
3)	Civil works of PMU Building[b]	1.3	1%
4)	Vehicles[b]	0.3	0%
5)	Environment and resettlement	11.6	9%
6)	Consulting Services	-	
	a) Project Implementation Consultants	0.8	1%
	b) PTAC for follow-on project	1.3	1%
	c) Others[d]	2.1	2%
7)	Training	0.1	0%
	Sub Total(A)	**129.6**	**99%**
B)	**Recurrent Costs**		
1)	Project Management Costs[b]	1.2	1%
	Sub Total (B)	**1.2**	**1%**
	Total Base Line Costs	**130.8**	**100%**
C)	**Contingencies**		
1)	Physical Contingencies	3.7	3%
2)	Price contingencies	2.6	2%
	Sub Total (C)	**6.2**	**5%**
D)	**Finance Charges during Implementation**		
1)	Interest during implementation	6.8	5%
2)	Commitment Charges	0.2	0%
	Sub- Total(D)	**7.0**	**5%**
Total Project Costs (A+B+C+D)		**144.0**	**110%**

Notes: Numbers may not sum precisely because of rounding.

[a] Includes foreign exchange component cost of $ 0.504 Million and being insignificant in the overall context of the project costs no separate presentation of local and foreign exchange element is provided

[b] Funded by Government of Tamil Nadu

[c] Includes taxes and duties amounting to $900,000 contributed by government of Tamil Nadu on cash contribution basis funded by the Government of Tamil Nadu. Irrigation related works are exempt of tax as per Government of India notification dated 1/3/2015.

[d] Includes services for environmental studies, internal auditing, topography surveys and implementing the resettlement plans

Source: Asian Development Bank estimates.

C. Allocation and Withdrawal of Loan Proceeds

Table 9: Allocation and Withdrawal of Loan Proceeds

Category			ADB financing Basis
Number	**Item**	**Total Amount allocated for ADB financing $ million**	**Percentage and Basis for Withdrawal from the Loan Account**
1	Civil Works	90.7	82% of total expenditure claimed
2	Equipment	1.6	84% of total expenditure claimed
3	Consulting Services	3.6	88% of total expenditure claimed
4	Unallocated	4.1	
	TOTAL	**100.0**	

D. Detailed Cost Estimates by Financier

Table 10: Detailed Costs by Financier

		$ Million						
		ADB		GOTN				
		Amount	% of cost category	Amount	Taxes and duties	Total	% of cost category	Total
A)	**Investment Costs**							
1)	Civil Works	90.7	82%	19.5	-	18.8	18%	110.2
2)	Equipment	1.6	84%	-	0.3	0.6	16%	1.9
3)	Civil works of PMU Building		0%	1.3	-	1.3	100%	1.3
4)	Vehicles			0.3		0.3	100%	0.3
5)	Environment and resettlement			11.6		11.6	100%	11.6
6)	Consulting Services							
	a) Project Implementation Consultants	0.7	88%	0.0	0.1	0.1	12%	0.8
	b) PTAC for follow-on project	1.1	88%	0.0	0.1	0.2	12%	1.3
	c)Others	1.8	88%	0.0	0.2	0.2		2.1
7)	Training			0.1		0.1		0.1
	Sub Total(A)	**96.0**	**74%**	**32.8**	**0.7**	**33.6**	**26%**	**129.6**
B)	**Recurrent Costs**							
1)	Project Management Costs		0%	1.0	0.2	1.2	100%	1.2
	Sub Total (B)			**1.0**	**0.2**	**1.2**	**100%**	**1.2**
	Total Base Line Costs	**96.0**	**73%**	**33.9**	**0.9**	**34.8**	**27%**	**130.8**
C)	**Contingencies**							
1)	Physical Contingencies	2.7	73%	1.0		1.0	27%	3.7
2)	Price contingencies	1.4	53%	1.2		1.2	47%	2.6
	Sub Total (C)	**4.1**	**65%**	**2.2**	**-**	**2.2**		**6.2**
D)	**Finance Charges during Implementation**							
1)	Interest during implementation		0%	6.8		6.8		6.8
							100%	
2)	Commitment Charges		0%	0.2		0.2	100%	0.2
	Sub- Total(D)		**0%**	**7.0**		**7.0**	**100%**	**7.0**
Total Project Costs (A+B+C+D)		**100.0**	**69%**	**42.4**	**0.9**	**44.0**	**31%**	**144.0**

GOTN= government of Tamil Nadu, PTAC= Project Technical Advisory Consultants
Note: Numbers may not sum precisely because of rounding.
Source: Asian Development Bank estimates

E. Detailed Cost Estimates by Outputs

Table 11: Detailed Cost Estimate by Output
($ million)

Item		Total $ Million	Output 1 Flood Management and Irrigation upgraded	Output 2 Management systems established
A.	**Investment Costs**			
1)	Civil Works	110.2	110.2	
2)	Equipment	1.9	1.3	0.6
3)	Civil works of PMU Building	1.3	1.3	
4)	Vehicles	0.3		0.3
5)	Environment and resettlement	11.6	11.6	
6)	Consulting Services	-		-
	A. Project Implementation Consultants	0.8	0.8	
	B. PTAC for follow-on project	1.3		1.3
	C. Others	2.1	-	2.1
7)	Training	0.1	0.1	
B.	**Recurrent Costs**			
	Project Management Costs	1.2	1.2	0
	Total Base Costs	**130.8**	**126.6**	**4.2**
C.	**Contingencies**	6.2	6.0	0.2
	Finance Charges during Implementation	7.0	6.8	0.2
Total Project Cost		**144.0**	**139.4**	**4.6**

PMU = Project Management Unit; PTAC = Project Technical Advisory Consultants
Note: Numbers may not sum precisely because of rounding.
Source: Asian Development Bank estimates

F. Detailed Cost Estimates by Year

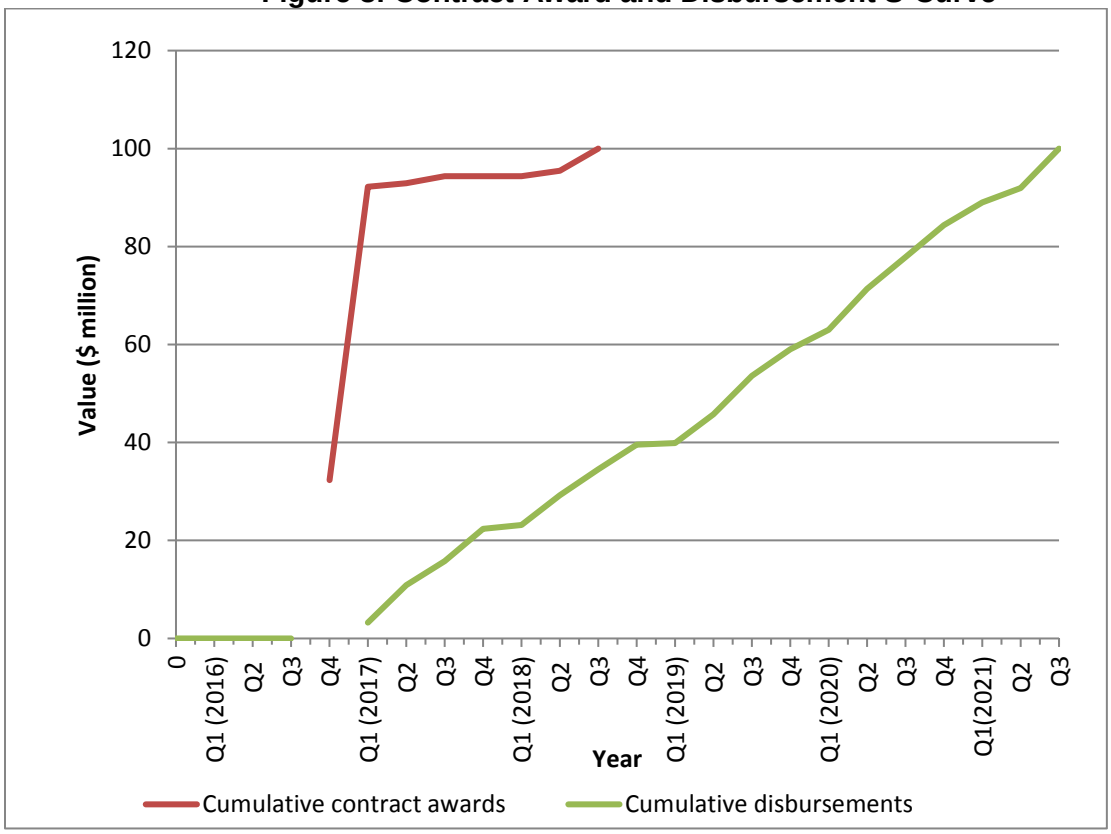
Table 12: Detailed Cost Estimate by Year
($ million)

		2016	2017	2018	2019	2020	Total
A)	**Investment Costs**						
1)	Civil Works	11.0	33.1	33.1	22.0	11.0	110.2
2)	Equipment	0.6	0.4	0.8	-	-	1.9
3)	Civil works of PMU Building	0.8	0.5	-	-	-	1.3
4)	Environment and resettlement	2.8	5.7	2.9	0.2	-	11.6
5)	Vehicles		0.3				0.3
6)	Consulting Services					-	-
	a) Project Implementation Consultants	0.1	0.2	0.2	0.2	-	0.8
	b) PTAC for follow-on project	-	0.3	0.9	-	-	1.3
	c)Others	0.2	0.8	0.6	0.4	-	2.1
7)	Training	0.0	0.1	0.0	-	-	0.1
	Sub Total (A)	**15.5**	**41.5**	**38.7**	**22.8**	**11.0**	**129.6**
B)	**Recurrent Costs**						-
1)	Project Management Costs	0.1	0.4	0.4	0.4	0.1	1.2
	Sub total (B)	**0.1**	**0.4**	**0.4**	**0.4**	**0.1**	**1.2**
	Total Base Line Costs	**15.6**	**41.8**	**39.0**	**23.2**	**11.1**	**130.8**
C)	**Contingencies**						
1)	Physical Contingencies	0.4	1.1	1.1	0.7	0.4	3.7
2)	Price contingencies	0.3	0.8	0.8	0.5	0.2	2.6
	Sub Total (C)	**0.7**	**1.9**	**1.9**	**1.2**	**0.6**	**6.2**
D)	**Finance Charges during Implementation**						
1)	Interest during implementation	0.2	0.8	1.5	2.0	2.4	6.8
2)	Commitment Charges	0.1	0.1	0.0	0.0	-	0.2
	Sub- Total(D)	**0.3**	**0.8**	**1.5**	**2.0**	**2.4**	**7.0**
Total Project Costs (A+B+C+D)		**16.6**	**44.6**	**42.4**	**26.3**	**14.0**	**144.0**

PMU = Project Management Unit; PTAC = Project Technical Advisory Consultants
Note: Numbers may not sum precisely because of rounding
Source: Asian Development Bank Estimate

G. Contract Award and Disbursement S-Curve

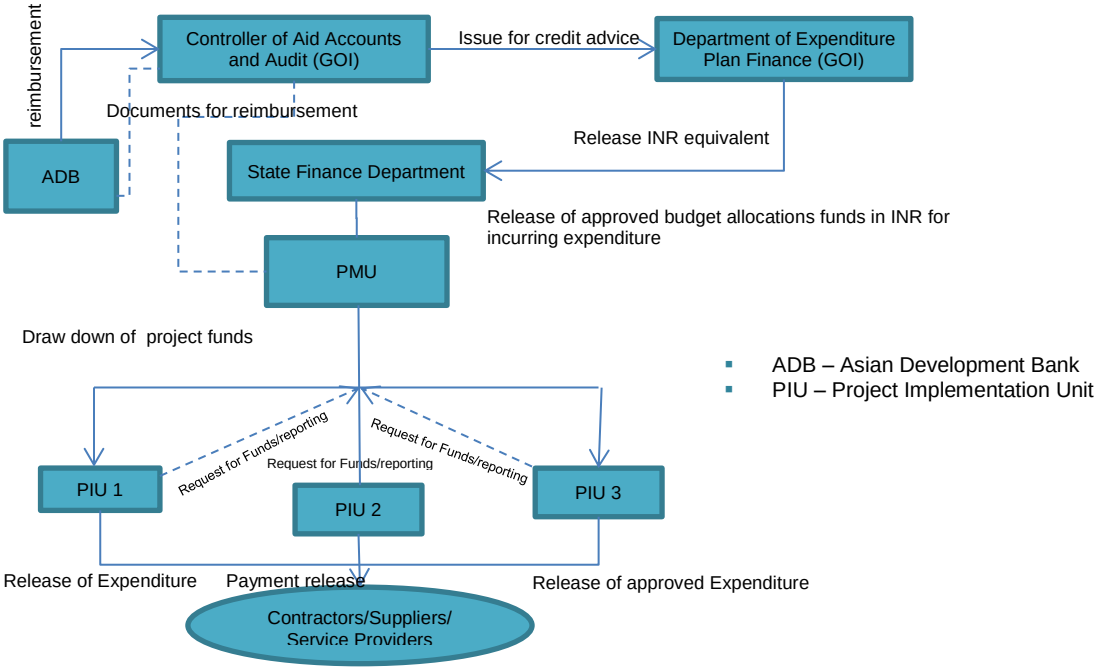
Figure 3: Contract Award and Disbursement S-Curve



H. Fund Flow Diagram

36. The funds for this project will be provided by the state government which will undertake the financing of this project along with the other projects as part of annual budgetary allocation and claim reimbursement from ADB for the eligible expenditure after deducting the share of state government. The fund flow arrangements for the project will be on reimbursement basis from the ADB loan proceeds. Detailed movement of funds is summarized in the diagram below (Figure 4).

Figure 4: Fund Flow Diagram—Disbursement/Reimbursement from ADB



V. FINANCIAL MANAGEMENT

A. Financial Management Assessment

37. The Financial Management Assessment (FMA) of the Water Resources Department (WRD) of The state government, the proposed EA, was carried out in respect of its current activities in accordance with *ADB's Guidelines for the Financial Management and Analysis of Projects* (2005) (the Guidelines) and the publication *Financial Due Diligence A Methodology Note* (2009). The FMA considered the capacity of WRD including funds-flow arrangements, staffing, accounting and financial reporting systems, financial information systems, and internal and external auditing arrangements. Based on the assessment, the key financial management risks identified are: (i) lack of internal audit function, (ii) expected delays in submission of the audited project financial statements and (iii) additional financial management staff required. It is concluded that the overall pre-mitigation financial management risk is moderate. WRD have agreed to implement an action plan as key measures to address the deficiencies. The financial management action plan is provided in Table 13 below.

Table 13: Financial Management Action Plan

Key Risk	Risk Mitigating Activity	Timeline	Responsible Entity
Lack of internal audit function	Engage a private audit firm for internal audit	2016	WRD
PMU not familiar with ADB disbursement and financial management arrangements	WRD shall depute resources from the Project Management Unit of World Bank funded IAMWARM project train PMU staff on reimbursement procedure of ADB.	Immediately	WRD
Delay in submission of audited project financial statements	Meet the AG and request the inclusion of project in their annual work plan to avoid delays	Immediately	WRD

38. This assessment borrowed from previous financial management assessments including a recent country public sector financial management system assessment for India.[18] In addition, a detailed Financial Management and Analysis Questionnaire (FMAQ) was completed based on document reviews and interviews with the Chief Engineer, Trichy, Divisional Accountant at the offices of the Executive Engineer's Offices at Thiruvarur (one of the proposed Project Implementing Units under the project) and the Irrigated Agriculture Modernization and Water Bodies Restoration and Management (IAMWARM) multi-disciplinary Project Unit at Chennai. A review of some transactions undertaken during the previous year and monthly accounts submitted to the Accountant General's Offices was conducted to understand the process of receipt and disbursement of funds, certification of works/invoices for goods and services. The findings from this assessment were considered while drawing up the financial management arrangements and oversight for the project.

39. The assessment indicates that, although the overall risk is assessed as moderate, with the proposed mitigating measures the financial management arrangements of WRD are adequate to implement the project:

Table 14: Summary of the Financial Management Assessment of WRD

[18] National Institute of Public Finance and Policy (2010a): *"India – Public Expenditure and Financial Accountability, Public Financial Management, Performance Assessment Report",* March

Particulars	Risk Assessment	Conclusions
A. Fund Flow	L	WRD and the state government have undertaken various other multilateral agencies projects mainly through the reimbursement method of seeking funds. The overall allocation for the project is carried out through the annual allocation of Budgetary resources. Based on past experience in the other multilateral agency funded projects there is no risk/concern on providing counterpart resources
B. Organization and Staffing	M	The present staff at the WRD are qualified and trained to undertake the accounting function. There are enough resources at the execution and supervisory levels to maintain adequate internal controls and segregation of duties. The head of accounting function is deputed from the Principal Accountant General's office maintaining independence of accounting function. However the staff at the EEs offices which were subject to review are not trained to handle the reimbursement procedures of CAAA and ADB. To address this WRD shall organise to take on deputation, resources from the Project Management Unit of IAMWARM project (a World Bank funded project which will close in June 2015) or train their staff on reimbursement procedure of ADB.
C. Accounting Policies and Procedures	M	Government Accounting System is being followed by WRD and includes maintenance of books of accounts on a cash basis of accounting and the overall financial management system, following finance and accounting procedures as has been done in implementing other externally aided projects in the recent past. There is a centrally established chart of accounts at Pan India level which is followed by WRD leading to an effective consolidation of the overall financial results. The present staff at the project implementation/monitoring unit level is not trained to provide project financial statements required by ADB. WRD shall undertake to get such resources on deputation from IAMWRM project or train their personnel at PMU by IAMWARM project staff
D. Budgeting	L	An assessment of the budgetary allocations for activities of WRD in the past few years indicate an increase in funding and dovetailing of funds from Central schemes, multilateral agencies, to integrate and enhance the interventions envisaged by WRD towards increasing productivity and active engagement in the field. The policies and procedure of budgeting for the Project would involve adequate annual budget allocations by the State Government for implementation of the Project Finance Components under the designated project specific budget heads. There is an effective monitoring system during the year to measure the performance against the budget and take corrective action.

		Project plans and budgets are generally realistic as it goes through vigorous checks from the technical and planning departments before it gets adopted into the budget. The state has committed to allocate a minimum of 2% of capital expenditure towards operation and maintenance.
E. Internal and External Audit	S	There is no internal audit function at WRD. A private audit firm shall be engaged by WRD to undertake internal audit of the project. The Statutory audit of Government of Tamil Nadu is conducted by the Comptroller and Auditor General (C&AG) of India through their offices in Chennai which includes annual and propriety audits. The C&AG is a constitutional body and are independent of the Executive. WRD will have to strengthen its staff strength by bringing people on deputation from the IAMWARM project to ensure that audited project financial statements are available within 180 days from the date of completion of relevant accounting year. The latest audit report for FY 2012-13 on GOTN state Finances does not indicate any specific issues relating to WRD, although in general there is delay in provision of Utilisation Certificates for audit
F. Monitoring and Reporting	L	All accounting records and supporting documents are retained by the project implementation units to allow proper and effective external audit. Monthly reports are generated by the project implementation units manually and sent to the controlling authorities for monitoring.
G. Information systems	M	The primary accounting records are maintained in a manual system at the project implementation units. A summary of the said manual records are transferred physically on a monthly basis to the central agency (Principal Accountant General's office) for maintenance of accounting records. The accounting at the central agency is maintained in a computerized system. As a result of the above, there is a time lag in the maintenance of accounting records and a need to reconcile the manual and computerized accounting records. WRD is in the process of computerizing the system under a World Bank funded project.
Overall Risk	**M**	

L= Low; M=Moderate, S=Substantial

ADB = Asian Development Bank, WRD = Water Resources Department, GOTN = Government of Tamil Nadu, —C&AG = Comptroller and Auditor General of India, IAMWARM = Integrated Tamil Nadu Irrigated Agriculture Modernization and Water Bodies Restoration and Management, CAAA = Controller of Aid Accounts and Audit;

40. **Staffing**: The PMU will be staffed with a divisional accountant, with the requisite experience and qualifications, who will be assigned with the responsibility for oversight of financial management of the project during implementation. It is also proposed that the divisional accountants at the PIU's will report to the divisional accountant who will be responsible for the following activities: (i) coordination of all financial management requirements of the project, (ii) preparation of project financial statements (iii) preparing financial progress and monitoring reports, (iii) follow up with the State Finance Department for the release of funds, (iv) preparation and submission of withdrawal applications to Controller of Aid Accounts and Audit (CAAA) of the

Ministry of Finance for reimbursement from ADB in coordination with the state finance department, and (v) overseeing the work of the internal auditors and coordinating the work of external auditors. It is recommended that the divisional accountant of the PMU be deputed from the MDPU of IAMWARM project as they have prior experience in handling the requirements of multilateral funding agencies or have PMU staff trained by IAMWARM staff. The day to day accounting function at the PIUs will be conducted by the existing divisional accountants and his staff.

41. **Budget Line Item in the State Government Budget:** The project will be pre-financed by the Government of Tamil Nadu through a dedicated budget head, separately identifiable line item under the Major Head no. DPC 4701 – 03 – 434 – PA – 1604 for the ADB project in the Demand for Grants of the State Water Resources Department (WRD). Funds allocated under this budget head for the Financial Year 2015-16 are based on the projected expenditure for the project for 2015-16. This budget head will be distinct from other budget lines under this Major Head. This exercise of establishment of a distinct budget head was initiated as part of the budget exercise for the current financial year which commenced in mid 2014 for the Financial Year 2015-16. The budget submitted shall include both ADB's share and counterpart (State) contribution agreed to finance approved activities planned under the project. Upon approval of budget by the State legislature, the State Finance Department would release funds under this subhead to the project management to allow these agencies to effect need based draw down of funds to finance approved project activities.

B. Disbursement

1. Fund Flow Arrangements

42. Disbursement of loan proceeds will be in accordance with ADB's Loan Disbursement Handbook (2015, as amended from time to time)[19] and the detailed arrangements agreed upon between the government and ADB. Training for project staff on disbursement policies and procedures is available online.[20] PMU and PIU staff are encouraged to avail of this training to help ensure efficient disbursement and fiduciary control.

43. Before the submission of the first withdrawal application, the state government should submit to CAAA sufficient evidence of the authority of the person(s) who will sign the withdrawal applications on behalf of the borrower, together with the authenticated specimen signatures of each authorized person.

44. **Statement of Expenditure Procedure (SOE):** The Statement of Expenditure (SOE) procedure will be used to reimburse eligible expenditures. The ceiling of the SOE procedure is the equivalent of $100,000 per individual payment. Supporting documents and records for the expenditures claimed under the SOE should be maintained and made readily available for review by ADB's disbursement and review missions, upon ADB's request for submission of supporting documents on a sampling basis, and for independent audit.

45. **Minimum value per withdrawal application:** The minimum value per withdrawal application is US$100,000 equivalent

[19] Available at http://www.adb.org/Documents/loan-disbursement-handbook
[20] Available at: http://wpqr4.adb.org/disbursement_elearning

C. Accounting

46. WRD will maintain separate project accounts and records by funding source for all expenditures incurred on the project. Project financial statements will follow the government of India's cash based accounting laws and regulations which are consistent with international accounting principles and practices. Template financial statements provided in the Standardized Terms of Reference for audit of ADB assisted projects, agreed with the Comptroller and Auditor General of India, the DEA and ADB can be referred to as a guide for preparing financial statements.

D. Auditing and Public Disclosure

47. WRD will cause the project financial statements to be audited in accordance with International Standards on Auditing and/or in accordance with Government's audit regulations, by the CAG or any private external auditor empanelled and assigned to the audit by the CAG, acceptable to ADB. The audited project financial statements will be submitted in the English language to ADB within six months of the end of the fiscal year by WRD.

48. The annual audit report for the project financial statements will include audit opinions which cover: (i) whether the project financial statements present a true and fair view or are presented fairly, in all material respects, in accordance with the applicable financial reporting framework; (ii) whether loan proceeds were used only for the purposes of the project or not; and (iii) the level of compliance for financial covenants contained in the legal agreements for the project. If the auditor issues a management letter, a copy will also be submitted to ADB.

49. Compliance with financial reporting and auditing requirements will be monitored by review missions and during normal project supervision, and followed up regularly with all concerned, including the external auditor.

50. The Government and WRD have been made aware of ADB's approach to delayed submission,[21] and the requirements for satisfactory and acceptable quality of the audited accounts. ADB reserves the right to verify the project's financial accounts to confirm that the share of ADB's financing is used in accordance with ADB's policies and procedures.

51. Public disclosure of the project financial statements, including the audit report on the project financial statements, will be guided by ADB's Public Communications Policy (2011).[22] After review, ADB will disclose the project financial statements for the project and the opinion of the auditors on the financial statements within 14 days of their endorsement by posting them on ADB's website. The management letter will not be disclosed.

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[21] ADB approach and procedure for delayed submission of audited project financial statements:

- When audited project financial statements are not received by the due date, ADB will write to the executing agency advising that (i) the audit documents are overdue; and (ii) if they are not received within the next six months, requests for new contract awards and disbursement such as processing of new reimbursement, and issuance of new commitment letters will not be processed.
- When audited project financial statements have not been received within 6 months after the due date, ADB will withhold processing of requests for new contract awards and disbursements such as processing of new reimbursement and issuance of new commitment letters. ADB will (i) inform the executing agency of ADB's actions, and (ii) advise that the loan may be suspended if the audit documents are not received within the next six months.
- When audited project financial statements have not been received within 12 months after the due date ADB may suspend the loan.

[22] Available from http://www.adb.org/documents/pcp-2011?ref=site/disclosure/publications

52. **Internal Audit:** The internal audit of the project will be conducted by an independent auditing firm recruited by WRD under agreed terms of reference. The objective of the internal audit is to strengthen the internal control framework and provide project management with timely fiduciary assurance that: (i) the financial management, the procurement systems and the internal control procedures as applicable to the activities under the project are being adhered to by the PMU, PIOs and the support entities; and (ii) the financial information being submitted to and by the PMU is in agreement with the financial records, and can be relied upon to support the disbursements made by the ADB as reimbursement of eligible expenditures. The internal auditor will submit a quarterly internal audit report to the Steering Committee. An executive summary of the key findings of the internal audit will also be submitted with the internal audit report for sharing the same with ADB, for the latter's information. The terms of reference for the internal audit are attached as Appendix D.

VI. PROCUREMENT AND CONSULTING SERVICES

53. This is the first ADB loan to be implemented by the EA. WRD staff are experienced with competitive procurement procedures, especially for civil works. However, they are not directly familiar with ADB's procedures, and the relevant staff have no direct experience with recruiting consulting firms. The project will provide training on ADB's rules and procedures, and a procurement specialist will directly support the PMU. A procurement risk assessment was conducted during the period April to September 2014 and is included as a supplementary document.

A. Advance Contracting and Retroactive Financing

54. All advance contracting and retroactive financing will be undertaken in conformity with *ADB's Procurement Guidelines* (April 2015, as amended from time to time)[23] and *ADB's Guidelines on the Use of Consultants* (2013, as amended from time to time).[24] The issuance of invitations to bid under advance contracting and retroactive financing will be subject to ADB approval. The borrower, State and WRD have been advised that approval of advance contracting and retroactive financing does not commit ADB to finance the project.

55. **Advance Contracting:** Before negotiations with ADB for the loan, bidding documents (including evaluation criteria) for all civil works and goods contracts to be awarded during first 12 months of project implementation will be prepared by the EA and approved by ADB. The invitation for bids for civil works will be issued prior to negotiations. Furthermore, the tenders for 30% of the packages to be awarded in the first year will have their evaluations approved by ADB and be ready for award. The call for expressions of interest for project implementation consultants will also be issued prior to loan negotiations. The detailed advance action schedules on procurement of works, which will be updated regularly, are presented below in Tables 15, 16 and 17.

[23] Available at: http://www.adb.org/Documents/Guidelines/Procurement/Guidelines-Procurement.pdf
[24] Available at: http://www.adb.org/Documents/Guidelines/Consulting/Guidelines-Consultants.pdf

Table 15: Procurement Timeline for Civil Works on Vellaiyar and Pandavaiyar

No	Activity	Days	Timeframe	Action By	Status
1	ADB approval of bidding document		1-Sep-15	ADB	done
2	Issuance of invitation for bids	8	9-Sep-15	WRD & ADB	done
3	Submission of bids and public opening of technical bids	58	6-Nov-15	WRD	done
4	Preparation of TBER and approval by Tender Award Committee	14	20-Nov-15		done
5	Submission of TBER	4	24-Nov-15	WRD	done
6	ADB review and approval of TBER	13	7-Dec-15	ADB	done
7	Public opening of financial bids	3	10-Dec-15	WRD	done
8	Preparation of FBER and approval by Tender Award Committee	48	27-Jan-16	WRD	done
9	Submission of FBER	1	28-Jan-16	WRD	done
10	ADB review and approval of FBER and contract award	11	8-Feb-16	ADB	done
11	PMU sends winning bidder notice of award / letter of acceptance and contract agreement	13	24-Feb-16	WRD	done
12	Bidder submits performance security and signed agreement	28	23-Mar-2016	WRD	done

ADB = Asian Development Bank, FBER = financial bid evaluation report, TBER = technical bid evaluation report, WRD = Water Resources Department

Table 16: Procurement Timeline for Design, Supply, Installation, Testing and Commissioning of Pumps

No	Activity	Days	Date	Action By	Status
1	ADB approval of bidding document		21-Jan-16	ADB	done
2	Issuance of invitation for bids	14	4-Feb-16	WRD & ADB	done
3	Submission of bids and public opening of technical bids	33	8-Mar-16	WRD	No response. To be retendered
4	Revise bid documents and submit to ADB		16-May-16	WRD	not yet due
5	ADB approval of revised bidding document	7	23-May-16	ADB	not yet due
6	Issuance of invitation for bids	4	27-May-16	WRD & ADB	not yet due
7	Submission of bids and public opening of technical bids	33	29-June-16	WRD	not yet due
8	Preparation of TBER and approval by Tender Award Committee	30	29-July-16	WRD	not yet due
9	Submission of TBER	1	30-July-16	WRD	not yet due
10	ADB review and approval of TBER	12	11-Aug-16	ADB	not yet due
11	Public opening of financial bids	5	16-Aug-16	WRD	not yet due
12	Preparation of FBER and approval by Tender Award Committee	30	15-Sep-16	WRD	
13	Submission of FBER	1	16-Sep-16	WRD	not yet due

14	ADB review of FBER and issuance of no objection to contract award	10	26-Sep-16	ADB	not yet due
15	PMU sends winning bidder notice of award / letter of acceptance and contract agreement	5	30-Sep-16	WRD	not yet due
16	Bidder submits performance security and signed agreement	28	27-Oct-16	WRD	not yet due

ADB = Asian Development Bank, FBER = financial bid evaluation report, TBER = technical bid evaluation report, WRD = Water Resources Department

Table 17: Procurement Timeline for Civil Works on Harichandranathi, Adappar, Valvanar, and Vedharnayam

No	Activity	Days	Date	Action By	Status
1	ADB approval of bidding document		1-Feb-16	ADB	done
2	Issuance of invitation for bids	4	5-Feb-16	WRD & ADB	done
3	Submission of bids and public opening of technical bids	32	8-Mar-16	WRD	Due to election code of conduct bids not opened and need to retender
4	Submit to ADB for review		15-May-16	WRD	not yet due
5	Issuance of invitation of retender for bids	12	27-May-16	WRD & ADB	not yet due
6	Submission of bids and public opening of technical bids	33	29-June-16	WRD	not yet due
7	Preparation of TBER and approval by Tender Award Committee	30	29-July-16	WRD	not yet due
8	Submission of TBER	1	30-July-16	WRD	not yet due
9	ADB review and approval of TBER	12	11-Aug-16	ADB	not yet due
10	Public opening of financial bids	5	16-Aug-16	WRD	not yet due
11	Preparation of FBER and approval by Tender Award Committee	30	15-Sep-16	WRD	not yet due
13	Submission of FBER	1	16-Sep-16	WRD	not yet due
14	ADB review of FBER and issuance of no objection to contract award	10	26-Sep-16	ADB	not yet due
15	PMU sends winning bidder notice of award / letter of acceptance and contract agreement	5	30-Sep-16	WRD	not yet due
16	Bidder submits performance security and signed agreement	28	27-Oct-16	WRD	not yet due

ADB = Asian Development Bank, FBER = financial bid evaluation report, PMU = Project Management Unit, TBER = technical bid evaluation report, WRD = Water Resources Department

56. **Retroactive Financing:** Withdrawals from the loan may be made for reimbursement of eligiible expenditures incurred under the project before the effective date, but not earlier than 12 months before the date of the loan agreement in connection with items to be retroactively finance, subject to a maxiumum amount equivalent to 20% of the loan amount.

B. Procurement of Goods, Works, and Consulting Services

57. All procurement of goods and works will be undertaken in accordance with ADB's Procurement Guidelines. An 18-month procurement plan indicating threshold and review procedures, goods, works, and consulting service contract packages is in Appendix C.

58. **Civil works and goods**. All procurement of goods and works will be undertaken in accordance with ADB's Procurement Guidelines (2015, as amended from time to time). ADB's standard bidding documents for international competitive bidding (ICB) will be used as a basis for preparing bid documents for national competitive bidding (NCB) for use under the project. The procurement plan indicates the threshold, mode of procurement and consultant selection, review procedures, and contract packages. International competitive bidding procedures will be used for civil works contracts estimated to cost $40 million or more, and supply contracts valued at $3 million or higher. Shopping will be used for contracts for procurement of works and equipment worth less than $100,000. All civil works for channels and pumping stations are expected to use NCB, with single-stage, two-envelope bidding procedure. Equipment will be procured using both NCB and shopping, in accordance with the procurement plan. Master bidding documents prepared for Vellayar and Pandavayar packages have been adopted for all other packages. Tenders for all goods and works contracts costing more than $1 million have been called for under advance action.

59. **Consultant services**. All consultants and nongovernment organizations (NGOs) will be recruited according to ADB's Guidelines on the Use of Consultants. The terms of reference for all consulting services are detailed in Appendix D.

60. Seven national consultants will be recruited as individuals to supplement the capacity of WRD staff and assist the PMU and PIU in project implementation. These are indicated in the procurement plan as Project Implementation Consultants. The cumulative person months fo the project implementation consultants are 102 months. In addition an individual consultant will be recruited as external resettlement monitoring specialist for 8 month input. The PMU will obtain ADB's prior review on the detailed terms of reference (TOR), cost estimate, and evaluation criteria for each individual before advertising for each position in an English language daily national newspaper and on WRD's and ADB's websites.

61. WRD will recruit a firm to support the PMU in the following deliverables: (i) preparation of flood maps and establishing a decision support system, and (ii) preparation of feasibility study, detailed design, and project documents for follow on project for the remainder of the Cauvery Delta. The consultant team is called Project Technical Assistance Consultants (PTAC) in the procurement plan. An estimated 25 person months international, 74 person months national are required for PTAC, and the quality- and cost-based selection (QCBS) method with a quality:cost ratio of 80:20 will be used. In addition two survey firms will be recruited to undertake topographic surveys for the proposed new project areas.

62. Implementation of the resettlement plan will require consultancy services of a NGO. A firm will be recruited to develop and maintain a management information system (MIS). WRD will use least cost selection method for the NGO package and QCBS for the MIS package . Expertise consist solely of national expertise.

C. Procurement Plan

63. The procurement plan indicating threshold and review procedures, goods, works, and consulting service contract packages and national competitive bidding guidelines is in Appendix C. The procurement plan provides: (i) a list of goods, works, and consulting services contract packages that will be processed over the next 18 months with milestone dates for activities; (ii) the proposed methods for procurement of such contracts permitted under the loan agreement; and (iii) the related ADB review procedures. The procurement packages in the procurement plan will be updated by the PMU for approval by ADB. The procurement plan should be updated at least every June (more frequently if necessary) and should cover the next 18 months of procurement activity. A delay in loan effectiveness, other start-up delays, and delays during implementation may require an unscheduled procurement plan update. ADB will review each updated procurement plan prior to its disclosure. When appropriate, this activity may be undertaken in the field by ADB missions in consultation with borrower and EA.

D. Consultant's Terms of Reference

64. The outline TOR for all consultant contracts except for the MIS developer and topography surveys are presented in table 18 and 19. Detailed TORs are presented in Appendix D. The TOR for the MIS developer and topography surveys will be prepared after the PIC is mobilized.

Table 18: Outline TOR for Project Implementation Consultants (PIC)

Designation	No.	Input (months)	Responsibilities
Project Management Specialist	1	36	• Provide support to PD/PMU on project and financial management including the tender process, award of contracts, supervision of construction contracts, planning and monitoring progress and quality control of construction. Support the PMU in preparing progress reports and the project completion report for Project. Develop the terms of reference for the MIS firm.
Construction engineer	1	12	• Assist the EE's in construction supervision and management
Financial Management Specialist		6	• Assist the in-house Finance Management Specialist to set up the accounts and manage the finances. Train in-house staff on ADB procedures and financial reporting requirements.
Procurement Specialist	1	6	• Assist the PIU in contract management and support preparation and evaluation of bid documents.
Environment Specialist	1	6	• Assist the PMU and PIU to monitor implementation of environmental management plan, prepare periodic monitoring reports and train WRD staff.
Social Development Specialist	1	18	• Assist the PMU in monitoring the implementation of the resettlement plan on social dimension aspects of the project including, establishment of channel stakeholder groups, and gender related activities. Update the resettlement plan if required for any changes in project design during implementation.

Designation	No.	Input (months)	Responsibilities
			Ensure coordination with the government program on rural empowerment especially for livelihood restoration measures for relocated households. Train PMU and PIU staff on monitoring and reporting on social indicators and resettlement plan implementation
Quality Assurance Engineer	1	18	• Responsible for implementation of quality assurance and quality control plan, inspection works, checking quality of construction, performance monitoring and reporting.
MIS Firm	1	6	• Work with PMU on developing project monitoring and reporting systems, collect and process MIS data. Assist PMU in designing project performance management system (PPMS) and training WRD staff in operationalizing PPMS. Assist PMU in preparing monthly, quarterly and annual reports

Table 19: Outline TOR for Project Technical Advisory Consultants (PTAC)

Designation	No.	Input (months)	Responsibilities
Team Leader (Civil/Water Resources Engineer) (International)	1	12	• Team Leader will work with PMU and WRD to coordinate and manage activities of the team on implementing output 2 and prepare follow on project. • Overall direction of the TA team, coordination of inputs, and management of survey teams and specialists • Prepare feasibility study and conduct due diligence on design.
GIS Specialist	1	12	• Gather all available and relevant spatial data related to the project areas including topographical data, land-use data, soils and geological data, and any other relevant data to the project, and develop a GIS database. Provide GIS data as needed for the DSS. • Support the Hydraulic modeling Specialists by preparing flood maps based on the outputs of the hydraulic modeling. • Support the Economist using the flood maps to assess potential benefits

Designation	No.	Input (months)	Responsibilities
Hydrologist (International) Hydrologist (National)	1 2	2 8	• Support the identification of hydrometereorological network and support implementation of DSS • For proposed follow on project, collect, quality control, archive and analyse hydrometeorological data. • Design and supervise programme of direct flow measurements using acoustic doppler current profilers (ADCP) to be carried out by WRD hydrologists. • Using ADCP results review and update stage-discharge ratings of all principal regulators. • Develop, calibrate and use rainfall-runoff models to simulate inflows to hydraulic models and water balance models. • Recommend suitable hydrological interventions that benefit flood management, water-use efficiency and groundwater recharge. • Provide hydrological data for the DSS. • Provide on-the-job training to WRD hydrologists.
Hydraulic and coastal modeller (International) Hydraulic and coastal modeller (National)	1 2	4 12	• For preparation of follow on project collect and review hydraulic data (topographical, structural and coastal), and determine the geographical extents and channels to be included within the hydraulic models. • Develop and calibrate 1D-2D hydraulic models of the follow on project areas (drainage systems and associated floodplains). • Model structural interventions to feasibility level with present and future climate and sea level scenarios. • Prepare flood extent, duration, and depth maps for a range of design storms under current and future climate and sea level scenarios. • Use model results to develop operating rules for management of hydraulic structures and for planning maintenance. • Use historic records to establish statistical correlations between river levels at head regulators and flood conditions at downstream regulators. • Use model results to establish flood warning trigger levels at head regulators corresponding to overflow conditions in downstream locations. • Provide on-the-job training to WRD hydraulic modellers.
Groundwater modeller (International) Groundwater Modeller (National)	1 1	2 6	• For proposed project area develop and implement aquifer model studies including groundwater flow and salute transport models • designing and establishing the monitoring network, overseeing the collection of data, data analysis • Provide on-the-job training to WRD hydrogeologists.
Economist (International) Economist (national)	1 1	2 4	• For follow on project establish agro-economic benchmarks in the project areas including current level of stakeholder participation in operation and maintenance and current cropping intensities and productivity at the system and farm levels. • Undertake a detailed economic and financial analysis of the subprojects in accordance with ADB's Guidelines for

Designation	No.	Input (months)	Responsibilities
			the Economic Analysis of Projects (1997) and CWC Guidelines (2010);
Financial Management Specialist (national)	1	4	Provide detailed costings on follow on project
Agriculture Specialist (national)	1	2	• For follow on project establish benchmarks on cropping intensity and productivity and identify current seasonal agriculture practices in the project areas. • Recommend water efficiency initiatives through conjunctive use of surface and groundwater for water supply and irrigation needs. • Recommend modifications to existing cropping schedules to minimize water demands maximize water-use efficiencies and reduce non-beneficial evaporation and discharge to saline bodies. • Provide agricultural data for the DSS.
Environment Specialist (national)	1	6	• For follow on project prepare necessary environmental assessments. • Support WRD in obtaining necessary statutory environmental clearances
Social and Gender Specialist (national)	1	6	• For follow on project prepare resettlement plans • Stakeholder consultation. • Identify key stakeholders (poor and vulnerable groups in particular), their project- related interests, and their likely barriers to participate in and benefit from project resources, and suggest possible strategies for addressing the concerns of these stakeholders. • Prepare initial stakeholder analyses and participation plans • Analyze project specific gender concerns and vulnerabilities and opportunities • Ensure livelihood restoration measures for relocated households and other impacted people are integrated with the livelihood development strategy of the project and the Gender Action Plan.
System operation specialist (international)	1	3	• Consult with internal stakeholders and define system operation, management, water use efficiency improvement and maintenance activities to be supported by DSS • Design the scope of the DSS to support these requirements • Oversee the development and implementation of the DSS
DSS development specialist (national)	1	6	• In consultation with the international specialist identify the appropriate software and hardware options to meet the needs of the DSS • Assist PMU in preparation of detailed specifications for DSS • Supervise the development and commissioning of the DSS • Provide on-the-job training to WRD staff on the application of DSS software.

65. An NGO team will be recruited (for 15 person months) to implement the resettlement plan.

E. Operations and Maintenance

66. The state has committed to allocate as a minimum 2% of capital costs towards operation and maintenance. Funds will be allocated annually and released on a timely basis and may be revised upward as required each year to ensure availability of adequate funds for operation and maintenance of project facilities.

VII. SAFEGUARDS

67. The EA will ensure that all requirements prescribed in the initial environmental examination report and resettlement plan will be complied with during preparation of relevant safeguard documents and implementation of the project.

68. Pursuant to ADB's SPS 2009 *(SPS),* ADB will not reimburse expenditure incurred on any activities listed in in the ADB's Prohibited Investment Activities List set forth in *Appendix 5* of the SPS, attached in Appendix G. WRD will ensure that all investments are in compliance with applicable national laws and regulations, and ADB's SPS 2009.

A. Environmental Safeguards

69. The project is categorized B as per ADB's SPS 2009. An initial environment examination (IEE) was prepared for the project and includes an environmental management plan (EMP) which describes mitigation measures to be adopted during design, construction and operation. The environment officers assigned by WRD (one assistant executive engineer assigned as safeguard officer at the PMU and assistant engineers at the PIU) supported by the environmental specialist attached to the PIC will monitor implementation of the environmental management plan and submit semi-annual environmental monitoring reports to ADB and government. WRD will be responsible to get the necessary governmental clearances, including the clearances required under the Coastal Regulation Zone act, prior to award of contract.

70. The EMP will be included in the bidding documents and form part of the contract documents. All bid documents will include a requirement to incorporate necessary resources into the contractor's bid to implement mitigation measures specified in the EMP. Where unanticipated environmental impacts become apparent during project implementation, the IEE including EMP will be updated by the environment specialist attached to the PMU. Any updates to the IEE or EMP will be submitted to ADB for review.

71. The EA through the PMU with the support of the environmental specialists in the PIC and environmental safeguards officers attached to the PMU and PIUs will be responsible to: (i) provide oversight on environmental management aspects of the project and ensure that the EMP is implemented by the contractors, (ii) facilitate and ensure contractors comply with all government rules and regulations and obtain any relevant approvals required for works, (iii) supervise and guide contractors on implementation of the EMP; (iv) review, monitor and evaluate the effectiveness with which the EMP is implemented, and recommend necessary corrective actions to be taken as necessary; (v) submit semi-annual monitoring reports to ADB; (vi) ensure timely disclosure of the IEE in locations and forms accessible to the public; (vii) take corrective actions when necessary when unforeseen negative environmental impacts occur; (viii) conduct ongoing consultation with the community during implementation of the project; and (ix) establish a grievance redress mechanism and ensure it is operated satisfactorily.

72. ADB will review progress of implementation of the EMP during regular review missions. ADB will also review periodic monitoring reports and officially disclose the IEE and monitoring reports on ADB's website.

B. Social Safeguards

73. The project will not involve any land acquisition, because all civil works along the 6 channels will be within the available right-of-way. However, the project will have a significant

impact due to its need to displace 3,235 squatter households, occupying the embankment of these channels, comprising of 2,642 residences, 478 shops and 115 cattle sheds/sheds, with total 12,887 affected peoples. The project is categorized A in accordance to ADB's Safeguard Policy Statement (2009). The resettlement plan (RP) complies with government regulations on resettlement rehabilitation and ADB's safeguard requirements for involuntary resettlement. The RP was prepared in close consultation with affected people and comprehensively assesses the impacts of involuntary resettlement, and provides adequate measures to address the impacts. The RP is based on the detailed design, and therefore, the RP is final unless unanticipated changes in design are encountered during project implementation. To strengthen the capacity of WRD in implementing the plan, the PMU will be assisted by a non-governmental organization and a social development consultant. An external monitoring consultant will also be engaged to monitor implementation of the resettlement plans. The WRD has secured a budget to implement the RP including budget to recruit consultants for implementing RP.

74. For the EA this RP is the first to be developed in accordance with the Government of India's new Act on land acquisition and ADB's SPS 2009. Therefore, the EA will need continuous support to ensure that the RP is implemented as planned. The PMU and PIUs will be assisted by an NGO and Social Development consultant. The following actions will be carried out by PMU and PIU to implement the RP.

(i) the RP will be updated if required and implemented by an NGO that will be engaged by PMU. This team will be supervised by PMU's social development consultant. During implementation, meaningful consultation with project affected persons (PAP) will be undertaken. During consultations the following will be shared (i) the entitlement matrix, (ii) the availability of GRM as an avenue to bring PAP concerns, and (iii) implementation arrangements.

(ii) the PMU's social development consultant (SDC) will be responsible to keep all records on implementation of RPs/updated RPs to (i) record the progress payments to displaced persons, (ii) record the progress in handling grievances, and (iii) other related matters in implementing the RPs. This information will be included in the quarterly progress reports and semi-annual monitoring report.

(iii) the Independent monitoring consultant will monitor the implementation of RP to review of the objectives of the RP are achieved, including verifying progress reports on RP implementation and submit monitoring reports to ADB.

(iv) the PMU and PIUs assisted by SDC and the NGO will coordinate with the relevant authorities to establish the GRM.

(v) the WRD assisted by PMU and PIUs will ensure that land and the basic facilities such as road, clean water for resettled displaced peoples (DPs) will be available prior to removing the DPs from project areas.

(vi) the PMU and PIUs will be responsible to: (i) obtain ADB's approval on RPs and updates if any, prior to awarding a civil work contract; (ii) monitor the implementation of RP, (iii) submit semi- annual resettlement monitoring reports to ADB, while quarterly progress on resettlement implementation will be reported in the Project quarterly progress report. All monitoring reports will also include GRC activities during the reporting period.

(vii) The EA must ensure that if the RP needs to be updated due to any design changes during implementation the updated RP is submitted to and approved by ADB prior to award of any contract.

75. **Indigenous Peoples**: Currently, there are no indigenous peoples under the project. Therefore, it is categorised as Category-C for indigenous peoples. The PMU and PIUs assisted

by SDC will continually oversee whether any IP will be affected by the project implementation, although the project is categorized as a C project, to ensure, if necessary action to address impact to IP is needed.

C. Grievance Redress Mechanism

76. Under the safeguards implementation, a project specific grievance redress mechanism (GRM) will be established to receive and facilitate the resolution of affected people's concerns, complaints and grievances if any about the social and environmental performance at the project level. The GRM will aim to provide a time bound and transparent mechanism to voice and resolve social and environmental concerns linked with the project. The project specific GRM is not intended to bypass the government's own redress process, rather it is intended to address project affected people's concerns and complaints promptly, making it readily accessible to all segments of affected persons and is scaled to the risks and impacts of the project.

77. A three tier GRM will be established. The first tier GRM will be a single contact point at the jurisdictional PIU Vennar Division, Thiruvarur or PMU. When a stakeholder raises an issue with the PMU or PIU every attempt will be made to respond speedily and the complaint should be acknowledge within three days. If the PMU or PIU are unable to find a resolution within two weeks of receiving the complaint it will be raised to the second tier. The second tier will be established at the project level, at Thiruvaur, and Nagapatinam. The second tier will have a grievance redressal committee (GRC) headed/chaired by Revenue Divisional Officer (RDO) and comprising of Executive Engineer (Thiruvarur), Projects, WRD as member secretary, a local person of repute and standing in the society, one male representative from among the displaced persons and one female representative from among the displaced persons. The RDO will nominate the local person of repute and standing in the society and the displaced persons representatives. The selected local person will function as the secretary of the GRC and will receive grievances and forward these to the member secretary for placing before the GRC. GRC will be convened once in every three weeks and after hearing the aggrieved person pass necessary orders. The complaint/grievance will be redressed in 2 weeks and written communication will be sent to the complainant. A complaint register will be maintained at PIU level with details of complaints lodged, date of personal hearing, action taken and date of communication sent to complainant. Minor complaints such as disturbances due to construction activity will be resolved immediately by the WRD and contractor. WRD will maintain a log of complaints made.

78. Any complaint that cannot be resolved or redressed in 2 weeks by GRC will automatically move to the third tier of GRM. The third tier of the GRC will be headed/chaired by District Collector and will comprise Executive Engineer, PMU, WRD as member secretary, District Revenue Officer and relevant officers from district level officers (membership may change based on the grievance). The second tier will focus on finding resolutions for the complainants, and with time frame not more than 2 weeks.

VIII. GENDER AND SOCIAL DIMENSIONS

79. The survey undertaken as part of the poverty and social assessment (PSA) study for the project area shows that female population are higher than male population (1,035 females per 1,000 males). The survey undertaken to prepare the resettlement plan, show that the project will displace 3,235 squatter households living along the embankments. Only 2,479 households provided sex disaggregated data during the survey. Of these households 2,186 households are headed by males and 293 are headed by females. Along the six channels, among the affected persons, 746 of the 1,780 agricultural laborers are women.

80. The results of the PSA survey of the Vennar system indicate that the percentage of households belonging to the Scheduled Tribes category ranged from 0.15% in Thanjavur to 0.29% in Thiruvarur district. The survey did not record any differences in livelihood patterns or cultural identities between the Scheduled Tribes and non-Scheduled Tribes. On the basis of these factors, it is concluded that the project will not directly or indirectly affect indigenous people as described in the ADB SPS 2009 and therefore an indigenous peoples plan is not required. The findings of the census survey undertaken for preparation of the resettlement plan also supports this conclusion, because out of the 2,500 households willing to provide information only 16 households are from schedule tribes. However, they are not living as a group but have merged with other families.

81. The project includes some features to include gender and social dimensions. This will be addressed primarily through the involvement of farmers, initially through channel stakeholder groups. Each stakeholder group will have 5 government officials and 15 farmers of the region, comprising of not less than 3 women. This forum is expected to promote participatory planning, operation and maintenance of irrigation schemes which will enhance water use efficiency, productivity and incomes of male and female farmers as indicated in the design and monitoring framework of the project.

82. The project is expected to have some gender benefits, and therefore the PMU assisted by SDC and PIUs will take the following actions: (i) ensure that the training for farmers will include at least 30% participants from women farmers and will consider women's needs and constraints (including possible limitations in time availability, mobility, literacy) in selecting the venue, timing and duration of training to enable maximum participation by women, (ii) ensure that each channel stakeholder group will have a minimum of 3 women farmers as member and support a female farmer to be elected as vice chair of the group, (iii) ensure that capacity building training programs of WRD will have at least 10% women officers, and (iv) ensure that the project quarterly report submitted to ADB will include a gender section to report the progress in implementing these above actions, including gender disaggregated data.

83. **Labor standards:** The borrower, State and WRD will ensure that Works contracts under the project follow all applicable labor laws of the borrower and the State and that these further include provisions to the effect that contractors; (i) carry out HIV/AIDS awareness programs for labor and disseminate information at worksites on risks of sexually transmitted diseases and HIV/AIDS as part of health and safety measures for those employed during construction; and (ii) follow and implement all statutory provisions on labor (including not employing or using children as labor, equal pay for equal work), health, safety, welfare, sanitation, and working conditions. Such contracts shall also include clauses for termination in case of any breach of the stated provisions by the contractors. WRD will closely monitor compliance

84. The PMU and PIU will require the contractors to report in each monthly progress report on labor employed covering the following information: (i) total number of contractor workers based on type of jobs in the particular reporting month, (ii) number of female and male workers in each job category, (iii) age of workers, and (iv) a statement of any difference in wages for male and female workers and the reasons.

IX. PERFORMANCE MONITORING, EVALUATION, REPORTING, AND COMMUNICATION

A. Project Design and Monitoring Framework

Impacts the Project is Aligned with
(i) Coastal districts are protected from cyclones and flooding exacerbated by climate change (Vision Tamil Nadu, 2023)[a]
(ii) Innovative and inclusive economic growth, including agricultural growth, in Tamil Nadu is accelerated (Twelfth Five Year Plan, 2012–2017)[b]

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting	Risks
Outcome Climate-resilient water management in the Vennar system improved	By 2021 a. 3,500 ha of land in tail-end areas have renewed access to irrigation (2015 baseline: 0)	a. WRD records	Floods exceed design limit
	b. 10,500 ha of land protected from river flooding (2008 baseline: area inundated without project is 21,300 ha)	b. District collectors' reports	
	c. The minimum average annual paddy yield for the project area (78,000 ha) is sustained at 2,800 kg/ha	c. Agriculture Department annual statistics report	
Outputs 1. Flood risk management and irrigation infrastructure upgraded	By 2020 1a. 200 km of climate-resilient embankment rehabilitated to withstand a 25-year return flood (2015 baseline: 50 km of embankment)	1a. PMU reports, WRD database	
	1b. 4 new regulators constructed, 10 regulators replaced, 13 upgraded, and 133 head sluices upgraded to be fully functional (2015 baseline: regulators and sluices are only partially functional) 1c. 13 irrigation pumping schemes rehabilitated (2015 baseline: pumping schemes functioning at 40% efficiency) 1d. Cumulative seawater ingress along channels decreased to 4 km (2015 baseline: cumulative seawater ingress 37 km)	1b–d. WRD database	
2. Improved water and flood risk management systems established	2a. WRD staff use DSS to support operational decision-making (2015 baseline: no DSS is available in 2015)	2a. WRD operational records	DSS-trained staff are moved to other areas of operation

	2b. Flood warnings issued by WRD, through district collectors, to the public at least 24 hours in advance (2015 baseline: 12 hours in advance) 2c. Channel stakeholder groups, comprising 20% women among farmer representatives, established (2015 baseline: channel stakeholder groups do not exist) 2d. 140 WRD staff, comprising 10% women, trained in improved water resource management 2e. Feasibility study and detailed design for the remainder of the Vennar and Cauvery systems. (2015 baseline: 0)	2b. District collectors' reports 2c–d. WRD records 2e. Project progress reports	

Key Activities with Milestones

1. Flood risk management and irrigation infrastructure upgraded

1.1 Implement resettlement plan (July 2016–June 2018)
1.2 Procure civil works (June 2015–October 2016)
1.3 Mobilize project implementation consultants (December 2015–April 2016)
1.4 Implement and complete civil works by April 2020

2. Improved water and flood risk management systems established

2.1 Mobilize technical advisory consultants by July 2017
2.2 Procure DSS and flood warning equipment by February 2018
2.3 Install DSS equipment and make it functional by October 2018
2.4 Prepare follow-on project by October 2018

Project Management Activities

PMU fully established by June 2016

Inputs

ADB: $100 million (loan)

Government of Tamil Nadu: $44 million

Assumptions for Partner Financing

Not Applicable

ADB = Asian Development Bank, DSS = decision support system, ha = hectare, kg = kilogram, km = kilometer, PMU = project management unit, WRD = Water Resources Department.

[a] Government of Tamil Nadu. 2012. *Vision Tamil Nadu, 2023: Strategic Plan for Infrastructure Development in Tamil Nadu.* Chennai.

[b] Government of Tamil Nadu, State Planning Commission. 2012. *Twelfth Five Year Plan: Tamil Nadu, 2012–2017.* Chennai.

Source: Asian Development Bank.

B. Monitoring

86. **Project performance monitoring**. The PMU will establish a project performance management system (PPMS) which will include monitoring using the targets, indicators, assumptions, and risks identified in the project design and monitoring framework. The baseline data for indicators and targets set out in the design and monitoring framework were collected during the PPTA and will be stored in the PPMS. Data indicators for subsequent years will be entered annually into the PPMS by PMU. Financial and physical progress will be recorded in the project management module of the PPMS.[25]

87. **Compliance monitoring.** The status of compliance with assurances, conditions and loan covenants—policy, legal, financial, economic, environmental, and others— will be included in the PMU quarterly progress reports and will be reviewed at each ADB review mission. All non-compliance issues, if any, together with remedial actions, will be updated in quarterly progress reports.

88. **Safeguards Monitoring.** WRD will establish a social and environmental monitoring cell within the PMU, which will be staffed by two government officers. Each of the two PIUs will include four government officers each assigned to implement and monitor environmental and social safeguards. The PMU and PIU will be supported by the PIC environment and social development consultants in monitoring and reporting.

89. The RP implementation will be monitored internally by the PIU assisted by PMU Social Development Consultant (SDC). The NGO engaged to help implement the resettlement plan will submit to PMU and PIUs monthly progress reports outlining the progress on paying compensation to displaced persons, physical progress of resettlement sites, progress on implementing other aspects of RP. On this basis, the PMU SDC will include quarterly progress in implementing RP, in the project quarterly progress reports submitted to ADB. In addition, the EA will submit a stand-alone semi-annual report on implementing RP to ADB and the government. The final RP semiannual report will cover overall implementation of RP and will be considered as RP compliance report. The external monitoring of the RP implementation will be undertaken by an external monitoring consultant who will submit semi-annual reports to WRD for submission to ADB.

90. On environmental safeguards, the PMU and PIU responsible officers supported by the environment specialist of the PIC will be responsible to monitor and report on implementation of the EMP. Progress of implementation of the EMP will be included in WRD's quarterly project progress reports and environmental monitoring reports will be submitted semi-annually.

91. ADB will monitor implementation of social and environmental safeguards during its review missions.

92. **Gender and social dimensions monitoring.** The PMU will report on public participation, gender, and implementation of labor law in the project quarterly progress report. The report on public participation will focus on the progress of formation and implementation of the channel level stakeholder participation and report on consultations undertaken during project implementation. On gender aspects, the quarterly progress reports will include information on participation of WRD staff in the project either through capacity building training or their direct involvement in managing

[25] ADB's project performance reporting system is available at: http://www.adb.org/Documents/Slideshows/PPMS/default.asp?p=evaltool

this project. The gender progress should also include data on sex disaggregated data on involvement of women farmers/communities in the project.

C. Evaluation

93. A mid-term review of the project will be undertaken 18 months after the loan effectiveness date. It will evaluate the scope of the loan, implementation arrangements; safeguard issues, achievement of scheduled targets, contract management progress, and other issues including mid-course corrections. As an input to the mid-term review, WRD will prepare with the assistance of its consultants an assessment of project results and implementation progress, and submit this to ADB two weeks in advance of the mid-term review mission. An evaluation will be undertaken by ADB one year after the closure of the project. Findings of the completion report will be shared and disseminated within ADB and with key government officials at the national and state level.

94. Within 6 months of physical completion of the project, WRD will submit a project completion report to ADB.[26]

D. Reporting

95. The PMU will provide ADB with (i) quarterly progress reports in a format consistent with ADB's project performance reporting system; (ii) consolidated annual reports including (a) progress achieved by output as measured through each indicator's performance targets, (b) key implementation issues and solutions; (c) updated procurement plan; (d) semi-annual environmental monitoring and semi-annual social safeguards monitoring reports and (e) updated implementation plan for next 12 months. To ensure projects continue to be both viable and sustainable, project financial statements and the executing agency audited financial statements, together with the associated auditor's report, should be adequately reviewed.

E. Stakeholder Communication Strategy

96. Effective participation of various stakeholders in the project will be achieved using a stakeholder communication plan (see Appendix F). Government officials, policymakers and water users, particularly farmers, will be the primary stakeholders in the project. Dissemination of information and seeking ideas and opinions of stakeholders is built into the communication plan. The following table summarizes the communications plan.

Stakeholder Group	Stakeholder Interests and Concerns	How the project Works with Stakeholder Group	Who is Responsible for Stakeholder Participation or Communication
General beneficiaries of improved water delivery and flood risk reduction	• Need to be aware of project and how it will benefit them • How the project intervention will result in increased income to the household	• Disseminate general information about project through information posters displayed in schools, health centers, project website, and brochure	PMU with support of PIC Social Development Specialist

[26] Project completion report format is available at: http://www.adb.org/Consulting/consultants-toolkits/PCR-Public-Sector-Landscape.rar

Stakeholder Group	Stakeholder Interests and Concerns	How the project Works with Stakeholder Group	Who is Responsible for Stakeholder Participation or Communication
	• Increased number of working days • Interested in timely and sufficient delivery of irrigation water • Affected by floods • Minimizing damage and loss to crops, livestock • Reduction in level salinity in drinking water of those HH dependent in ground water	• Briefings for local community. Meetings will be conducted semi-annually. Local best practices to be shared at these meetings. • Flood forecasting information will be disseminated through District Collectors (once developed under project) • Representative farmers will be members of Channel Stakeholder Groups as the main forum for voicing their needs and perspectives to WRD	PMU, with support of Social Development Specialist PMU, with support of Social Development Specialist PMU, with support of Social Development Specialist
Households having structures on channel embankments that will be removed under the project	• Reluctant to move on time • Concerns of loss of livelihood, residence • Concern of employment opportunity in the relocated site	• Gist of RP to be disseminated through handouts in Tamil and hold meetings with DHs • Monitor implementation of resettlement plan, ensuring livelihood restoration measures for relocated households • Timely availability of information about entitlements, schedule for relocation and civil works	NGO / PIU NGO engaged by PMU to implement RP, supervised by PMU's Social Development Specialist and external monitor NGO / PIU
District-level government agencies working in agriculture, fisheries, disaster management, environment, and local	• Need to be aware of project and how it will affect their programs • They serve as a liaison with project	• They will be members of Field Implementation Coordination Committee and meet regularly to	PIU

Stakeholder Group	Stakeholder Interests and Concerns	How the project Works with Stakeholder Group	Who is Responsible for Stakeholder Participation or Communication
roads, and district collectors	beneficiaries through their own programs • Their cooperation will be needed for key project activities such as road improvements on channel embankments, implementing flood early warning systems, etc.	share information and coordinate	
Channel Stakeholder Groups (CSG)	• Need to be aware of the objectives of project and progress of works • Availability of water for irrigation • Reduction in flooding of fields • Early warning for preventive measures	• Dissemination of scope and objective of project, schedule of activities in regular meetings held minimum four in a year • Discuss plans on effective use of water and implement the reasonable/feasible decisions • Periodically update on progress of works/maintenance required	PIU in coordination with CSG
Local Body representatives, panchayats	• Need to be aware of the objectives of project and progress of works	• Dissemination of scope and objective of project, schedule of activities in regular/special gram sabha meetings • Periodically update on progress of works	PIU in Coordination with local body
Delta Farmers association(s)	• Need to be aware of the objectives of project and progress of works	• Dissemination of scope and objective of project, schedule of activities • Periodically update on progress of works	Public relations officer of PMU with the support of SDO, PMU and NGO

X. ANTICORRUPTION POLICY

97. The Government, the state government, and WRD are advised of ADB's Anticorruption Policy (1998, as amended to date). Consistent with its commitment to good governance, accountability and transparency, implementation of the project shall adhere to ADB's Anticorruption Policy. ADB reserves the right to review and examine, directly or through its agents, any alleged corrupt, fraudulent, collusive, or coercive practices relating to the project. In this regard, investigation of government officials, if any, would be requested by ADB to be undertaken by the government.

98. To support these efforts, relevant provisions of ADB's Anticorruption Policy are included in the Loan Regulations, Agreements, and the bidding documents. In particular, all contracts financed by ADB shall include provisions specifying the right of ADB to audit and examine the records and accounts of the State and WRD, and all contractors, suppliers, consultants, and other service providers as they relate to the project. Individuals/entities on ADB's anticorruption debarment list are ineligible to participate in ADB-financed activity and may not be awarded any contract under the Project.[27]

99. ADB's Anticorruption Policy designates the Office of Anticorruption and Integrity (OAI) as the point of contact to report allegations of fraud or corruption among ADB-financed projects or its staff. OAI is responsible for all matters related to allegations of fraud and corruption. For a more detailed explanation refer to the Anticorruption Policy and Procedures. Anyone coming across evidence of corruption associated with the project may contact the Anticorruption Unit by telephone, facsimile, mail, or email at the following numbers/addresses:

(i) by email at integrity@adb.org or anticorruption@adb.org
(ii) by phone at +63 2 632 5004
(iii) by fax to+6326362152
(iv) by mail at the following address (Please mark correspondence Strictly Confidential):
Office of Anticorruption and Integrity
Asian Development Bank
6 ADB Avenue Mandaluyong City
1550 Metro Manila, Philippines

[27] ADB's Integrity Office web site is available at: http://www.adb.org/integrity/unit.asp

XI. ACCOUNTABILITY MECHANISM

100. People who are, or may in the future be, adversely affected by the project may submit complaints to ADB's Accountability Mechanism. The Accountability Mechanism provides an independent forum and process whereby people adversely affected by ADB-assisted projects can voice, and seek a resolution of their problems, as well as report alleged violations of ADB's operational policies and procedures. Before submitting a complaint to the Accountability Mechanism, affected people should make a good faith effort to solve their problems by working with the concerned ADB operations department. Only after doing that, and if they are still dissatisfied, should they approach the Accountability Mechanism.[28]

XII. RECORD OF CHANGES TO THE PROJECT ADMINISTRATION MANUAL

101. On 16 June 20017, after discussions held during the 12-16 June review mission, the following updates were agreed on and updated in the PAM:

- Table 3 and Figure 2: Two additional PIUs have been formed to support the supervision of the construction works: (i) Thanjavur-Cauvery and (ii) Thanjavur-Vennar. The PIUs are also being supervised by the SE, lower Cauvery basin circle, Thanjavur.
- Paragraph 77: Grievance Redress Mechanism (GRM): Any complaint will be acknowledged within three days, and if unresolved after two weeks raised to the second tier. Additionally, the first tier GRM has been amended to a single contact point at the jurisdictional PIU Vennar Division, Thiruvarur or PMU. The grievance redressal committee (GRC) was also updated with an Executive Engineer (Thiruvarur).
- Table 3 and Appendix F - paragraph 9: The field implementation coordination committee (FICC) is chaired by the relevant district collector, with the district revenue officer as the vice chair. The FICC was also formed in Thiruvarur and Nagapattinam districts.

[28] For further information see: http://www.adb.org/Accountability-Mechanism/default.asp.

APPENDICES

Appendix A: Management of Flood Risk and Flood Events

Assessment of Flood Risk

1. Analysis of flood risk on rivers and drains and adjacent flood plains in the Vennar system will be based on flood risk mapping derived from modelling of flood frequency and impact under current and future climate scenarios using the digital terrain models (DTMs) to prepare flood extent, duration, and depth maps for a range of design storms under current and future climate and sea level scenarios.

2. Flood risk mapping for the Pandavayar, Vellaiyar, Harichandra, Adappar and Valavanar catchments has already been undertaken. For the follow on project it will be undertaken by the PTAC consultants, the Hydrologist, Surface Water Modeller and GIS Specialist. On the job training will be provided to WRD staff in the process. Flood forecasting and warning will be installed in the project area and recommendations provided for the follow on project.

Flood Forecasting and Warning

3. There is already an effective flood warning system for the Cauvery and Coleroon rivers but flood forecasting and warning for the smaller delta watercourses such as the Lower Cauvery and Vennar rivers and the Grand Anicut Canal are less well developed.

4. The flood forecasting and warning systems will comprise the following:

(i) Links between the WRD DSS and 1-3 day rainfall forecasts in the Indian meteorological department (IMD) daily weather bulletin for Tamil Nadu and Pondicherry[1] which includes 3-day forecasts of rainfall according to six classes (widespread, fairly widespread, scattered, isolated, mainly dry and dry) and warnings of heavy rainfall according to three severities (Heavy (64.4-124.4 mm; Very Heavy (124.5-244.4 mm; Extremely Heavy (>244.4 mm)). The IMD bulletin also provides a weather outlook for the 4-day period following the 3-day forecast period.

(ii) Real time links between the WRD DSS flows within the river/canal/drainage systems as indicated by the network of telemetered water level recorders

(iii) Modelling by WRD hydrologists of storm runoff from the Vennar and Cauvery systems using a simple catchment rainfall-runoff model such as SWAT (Soil and Water Assessment Tool) or similar from forecast rainfall obtained from the IMD daily weather bulletins.

(iv) For normal flood operation of regulators in the irrigation systems, model water levels within the channels at key locations for up to 3 days

(v) Modelling of alternative modes of flood operation of regulators to identify optimum gate settings to minimize flood impacts and conserve excess surface water in natural storage areas. During major widespread floods it is standard practice to

[1] http://www.imd.gov.in/section/nhac/dynamic/ALLINDIA_MAIN.HTM

fully open all regulators in the Vennar system (except the Harichandra and Adappar head regulators) in order to discharge flood waters to the sea as quickly as possible. However during less widespread flooding there may be opportunities to reduce flood impacts locally and save water by re-routing flood water towards natural storage areas such as the flood plain/paleo-lagoon on the lower Valavanar Drain.

(vi) Identify areas where high water levels in the channels will impede field drainage or exceed embankment levels.

(vii) Develop links to District Collectors, District Disaster Management Authorities, Municipalities and Panchayats for the dissemination of flood warnings.

5. The techniques to be used will include:

(i) Statistical correlations between historical IMD forecasts of rainfall and locally observed rainfall and peak water levels at the principal structures in the Vennar and Cauvery systems

(ii) Rainfall intensity and duration thresholds corresponding to observed flooding in the systems.

(iii) Statistical correlations between historical observed water levels at the principal structures in the Vennar and Cauvery systems

(iv) Water level thresholds corresponding to observed flooding in the systems.

(v) Confirmation of rainfall and water level thresholds through hydraulic modelling of the without-project and with-project configurations of channels and structures

(vi) Determine flood forecast and flood warning triggers.

(vii) Flood forecast and flood warning triggers will be programmed into the DSS so that WRD decision makers can be alerted to the risk of flooding and the potential need to issue targeted flood warnings through the District Disaster Management Authorities to the public.

Flood Risk Mapping

6. Post-flood surveys of structures and embankments that are normally carried out by WRD after floods will be expanded to include the mapping of flood extent and estimation of depth, duration, velocity and direction of flow on the flood plains. This information will be used to improve the configuration and calibration of the flood models, flood warning triggers and indicate high risk locations where additional flood risk mitigations are required.

7. Using the DTMs produced from the topographic surveys of channels, structures and flood plains and stereo imagery and any existing DTMs of the Vennar and Cauvery systems and the hydrological and hydraulic models of the systems, geo-referenced maps of flood extent, duration and depth for a range of design floods (25, 50 and 100-year floods with and without climate change) for the with-project scenario and the without-project scenarios will be produced.

8. The flood maps will be used by WRD to (i) refine the flood forecasting and warning systems by developing geographically targeted forecasts and warnings which will assist district disaster management authorities (DDMAs) to deploy emergency services accurately and efficiently, (ii) identify high risk areas which require additional flood mitigation measures and (iii) support flood disaster planning by the DDMAs.

Training of WRD staff

9. The training of WRD in the installation, operation and maintenance of the field equipment will be provided by the equipment suppliers. Training in the operation and maintenance of hydro meteorological databases required for flood forecasting and warning, including data quality control, processing, reporting and archiving will be provided in the course of setting up the DSS. Training in rainfall-runoff modelling, hydraulic modelling and the development of flood warning triggers will be delivered by the PTAC consultants.

Appendix B: Implementation of Decision Support System

A. Summary

1. A Decision Support System (DSS) is to be developed to support WRD to improve water resources management in the project area by providing a near real time overview of the water resources related information in the Vennar system and providing guidance on action to be taken. It is envisaged that the information provided by the system would progressively developed in response to user needs once they become familiar with the system.

2. The DSS will comprise basic information and data necessary to support decision making for regulator operations, irrigation planning and management of water resources by the WRD and will include surface water and groundwater databases and irrigation command area (ayacut) information such as crop water requirements and crop areas. The DSS would also include an asset management component to support improved planning of system maintenance.

3. The simple DSS will be accessible to WRD decision makers and operating staff through a user-friendly computer interface (or tablets and smartphones) allowing them to inspect up-to-date storage level at Mettur Dam, river levels, flows, water demands throughout each irrigation and drainage system and to adjust surface water deliveries to actual needs considering local groundwater availability and recent rainfall.

4. There are three main components to the system:

   (i) Equipment along the six channels to capture key data, particularly water levels and telemetry to convey the data to a central data base

   (ii) A database with software to process the channel data and combine with other data to provide information relating to the system status and provide guidance on operation.

   (iii) Users who access the information through the internet using fixed (e.g. desktop computers) and mobile (e.g. smartphones and tablets) devices in order to make decisions and take action on system operation and and maintenance. The system would also be able to automatically generate messages through SMS or other technological means for pre-determined conditions.

5. In the interests of benefit to all users, transparency, accountability and stakeholder participation, the water users may be given access to the system status information provided by the DSS.

6. The architecture of the DSS will comprise will comprise of software and hard ware with excellent internet connectivity and backup systems such as in the PWD Surface Water and Groundwater Data Centre in Chennai. Computers in the offices of the divisional Executive Engineers and/or the sub-divisional Assistant Executive Engineers will be able to access the main DSS database through the internet using either reports or web pages created on demand or by downloading specific data for local analysis. A tablet/smartphone or suitable application should be developed to enable key data in the DSS to be accessed by field staff when out of office. For example, incorporation of gate rating curves in the system would enable operating staff to be guided on the appropriate gate openings to achieve the required flow distribution.

7. The monitoring stations will deliver data into the database automatically in near real time and will be immediately available for automatic quality control, archiving, processing and analysis. Interpretation, decision-making and reporting would be undertaken by qualified WRD technicians to support operational decisions by key WRD engineers. To the maximum extent possible the data processing functions will be automated with reports and graphs created on demand to meet user requirements. The database software will detect abnormal conditions and automatically raise alarms by SMS or email to pre-defined users.

8. Key decision-making that would be supported initially include: (i) Irrigation planning and efficient water distribution to the systems on seasonal and crop watering (e.g. 6-day) time scales, based on actual immediate crop water requirements in individual command areas, (ii) integrated operation of Mettur dam, anicuts, head regulators, cross regulators and tail regulators to maintain appropriate flows and water levels in the rivers and main drains during normal supply periods and floods, and (iii) Detection and response to distribution system problems and breakdowns at regulators. The system would also entry the entry of data by authorised field staff on operational problems and maintenance requirements to facilitate the generation of status reports

9. After WRD familiarity and confidence in the usefulness DSS has been established, the DSS should be developed into a more sophisticated tool that will support the planning, execution and monitoring of water use, the integration of hydrologic and hydraulic models to inform decision making about irrigation operations during normal and stressed water resource conditions. These developments maybe considered during the proposed follow on project.

10. Further development of the DSS could include flood forecasting (using links to the India Meteorological Department and the CWC) and flood warning and management of regulators during flood events.

B. Analysis of Needs

11. Surface water supply to the Cauvery Delta during June to October is determined largely by the amount of water available in the Stanley Reservoir at Mettur Dam. Estimates of irrigation requirements are prepared by the WRD sub-divisional engineers according to irrigated farm areas and standard water duties. The sub-divisional estimates are aggregated by the Executive Engineers and Superintending Engineer and used to decide the necessary releases of water from Mettur Dam.

12. Operation of head regulators in the Cauvery Delta determines the distribution of water released from Mettur Dam. The Grand Anicut is the apex regulator in the delta which controls discharges to the Cauvery, Vennar and Grand Anicut Canal systems. In the Vennar system, the VVR head regulator is used to release the necessary discharges to maintain normal supply levels in the Vettar, Vennar and Vadavadar rivers.

13. Formal control rules and structure ratings, published in 1937, are still referred to by WRD gate operators. These instruct the operators how to determine appropriate gate settings to maintain the required supply levels. WRD review gate settings on a six day cycle using information on irrigation demands and recent rainfall to decide appropriate discharges and gate settings for the next 6 days. This procedure is based on the experience and judgment of WRD Engineers.

14. Actual discharges through the head regulators are now probably less than those indicated by the 1937 theoretical discharge tables because of the influence of vegetation and sediment on flow characteristics in the vicinity of the regulators. Therefore, based on their judgment, the gate

operators compensate by adjusting gate openings in order to maintain normal supply levels in the system.

15. WRD engineers attempt to maintain the rivers at normal supply levels but operate the canal head sluices in response to farmers' requests, many of which are received individually by telephone or through direct lobbying. Decision-making on water distribution to the command areas is therefore not systematic or collective. There appear to be no formal water distribution plans or watering schedules for each command area (ayacut). Present practices tend to favor upstream users, giving them the opportunity to consume more water than needed and to disadvantage downstream users.

16. During flood conditions inflows into the delta from the Cauvery River are stopped at the Grand Anicut and diverted to the sea through the Ullar channel to the Coleroon River. At these times most regulators in the Cauvery, Vennar and Grand Anicut Canal systems are opened fully to discharge storm runoff generated within the delta to the sea as quickly as possible. In the Vennar system, flood waters are directed preferentially down the Vettar River, then down the Vennar River and finally, if necessary, down the Vadavar River.

17. This indicate that (i) there is a need for greater accuracy of discharge measurements at all regulators through updated calibrations of the gates, (ii) linking gate operation with rainfall forecasts could improve the management of the irrigation systems by reducing irrigation requirements, increasing water use efficiency, and securing crop production, and (iii) some irrigation head sluices are unregulated because they are blocked or stuck partially open, or fully open, due to lack of maintenance,.

C. Functions of the Decision Support System

a. Water Distribution

18. The current method of operation of the canal systems in the Cauvery Delta is in response to requests from farmers for water. It favors individual farmers but is inefficient in terms of water management. There is also the problem of collating all requests, and identifying and scheduling the most effective way of meeting all individual requirements.

19. Optimal irrigation supply requires that rainfall in the irrigated area is anticipated and supply reduced accordingly. A DSS function could be provided to link the operation of the Mettur Dam, Grand Anicut and VVR head regulator with the forecast rainfall. This would support decision-making by WRD to adjust river flows in advance. It takes water approximately 3 days to travel from Mettur Dam to Grand Anicut and a further 3 days from Grand Anicut to the tail end regulators in the delta.

20. There is also the issue of equity of supply as farmers closer to the source of irrigation water will receive more water than those at the tail of the system. Special arrangements have to be made if equity of supply is to be achieved. The DSS, by providing up-to-date information on the current status of flows in the rivers, the availability of surface water and irrigation requirements in the ayacuts, will facilitate decision-making by WRD to reallocate surface water more equitably and more efficiently to maximize productivity.

21. In some years the volume of water stored in the Stanley Reservoir at Mettur Dam is not adequate to meet irrigation requirements for the whole cropping season. Under those circumstances, rationing of water releases is needed. The DSS could support WRD decisions on

optimal releases to minimize crop losses, making use of data in the DSS on cropped areas, crop water requirements, water transmission efficiencies and the other related data.

22. If shortfalls are expected, the DSS could provide guidance on likely reduction in crop yields for a given supply strategy – for example share deficit evenly over all potential planted areas and throughout the full growing season, or advise a reduction in cropped area to match the available water resources and spread supply throughout the full irrigation season.

23. The DSS could also provide short-term guidance on distribution of water within the system. For example, if rain is forecast (or occurs) re-evaluate the irrigation water requirements based on estimated soil moisture conditions following the rain then reduce irrigation water requirements through the canal system accordingly (perhaps making use of temporary storage in reservoirs and tanks within the irrigation system at the same time as reducing releases from Mettur).

24. It could also take into consideration actual water stress in the region (if suitable monitoring systems were to be set up) so that irrigation water supply could be sent to areas suffering more than others to relieve such stress. The DSS could advise from such data what the scheduling of flows in each canal at each regulator should be – and what gate settings should be.

25. Incorporation of an asset management component in the DSS would enable problem reports and maintenance requirements to be logged in a systematic manner to support more effective planning and efficient implementation of maintenance. Maintenance requirements that impact on operations would be automatically reflected in the operating guidance provided by the DSS.

b. Management of Flood Flows

26. The network of telemetered rain gauges, weather stations and flow gauges can be used to forecast and manage flood conditions. The telemetry system will be capable of real-time reporting of:

(i) Water levels and flows within the canal system to inform decisions on the timely operation of control structures

(ii) Expected inflows to the system – both at the head of the system (main river) and the drainage from land within the irrigated area

(iii) Sea water levels or downstream water levels as appropriate

(iv) The state of groundwater and surface water storage in the catchment

27. The DSS forecasts of critical water levels in the channels will be based on statistical correlations between water levels at the head regulators and water levels in downstream flood zones. A potential further development of the DSS would replace the statistical correlations by forecasting models (rainfall-runoff, hydraulic and water balance models) to give forecasted water levels and flows within the system (forecasts are updated as real time data is received).The flood management function of the DSS would:

(i) Provide links to 1-6 day rainfall estimates from appropriate web-sites e.g. the India Meteorological Department,

(ii) Forecast flows in the Cauvery River at Grand Anicut up to 6 days ahead (through statistical correlation between observed levels/flows)– implying that a routing model is required (either a hydrodynamic model or a routing model)

(iii) Forecast flows and water levels at key locations in the Vennar and Cauvery Rivers in the delta up to 6 days ahead using the CAVSCD hydrologic and hydraulic models prepared by the PPTA and PTAC consultant with forecast rainfall from the IMD and real-time data from the telemetric monitoring stations,

(iv) modelling such as SWAT, eWater Source, HEC-HMS or NAM (models such as HEC-HMS or NAM become more appropriate at short time intervals)

(v) For assumed flood management flow distribution for this 6 day period, and assumed operation of tail sluices, estimated water levels within the canal/drainage system at key locations and for the three day forecast

(vi) Identify river embankments where water levels are expected to exceed top levels and indicate the likely extent, depth and duration of flooding,

28. The DSS would support rapid assessment of alternative strategies for regulator operations to direct flood flows away from vulnerable assets and minimise the impact of flooding

D. Training of WRD Staff

29. Training and capacity development of WRD planning and operation staff will be required to introduce them to the concept and capabilities of the DSS and then progressively enhance their ability to use the system in the execution of their daily workload. The training will also provide opportunity for feedback on the DSS capabilities and development of the user interface (for example, additional reports and graphs).

30. Provision would be included within the DSS development contract for ongoing support and refinement of the DSS in response to user requirements and suggestions to ensure that the DSS becomes an integral part of the system operation and maintenance.

31. Specific WRD staff will be given training in operation and maintenance of the system hardware (including the field equipment) and software although it is envisaged that primary responsibly for the DSS operation and maintenance during the project implementation period will rest with the supplier. Training in the use of the ultrasonic flow measurement equipment would also be provided by the hydrologist in the project technical advisory consultants.

32. Beyond this, an overall capacity building program in climate-resilient integrated water resources management would be provided for WRD staff. In addition to training on the DSS tools described above, WRD staff would gain knowledge and upgraded skills in using climate change projections, using the new criteria for engineering designs prepared through the setting up and using hydraulic and hydrologic modelling for design and planning, flood forecasting and warning, and how to work with farmers to manage their surface water and groundwater resources.

E. Inputs to the DSS

a. DSS. The main components of the initial DSS are: (i) field monitoring equipment and telemetry, (ii) computer hardware and database software,

(iii) a program of flow measurements to calibrate discharges through regulators, (iv) a watering schedule calendar in the form of a simple spreadsheet, (v) a georeferenced asset register of channels, structures and other pertinent features including their hydraulic connectivity and (vi) details of catchment and command areas.

b. Monitoring Equipment and Database

33. Table 1 gives lists of the hydrometric field equipment (to be installed at key regulators) and office based hardware and software that would be needed to link the monitoring stations to the DSS and implement it for the project.

Table 1: Equipment for DSS

Field Equipment	Number of Installations
Recording rain gauges	30
Check rain gauges	30
Automatic meteorological stations	4
Surface water level measurement	45
Radar flow velocity measurement	9
Groundwater level recorders	23
Gate position measurement	32
Data logger / PSU / telemetry unit	79
Ultrasonic flow meter	3
SIM cards and cell phone contracts	79
Office Equipment	
Telemetry system base station	1
Server + Back-Up Facility	1
Workstations + UPSs	20
Software and Capacity Development	
Development of database	1
Entry of data to database	1
Development of user interface	1
Training of WRD field engineers	1
Ongoing refinement of DSS during the project	

c. Calibration of Regulator Discharges

34. To promote fairly accurate decisions on releasing flow through various channels it becomes important to generate a simple model of discharge rating calibration. The gate rating calibration involves measuring the actual discharge using flow meter reading and cross section of the river at a reasonable distance downstream of the regulator over the widest possible range. Each discharge value will reflect a different gate opening (or combination of gate openings where

there are multiple gates) condition. A coefficient of discharge Cd (Cd is the ratio of actual flow rate to theoretical discharge) is calculated for each set of measurements. The flow measurements would be obtained using Acoustic Doppler Current Profilers to be procured under the project.

35. Such an approach will be developed by experts in the PTAC working alongside WRD staff, using feedback from current day-to-day operations and processes to help develop an "expert system" that fully reflects the extent of information needed by those making operational decisions for the system management. The spreadsheet (or other simple computational tool such as a tablet or smartphone app) could be adapted to incorporate improvements made to the canal system under the project and become a "live" system capable of regular revision to incorporate future changes.

d. Water Schedule Calendar

36. This is a practical spreadsheet-based approach to the management of irrigation schemes in the Vennar system using a calendar of projected crop water requirements to plan irrigation schedules well in advance. The spreadsheet would provide a calendar of gross and net irrigation requirements for a target command area based on planned cropped areas and crop calendars and normal rates evapotranspiration. The spreadsheet could then be updated contingent on actual rainfall, evapotranspiration and availability of groundwater and surface water in the rivers and local tanks in order to improve canal operations. While the spreadsheet may be initially developed as a stand-alone tool, it would be advisable to have this facility incorporated into the DSS database software so that the foundation data are automatically provided.

e. Asset Register

37. The DSS requires knowledge of the infrastructure (channels, regulators, etc., which forms the water distribution system with their hydraulic connectivity and operating parameters so that the system can determine operational recommendations. An enhancement of this inventory is to include provision for the maintenance status so that the DSS becomes the system for recording problems and the maintenance status. The DSS will also require data for catchments and command areas

Appendix C: Procurement Plan

Basic Data

Project Name: Climate Adaptation in Vennar Subbasin in Cauvery Delta	
Project Number: 44429-013	**Approval Number**:
Country: India	**Executing Agency**: Water Resources Department, Government of Tamil Nadu
Project Procurement Classification: B	**Implementing Agency:** N/A
Procurement Risk: Substantial	
Project Financing Amount: $144 million **ADB financing**: $100 million **Non-ADB Financing:** $44 million	**Project Closing Date:** 31 December 2020
Date of First Procurement Plan: 7 April 2016	**Date of this Procurement Plan**: 7 April 2016

A. Methods, Thresholds, Review and 18-Month Procurement Plan

1. Procurement and Consulting Methods and Thresholds

1. Except as the Asian Development Bank (ADB) may otherwise agree, the following process thresholds shall apply to procurement of goods and works.

Procurement of Goods and Works		
Method	**Threshold**	**Comments**
International Competitive Bidding for Goods	US$ 3,000,000 and above	
National Competitive Bidding for Goods	Between $100,001 and $2,999,999	
Shopping for Goods	Up to $100,000	WRD will issue a public request for quotations
International Competitive Bidding (ICB) for Works	$40,000,000 and above	
National Competitive Bidding (NCB) for Works	Between $100,001 and $39,999,999	
Shopping for Works	Up to $100,000	WRD will issue a public request for quotations

Consulting Services	
Method	**Comments**
Consultants' Qualifications Selection for Consulting Firm	
Fixed Budget Selection for Consulting Firm	
Least-Cost Selection for Consulting Firm	
Quality- and Cost-Based Selection for Consulting Firm	80:20 quality-cost ratio
Quality Based Selection for Consulting Firm	
Individual Consultants Selection for Individual Consultant	

2. Goods and Works Contracts Estimated to Cost $1 Million or More

2. The following table lists goods and works contracts for which the procurement activity is either ongoing or expected to commence within the next 18 months.

Package Number	**General Description**	**Estimated Value**	**Procurement Method**	**Review** [Prior / Post/Post (Sample)]	**Bidding Procedure**	**Advertisement Date** (quarter/year)	**Comments**
CW 1 - CAVSCDP/TN/HRN	Infrastructure Improvements and Reconstruction Works on Harichandranathi from LS 121.142 Km to 160.200 Km &Lawford Straight Cut from LS 0 to 3.900 Km.	$35.73M	NCB	Prior	1S2E	Q1/2016 (advertised on 5/2/2016)	Prequalification of Bidders: N Domestic Preference Applicable: N Advance contracting: Y Bidding Document: Small Works
CW 2 - CAVSCD/TN/ADP	Infrastructure Improvements and Reconstruction Works on Adappar River from LS 130.236 Km to 169.025 Km &Adappar Straight Cut from LS 0 to 2.40 Km.	$23.33M	NCB	Prior	1S2E	Q1/2016 (advertised on 5/2/2016)	Prequalification of Bidders: N Domestic Preference Applicable: N Advance contracting: Y Bidding Document: Small Works
CW 3 - CAVSCD/TN/VLR	Infrastructure Improvements and Reconstruction Works on Vellaiyar River from LS 111.650 Km to 153.650 Km.	$24.66M	NCB	Prior	1S2E	Q3/2015 (advertised on 9/9/2015)	Prequalification of Bidders: N Domestic Preference Applicable: N Advance contracting: Y Bidding Document: Small Works
CW 4 - CAVSCD/TN/PDR	Infrastructure Improvements and Reconstruction Works on Pandavaiyar River from LS 109.270 Km to 148.020 Km.	$13.95M	NCB	Prior	1S2E	Q3/2015 (advertised on 9/9/2015)	Prequalification of Bidders: N Domestic Preference Applicable: N Advance contracting: Y Bidding Document: Small Works

CW 5 - CAVSCD/TN /VNR	Infrastructure Improvements and Reconstruction Works on Valavanar Drain from LS 0 Km to 16.450 Km.	$6.18M	NCB	Prior	1S2E	Q1/2016 (advertised on 5/2/2016)	Prequalification of Bidders: N Domestic Preference Applicable: N Advance contracting: Y Bidding Document: Small Works
CW 6 - CAVSCD/TN /VRM	Infrastructure Improvements and Reconstruction Works on V.Canal and Uppanar.	$4.45M	NCB	Prior	1S2E	Q1/2016 (advertised on 5/2/2016)	Prequalification of Bidders: N Domestic Preference Applicable: N Advance contracting: Y Bidding Document: Small Works
Pump 1 - CAVSCD/TN /PS	Design, Supply, Installation, Testing and Commissioning of Various pumping machinery including associated electrical, Mechanical and civil works.	$2.02M	NCB	Prior	1S2E	Q1/2016 (advertised on 4/2/2016)	Prequalification of Bidders: N Domestic Preference Applicable: N Advance contracting: Y Bidding Document: Small Works

3. Consulting Services Contracts Estimated to Cost $100,000 or More

3. The following table lists consulting services contracts for which the recruitment activity is either ongoing or expected to commence within the next 18 months.

Package Number	**General Description**	**Estimated Value**	**Recruitment Method**	**Review** (Prior / Post)	**Advertisement Date** (quarter/year)	**Type of Proposal**	**Comments**
CS-1A	Project Implementation Consultants (PIC) - Project Management Specialist	$285,655	ICS	Prior	Q1/2016	N/A	Assignment: National Expertise: Project Management Advance Contracting: Y Comments: 36 person-months (p-m)

CS-1F	PIC – Social Development and Resettlement Specialist	$102,690	ICS	Prior	Q1/2016	N/A	Assignment: National Expertise: Social Development and Resettlement Advance Contracting: Y Comments: 18 p-m
CS-1G	PIC – Quality Assurance Engineer	$103,478	ICS	Prior	Q1/2016	N/A	Assignment: National Expertise: Quality Assurance Engineer Advance Contracting: Y Comments: 18 p-m
CS-2	Project Technical Advisory Consultants (PTAC)	$1,100,000	QCBS	Prior	Q3/2016	Full technical	Assignment: International Quality-Cost Ratio: 80:20 Advance Contracting: N Comments: For flood mapping, DSS, and feasibility study for follow-on project
CS-3	MIS Development and Maintenance	$300,000	QCBS	Prior	Q2/2016	Bio-data	Assignment: National Quality-Cost Ratio: 80:20 Advance Contracting: N Comments: Lump sum contract
CS-4	Internal Audit	$240,000	QCBS	Prior	Q1/2016	Bio data	Assignment: National Quality-Cost Ratio: 80:20 Advance Contracting: Y Comments: Lump sum contract
CS-5	Topography Survey- Vennar	$400,000	QCBS	Prior	Q3/2016	Bio-data	Assignment: National Quality-Cost Ratio: 80:20 Advance Contracting: Y

							Comments: Lump sum contract
CS-6	Topography Survey- Cauvery	$475,000	QCBS	Prior	Q3/2016	Bio-data	Assignment: National Quality-Cost Ratio: 80:20 Advance Contracting: Y Comments: Lump sum contract

4. Goods and Works Contracts Estimated to Cost Less than $1 Million and Consulting Services Contracts Less than $100,000 (Smaller Value Contracts)

4. The following table groups smaller-value goods, works and consulting services contracts for which the activity is either ongoing or expected to commence within the next 18 months.

Goods and Works								
Package Number	**General Description**	**Estimated Value**	**Number of Contracts**	**Procurement Method**	**Review** [Prior / Post/Post (Sample)]	**Bidding Procedure**	**Advertisement Date** (quarter/ year)	**Comments**
Equipment 1	Field hydro-meteoro-logical equipment	$ 592,700	1	NCB	Prior	1S1E	Q3/2017	Prequalification of Bidders: N Domestic Preference Applicable: N Advance Contracting: N Bidding Document: Goods Comments: Provider will train on equipment use
Equipment 2	DSS Office equipment	$40,000	1	Shopping	Post	N/A	Q3/2017	Advance Contracting: N
Equipment 3	PMU Office Equipment	$240,000	Multiple	Shopping	Post	N/A	Q4/2016	Advance Contracting: N

								Comments: multiple contracts
Software 1	DSS software	$85,000	1	Shopping	Post	N/A	Q3/2017	Advance Contracting: N

Consulting Services

Package Number	**General Description**	**Estimated Value**	**Recruitment Method**	**Review** (Prior / Post)	**Advertisement Date** (quarter/year)	**Type of Proposal**	**Comments**
CS-1B	PIC – Construction Engineer	$69,773	ICS	Prior	Q1/2016	N/A	Assignment: National Expertise: Construction Supervision Advance Contracting: Y Comments: 12 p-m
CS-1C	PIC – Financial Management Specialist	$34,493	ICS	Prior	Q1/2016	N/A	Assignment: National Expertise: Financial Management Advance Contracting: Y Comments: 6 p-m
CS-1D	PIC - Procurement Specialist	$34,493	ICS	Prior	Q1/2016	N/A	Assignment: National Expertise: Procurement Advance Contracting: Y Comments: 6 p-m
CS-1E	PIC - Environment Specialist	$34,493	ICS	Prior	Q1/2016	N/A	Assignment: National Expertise: Environment Advance Contracting: Y

							Comments: 6 p-m
CS-1H	External resettlement monitoring specialist	$45,728	ICS	Prior	Q1/2016	N/A	Assignment: National Expertise: Social Development and Resettlement Advance Contracting: Y Comments: 8 p-m
CS-7	NGO for resettlement plan implementation	$42,000	LCS	Prior	Q4/2015	BTP	Assignment: National Advance Contracting: Y

B. Indicative List of Packages Required Under the Project

5. The following table provides an indicative list of goods, works and consulting services contracts over the life of the project, other than those mentioned in previous sections (i.e., those expected beyond the current period).

Goods and Works							
Package Number	**General Description**	**Estimated Value (cumulative)**	**Estimated Number of Contracts**	**Procurement Method**	**Review** (Prior/Post)	**Bidding Procedure**	**Comments**
None							

Consulting Services							
Package Number	**General Description**	**Estimated Value (cumulative)**	**Estimated Number of Contracts**	**Recruitment Method**	**Review** (Prior/Post)	**Type of Proposal**	**Comments**
None							

Appendix D: Detailed Terms of Reference for Project Technical Advisory Consultants, Project Implementation Consultants, NGO/CBO services for implementation of Resettlement plan, External Resettlement Monitor, and Internal Audit Firm

TERMS OF REFERENCE

PROJECT TECHNICAL ADVISORY CONSULTANTS

A. Background

1. These terms of reference (TOR) outline the scope of works, deliverables and work project for the Project Technical Advisory Consultants (PTAC). The PTAC will support the Water Resources Department, Tamil Nadu implement the Climate Adaptation in Vennar Subbasin in Cauvery Delta. The expected outcome is improved water management in the Vennar Subbasin. The project comprises two outputs: (i) flood risk management and irrigation infrastructure upgraded, and (ii) improved water and flood risk management systems established.

2. Agriculture is the dominant employment sector in Tamil Nadu and it provides livelihoods for nearly 45% of the population. However, the sector's contribution to state gross domestic product (GDP) fell from 11.1% in 2004-05 to 8.2% in 2010-11.[1] Estimated total water demand in Tamil Nadu in 2001 was 54,395 MCM mainly for irrigation (50,007 MCM), industry/power/livestock (2,192 MCM) and drinking (1,445 MCM) compared to an estimated annual water potential including surface (24,864 MCM) and groundwater (22,423 MCM) is assessed of 46,540 MCM.[2] While the total demand is forecast to go up to 57,725 MCM by 2050, usage for irrigation is not expected to increase significantly because of demand for land for urbanization.

3. There are 17 major river basins in the state, of which the Cauvery basin (81,115 km²) is the largest. About 90% of surface water is used in irrigation. The Cauvery River basin spans the states of Karnataka, Tamil Nadu, Kerala, and part of the Union Territory of Pondicherry. According to the decision of the Cauvery Waters Dispute Tribunal in 2007, 58% (11,865 MCM in an average year) of the surface water resources of the basin are allocated to Tamil Nadu. The total potential irrigation demand in the Cauvery delta,[3] excluding irrigation demand upstream of the delta and other water uses, exceeds the available resource.

4. The Cauvery Delta (6900 km²) has a total population of about 4.8 million, with about 73% relying on farming and fishing. There are four main irrigation systems in the delta: (i) Lower Coleroon Anicut (53,000 ha), (ii) Cauvery (200,000 ha), (iii) Vennar (190,000 ha), and (iv) Grand Anicut (121,000 ha). Key constraints faced by the Cauvery Delta farmers are: (i) difficulty in planning of annual cropping pattern due to the lack of assurance about surface water availability; (ii) inefficient distribution and application of water; (iii) inequitable access to water resources with downstream users have intermittent access to surface water and poor access to suitable quality groundwater, (iv) crop damage during the north east monsoon due to flooding and poor drainage in coastal areas. The three districts in the Vennar System

[1] Government of Tamil Nadu 2012 – *State Planning Commission, Twelfth Five Year Plan 2012-17* http://www.spc.tn.gov.in//fiveyearplans/approachnew.pdf

[2] Government of Tamil Nadu, 2005 – *Department of the Environment , State of the Environment Report* http://www.environment.tn.nic.in/SoE/images/Waterresources.pdf

[3] The Cauvery Delta lies in the eastern point of Tamil Nadu, at the bottom of the Cauvery river basin between 10.00N to 11.30N Latitude and between 78.15E to 79.45 E longitudes.

(Thanjavur, Thiruvarur, Nagapattinam) record the lowest average rice productivity in Tamil Nadu.

5. Climate change is expected to worsen the already challenging situation. The projections indicate much drier conditions between January and May but wetter and warmer conditions during the irrigation season (June to December). However the climate projections also show large increases in storm rainfall and runoff. Therefore more frequent and serious flooding can be expected. Flooding in coastal areas will gradually be exacerbated by rising sea levels.

6. The key management issues facing the water resources sector are: (i) inadequate planning and stakeholder participation in resource management, (ii) limited demand management, (iii) no effective use of economic incentives and penalties to reduce pollution and wastage, (iv) WRD's mandate and skill set is in irrigation supply will little emphasis on water resources management, (v) under-investment in infrastructure due to the Cauvery waters dispute, (vi) inadequate funding for operation and maintenance, and (vii) flood management is reactive with minimal planning for flood risk mitigation.

7. The Project will contribute to the initial improvement of water resources management in the Cauvery Delta.

B. The Project

8. The project comprises two outputs: (i) flood risk management and irrigation infrastructure upgraded, and (ii) improved water and flood risk management systems established. Under Output 1, the project will support the (i) repair and upgrading of existing infrastructure including embankments designed to withstand a 25 year return flood taking into consideration climate change projections, and (ii) construction of new essential infrastructure.

9. Output 2 will deliver non-structural adaptations designed to improve the management of surface water resources, and manage flood risks and flood events. Initiatives to be developed are: (i) improved assessment of water resources through installation of additional rainfall, surface water level, groundwater level and tide level monitoring stations and through direct flow measurements at key structures, (ii) development of a Decision Support System (DSS) and (iii) capacity development of Water Resources Department officers in improved management of water resources. The improvements to management of flood risks and flood events will be achieved through establishment of flood forecasting and warning systems and preparation of flood risk maps.

C. Implementation Arrangements

10. The executing agency is the Water Resources Department and a Project Management Unit (PMU) has been established. The PMU is headed by a full time Project Director of Chief Engineer Rank. The PMU will be supported by Project Implementation Units (PIUs) established in the respective EEs offices. Three PIUs will be established in Thiruvarur, Nagapttinam and Thiruthuraipoondi. The PMU will be supported by two teams of consultants; (i) Project Implementation Consultants who will support the implementation of Output 1 and establishment of channel stakeholder groups under Output 2, and (ii) Project Technical Advisory Consultants (PTAC), who will (a) support the implementation of the establishment of a decision support system, and flood risk mapping and establishment of forecasting and warning systems under Output 2 in the project, and (b) support the preparation of feasibility studies for a follow on project

covering the remainder of the Vennar Subbasin and Cauvery Subbasin (hereinafter referred to as follow on project).

11. The PTAC will be established in Tiruchirappali

D. Consulting Services

12. This ToR is for the PTAC who will: (i) provide technical guidance to WRD to implement certain activities of Output 2 under the project (detailed implementation notes of Output 2 are provided as Appendix A to this ToR); (ii) support WRD to prepare feasibility studies and necessary loan documents for proposed ADB financing for follow on project covering the remainder of the Vennar Subbasin and the Cauvery Subbasin.

13. The PTAC will be for 15 months during implementation of the project (2016-2018). Recruitment will be undertaken in accordance with ADB's Guidelines on the Use of Consultants (2013, as amended from time to time).[4] Firms will be recruited using quality- and cost- based selection (QCBS) method with an 80:20 quality to cost ratio. A full technical proposal will be required. The team will comprise of 25 months of international person months and 74 months of national person months.

International		**National**	
Position	Months	Position	Months
Team Leader	12	GIS specialist	12
Hydrologist	2	Hydrologist	2 x 4
Hydraulic modeler	4	Hydraulic modeler	2 x 6
Groundwater specialist	2	Groundwater modeler	6
Economist	2	Economist	4
System operation specialist	3	DSS development specialist	6
		Agriculture specialist	2
		Environment specialist	6
		Social safeguards / resettlement spec	6
		Financial management specialist	4
		Irrigation Engineer	8

14. The scope of works of the PTAC is provided below and the individual ToRs are provided in Section H:

15. Implementation of Output 2: Activities will include:

(i) Fieldwork and consultation with WRD to develop the DSS concept (as outlined in the implementation note attached as Appendix A and B of the PAM) including verification of the most appropriate types of equipment and locations

(ii) Preparing a detailed proposal for how the DSS will be used for improved operation of the channels for more efficient and equitable water distribution, to provide status information and forecasts during floods and to facilitate effective long term maintenance of the infrastructure. Aspects to be covered include:
- Identification of the type of equipment suitable to various channel dimensions
- The power requirements to maintain the equipment functionality

[4] Available at: http://www.adb.org/sites/default/files/institutional-document/31481/guidelines-use-consultants.pdf

- Verification of the existing communications networks suitable for telemetry
- Infrastructure specifications to mount the equipment in the field
- Database backup, recovery and decision making systems hardware and software
- Hardware and required software
- Incorporation of GIS date into the DSS
- Data analytics and decision making system
- Inclusion of infrastructure asset management in the DSS
- Redundancy provisions
- DSS equipment maintenance guidelines
- Initial and periodic calibration procedures
- Access to the DSS by desktop and laptop computers, tablets and smartphones

(iii) The preparation of detailed requirements for the data and analytical methodologies to be incorporated into the DSS and arranging for the required data to be collated

(iv) Provision of detailed specifications for procurement of the DSS including digital telemetric rainfall, river, ground water and tide level monitoring gauges, data storage and processing hardware and software, system enhancement during the course of the project and associated training and capacity development for the WRD staff

E. Preparation of feasibility studies for follow on project

(i) In consultation with WRD recommend and prepare feasibility studies for drainage, surface water and groundwater infrastructure improvements following the standards recommended in the new design guidelines prepared under the previous Project Preparatory Technical Assistance (TA 8166). Interventions may include modifying channel sections increasing the capacity of existing or creating new flood retention areas, installing new control structures, and re-designation of flood impacted land and formalized overland flow paths, and improving operation and maintenance procedures including improved sustainable management and removal of aquatic weeds.

(ii) Prepare feasibility studies for new and rehabilitated tail-end regulators[5] to: (i) prevent seawater ingress in the drainage system; and (ii) trap and store unused freshwater for: (a) storage for lift irrigation, and (b) groundwater recharge.

(iii) Develop a calibrated hydrologic and hydraulic model of the Upper Vennar and Cauvery system to guide the design of the infrastructure improvements. The model will: (i) represent the present and future hydrologic and sea level conditions of the basin including the coincidence of extreme rainfall and high sea levels; (ii) take into account the flood diversion capacities of the Upper Anicut and Grand Anicut under present and expected future conditions; (iii) accurately represent the existing drainage system, control structures, flood plains and coastal outlets; (iv) be capable of assessing and developing proposed interventions; and (v) prepare

[5] The design horizon of feasibility studies for all tail-end regulators and other structures shall be based on the future design scenario accounting for expected climate changes.

sufficiently detailed flood maps (extent, risk and hazard) for current and future scenarios.[6]

(iv) Assessing the geology, groundwater level and quality, and abstraction data within the follow on project areas to: (i) identify processes causing saline intrusion within the study areas; (ii) develop a representative quantitative two-dimension groundwater model to analyze current and future scenarios (both climate change and interventions identified by this project); (iii) use the model to estimate and recommend indicative sustainable abstraction rates;

(v) Review current activities in the project area and recommend additional opportunities, locations and methods to supplement groundwater recharge based on: (i) the geology of the project area; (ii) the performance of the existing initiatives; (iii) the results of the groundwater model; and (iv) the existing and recommended drainage improvement interventions. Prepare feasibility studies and develop a monitoring and evaluation system to assess the effectiveness of existing and groundwater recharge measures.

(vi) Assess existing and future coastal processes and their impact on operation of the drainage system's natural beach outlets and prepare feasibility studies on appropriate methods for maintaining open outlets.

(vii) Prepare flood risk maps for new project areas.

(viii) Prepare proposals to expand activities identified under output 2 to new project area.

(ix) Based on feedback from PMU on training received help develop training programs under new project.

(x) Prepare necessary loan documents for the follow on project.

F. Individual Terms of Reference for Key Experts

1. Team Leader (Civil/Water Resources Engineer) - 1 x International, 12 months

16. The Team Leader will work with the PMU and WRD to coordinate and manage activities of the team and implement output 2 of the project and prepare feasibility studies, conduct due diligence on design, support the PMU in preparing the necessary ADB documents for a proposed follow on loan, project appraisal reports and associated linked documents.

17. The expert will be experienced in preparing and implementing multidisciplinary water resources management projects. Experience in project preparation for external funding agencies will be given preference. The team leader must be an experienced civil/water resources engineer with at least a Master's degree and about 20 years of work experience out of which about 10 years should be related to implementation and designing of similar projects including both regional project and experience in the team leader position.

[6] Modelling was undertaken for preparation of the feasibility study of the existing project and may be used for guidance so that the completed models for the follow on project are consistent. Information is available with WRD.

18. The expert will undertake the following tasks:

(i) Provide overall direction of the consultant team and manage relations with the PMU.

(ii) Prepare inception report within 30 days of fielding. This will include identification of any aspects of the design guidelines prepared by the TA 8166 that may require review.

(iii) Establish baseline data and result targets with the Economists and arrange necessary surveys and data collection.

(iv) Manage the process of feasibility assessment of proposed project interventions and their reporting, covering the following aspects: (a) basic infrastructure and project design and options including climate change resilient design; (b) implementation cost, arrangements, schedules; (c) economic and financial impacts, and environmental, and social safeguards including actions to enhance the participation of vulnerable groups; and, (d) risk assessments and mitigation measures.

(v) Lead the process of preparing the necessary loan documents for follow on project comprising: (a) component design, cost estimates and financing, implementation arrangements, detailed implementation plan, procurement plan, and monitoring and evaluation with effective management information system (MIS); (b) Institutional arrangements for effective implementation; and, (c) capacity development plan.

(vi) Review detailed designs prepared by WRD and together with the other team members prepare the feasibility reports

(vii) Together with WRD, assess the existing drainage of the new project area, recommend interventions and prepare feasibility studies to alleviate routine flooding, sea water ingress and improve water availability. Interventions may include but not be limited to modifying channel sections and alignments, increasing the capacity of existing ponds and tanks, proposing formalized flood retention areas, rehabilitating existing and installing new control structures, re-designating flood impacted land, formalizing overland flow paths when the capacity of the drainage system is exceeded, and improving operating and maintenance procedures including proposing interventions for the sustainable management of sediments and aquatic plants.

(viii) Together with WRD, assess existing pumped irrigation schemes in the new project area and prepare feasibility studies for their modernization.

(ix) Cover aspects of output 2 of the present project for the new project area including post-flood asset inspections, inundation mapping, flood warning systems and flood risk mapping accounting for expected climate change, and expansion of the DSS

(x) Supervise and provide quality assurance during the preparation of detailed project reports (DPRs) and associated procurement packages for new project sub-projects

(xi) Assess the training undertaken under existing project and determine a training plan for new project area

2. Hydrologists - 1 x International, 2 months; 2 x National, 4 months each

19. The hydrologists will have 10 year experience with a relevant Master's degree in Science or engineering, with demonstrated professional experience in carrying hydrological analyses and modeling in tropical and cyclone affected areas. The two national experts will focus on two geographic areas- (i) the remainder of the Vennar and Vettar system, and (ii) the Cauvery system.

20. The experts will undertake the following tasks:

(i) Collect and review the outputs from climate change studies including historic and future rainfall depths for various durations and design storm frequencies.

(ii) Assess the operation and management of existing hydrometeorological networks and recommend any necessary measures to modernize current data collection, processing and storage practices; increase technical capacity of hydrometric staff and establish how this can be interfaced with the DSS.

(iii) Collect quality control and analyze all relevant existing hydrometeorological data for the proposed Project areas.

(iv) Develop water balance models of the proposed project areas including rainfall, evapotranspiration, runoff, soil moisture storage, infiltration etc.

(v) Develop storm profiles for the proposed project areas by analysis of historic data or by suitable alternative methods.

(vi) Develop, calibrate and run rainfall-runoff models to produce time series of simulated historic and future runoff as inputs to the hydraulic models being developed by the Hydraulic Modellers.

(vii) Provide recommendations for suitable interventions that benefit flood management, water-use efficiency and groundwater recharge.

(viii) Guide the use of current metering for updating the rating curves of the hydraulic structures

(ix) Provide hydrological base data and hydrological analysis procedures for the DSS

(x) Document the work undertaken for inclusion in the project report.

3. Hydraulic and Coastal Modelers - 1 x International, 4 months; 2 x National, 6 months each

21. The hydraulic modelers will have a Master's degree in a related field and at least 10 years of professional experience in developing complex 1D or 2D unsteady state floodplain and coastal hydraulic models. The experts will undertake the following tasks:

(i) In coordination with the GIS specialist, collect and review available topographic, infrastructure, coastal and flood data.

(ii) Develop conceptual models of the drainage systems in the proposed project areas representing the channels, storage cells, dynamic flood plains, and runoff contributing areas.

(iii) Develop1D and/or 2D hydraulic and coastal models (HECRAS, TELEMAC-2D or equivalent) of the drainage systems with runoff and tidal boundary conditions provided by the hydrologists. Calibrate the model using available historical records and observations.

(iv) Use the models to simulate "with-project" and "without-project" flow regimes and design floods with the present and future climate scenarios and river management practices. Flood simulation should be done for the 1 in 2, 5 10, 50 and 100-year design storm events. The modelers must account for the joint probability of extreme rainfall events and extreme tide surges.

(v) Use the models to analyze the benefits and impacts of project interventions, including the “without project” case which will be considered as the baseline for comparative technical and economic appraisals.

(vi) To examine the robustness of the project interventions, the sensitivity of the model results to uncertainties in climate change scenarios and hydraulic controls such as channel roughness and marine sand bars at the coastal outlets, must be tested.

(vii) In conjunction with the GIS specialist, use the model results to prepare flood extent, duration and hazard maps for all design storm events with present and future climate scenarios and "with-project " and "without-project" flow regimes. The maps will provide sufficient detail for: (a) economic assessment of the interventions; (b) comparative analysis of the expected impact of climate change; (c) comparative analysis of interventions and the do-nothing scenario; and, (c) development by WRD of flood event management plans and by the District Disaster Management Authority of flood disaster risk management plans.

(viii) Using the model results, develop operating rules for operation and maintenance of hydraulic structures and drainage systems.

(ix) Use historical records to establish statistical correlations between river levels at head regulators and flood conditions at downstream regulators

(x) Use model results to establish flood warning trigger levels at head regulators corresponding to overflow conditions in downstream locations

(xi) Provide on the job training to WRD hydraulic modelers

(xii) Document the work undertaken for inclusion in the project report.

4. Groundwater Modellers - 1 x International, 2 months; 1 x National, 6 months

22. The groundwater modelers will have Master’s degree and 10 years professional experience in developing groundwater models in coastal areas to assess the causes and impacts of groundwater depletion and salinization. The experts will undertake the following tasks:

(i) Collect and analyze available data on the geology of the proposed project areas, aquifer formations, groundwater levels and flows, abstractions and groundwater quality, particularly the extent and dynamics of saline groundwater.

(ii) Develop a groundwater model of the proposed project areas to provide quantitative analysis of groundwater quantity and quality under various climate changes and project intervention scenarios.

(iii) Use the model to recommend indicative sustainable abstraction rates under various project interventions. Review existing groundwater recharge schemes in the proposed project areas and, if appropriate, recommend additional schemes or alternative interventions. Prepare feasibility studies for additional groundwater recharge interventions and recommend an appropriate monitoring and evaluating program.

(iv) Document the work undertaken for inclusion in the project report.

5. Economists - 1 x International, 2 months; 1 x National 4 months

23. A degree to Master's level in Economics with at least 15 years of experience in undertaking economic assessments for international development projects with a focus on flood management and irrigated agriculture. The specialists should have experience in preparing projects for multilateral funding and undertaking required economic due diligence. The specialists will:

(i) Establish agro-economic benchmarks in the project areas including current level of stakeholder participation in operation and maintenance and current cropping intensities and productivity at the system and farm levels.

(ii) Undertake a detailed economic and financial analysis of the subprojects in accordance with ADB's Guidelines for the Economic Analysis of Projects (1997) and CWC Guidelines (2010);

(iii) Identify the economic and financial risks associated with the proposed project and conduct a sensitivity and risk analysis;

(iv) Prepare economic and financial analyses of proposed projects.

(v) Calculate the incremental cost of recommended interventions in light of climate change.

(vi) Support the financial management consultant to prepare detailed cost tables of proposed project.

(vii) Provide inputs into the Final Report.

6. Agriculture Specialist - 1 x National, 2 months

24. The Agricultural Specialist will have a Master's degree in agriculture with over 10 years of professional experience in planning and implementing irrigated agriculture development programs, including field based technology demonstration and dissemination, value chain

development including market linkage development and action-oriented researches for new technologies. Experience in options to promote higher crop per drop will be preferred. The specialist will undertake the following tasks:

(i) Establish benchmarks on cropping intensity and productivity and identify current seasonal agriculture practices in the proposed project and 3 areas.

(ii) Provide agricultural data for use by the economists.

(iii) Recommend how agricultural requirements can be incorporated in the DSS and provide the appropriate data and methodologies.

(iv) Recommend modifications to existing cropping schedules to minimize water demands maximize water-use efficiencies and reduce non-beneficial evaporation and discharges to waste.

(v) Provide inputs into the final report.

7. Environment Specialist - 1 x National, 6 months

25. The environmental specialist should have a Master's degree in environment science, preferably in environmental engineering; 10 years of general experience; and 5 year experience in the field of environment assessment and monitoring

(i) Categorize the project based on ADB's rapid environment checklists.

(ii) Based on categorization prepare an environmental impact assessment (EIA) or Initial Environmental Examinations (IEEs) for the Proposed project areas according to guidelines presented in the ADB Safeguard Policy Statement 2009

(iii) Work with WRD to ensure that project affected persons are consulted during the preparation of the EIA/IEE, and that key information on project, impacts and proposed mitigation and management measures are provided to affected persons.

(iv) Prepare Environment Management Plans (EMPs) for proposed project civil works.

(v) Support WRD in obtaining necessary statutory environmental clearances and applying environmental safeguards.

(vi) Prepare necessary inputs to the team's final report.

8. Social Safeguard and Resettlement Specialist - 1 x National, 6 months

26. The Specialist will have at least 10 year experience in the design and implementation of resettlement action plans and in gender sensitive, participatory rural appraisal for community development. The specialist will advise Project Preparation Team on resettlement, socio-economic and gender aspects. The specialist's tasks will include:

(i) Consult stakeholders in the Proposed project areas and prepare a stakeholder and social/gender analysis and provide a baseline against which envisaged improvements in the communities' lives can be measured.

(ii) Prepare initial stakeholder analyses and participation plans.

(iii) Identify key stakeholders (poor and vulnerable groups in particular), their project-related interests and any socio-economic barriers to delivery of project benefits.

(iv) Identify areas under project outputs where women's participation can be increased and develop specific gender actions with appropriate targets

(v) Recommend strategies for addressing the concerns of these stakeholders and maximizing the socio-economic benefits of the projects.

(vi) Prepare Participation Plans for new projects which, in recognition of women's status, needs, abilities, roles and vulnerabilities, will promote women's engagement with the projects and maximize their access to project benefits.

(vii) Prepare resettlement plans (if required)

(viii) Ensure livelihood restoration measures for project affected households and businesses are included in the project Resettlement Plans and the plans are gender sensitive.

(ix) Prepare necessary inputs into the final report.

9. System Operation Specialist - 1 x International, 3 months

27. The specialist will have a minimum of a Masters qualification in a relevant discipline plus at least 15 year experience including at least 5 years in water resources management using telemetric data and broad knowledge of the supporting hardware.

(i) Review the existing concept note for implementation of the DSS and become familiar with the project area

(ii) identify the range of decisions required in Vennar Subbasin under CAVSCD for improved water resources management and define multiple elements of DSS

(iii) hold consultations with internal stakeholders and define Vennar Subbasin operation, resource management, water use efficiency improvement, and asset management decisions to be supported by DSS

(iv) In consultation with WRD and the DSS Development Specialist and with the support of the other PTAC team members, prepare a detailed design for the system.

(v) Support the DSS Development Specialist in the preparation of the detailed specifications of the DSS.

(vi) Support the DSS Development Specialist during commissioning of the system.

10. DSS Development Specialist - 1 x National, 6 months

28. The specialist will have a relevant qualification in information technology and a minimum of 5 years relevant experience including at least 2 years development and implementation of decision support systems and a knowledge of the enabling hardware.

(i) Evaluate alternatives and identify the general requirements for the DSS processing software and hardware. Develop outline proposals for the data management, user interface and report formats.

(ii) Become familiar with the project area, the project DSS concept and the WRD requirements and, in conjunction with the System Operation Specialist, prepare the detailed design of the DSS.

(iii) In conjunction with the System Operation Specialist prepare the detailed specifications for the DSS to be provided to the PIC Procurement Specialist.

(iv) Oversee the installation and commissioning of the DSS

(v) Provide on-the-job training to WRD staff on the application of DSS software.

11. Financial Management Specialist - 1 x National, 4 months

29. A Master's degree in finance, accounting or equivalent, with at least 10 years of experience in undertaking financial analysis, and preferably in multilaterally financed projects. The expert will:

(i) support the Economist in preparing financial analyses of proposed interventions

(ii) Review existing financial management systems and recommend any improvements/updates if required for implementing new project

(iii) Work with WRD to prepare detailed cost estimates for Proposed project a consistent format ready for use by the economics specialist and update project costs.

12. Irrigation/Water Resources Engineer- (1 national 8 months)

30. The expert will have over 15 year' experience in the planning and design of hydraulic structures and drainage systems.

(i) The expert will assist in the preparation of the preliminary designs and costs of recommended interventions and provide quality assurance of detailed design reports (DPR) prepared by WRD.

(ii) Update the Sector Assessment and Institutional assessment as required for the new project preparation

13. GIS Specialist - 1 x National, 12 months

31. University degree in a relevant discipline to Master's level with 10 years' experience in the use of GIS to assess and map resources and data related to the work; experience in a flood hazard mapping team will be an added advantage

(i) Gather all available and relevant spatial data related to the project areas including topographical data, land-use data, soils and geological data, and any other relevant data to the project, and develop a GIS database.

(ii) Work together with the topographical survey team to prepare a digital elevation model.

(iii) Undertake spatial analyses and provide mapping as needed to support the other team member's work and the preparation of the feasibility studies.

(iv) Support the Hydraulic Modeling Specialists by preparing flood maps based on the outputs of the hydraulic modeling.

(v) Prepare spatial data as needed for the DSS

(vi) Support the Economists to use the flood maps to assess potential benefits

32. **Provisional sums:** surveys for environmental and socio- economic baseline data have been included under provisional sums. The PTAC will be responsible for preparing the exact implementation arrangements, TORs, specifications, and detailed cost estimates of the procurement which will be approved by the Project Director before initiating procurement.

G. Deliverables:

33. The PTAC will submit the following reports as per schedule provided. The feasibility studies will be undertaken concurrently for all proposed works in the project area, with two modelling teams working in parallel. All reports will be submitted as draft reports and finalized upon receiving comments from WRD and ADB:

(i) An inception report including updated work plan and personnel schedule (4 copies to PMU and 2 copies to ADB) to be submitted within 4 weeks of commencement of services. The inception report will outline the work plan and staffing schedule for implementation of output 2 and preparation of feasibility studies for follow on project.

(ii) Progress report on implementation of Output 2 under the project every quarter. This progress will be submitted to the PIU so that WRD can include it in their quarterly progress report briefings for the project.

(iii) Interim report on preparation of proposed follow on project The interim reports will include the preliminary findings of the modeling work, evaluation of options for determining feasible proposals, and proposed scope (4 copies to PMU and 2 copies to ADB) to be submitted in 24 weeks

(iv) Draft final report- which will include the draft feasibility studies, and all necessary loan documents for follow on project with technical, safeguards, economic, social due diligences based on standard ADB format including the cost estimates (4 copies to PMU and 2 copies to ADB) to be submitted within 40 weeks of commencement of services

(v) Final Report to be submitted (4 copies to PMU and 2 copies to ADB) at the end of the assignment.

H. Client's input and counterpart personnel

34. The PTAC team will be located in Tiruchirappalli and WRD will provide the necessary office space to house the consultants. WRD will also provide counterpart staff to (i) supervise topographic surveys, (ii) undertake asset surveys of regulators and structures in the Proposed project areas, (iii) undertake detailed designs, and (iv) prepare detailed cost estimates and the detailed project reports (with inputs from consultants findings). In addition WRD will procure a global digital elevation model (DEM), and procure necessary monitoring equipment under a separate package and (v) prepare bid documents for proposed project.

35. The PMU shall provide the PTAC with all related reports, documents that are available for the investment project. This will include the final reports prepared under the project preparatory technical assistance (PPTA 8166). These reports may be accessed from ADB's website and at the chief engineer's office in Chennai/Tiruchirappalli. The PTAC shall take responsibility for office maintenance, consumables and upkeep.

PROJECT IMPLEMENTATION CONSULTANTS

A. Background

1. These terms of reference (TOR) outline the scope of works, deliverables and work program for the Project Implementation Consultancy team, who will support the Water Resources Department, Tamil Nadu implement the Climate Adaptation in Vennar Subbasin in Cauvery Delta. The expected outcome is improved water management in the Vennar system. The project comprises two outputs: (i) flood risk management and irrigation infrastructure upgraded, and (ii) improved water and flood risk management systems established.

2. Agriculture is the dominant employment sector in Tamil Nadu and it provides livelihoods for nearly 45% of the population. However, the sector's contribution to state GDP fell from 11.1% in 2004-05 to 8.2% in 2010-11.[1] Estimated total water demand in Tamil Nadu in 2001 was 54,395 MCM mainly for irrigation (50,007 MCM), industry/power/livestock (2,192 MCM) and drinking (1,445 MCM) compared to an estimated annual water potential including surface (24,864 MCM) and groundwater (22,423 MCM) is assessed of 46,540 MCM.[2] While the total demand is forecast to go up to 57,725 MCM by 2050, usage for irrigation is not expected to increase significantly because of demand for land for urbanization.

3. There are 17 major river basins in the state, of which the Cauvery basin (81,115 km²) is the largest. About 90% of surface water is used in irrigation. The Cauvery river basin spans the states of Karnataka, Tamil Nadu, Kerala, and part of the Union Territory of Pondicherry. According to the decision of the Cauvery Waters Dispute Tribunal in 2007, 58% (11,865 MCM in an average year) of the surface water resources of the basin are allocated to Tamil Nadu. The total potential irrigation demand in the Cauvery delta,[3] excluding irrigation demand upstream of the delta and other water uses, exceeds the available resource.

4. The Cauvery Delta (6900 km²) has a total population of about 4.8 million, with about 73% relying on farming and fishing. There are four main irrigation systems in the delta: (i) Lower Coleroon Anicut (53,000 ha), (ii) Cauvery (200,000 ha), (iii) Vennar (190,000 ha), and (iv) Grand Anicut (121,000 ha). Key constraints faced by the Cauvery Delta farmers are: (i) difficulty in planning of annual cropping pattern due to the lack of assurance about surface water availability; (ii) inefficient distribution and application of water; (iii) inequitable access to water resources with downstream users have intermittent access to surface water and poor access to suitable quality groundwater, (iv) crop damage during the north east monsoon due to flooding and poor drainage in coastal areas. The three districts in the Vennar System (Thanjavur, Thiruvarur, Nagapattinam) record the lowest average rice productivity in Tamil Nadu.

5. Climate change is expected to worsen the already challenging situation. The projections indicate much drier conditions between January and May but wetter and warmer conditions during the irrigation season (June to December). However the climate projections also show large increases in storm rainfall and runoff. Therefore more frequent and serious flooding can be expected. Flooding in coastal areas will gradually be exacerbated by rising sea levels.

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[1] Government of Tamil Nadu, 2012 – *State Planning Commission, Twelfth Five Year Plan 2012-17* http://www.spc.tn.gov.in//fiveyearplans/approachnew.pdf

[2] Government of Tamil Nadu, 2005 – *Department of the Environment , State of the Environment Report* http://www.environment.tn.nic.in/SoE/images/Waterresources.pdf

[3] The Cauvery Delta lies in the eastern point of Tamil Nadu, at the bottom of the Cauvery river basin between 10.00N to 11.30N Latitude and between 78.15E to 79.45 E longitude.

6. The key management issues facing the water resources sector are: (i) inadequate planning and stakeholder participation in resource management, (ii) limited demand management, (iii) no effective use of economic incentives and penalties to reduce pollution and wastage, (iv) WRD's mandate and skill set is in irrigation supply will little emphasis on water resources management, (v) under-investment in infrastructure due to the Cauvery waters dispute, (vi) inadequate funding for operation and maintenance, and (vii) flood management is reactive with minimal planning for flood risk mitigation.

7. The long standing Cauvery water dispute prevented substantial investments in the sector. Since the Cauvery Waters Dispute Tribunal ruling in 2007 on allocating 58% of the surface water resources was upheld by the Supreme Court in 2013, the state government formulated investments plans for the modernization of the irrigation systems. These include improvements to water resources management and increased climate resilience of water services in the subbasin.

8. The Project will contribute to the initial improvement of water resources management in the Cauvery Delta.

B. The Project

9. The project comprises two outputs: (i) flood risk management and irrigation infrastructure upgraded, and (ii) improved water and flood risk management systems established. Under Output 1, the project will support the (i) repair and upgrading of existing infrastructure including embankments designed to withstand a 25 year return flood taking into consideration climate change projections, and (ii) construction of new essential infrastructure.

10. Output 2 will deliver non-structural adaptations designed to improve the management of surface water resources, and (ii) manage flood risks and flood events. Initiatives to be developed are: (ii) improved assessment of water resources through installation of additional rainfall, surface water level, groundwater level and tide level monitoring stations and through direct flow measurements at key structures, (ii) development of a Decision Support System (DSS), initially piloted in the Pandavayar, Vellaiyar and Harichandra channels, and then conditionally to the rest of the area and (iii) capacity development of Water Resources Department officers in improved management of water resources. The improvements to management of flood risks and flood events will be achieved through establishment of flood forecasting and warning systems and preparation of flood risk maps.

C. Implementation Arrangements

11. The executing agency is the Water Resources Department and a Project Management Unit (PMU) has been established. The PMU is headed by a full time Project Director of Chief Engineer Rank. The PMU will be supported by Project Implementation Units (PIUs) established in the respective EEs offices. Three PIUs will be established in Thiruvarur, Nagapttinam and Thiruthuraipoondi. The PMU will be supported by two teams of consultants; (i) Project Implementation Consultants who will support the implementation of Output 1, and (ii) Project Technical Advisory Consultants (PTAC), who will (a) support the implementation of the establishment of a decision support system, and flood risk mapping and establishment of forecasting and warning systems under Output 2, (b) and support the preparation of feasibility studies for a follow on project covering the remainder of the Vennar Subbasin and Cauvery Subbasin.

12. The Project implementation consultants comprise seven individual consultants (Project Management Specialist, Financial Management Specialist, Procurement Specialist, Construction Engineer, Environment Specialist, Social Development Specialist and Construction Quality Assurance Specialist. The consultants will be based in the Trichy PMU but would also need to support the PIUs in the three EE's offices as and when required. The Project will be implemented from 2015-2019, with all civil works expected to be completed by 2018. The EA will provide office space, internet and telephone connection, printing and photocopying facilities and administrative support.

14. Terms of reference for Project Management Specialist (36 months)

Scope of work

13. The Project Management Specialist will manage the inputs of the rest of the team and assume the team leader position. The expert will support PD/PMU on project and financial management including the tender process, award of contracts, supervision of construction contracts, planning and monitoring progress and quality control of construction. Support the PMU in preparing progress reports and the project completion report.

Detailed tasks:

- Assume overall responsibility for the Project Implementation consultancy team and ensure that each team member provides the timely outputs
- Support the PMU and PIUs to establish an effective organizational and administrative system to manage and monitor the project progress as per ADB and the state government requirements
- Support PMU in coordinating with ADB and other stakeholders and agencies as necessary
- Assist PMU to set up project implementation and monitoring systems and procedures.
- Assist PMU in preparing annual work plans, detailed implementation schedule and budgets using computer based project management tools and in monitoring progress
- Support PMU in setting up an efficient contract administration system.
- Review the existing MIS system operational under the IAMWARM project and develop a ToR for MIS specialist team to create a similar or expand the existing system.
- Assist the PMU in organizing the necessary training programs as outlined in the project administration manual
- Support WRD to prepare projections for annual disbursement and contract awards
- Establish Project Performance Monitoring System (PPMS) based on the design monitoring framework and monitor progress against the indicators
- Ensure that WRD maintains project accounts with all ledgers and necessary control systems
- Monitor compliance with loan covenants and advise PMU on any measures to be taken to improve
- Provide periodic progress reports to ADB and the state government and provide necessary reports to support ADB review missions. The consultant will support WRD prepare a comprehensive mid-term report prior to ADB's mid-term review mission.

Output/Reporting requirements:

- Take the lead in preparation of quarterly and annual progress reports to be submitted to ADB.
- Take the lead in preparing the project completion report as per ADB's format.
- Report to the PD/PMU.

Minimum qualification requirements

14. The expert must be an experienced civil engineer with at least a Master's degree and about 12 years of work experience, out of which about 8 years of experience in implementing projects of a similar nature and at least 5 years in managing project of this nature. Experience of working in donor funded projects is an advantage.

15. Terms of Reference for Procurement Specialist (6 months)

Scope of work

15. The Procurement Specialist will assist the PMU in contract management and support in the preparation and review of bid documents.

Detailed Tasks:

- Support WRD in the preparation of bid documents and RFPs in line with ADB's guidelines.
- Support WRD in the evaluation of bid proposals and prepare bid evaluation reports jointly with WRD.
- Assist WRD in resolving procurement related issues.
- Assist WRD in contract negotiations with the successful bidders.
- Prepare contract documents.

Output/Reporting requirements:

- Provide inputs to quarterly and annual progress reports to be submitted to ADB.
- Report to the Project Director/PMU and provide work plan to Project Management Specialist who will be the team leader of the PIU consultants.

Minimum qualification requirements

16. The expert must be fully conversant with procurement procedures of ADB and hold a Master's degree and at least 10 years of work experience, out of which about 5 years of experience in implementing projects of a similar nature. The consultant should have prior experience in working on ADB or World Bank funded projects.

16. Terms of Reference for Construction Quality Assurance Engineer (18 months)

Scope of work

17. The Construction Quality Assurance Engineer will support WRD in monitoring the contractors' performance in implementation of Quality Assurance and Quality Control plan, inspection works, checking quality of construction, performance monitoring and reporting

Detailed tasks:

- In coordination with the Construction Engineer, monitor construction methods and quality control; verify and certify that the quality of works conforms to the specifications and drawings;
- In coordination with the Construction Engineer, assess the adequacy of the contractor's input materials, labor, and construction methods and attend third party inspections as necessary etc.
- perform random field testing of materials and inspection of quality of work as per quality assurance & quality control manual
- In coordination with the Construction Engineer, ensure quality of the works during construction and suggest appropriate remedial action, where required
- Witness site acceptance tests on installation, trial run, etc. for the completed facilities.
- Ensure documentation of adoption of QA & QC procedures and approvals at different stages of the project.

Output/Reporting requirements:

- Provide inputs to the quarterly and annual progress reports to be submitted to ADB.
- Submit inputs to the project completion report as per ADB's format.
- Report to the Project Director/PMU and provide work plan to Project Management Specialist who will be the team leader of the PIU consultants.

Minimum qualification requirements

18. The expert must be an experienced civil engineer with at least a Master's degree and about 15 years of work experience, out of which at least 10 years of experience in infrastructure projects with a minimum of 5 years in a quality control position.

17. Terms of reference for Construction Engineer (12 months)

Scope of work

19. The Construction Engineer will work with the PMU and WRD to coordinate and manage the supervision of civil works construction. The consultant will have professional experience in designing and construction supervision of the modernization of irrigation and drainage projects including hydraulic structures. The consultant will carry out the following tasks

Detailed tasks:

- Support WRD with the review of the Contractors' workplans, method statements, material sources, manpower and equipment deployment schedules, Performance

Security, advance payment and required insurances, and the commencement orders.

- Support the preparation of the detailed ToR for survey works to be undertaken for subsequent project design and oversee the topographical survey,
- Make recommendations to WRD to explain and/or adjust ambiguities and/or discrepancies in the Contract Documents and propose clarifications or instructions as required.
- Review, verify and assist WRD with further detailing of the design of the works, and make recommendations on the approval of the contractors' drawings and if necessary propose additional drawings and/or instructions to the Contractor.
- Advice WRD about modifications to the designs, technical specifications, and drawings, relevant calculations and cost estimates as may be necessary in accordance with actual site conditions and make recommendations to PMU as appropriate.
- Support WRD engineers in carrying out field inspections of the contractors' activities to ensure that the works are carried out in accordance with drawings and specifications.
- Regularly monitor physical and financial progress against milestones specified in the contract so as to ensure completion of the contract on time.
- Oversee construction activities so that the contractual requirements will be met by the Contractors including those in relation to (i) the quality of works, (ii) safety and (iii) protection of the environment.
- In coordination with the Construction Quality Assurance Engineer, monitor field tests, sampling and laboratory tests carried out by the contractors, assess the results and make recommendations as appropriate.
- Inspect the construction methods, equipment used and workmanship on site to ensure compliance with the drawings and specifications
- Submit timely reports to PMU on any inconsistencies in executing the works and make recommendations on appropriate corrective measures to be applied.
- Inspect the works and make recommendations to PMU on the issuance of certificates such as Completion Certificate, Performance Certificate as specified in the civil works and pump station contracts.

Output/Reporting requirements:

- Provide inputs to the quarterly and annual progress reports to be submitted to ADB.
- Submit inputs to the project completion report as per ADB's format.
- Report to the Project Director/PMU and provide work plan to Project Management Specialist who will be the team leader of the PIU consultants.

Minimum qualification requirements

20. The expert must be an experienced civil engineer with at least a Master's degree and about 15 years of work experience, out of which at least 10 years of experience in the construction of irrigation projects and at least 5 years working with a contractor.

18. Terms of reference for Financial Management Specialist (6 months)

Scope of work

21. The specialist will support the PMU Finance Officer during project start-up to set up the accounts and manage the finances of the project meeting ADB's requirements. The specialist will train the PMU staff on ADB procedures and reporting requirements,

Detailed tasks:

- Assist PMU in maintaining the project accounts with all ledgers and control systems.
- Support the PMU staff on ADB disbursement and reporting procedures.
- Help PMU in preparation of annual budget, accounting and audit reports.
- Generate different accounts reports and financial statements.
- Assist PMU in ensuring smooth funds flow from ADB and the state government.
- Support the PMU in obtaining reimbursements from ADB.

Output/Reporting requirements:

- Provide inputs to the quarterly and annual progress reports to be submitted to ADB.
- Submit inputs to the project completion report as per ADB's format.
- Report to the Project Director/PMU and provide work plan to Project Management Specialist who will be the team leader of the PIU consultants

Minimum qualification requirements

22. The expert must be an experienced financial management specialist/accountant with at least a Master's degree and about 15 years of work experience, out of which about 10 years of experience in managing projects of similar nature.

19. Terms of reference for Social Development Specialist (18 months)

Scope of work

23. The Social Development Specialist will assist the PMU in implementing the resettlement plan; establishing channel stakeholder groups, social development, and ensuring social safeguards of the project are adhere to. The specialist will train the social development officers attached to the PMU on monitoring and reporting on social indicators and resettlement plan implementation.

Detailed tasks:

- Support the PMU and revenue department (responsible of implementing the resettlement plan) to coordinate the resettlement plan implementation and update the plan if needed due to unexpected changes in design during implementation.
- Ensure implementation of RP is recorded and prepare implementation monitoring reports in close coordination with the PIUs.
- Ensure RP objectives are met.
- Monitor the performance of the team responsible to update and implement the resettlement plan
- Information/ Data Base Management - Manage comprehensive social information management system/data bases and documentation.

- Review the monthly progress report of contractor on implementation of social aspects of the project such as gender and compliance with labor law
- Training and Capacity building - Periodic workshops/ Meetings seminars on resettlement plan and ensuring gender aspects of the resettlement plan implementation are implemented; develop tailor made courses; organize basic /orientation training programs; organize documentation of staff experience on implementation and monitoring of implementation of resettlement plan
- Provide assistance for sub project implementation; provide essential guidance and inputs related to Gender Equity & Social Inclusion aspects for sub projects and compliance with labor law requirements.
- Ensure gender targets identified in the design and monitoring framework and other gender actions under the project are implemented as planned.
- Advice the PMU on actions that can be undertaken to increase the role of women in project activities
- Assist the PMU in establishing the channel stakeholder groups and help in implementing the communications plan
- Provide technical assistance to Water Resources Department related to grievance redress mechanism to attend to any social and environmental grievances made by any person, community group or agency under sub projects.
- Assist PMU and PIU to monitor contractors compliance to applicable labor laws
- Assist PMU and PIUs to monitor and ensure compliance with the safety, health and hygiene norms and conduct HIV/AIDS awareness campaigns among workers

Output/Reporting requirements:

- Provide inputs on implementation of social, gender and implementation of social safeguards to quarterly and annual progress reports to be submitted to ADB.
- Prepare bi-annual resettlement monitoring reports.
- Report to the Project Director/PMU and provide work plan to Project Management Specialist who will be the team leader of the PIU consultants.

Minimum qualification requirements:

24. The specialist will have a Master's degree in Social sciences with at least 15 years, out of which at least 10 years experience in the design and implementation of resettlement action plans and in gender sensitive, participatory rural appraisal for community development.

25. The EA will provide office space, internet and telephone connection, printing and photocopying facilities and administrative support. The team leader (Project Management Specialist) will be responsible to organize transportation for field visits.

20. Terms of reference for Environment Specialist (6 months)

Scope of work:

26. The Environment Specialist will assist the PMU in monitoring environmental safeguards and also train the environmental officers attached to the PMU on environmental monitoring and reporting.

Detailed tasks:

- Monitor the implementation of the EMP by the contractors and suggest any corrective actions if required.
- Update the EMP as necessary and advice on any unidentified impacts and suggest suitable mitigating measures.
- Arrange for environmental monitoring survey as per EMP. Budget to be provided by PMU for the surveys.
- Organize environmental orientation and awareness training for WRD staff.
- Review project plans, schedules, designs, costs and bid documents to ensure environmental factors and mitigations are incorporated.
- Carry out site inspections during implementation of subprojects and provide feedback to the PMU.
- Identify requirements for environmental permissions from Government Departments that are necessary for compliant implementation of the project and coordinate with those departments;
- Prepare quarterly reports in compliance to ADB guidelines.
- Assist the Environmental Officer of the PMU to implement EMPs and to report compliance to ADB and Indian regulatory authorities.
- Review progress reports of contractors and periodic reports on EMP implementation and advise PMU of any necessary corrective measures.

Output/Reporting requirements:

- Provide inputs to quarterly and annual progress reports to be submitted to ADB.
- Submit semi- annual environmental monitoring reports to ADB.
- Submit work plan to Project Management Specialist who will be the team leader of the PIC and report to PD/PMU.

Minimum qualification requirements

27. The expert must be an experienced environmental specialist with at least a Master's degree in environmental engineering/management or related field and about 10 years of work experience, out of which about 5 years of experience in preparation of environmental assessment and monitoring or works of a similar nature.

NGO TEAM TO ASSIST PIU IN RESETTLEMENT PLAN IMPLEMENTATION

A. Project Background

28. The Government of Tamil Nadu (GoTN) is implementing the Climate Adaptation in Vennar Subbasin in Cauvery Delta Project (CAVSCDP) with Asian Development Bank's assistance. Subprojects proposed under the modernisation of irrigation system by design, construction and operation. This includes re-sectioning of river/canals, desilting of river bed, construction of new or rehabilitation old or reconstruction of head regulators, cross regulators, drainage out fall, irrigation out falls and infalls on Harichandranadi, Adappar, Pandavayar,Vellayar, Valavanarand Vedaranyam rivers and canals of Vennar Subbasin. Re-sectioning of the 220.9-kilometer (km) river involves Harichandranadi River of 39.27 km, Adappar River of 41.23 km, Pandavayar of 38.18 km, Vellayar River of 43.27 km and Vedaranyam Canal of 39.64 km.

29. The RP that was prepared by referring to the project's detailed design identify a significant impact associated with IR. There will be a need to displace 3235 squatter households, occupied the embankment of these canal and rivers, comprising of 2,642 residences, 478 shops and 115 cattle sheds/sheds.

30. The Water Resources Department (WRD), GoTN has prepared a Resettlement Plan (RP) that addresses social issues arising out of squatting and encroachments, along the banks of the canal and river, that require to be removed. This will result in social and/or economic displacement to households/individuals/community, either direct or indirect and the RP is in compliance with the National and State laws and ADB's Safeguard Policy Statement 2009.

31. The executing agency is the Water Resources Department and a Project Management Unit (PMU) has been established. The PMU is headed by a full time Project Director of Chief Engineer Rank. The PMU will be supported by Project Implementation Units (PIUs) established in the respective EEs offices. Three PIUs will be established in Thiruvarur, Nagapattinam and Thiruthuraipoondi. Resettlement planning and implementation will be under the responsibility of the Thiruvarur and Nagapattinam PIUs.

32. To assist the PIU in the implementation of the RPs, WRD invites the services of eligible nongovernment organization team.

B. Consulting Services

33. The team will assist in implementing the resettlement plans (RPs) in a timely manner, and to ensure that displaced persons (DPs) will not be worse off due to the project, and will be compensated for their losses. The following personnel are required:

	Number of Persons	Input in Months Per person	Total Person Months
Key Experts			
Team Leader cum Community Development Specialist	1	6	6
Field Coordinator	2	12	24
Non-Key Experts			
Field Support Staff	2	10	20

34. Two field teams will be fielded one under Thiruvarur PIU and the other under Nagapattinam PIU, with the team leader holding overall charge. Each field team will include one field coordinator and one field staff each. Therefore, in total there will be two field staff.

C. Scope of Work

35. The team will assist the project management unit (PMU) and project implementation units (PIU) in implementing the RPs, and will also work closely with (i) local revenue officer responsible for impacted areas, (ii) grievance redress mechanism (GRM) team, and (iii) Displaced People (DP) as well as the panchayats. The team will be responsible for the following activities:

(i) With assistance of the local revenue officer and engineer, verify the information already contained in the census and socio economic survey of each RP to ensure that all project-affected persons (PAPs) are well recorded. Assist PMU in updating RP, in case there is changed in design during project implementation. The updated RP should be updated based on the agreed entitlement matrix. However, additional socio-economic surveys will need to be undertaken if there will be additional project affected peoples (PAPs). The updated RP, if needed, has to be prepared following meaningful consultation with PAPs.

(ii) Assist the PMU/PIU in preparing working plan (or micro plan) for implementing each RP that includes entitlements that each PAP will get and plan for releasing compensation by block areas, or villages/panchayat. Prepare plan to implement RP in close coordination with procurement team, to ensure that affected households will not be removed/displaced without compensation or without available housing. Ensure that all affected households are compensated/or provided housing before WRD hands over the site to the contractor.

(iii) In close coordination with local village officer, assist the PMU and PIUs in organizing public meetings and regular meetings with project affected persons (PAPs), and in translating summary RPs into local language and disclosing RPs to ensure that PAPs especially DPs have been given full information related with the RPs and the plan to implement the RPs, and assist in disclosing the list of eligible DPs in prominent public places, and record minutes of all meetings with PAPs.

(iv) Assist the PMU/PIU and revenue officials in obtaining options and choices for resettlement sites, in identifying resettlement site, in preparing monitoring sheet to check whether the resettlement sites are ready for occupancy of DPs who are physically displaced, and to ensure the sites are ready before asking DPs to move from project areas.

(v) Update and maintain database of DPs with clear identity to be recorded, property affected by each of them, detail item of compensations or allowance to be provided to them, and included target date for payment. Indicate the preferred site that each of them want to move or to be relocated, and put the target date. This database should also include list of people who voluntarily move to a location of their own choice, if possible, data to where they will move to be recorded in the database as well.

(vi) Assist PIU in preparing and distributing the entitlement and identity card to the eligible DPs, to help in monitoring the progress on compensation payment. (The identity card should include a photograph of the DP, types of loss and contact details of GRC).

(vii) Assist the project implementation unit (PIU) in maintaining the database of DPs in all compensation transactions with DPs to enable to continually provide data and

report to the PMU which areas have been cleared in terms of compensations and if allowance have been fully paid, and if the DPs have been physically resettled in the resettlement sites.

(viii) Collect data and submit progress reports on a monthly and quarterly basis for PIU to monitor the progress of RP implementation. It will include number of DPs that receive a compensation, number of DPs that have moved to resettlement sites, progress of the establishment of resettlement sites

36. In close coordination with PIU and village officer, assist PAPs on the following:

(i) Educate the DPs on their rights to entitlements and obligations.
(ii) Ensure that the DPs are given the full entitlements due to them, according to the entitlements in the RP.
(iii) Assist the DPs in relocation and rehabilitation, including counseling, and coordination with local authorities.
(iv) Provide support and information to DPs for income restoration. Explain to the DPs the implementation arrangement of RPs to their respective DPs. This will include (i) communication to the squatters and encroachers about when the DPs are expected to move out from the project areas,(ii) what support will be needed and provided to the DPs for their relocation either by self or with project assistance, and (iii) the timeframe for their relocation and their entitlements.
(v) Assist in ensuring a smooth transition (during the part or full relocation of the DPs), helping the DPs to take salvaged materials and shift, and in close coordination with DPs, provide PIUs with planned dates when the DPs will be moved out from project areas to resettlement sites.
(vi) Assist the DPs in opening bank accounts explaining the implications, the rules and the obligations of a bank account and how s/he can access the resources s/he is entitled to.
(vii) In addition to counseling and providing information to the DPs, the consultant will carry out periodic consultation with the DPs and other stakeholders to ensure that RPs have been properly implemented.
(viii) Make the DPs aware of the existence of the GRM.
(ix) Assist the DPs in redressing their grievances through the grievance redress committee (GRC) set up for the subproject.
(x) Record the grievance and bring it to the notice of the GRM team within the required days as stated in the GRM procedure.
(xi) Help the DPs in registering their grievance. If necessary, escort the DPs to the GRM meeting on the decided date, help the DP to express his/her grievance in a formal manner if requested by the GRC and again inform the DPs of the decisions taken by the GRC within 3 days of receiving a decision from the GRC.
(xii) Translating the summary RP in Tamil in the form of leaflets/brochures to be disseminated to DPs
(xiii) Submitting monthly and quarterly progress report to the PIU covering both physical and financial progress on RP implementation. The report should cover implementation issues, grievances and summary of consultations

D. Individual Terms of Reference

37. **Team leader cum community development specialist (6 person-months, intermittent).** The Team leader cum community development specialist should be a postgraduate in social science with at least 10 years overall experience and at least 5 years experience in implementing resettlement plans and experience in working on either World Bank or ADB funded projects would be preferred. Should be proficient in Tamil and English.

38. Key tasks will include liaising with client in matters related to RP implementation and manage the team in carrying out various tasks envisaged in the RP implementation. The team leader cum community development specialist will be responsible for consultations, disclosure activities envisaged during RP implementation including (i) overall coordination of all activities envisaged under RP implementation including submission of monthly action plans to PMU/PIU with targets; (ii) identifying suitable income generating schemes for those losing their livelihood; (iii) conduct consultations periodically and disclose relevant project information in Tamil to the DPs and other stakeholders; (iv) assess the suitability of resettlement sites and amenities/facilities provided therein; and (v) carry out HIV AIDS awareness campaigns, and other social dimensions of the project on labour standards, as well as health and safety. Submit monthly and quarterly progress reports. Attend quarterly review meetings at PMU and be available during visit of ADB and external monitor

39. **Field coordinator (2 positions at 12 person-months each, intermittent).** The field coordinator should be a graduate with minimum 3 year experience in implementing rural development livelihood projects in Tamil Nadu. Should be proficient in Tamil and with working knowledge of English. Should have knowledge and ability to use MS Office (Excel / Word) applications. Should have prior experience in implementing resettlement and rehabilitation projects.

40. The field coordinators will be fielded in the subproject areas and will be the single point contact for DPs seeking clarification on eligibility, entitlement, RP implementation schedule and GRM. He will assist PIU in: (i) verification of DPs; (ii) during verification of DPs, ensure that each of the DPs are contacted and consulted individually. Place special attention for consultations with women especially women headed households; (iii) updating of census and socio economic survey data; (iv) updating/appending the survey data in the database; (v) disclosing the gist of the RP including details of contact of GRC; (vi) facilitating the revenue cell and PIU in identifying suitable sites for resettlement; (vii) identifying amenities and facilities requires at resettlement site; (viii) assisting PIU in getting the ID cards prepared; (ix) issuing of identity cards; (x) obtaining bank particulars of PAPs for disbursement purpose (x) obtaining options from DPs, wherever applicable; (xi) preparing list of eligible DPs for dissemination; (xii) assisting PIU in disclosing draft list of PAPs along with details of impact and entitlements (micro plan); (xiii) assisting PIU and revenue cell in receiving and hearing concerns and complains with regard to draft list of entitlement published; (xiv) disbursement of assistances; (xv) assisting PAPs in relocating to the resettlement site; (xvi) providing guidance and counselling during the transition period (xvii) facilitating disclosure of relevant information in a timely manner in Tamil; (xviii) holding periodic consultations with PAPs; and (xix) identifying suitable training for skill development. Will also assist DPs in approaching the GRC, whenever required, and assist PIU in maintaining a record of grievances received/lodged and action taken/compliance. Attend monthly review meetings at PMU and be available during visit of ADB and external monitor.

E. Deliverable Outputs

41. Submit an inception report within 3 weeks of signing up of the contract including a work plan for the whole contract period and staffing and personnel deployment plan.

42. Prepare report on monthly and quarterly progress in implementing the RPs and to be included in the project quarterly progress report, and also prepare semiannual report in implementing the RPs and submit to PMU.

43. Submit a completion report at the end of completing the RPs' implementation.

44. Submit all record/minute of meeting from all consultation meetings with DPs

F. Timeframe for Services

45. The team will be engaged for 24 months from the date of commencement expected to be June 2016.

G. Clients inputs and counterpart personnel

46. WRD will provide the necessary office space to house the team. WRD will provide details of area to be affected and provide all relevant reports to the team. PIU staff of WRD will be available to work with the consultant.

TERMS OF REFERENCE FOR EXTERNAL RESETTLEMENT MONITORING SPECIALIST

A. Project Description

1. Government of Tamil Nadu (The state government) is implementing the Climate Adaptation in Vennar system in Cauvery Delta Project (CAVSCDP) with Asian Development Bank's assistance. Subprojects proposed under the modernization of irrigation system by design, construction and operation. This includes re-sectioning of river/ canals, desilting of river bed, construction of new or rehabilitation old or reconstruction of Head regulators, Cross Regulators, drainage out fall, irrigation out falls and infalls on Harichandranadi River, Adappar, Pandavanar, Velliar, Vanavanar and Vedaranyam Canal of Vennar Subbasin. This includes; re-sectioning of 220.9 km river involves Harichandranadi River of 39.27 km, Adappar River of 41.23 km, Pandavayar of 38.18 km, Vellieyar River of 43.27 km and Vedaranyam canal of 39.64 km.

2. The RP that was prepared by referring to the project's detailed design identify a significant impact associated with IR. There will be a need to displace 3235 squatter households, occupied the embankment of these canal and rivers, comprising of 2,642 residences, 478 shops and 115 cattle sheds/sheds.

3. WRD, the state government will update the RP prepared during project preparation. The RP addresses social issues arising out of squatting and encroachments, along the banks of the canal and river, that require to be removed. This will result in social and / or economic displacement to households / individuals / community, either direct or indirect and the RP is in compliance with National and State laws and ADB's Safeguard Policy Statement 2009.

4. The RP will be implemented by the PIU, WRD with the assistance of the Special Revenue Cell and an implementation support consultancy team (NGO/CBO).

5. The subproject includes a provision for monitoring of the implementation of the subproject resettlement plan by an external monitor. Therefore, the WRD, which is the EA for this project, requires the services of a reputed individual for monitoring and evaluation of RP implementation.

B. Scope of work – Generic

6. The scope of work includes:

- To review and verify the progress in resettlement implementation as outlined in the RP;
- To monitor the effectiveness and efficiency of PIU, Special Revenue Cell and consultant in RP implementation consultant;
- To review the effectiveness of the GRM system and recommend improvements if required
- To assess whether resettlement objectives, particularly resettling DPs, livelihoods improvement for enhancing living standards of the Displaced Persons (DPs) have been achieved;
- To assess resettlement efficiency, effectiveness, impact and sustainability, drawing both on policies and practices and to suggest any corrective measures, if necessary; and
- To review the project impacts on vulnerable groups viz, WHH, BPL, SC, elderly and Children and assess the effectiveness of the mitigating actions taken.

C. Scope of work- Specific

7. The major tasks expected from the external monitor are:

- To develop specific monitoring indicators for undertaking monitoring for RP implementation;
- Review results of internal monitoring and verify claims through random checking by adopting suitable sampling method at the field level to assess whether resettlement objectives have been generally met;
- Involve the affected people and community groups in assessing the impact for monitoring and evaluation purposes;
- Evaluate the facilities and amenities provided at the resettlement site and the process of relocation of DPs;
- Evaluate and assess the adequacy of assistances given to the DPs and the livelihood opportunities and incomes as well as the quality of life of DPs of project-induced changes; and
- To evaluate and assess the adequacy and effectiveness of the disclosure to DPs and consultative process with DPs, particularly those vulnerable.
- Evaluate the adequacy and effectiveness of grievance procedures and legal redress available to the displaced persons, dissemination of information about existence of the GRC and the effectiveness and timeliness in grievances redressed.

D. Time Frame and Reporting

8. The independent monitoring expert will be hired for a period of 8 months intermittent over 2 years and will be responsible for overall monitoring of the RP implementation and will submit quarterly and semi-annual review report directly to CE, WRD and ADB.

E. Qualifications

9. The monitoring expert will have significant experience in resettlement policy analysis and RP implementation. Further, work experience and familiarity with all aspects of resettlement operations would be desirable. Candidates with postgraduate degree in social science will be preferred. Interested consultants should submit proposal for the work with a brief statement of the approach, methodology, and relevant information concerning previous experience on monitoring of resettlement implementation and preparation of reports. Prior experience of having worked in Tamil Nadu and knowledge of Tamil will be desirable.

10. The curriculum vitae of the expert along with experience in policy analysis and RP implementation must be submitted along with the proposal.

F. Budget and Logistics

11. Copies of the proposal - both technical and financial - should be submitted and the budget should include all cost and any other logistics details necessary for resettlement monitoring.

12. WRD will provide all reports and DP data to the expert and assist in contacting the DPs. Office space, clerical support or transport will be not be provided by WRD.

TERMS OF REFERENCE FOR INDEPENDENT INTERNAL AUDIT FIRM

A. Background

1. These terms of reference (TOR) outline the scope of works, deliverables and work project for the Internal Audit Firm. The Firm will support the Water Resources Department, Tamil Nadu implement the Climate Adaptation in Vennar Subbasin in Cauvery Delta. The expected outcome is improved water management in the Vennar system. The project comprises of two outputs: (i) Improved infrastructure for flood management and irrigation, (ii) Improved management systems established.

B. The Project

2. Under Output 1, the project will support the (i) repair and upgrading of existing infrastructure including embankments designed to withstand a 25 year return flood taking into consideration climate change projections, and (ii) construction of new essential infrastructure.

3. Output 2 will deliver non-structural adaptations designed to improve the management of surface water resources, and (ii) manage flood risks and flood events. Initiatives to be developed are: (ii) improved assessment of water resources through installation of additional rainfall, surface water level, groundwater level and tide level monitoring stations and through direct flow measurements at key structures, (ii) development of a Decision Support System (DSS) and (iii) capacity development of Water Resources Department officers in improved management of water resources. The improvements to management of flood risks and flood events will be achieved through establishment of flood forecasting and warning systems and preparation of flood risk maps.

C. Implementation & Financial Management Arrangements

4. The executing agency is the Water Resources Department and a Project Management Unit (PMU) has been established. The PMU is headed by a full time Project Director of Chief Engineer Rank. The PMU will be supported by Project Implementation Units (PIUs) established in the respective EEs offices. Three PIUs will be established in Thiruvarur, Nagapttinam and Thiruthuraipoondi. The PMU will be supported by two teams of consultants; (i) Project Implementation Consultants who will support the implementation of Output 1, and (ii) Project Technical Advisory Consultants (PTAC), who will (a) support the implementation of the establishment of a decision support system, and flood risk mapping and establishment of forecasting and warning systems under Output 2, (b) and support the preparation of feasibility studies for a follow on project covering the remainder of the Vennar Subbasin and Cauvery Subbasin.

5. The financial management arrangements within the project are largely mainstreamed using the regular budgeting, funds flow and the state government treasury accounting and financial rules being applicable to the project. The project, through the PMU submits yearly financial reports to the bank (ADB)

D. Objective:

6. The firm engaged shall provide outsourced internal audit services to WRD. The purpose of the engagement is to provide additional level of control and oversight over the accounting,

internal controls and financial management procedures of WRD, in particular and with particular focus over the ADB-funded project. The internal auditors' shall be appointed by the project steering committee, and shall report directly to the project steering committee. The internal auditors so appointed are expected to be, and maintain, their independence throughout the engagement, and shall not provide any additional services to WRD which may impair their independence.

E. Services/Scope of Work

7. The internal audit should be carried out in accordance with standards and) and the guiding principles of the Institute of Internal Auditors (IIA) , will follow a risk-based approach and will include such tests and controls as the Internal Auditor Considers necessary under the circumstances. An annual audit plan should be prepared, based on a risk assessment, and submitted to the project steering committee for their concurrence. Specific areas of coverage of the internal audit could include the following:

a) An assessment of the adequacy of the project financial management systems, including internal controls. This would include aspects such as adequacy and effectiveness of accounting, financial and operational control; level of compliance with general financial rules and treasury rules of the state government;
b) An assessment of compliance with provisions of financing agreements (ADB Loan Agreement and Project Agreement) especially those relating to accounting and financial matters.
c) That all external funds received under the project have been used in accordance with the financing agreement, with due attention to economy and efficiency and only for the purposes for which the financing was provided; that civil works, goods and services, including consultancy services financed have been procured in accordance with the financing agreements and procurement guidelines of the bank;
d) The budgets are allocated to the PIUs in a timely manner and expenditure is as per approved budget.
e) Funds flow are adequate and timely and with respect to WRD, the LOC are issued in a timely manner and not used for non project activities i.e. adequate control over issue and utilization of LOC.
f) That all necessary supporting documents, contracts, records, and accounts have been kept in respect of all project expenditures reported by the implementing units, and that clear linkages exist between that accounting records and accounts books and the monthly/ quarterly financial reports submitted by such implementing units to PMU.
g) Status of reconciliation of the accounts maintained by the with the treasury and AG (A&E) as applicable;
h) That adequate records maintained regarding assets created and assets acquired by the project, including details of cost, identification and location of assets; and that the physical verification of assets is being done.
i) With respect to civil works executed check to ensure that contract registers have been maintained and updated; running bills are properly approved and in agreement with the Measurement Book; advances are properly adjusted and statutory deductions have been made

8. In addition, the outsourced internal audit firm will prepare an Internal Audit Manual for use by WRD, and also provide training workshops to the senior management of WRD, and relevant

accounting staff, to explain the scope and objectives of Internal Audit Function, such that WRD may consider subsequently co-sourcing, and then allocating resources for an in-house internal audit department. If necessary, the team will also train selected WRD staff for potential future co-sourcing or in house Internal Audit Department.

9. The Internal Audit Firm will be engaged for an initial period of 24 months (2016-17) and depending upon the performance the contract may be renewed for a further period of 1 year i.e till the completion of project. Recruitment will be undertaken in accordance with ADB's Guidelines on the Use of Consultants (2013, as amended from time to time).[4] Firms will be recruited using quality- and cost- based selection (QCBS) method with a 80:20 quality to cost ratio. A bio-data technical proposal will be required. The team will comprise of :

Position	Months(for two years of contact)
Partner/Director	4
Audit Manager/Team Leader	8
Audit Assistants	40

10. The qualification requirements of each of the members of the team are given below:

11. **Partner/ Director.** Qualified Chartered Accountant with at least 15 years experience as a partner with expertise in the area of internal audit planning execution and reporting. Certification by the Institute of Internal Auditors is preferable.

12. **Audit Manager/Team Leader.** Qualified Chartered Accountant with at least 5 years experience in internal audit with ability to lead and team and interact with senior level official of EA.

13. **Team Member.** Qualified Chartered Accountant with at least 2 years of experience in internal audit with an ability to review systems and procedures and with specific experience in budgets, treasury and financial rules, LOC system of funds transfer in the state government and GOI.

14. **Reporting.** The Internal auditor firm will provide a quarterly report for the activities covered in the quarter to the project steering committee with a copy to ADB. The report shall contain the records verified, deviations, if any, the adequacy of internal controls and adherence to Government orders, and treasury rules. The report should be discussed and agreed with the respective head of office and should be structured in a manner giving the observations, the implications of the observations, the suggested recommendation and the management comments/ agreed actions. This will be in the form of an Internal Audit Report (including an executive summary highlighting critical and cross cutting issues, key issues which require the attention of the Principal Secretary WRD,PMU& Project Steering Committee which will inter-alia include;

i. Comments and observations on the financial management records, system and controls that were examined during the course of the internal audit;
ii. Deficiencies and areas of weakness in systems and controls and specific recommendations for their improvement;

[4] Available at: http://www.adb.org/sites/default/files/institutional-document/31481/guidelines-use-consultants.pdf

iii. Compliance with agreement and comments, if any, on internal and external matters affecting such compliance;
iv. Test check for the compliance of Arithmetic accuracy and passing of the bills
v. Matters that have come to attention during the internal audit that might have a significant impact on the implementation of the project; and
vi. Any other matter that the internal auditors consider pertinent
vii. Status of Compliance with/follow up on agreed actions from previous audit reports.

15. Copies of the internal audit together with the Executive Summary will be provided to the PMU with the relevant sections to the concerned departments within 45 days from the end of each quarter.

Procedure for Review of Audit Report

16. PIUs will review the Audit report within 20 days from the submission of report by the internal auditor and will send the status of Compliance report to the PMU. The PMU will consolidate the PIUs and send it to steering committee and ADB with comments within 20 days from the date of receipt from the PIU.

General

17. The Internal Auditor would be given access to all the documents, correspondence, and any other information relating to the project and deemed necessary by the Internal Auditor. The Internal Auditor should become familiar with the project and with the relevant policies and guidelines of GOTN and the ADB (including those relating to procurement and financial management and reporting). The Internal Auditor would be provided copies of the project Implementation Plan; project Appraisal Documents, Loan Agreement and project agreement with ADB (including agreed Minutes of negotiations); guidelines, policies and procedures issued by project management and implementing agencies including Government Orders and project budget lines.

Appendix E: Training Plan

1. Project preparatory technical assistant consultants had initial discussions with a number of internal and external stakeholders, including Irrigation Management Training Institute, Trichi (IMTI); Madras Institute of Development Studies, Chennai (MDS); Annamalai University, Chidambaram; Institute of Water Studies, Chennai (IWS) and SWARMA. Discussions were held to understand the possible areas of training for the department officers and others involved in the implementation of the project. The capabilities within the WRD in IWRM, irrigation management, environment management, community engagement, project execution, contract management and project monitoring were also reviewed.

2. Based on these discussions, the following training has been identified. This is to cover the critical training needs at the circle, division and sub-division levels. This is reflected in the Indicative Training Plan below. This is a provisional list.

3. Three broad types of courses have been identified.

- Courses to be organized on nomination basis. They will be nominated to national or state level training agencies, based on their training calendars (e.g. National Water Academy, Pune, ADB)
- Courses specifically designed for the project and delivered by competent training agencies (e.g. National Institute of Construction Management and Research, Pune, IMTI, Trichy) and
- Courses to be designed based on the software to be procured and to be conducted on-the-job (e.g. DSS, Flood forecasting)

#	Indicative Training	Cost/head	No of heads	No of courses	Total cost (INR)	Suggested training provider	Type of Course
1	Project Management & Monitoring	15,000	10	2	300,000	Irrigation management training institute (IMTI)	Formal course
2	IWRM concepts and practices	15,000	15	3	675,000	Madras Institute of Development Studies (MIDS), Chennai or Anna University Chennai or National Water Academy(NWA), Pune	Formal course to be designed
3	DSS concept design and implementation	20,000	5		100,000	DSS Development Specialist	On-the-job; Internal workshops
4	DSS Use	20,000	25		500,000		Internal workshops
5	Flood forecast and flood modelling	15,000	10	2	300,000	National Water Academy (NWA) Pune +	Formal course + on-the-job

						Project Technical Advisory Consultants (PTAC)	
6	ADB procurement procedures	10,000	5	2	100,000	ADB/NWA, Pune	Formal course
7	FIDIC style contract management	15,000	20	1	300,000	National Institute of Construction Management and Research (NICMAR), Pune or Administrative Staff College of India (ASCI), Hyderabad	Formal course to be designed
8	Improved farming practices	500	200 farmers	6	600,000	IMTI	Formal course to be designed
9	Financial Management Systems and reporting	2,000	6	1	12,000	Project Implementation Consultants (PIC) + IMTI + ADB	On-the-job + Formal courses to be designed
10	Overseas training during The project and exposure visits to IWRM best practice locations	30,000	10	1	3,000,000	To be coordinated by IMTI + PIC and PTAC	Formal courses
11	GIS applications and remote sensing	10,000	5	1	50,000	GIS training institute of India and PTAC	Formal course + On-the-job
12	IEE/EIA/Environment management related training	10,000	5	2	100,000	Annamalai University	Formal course
13	Rainfall-runoff modelling & hydraulic modelling	10,000	5	1	50,000	Central Water, Power Research Station, Pune + PTAC.	Formal course + On-the-job
	Construction Quality Assurance	10,000	5	1	50,0000	To be identified	Formal course
	Total				6,137,000		
	Contingency				963,000		
	Grand Total				**7,100,000**		

Appendix F: Stakeholder Communications Plan

A. Objective and Principles

1. The objective of the Stakeholder Communications Plan (SCP) is to describe how the project will ensure meaningful participation of all stakeholders in project implementation and monitoring. The SCP recognizes that beneficiaries participate from different starting points and cultural experience, and that this has implications on how beneficiaries will participate and contribute.

2. A fundamental principle of participation is that all legitimate stakeholders be heard, in particular, women and other disadvantaged groups that have traditionally been excluded, such that benefits reach the broadest possible cross section of people. This ensures that the project will be designed and implemented as per the needs, capacities and constraints of those benefiting.

3. Effective participation of various stakeholders will be achieved by keeping them informed of project activities and involving them in decisions that affect them. Dissemination of information and seeking ideas and opinions of stakeholders is built into the SCP.

B. Stakeholder Analysis and Key Areas for Participation

4. Stakeholder analysis is the means to identify types of stakeholders acting at different levels to develop and implement the project. These groups interact within communities and at district level; their opinions and interactions can guide and influence project outcome.

5. The stakeholders involved and their interests and concerns are shown in Table 1. Key measures for stakeholder engagement in the project are identified, along with the party responsible for ensuring the participation (Table 1).

Table 1. Stakeholder Analysis and SCP

Stakeholder Group	Stakeholder Interests and Concerns	How the project Works with Stakeholder Group	Who is Responsible for Stakeholder Participation or Communication
General beneficiaries of improved water delivery and flood risk reduction	• Need to be aware of project and how it will benefit them • How the project intervention will result in increased income to the household • Increased number of working days • Interested in timely and sufficient delivery of irrigation water • Affected by floods • Minimizing damage and loss to crops, livestock	• Disseminate general information about project through information posters displayed in schools, health centers, project website, and brochure • Briefings for local meeting will be conducted semi-annually • Flood forecasting information will be disseminated through District Collectors (once developed under project)	PMU, with support of PIC Social Development Specialist PMU, with support of Social Development Specialist PMU, with support of Social Development Specialist

Stakeholder Group	Stakeholder Interests and Concerns	How the project Works with Stakeholder Group	Who is Responsible for Stakeholder Participation or Communication
	• Reduction in level salinity in drinking water of those HH dependent in ground water	• Representative farmers will be members of Channel Stakeholder Groups as the main forum for voicing their needs and perspectives to WRD	PMU, with support of Social Development Specialist
Households having structures on channel embankments that will be displaced under the project	• Reluctant to move on time • Concerns of loss of livelihood, residence • Concern of employment opportunity in the relocated site	• Gist of RP to be disseminated through handouts in Tamil and hold meetings with DHs • Monitor implementation of resettlement plan, ensuring livelihood restoration measures for relocated households • Timely availability of information about entitlements, schedule for relocation and civil works	NGO / PIU NGO engaged by PMU to implement RP, supervised by PMU's Social Development Specialist and external resettlement monitoring specialist. NGO / PIU
District-level government agencies working in agriculture, fisheries, disaster management, environment, and local roads, and district collectors	• Need to be aware of project and how it will affect their programs • They serve as a liaison with project beneficiaries through their own programs • Their cooperation will be needed for key project activities such as road improvements on channel embankments, implementing flood early warning systems, etc.	• They will be members of Field Implementation Coordination Committee and meet regularly to share information and coordinate	PIU
Channel Stakeholder Groups (CSG)	• Need to be aware of the objectives of CAVSCD and progress of works • Availability of water for irrigation • Reduction in flooding of fields	• Dissemination of scope and objective of CAVSCD, schedule of activities in regular meetings held minimum four in a year • Discuss plans on effective use of water and implement the	PIU in coordination with CSG

Stakeholder Group	Stakeholder Interests and Concerns	How the project Works with Stakeholder Group	Who is Responsible for Stakeholder Participation or Communication
	• Early warning for preventive measures	reasonable/feasible decisions • Periodically update on progress of works/maintenance required	
Local Body representatives, panchayats	• Need to be aware of the objectives of project and progress of works	• Dissemination of scope and objective of project, schedule of activities in regular/special gram sabha meetings • Periodically update on progress of works	PIU in Coordination with local body
Delta Farmers association(s)	• Need to be aware of the objectives of project and progress of works	• Dissemination of scope and objective of project, schedule of activities • Periodically update on progress of works	Public relations officer of PMU with the support of SDO, PMU and NGO

C. Key Actors in SCP Implementation

6. This section describes the key ways in which participation and communication will be facilitated under the project. The Project Management Unit will monitor the CPC Plan and will be expected to report on the status of implementation of each of the activities listed below in their progress reports and during ADB review missions. Stakeholder interests and needs may change during the implementation period, and if so the activities needed to engage various stakeholders will also change. The PMU will update the CPC Plan as necessary.

7. **Project Management Unit (PMU)**. The PMU will be responsible for developing and maintaining a project website that includes up-to-date information about the project and status of implementation. It will produce posters and brochures for wide dissemination of the project. It will ensure targeted information is prepared for households affected and identified in the resettlement plan.

8. **Project Implementation Unit (PIU)**. The PIU is responsible for monitoring of implementation of resettlement and environmental management plans, organizing the Channel Stakeholder Groups, and conducting general stakeholder consultations, and organizing and ensuring the grievance redress committees are established and operational at the district level. The PIU will organize regular consultations with farmers in the pilot area or the conjunctive use scheme.

9. **Field Implementation Coordination Committee (FICC).** An FICC will be formed in Thiruvarur and Nagapattinam districts. Chaired by the relevant district collector, with the district revenue officer as the vice chair , the FICC includes representatives of other district-level stakeholder agencies (agriculture, fisheries, disaster management, environment, and local roads), and chairperson of channel stakeholder groups. The PMU will use the FICC platform to report in FICC project status, facilitate coordination among government agencies, and hear feedback from district-level stakeholders.

10. **Channel Stakeholder Groups (CSG)**. Each stakeholder group will have 5 government officials and 15 farmers of the region, comprising of not less than 3 women (if participation of active women land owners is not feasible, then women from farming families will be inducted), 3 marginal farmers, 3 small farmers, 3 big farmers and any 3 Panchayat Presidents of the concerned Panchayats. The membership of each stakeholder group will include officials from the District Departments (WRD, Agriculture, Fisheries, Environment) and representatives of the farming communities nominated by the concerned Revenue Divisional Officer (RDO). The group's Chairperson will be nominated through consensus from amongst the member-farmers to hold office for a period of 1-year by rotation.

Appendix G - ADB Prohibited Investment Activities List

The following do not qualify for Asian Development Bank financing:

(i) Production of activities involving harmful or exploitative forms of forced labor[1] or child labor;[2]
(ii) Production of or trade in any product or activity deemed illegal under host country laws or regulations or international phase outs or bans, such as (a) pharmaceuticals,[3] pesticides, and herbicides,[4] (b) ozone-depleting substances,[5] (c) polychlorinated biphenyls6 and other hazardous chemicals, [7](d) wildlife or wildlife products regulated under the Convention on International Trade in Endangered Species of Wild Fauna and Flora,[8] and € transboundary trade in waste or waste products;[9]
(iii) Production of or trade in weapons and munitions, including paramilitary materials;
(iv) Production of or trade in alcoholic beverages, excluding beer and wine;[10]
(v) Production of or trade in tobacco (footnote 10);
(vi) Gambling, casinos, and equivalent enterprises (footnote 10);
(vii) Production of or trade in radioactive materials,[11] including nuclear reactors and component thereof;
(viii) Production of, trade in, or use of unbonded asbestos fibers;[12]
(ix) Commercial logging operations or the purchase of logging equipment for use in primary tropical moist forests or old-growth forests; and
(x) Marine and coastal fishing practices, such as large-scale pelagic drift net fishing and fine mesh net fishing, harmful to vulnerable and protected species in large numbers and damaging to marine biodiversity and habitats.

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[1] Forced labor means all work or services not voluntarily performed, that is, extracted from individuals under threat of force or penalty.
[2] Child labor means the employment of children whose age is below the host country's statutory minimum age of employment or employment of children in contravention of International Labor Organization Convention No. 138 "Minimum age Convention" (www.ilo.org).
[3] A list of pharmaceutical products subject to phase outs or bans is available at http://www.who.int.
[4] A list of pesticides and herbicides subject to phase outs or bans is available at http://www.pic.int.
[5] A list of chemical compounds that react with and deplete stratospheric ozone resulting in the widely publicized ozone holes is listed in the Montreal Protocol, together with target reduction and phase-out dates. Information is available at http://www.unep.org/ozone/montreal.shtml.
[6] A group of highly toxic chemicals, polychlorinated biphenyls are likely to be found in oil-filled electrical transformers, capacitors, and switchgear dating from 1950 to 1985.
[7] A list of hazardous chemicals is available at http://www.pic.int.
[8] A list is available at http://cites.org.
[9] As defines by the Basel Convention; see http://basel.int.
[10] This does not apply to project sponsors who are not substantially involved in these activities. Not substantially involved means that the activity concerned is ancillary to a project sponsor's primary operations.
[11] This does not apply to the purchase of medical equipment, quality control (measurement) equipment, and any equipment for which ADB considers the radioactive source to be trivial and adequately shielded.
[12] This does not apply to the purchase and use of bonded asbestos cement sheeting where the asbestos content is less than 20%.