

**MEMORANDUM OF UNDERSTANDING**  
**Between the Government of Viet Nam and the Asian Development Bank**

**VIE (49404-002): Proposed Water Efficiency Improvement in Drought Affected Provinces Project**  
**Loan Fact-Finding Mission (14 July – 8 August 2017)**

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**I. INTRODUCTION**

1. A Loan Fact-Finding Mission<sup>1</sup> (the Mission) from the Asian Development Bank (ADB) on the proposed Water Efficiency Improvement in Drought Affected Provinces (WEIDAP) Project (hereinafter referred to as the project) was fielded from 14 July to 8 August 2017 to: (i) discuss and agree with the government on the project's design including the scope, outputs, investment and financing plans, implementation arrangements, and processing schedule; (ii) clarify the required due diligence, including initial project staffing, safeguards and policy, and capacity constraints; (iii) prepare draft ADB's report and recommendation of the President to the Board of Directors (RRP) including the linked and supplementary documents such as the project administration manual, contribution to the ADB's results framework, development coordination, economic and financial analysis, country economic indicators, summary poverty reduction and social strategy, gender action plan, initial environment examination, resettlement and ethnic minority development plan, and risk assessment and risk management plan; and (iv) discuss the project readiness conditions and covenants to be included in the loan agreement, including advance actions. The Mission also discussed the opportunities for scaling up the project interventions by conducting dialogue with potential cofinanciers and development partners.
2. A kick-off meeting, chaired by Mr. Chu Van Chuong, Deputy Director General, International Cooperation Department of the Ministry of Agriculture and Rural Development (MARD), took place on 14 July 2017. Thereafter, the Mission met with the officials from the Provincial People's Committee (PPC), Department of Agriculture and Rural Development (DARD), and potential development partners. Meetings with the Ministry of Planning and Investment (MPI) and Ministry of Finance (MOF) were conducted on 2 and 3 August 2017 respectively. A wrap-up meeting, chaired by Mr. Nguyen Van Tinh, Deputy Director General, Water Resources Directorate, MARD and attended by representatives of State Bank of Viet Nam (SBV) and MARD was held on 8 August 2017. The list of persons met is in Appendix 1.
3. This memorandum of understanding (MOU) outlines the agreements reached between the Mission and the government on the design of the project for further consideration and processing of the Loan. The agreements set out in this MOU are subject to review and approval by higher authorities of the government and ADB.

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<sup>1</sup> The Mission comprised: (i) Sanath Ranawana, Senior Natural Resources Economist/Mission Leader; (ii) Takeshi Ueda, Principal Natural Resources and Agriculture Economist; (iii) Karen Chua, Associate Operations Officer; (iv) Nguyen Thanh Giang, Senior Social Development Officer (Gender); (v) Dinh Kieu Oanh, Associate Social Development Officer (Safeguards); (vi) Pham Quang Phuc, Senior Environment Officer; (vii) Ho Le Phong, Senior Project Officer (Natural Resources and Agriculture); and (viii) Luong Thi Thanh Ngan, Associate Procurement Officer. Support from the Country Director, VRM, and other staff are gratefully acknowledged. The Mission was also supported by the project preparatory technical assistance consulting firm lead by Kevin Rutter and staff consultants Alan Clark and Hai Ngo.

## THE PROJECT

4. The project was predicated by the El Niño induced drought of 2014– 2016 which affected the south central coastal and central highland regions of Viet Nam. The project will modernize eight irrigation systems in five provinces that were most severely affected by the drought, namely Binh Thuan, Dak Lak, Dak Nong, Khanh Hoa and Ninh Thuan. The modernized irrigation systems will support farmers to grow high value crops (HVC) which will increase the water productivity of agriculture.<sup>2</sup> The project takes a comprehensive and integrated approach under three outputs: (i) irrigation management services strengthened; (ii) modernized irrigation systems implemented; and (iii) efficient on-farm water management practices adopted. The project is aligned with the government's agriculture sector strategy and supports implementation of its recently approved Law on Hydraulic Structures. It is also aligned with ADB's country partnership strategy for Viet Nam (2016–2020), specifically pillar 2: increasing the inclusiveness of infrastructure and service delivery, and pillar 3: improving environmental sustainability and climate change response.

### A. Impact, Outcome and Outputs

5. The project is aligned with the following impact: climate resilience and water productivity in agriculture improved. The project will have the following outcome: climate resilient and modernized irrigation systems in five participating provinces established. The design and monitoring framework is attached as Appendix 2.

6. **Output 1: Irrigation management services strengthened** aims to enhance climate resilience by improving irrigation management services. The output will focus on two sets of activities: (i) conduct irrigation water resource assessments, allocation planning and monitoring; and (ii) support cost recovery and public private partnerships for irrigation operation and maintenance (O&M).

7. Under the first set of activities, the project will support the collection and analysis of hydrological data (including surface and ground water) from the targeted catchments and command areas. Information from existing sources will be supplemented with new information (e.g., new groundwater bore holes, remote sensing) to improve the overall reliability of estimating irrigation water requirements and projections within the catchment and command area. The information will be used to develop water allocation plans for each subproject command area, where essential needs and selected crops will be prioritized to receive water during times of scarcity. The allocation frameworks developed under the project could be the basis for future efforts to define systems of water entitlements within a sub-basin or basin. Finally, this activity will support the development of an advisory service to farmers on crop water requirements and appropriate scheduling of irrigation on farm. The service will provide real time information to farmers<sup>3</sup> based on estimating crop water requirements at the farm level using remote sensing technology.<sup>4</sup>

8. The second activity will support measures to enhance the sustainability of the irrigation systems developed under the project. Activities include upgrading subproject asset inventories and operation control systems, ensuring uniformity between databases and software for supervisory control and data acquisition (SCADA) systems installed in each the

<sup>2</sup> Water Productivity (commonly termed as 'crop per drop') involves the dual objectives of increasing crop yields and/or reducing crop water use. It does not replace irrigation efficiency; instead it brings together the two essential outcomes of irrigation water management into one single expression: crop production and crop water consumption. It is a relative indicator measured in terms of crop yield (kg) or value (\$) per unit of water consumed (m<sup>3</sup>).

<sup>3</sup> Such as over a digital mobile network.

<sup>4</sup> Apart from being a useful tool for farmers to improve on-farm irrigation practices, this activity will contribute to monitoring key project indicators (i.e., water productivity).



subprojects, developing guidelines for operation and software systems and for maintenance planning, budgeting and implementation.

9. Activities will also support the ongoing efforts to develop a framework and mechanism for irrigation water charges in line with the new Law on Hydraulic Works. The piped irrigation systems developed under the project will be equipped with meters which allows for transparent volumetric measurement of water use. The project will support an assessment of existing charging arrangements used by irrigation management companies (IMCs, for bulk water users) and by private pump operators and adapt them to meet the specific conditions of the piped irrigation schemes developed under the project. The project will also support an information, education and communication program to raise awareness regarding water charges. Finally, options for engaging a third party to operate and maintain the piped schemes will be developed especially in situations where the IMC does not have the skills to operate and maintain modernized irrigation systems. The project will assess the availability and the willingness of private operators to take up O&M of piped irrigation systems and prepare sample bid documents for a model public-private partnership (PPP).

10. **Output 2: Modernized irrigation systems implemented.** The project will modernize eight irrigation subprojects in the five provinces to support HVCs and reduce vulnerability to climate change.<sup>5</sup> The modernization works for each subproject are summarized in Appendix 3 essentially fall into three groups.

Group 1: New pipe systems taking water from canals or reservoirs, and supplying hydrants located at a reasonable distance from a farmer's field, such that the farmer can connect directly using a hose.<sup>6</sup> Several farmers would connect to each hydrant taking water in turns and as per their requirements. Sufficient flexibility is provided so that, generally, all farmers can irrigate within daylight hours. Basic SCADA systems will facilitate operations such as remote monitoring of flows at hydrants, pressures at key points in pipelines, and linking pump operation to water levels in a controlling header tank. This group of works is further subdivided into: gravity pipe systems, and pumped pipe systems.

Group 2: Existing canal systems rehabilitated and upgraded including canal lining, control structure, balancing storage and installation of flow control and measurement devices with remote monitoring.<sup>7</sup> Direct pumping into pumped-pipe systems will be supported. The canal systems together with pumped pipe abstractions, will support efficient irrigation of high value crops.

Group 3: New and improved weirs, and other works. New weir structures will replace farmer constructed temporary weirs and provide permanent ponds from which farmers can pump to irrigate HVC such as pepper and coffee on hill slopes. Other works include upgrading of upstream storage and supply systems reservoirs, culverts, roads, and control/monitoring systems to facilitate improved management.

11. As part of operating the system, the project will finance on a sliding scale, the viability gap associated with the operator's breakeven financial return over the course of the project

<sup>5</sup> Two each in Dak Nong, Ninh Thuan and Binh Thuan provinces and one each in Dak Lak and Khanh Hoa provinces.

<sup>6</sup> Typically, 63 mm in diameter, with flows of about 5 l/s and within a range of 500 to 1,000 m from a field.

<sup>7</sup> Balancing storage at the tail is suggested where tail ends supplies HVC, but not where systems have rice in the tail area.

period. It will also finance an evaluation study upon completion to assess effectiveness and commercial viability of the arrangement.

12. **Output 3: Efficient on-farm water management practices adopted.** Project activities will include: (i) information, education, and communication on crop water requirements; and (ii) technical support on developing appropriate water efficient application technology (WEAT) systems and supporting access to WEAT suppliers. The water productivity assessments conducted under output 1 will help identify farmers who are achieving high and low levels of water productivity in each subproject command area. Based on this information, farmers will be targeted to receive information and education on good irrigation practices aimed at improving their water productivity. Farmers will also receive technical advice on identifying and developing appropriate WEAT systems that meets their individual requirements. They will be linked up with suppliers and be provided training in O&M of WEAT systems.

## B. Cost Estimate and Financing Plan

13. The project is estimated to cost \$123.33 million with ADB financing \$100 million equivalent from the concessional ordinary capital resources<sup>8</sup> loan and about \$22.28 million from the government and the beneficiaries, as given in Table 2. Further details of the cost and financing plan are given in draft Project Administration Manual.

14. ADB loan will be used to finance modernization of eight irrigation systems, engineering consultants, construction supervisions and monitoring, development of system for subproject maintenance, technical service provider for the application of WEAT, and implementation of the gender action plan and environmental management plan. The government will finance taxes and duties, resettlement costs, detail engineering design and co-finance for component 1.

15. A grant of \$1.05 million will be provided by the Climate Change Fund (\$0.3 million) and Water Financing Partnership Fund (\$0.75 million). These grants will finance activities under output 1.

**Table 1: Investment Plan  
(\$ million)**

Item	Amount <sup>a</sup>
<b>A. Base Cost<sup>b</sup></b>	
1. Irrigation management services strengthened	1.65
2. Modernized irrigation systems constructed and implemented	98.81
3. Efficient on-farm water management practices adopted	0.45
<b>Subtotal (A)</b>	<b>100.91</b>
<b>B. Contingencies<sup>c</sup></b>	<b>19.94</b>
<b>C. Financial Charges During Construction<sup>d</sup></b>	<b>2.48</b>
<b>Total (A+B+C)</b>	<b>123.33</b>

<sup>a</sup> Includes taxes and duties of \$7.5 million. Such amount does not represent an excessive share of the project cost and will be financed by the government through exemption.

<sup>b</sup> In mid-2017 prices as of June 2017.

<sup>c</sup> Physical contingencies computed at 10% for civil works; and 10% for all items of expenditure except for consulting services where physical contingencies are estimated at 0%. Price contingencies computed at average of 1.5% on foreign exchange costs and 5% on local currency costs; includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.

<sup>d</sup> Includes interest during construction computed at the 6-year US dollar fixed swap rate plus an effective contractual spread of X.X% and maturity premium of Y.Y%. The loan will have a 25-year term including a grace period of 5 years, an interest rate of 2% per annum during the grace period and thereafter and such other terms

<sup>8</sup> Formerly known as Asian Development Fund (ADF).



and conditions set forth in the draft loan and project agreement  
Source: Asian Development Bank estimates.

**Table 2: Financing Plan**

Source	Amount (\$ million)	Share of Total (%)
Asian Development Bank		
Ordinary capital resources (concessional loan)	100.00	81.8
Water Financing Partnership Facility (grant) <sup>a</sup>	0.75	0.6
Climate Change Fund (grant)	0.30	0.2
Beneficiary farmers	2.27	1.8
Government	20.01	16.2
<b>Total</b>	<b>123.33</b>	<b>100.0</b>

The Australian Water Partnership will provide technical assistance to support output 1 activities, specifically water resource assessment and allocation planning, preparations for handing over piped irrigation systems for third party operation and maintenance and policy analysis on water charging

<sup>a</sup> Through the contribution from the Netherlands Food and Nutrition Security Grant.

ADB = Asian Development Bank, ADF = Asian Development Fund

Source: Asian Development Bank estimates.

### C. Implementation Arrangements

16. **Project organizations, roles and responsibilities.** The project implementation arrangements are illustrated in Appendix 4. They take into consideration the organic functions and responsibilities of MARD as the central agency responsible for driving irrigation modernization initiatives under relevant laws and decrees, including the Agriculture Restructuring Plan and the Law on Hydraulic Structures. The arrangements take into account the: (i) need for uniformity of technical designs and standards when implementing a series of innovative subprojects consisting of piped and pumped irrigation systems; (ii) efficiency of coordination both horizontally (between provinces) and vertically (between provinces and the central agencies). Such coordination is essential, especially on institutional and policy related issues related to O&M of piped irrigation systems. For instance, the project will put in place modernized irrigation systems that could be operated by a third party. The institutional and regulatory arrangements for doing so, including the enforcement of water charges must be developed in a harmonized manner and contribute towards the preparation of regulation and guidelines at the national level.

17. Accordingly, MARD will be the executing agency and will be responsible for the overall coordination and management of the project through its Central Project Office (CPO).<sup>9</sup> CPO will establish a central project management unit (CPMU) to: (i) undertake overall coordination of the project with ADB, other central government agencies and provincial agencies; and (ii) implement the non-structural activities under output 1. The participating PPCs will be the implementing agencies and will be responsible for implementation of the subprojects. PPCs will delegate implementation responsibility to their respective DARD. Each DARD will establish a PPMU to implement activities under outputs 2 and 3 in their respective provinces. All loan proceeds will be channeled directly to the provinces on re-lending terms and conditions agreed between MOF and the provinces.<sup>10</sup> MARD will receive no loan proceeds.

<sup>9</sup> Following Decree 16 Article 3 para. 7, which defines umbrella projects in which one agency acts as a line agency and performs overall coordination function while other line agencies are involved in management, implementation and benefitting from sub-projects under the umbrella project. In this case, the PPCs will play a role similar to an executing agency with regard to their respective subprojects.

<sup>10</sup> In accordance with Decree 52/2017/ND-CP.



18. The CPMU and PPMUs will be established immediately after approval of the feasibility study by MARD. The CPMU will be headed by a project director and supported by qualified staffs responsible for social/gender safeguards, environment safeguards, resettlement safeguards, procurement accounts, monitoring and evaluation and office administration.

19. Each PPMU will be headed by a project director and have staff responsible for safeguards, implementation support, contract administration and supervision, procurement, accounts, monitoring and evaluation, and office administration. ADB recommends that staff with previous experience in implementing ADB projects or other official development assistance projects be recruited for the PMUs. Qualifications of selected staff will be subject to ADB's review and no-objection.<sup>11</sup>

20. **Procurement.** The procurement capacity assessment shows overall risk as "medium". Mitigation measures were proposed and are included in the procurement capacity assessment which is a supplementary appendix of the RRP. Measures include (i) tailored procurement training programs to be designed by ADB and delivered to the CPMU and PPMUs with the assistance of project implementation consultants; (ii) MARD and PPCs' confirmation that qualified and experienced staff (i.e. have procurement experience with ADB, World Bank or other donor-funded projects) will be assigned to handle procurement in CPMU and PPMUs; (iii) business outreach events to be organized by CPMU and five PPMUs to educate bidders about the procurement pipeline and nature of contracts to be procured, as well as mistakes to avoid when bidding.

21. Procurement of ADB-financed goods and related services, and civil works will be undertaken in accordance with ADB's Procurement Guidelines (2015, as amended from time to time). International competitive bidding (ICB) procedures will be used for civil works contracts estimated to cost \$10.0 million or more, and supply contracts valued at \$2.0 million or higher. National competitive bidding (NCB) procedures will be used for civil works estimated to cost less than \$10.0 million, and for goods and equipment worth less than \$2.0 million. Contracts procured using NCB procedures will follow the national procurement laws, subject to the modifications described in the NCB Annex attached to the Procurement Plan. Shopping procedure might be used for contracts for procurement of works and goods valued less than \$100,000.

22. Recruitment of ADB-financed consultants will be in accordance with ADB's Guidelines on the Use of Consultants (2013, as amended from time to time). The project includes engagement of several technical service providers to undertake specialized tasks associated with improved irrigation management service delivery. To ensure uniformity, contracts for independent safeguard monitoring, construction engineering support consultant, irrigation management software development and WEAT application will be initiated by CPMU with separate final contracts being signed by each respective province. Terms of reference for all contract packages will be finalized prior to ADB's staff review meeting expected to be in September 2017.

23. The Institute for Water Resources Planning (IWRP) is proposed to be directly engaged to undertake two service contracts, namely, the *Water Resources Assessment and Water Allocation Framework Development*, and *Water Productivity Initiative*. IWRP holds the most comprehensive database on water resources and irrigation development in river basins, especially on the central and central highlands regions. IWRP is tasked annually by MARD to undertake water source assessments and water use plan development to manage water supply for agricultural production in river basins. IWRP is also the only Vietnamese agency that has national experts trained to undertake the task of assessing crop water productivity.

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<sup>11</sup> Selected staff include project implementation officer, procurement officer and safeguard officers.



Single source selection (SSS) of IWRP is therefore justified on the grounds of having 'experience of exceptional worth for the assignment'.

24. The Center for Water Resources Software (CWRS) is proposed to be directly engaged to undertake the contract for *Development of Technical Systems for Subproject Management*. This activity requires expertise in: managing built systems (i.e., remote-sensing technology to serve the irrigation schedule planning and system operation) for monitoring and controlling water distribution within irrigation systems. It does so by monitoring information (see: <http://thuyloivietnam.vn>) from around 6,000 reservoirs, river networks and irrigation structures. The system also receives data from over 1,000 rain gauge stations and water level monitoring stations linked with the National Hydro- meteorological center. CWRS is also the only agency in Viet Nam that conducts in-depth research and development of technology for managing, monitoring, controlling and operating irrigation systems. This system has been developed incrementally through different projects and will be expanded to cover the subprojects under WEIDAP. SSS is justified based on the need to harmonize with national monitoring systems which have been developed by CWRS and its 'experience of exceptional worth for the assignment'.

25. **Fund flow.** The fund flow arrangements for the project are illustrated in Appendix 5. In accordance with the State Budget Law, all ADB loan proceeds will be transferred to the provinces on re-lending terms agreed between the provinces and the MOF. ADB grant proceeds (Climate Change Fund and Water Financing Partnership Facility) will be transferred to MARD. Accordingly, seven advance fund accounts will be opened for the project – two at the CPMU and one for each PPMU. The advance accounts are to be used exclusively for ADB's eligible expenditures. MOF, in close cooperation with the EAs, will be responsible for fund flow.

26. MARD and PPCs will be responsible for (i) fulfilling government's fiduciary and financial management oversight, (ii) providing sufficient counterpart funds for project activities in a timely manner, and (iii) ensuring that delays are not encountered in procurement and recruitment. The Directors of CPMUs and PPMUs in each province will be accountable for proper use of advances and reconciliation of the accounts.

27. **Audit report.** MARD as the overall executing agency, will consolidate the financial reports of all project provinces including the grants and have this report audited annually by an independent auditor acceptable to ADB. The audited financial report will be submitted to ADB within six months from the end of the calendar year. A financial management manual will be prepared by MARD for this project to ensure consistent accounting practices across the six PMUs. A single external auditing firm will be recruited to perform audit for the whole project.

#### **D. ADB and Government Processing and Approvals**

28. ADB and Government processing and approvals with their expected completion dates are shown in Table 4 below. SBV confirmed that this schedule is reasonable considering the requirements of processing a Category A project. However, the government and ADB will try to expedite approval processes by fourth quarter of 2017.

**Table 3: ADB and Government Processing and Approvals**

Activity	2017				2018						Responsible Agency
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Approval of Pre-FS <sup>a</sup> and FS		X									PM / MARD
Establishment of PMUs			X								CPO / DARD
Staff review meeting	X										ADB
Initiate advance contracting for output 1			X								CPMU
Loan negotiations			X								ADB / SBV
ADB Board approval						X					ADB
Commencement of detailed engineering design							X				CPO/DARD
Loan signing								X			ADB/SBV
Government legal opinion provided									X		SBV
Government budget inclusion									X		MARD /PPCs
Loan effectiveness										X	ADB/MARD

ADB = Asian Development Bank, CPO = Central Project Office, CPMU = central project management unit; DARD = Department of Agriculture and Rural Development, DED = detailed engineering design; MARD = Ministry of Agriculture and Rural Development, PM = Prime Minister, PMU = project management units, PPC = Provincial Peoples Committee, SBV = State Bank of Viet Nam.

<sup>a</sup> Pre-feasibility study submitted to the Prime Minister on 4 July 2017. Approval is expected by 4 October 2017 and by MARD on 20 October 2017.

Source: Asian Development Bank

29. The key advance actions include: (i) CPO and DARDs establishing project management unit for the project by November 2017; (ii) completion of the detailed engineering designs (DEDs) of all subprojects by June 2018; (iii) recruitment of IWRP and CWRS for water resources assessment and water allocation framework development, and water productivity initiative by June 2018; and (iv) initiate advance contracting for the subprojects construction supervision.

## **E. Due Diligence**

### **1. Debt Sustainability Assessment**

30. The MOF confirmed that it had received the debt sustainability assessments (DSA) from all five provinces. Based on a preliminary review, MOF commented that Ninh Thuan has very limited headroom for further borrowing in 2017. MOF suggested that the Ninh Thuan province will need to consider reducing the amount of borrowing under this project. MOF will provide more detailed comments on the DSA along with their comments on the pre-feasibility study report.

### **2. Technical**

31. **Subproject design.** Preliminary designs and cost estimates for the subprojects were initially prepared by the national consultants recruited by the provincial authorities. They were subsequently revised by the PPTA consultants<sup>12</sup> with support from the Australian Water Partnership (AWP). The subproject technical reports prepared in this manner meet the due diligence requirements of technical designs for a feasibility study report. The PPTA team expect to have all the subproject technical reports completed by 11 August 2017. MARD and the provinces will use these documents to prepare the feasibility study reports for the project.

<sup>12</sup> Recruited through the consulting firm, PRIMEX and individually.



32. **Detailed engineering design.** The feasibility study report will be the basis for preparing the detailed engineering designs (DED). During DED, as well as preparation of detailed drawings and cost estimates, additional work is required to optimize the designs. To support this, a guideline for DED was prepared in June 2017, and will be attached to the terms of reference for the national DED consultants' contracts. This guideline includes the design principals to be adopted in designing the subprojects. They supplement national design standards and criteria by providing guidance particularly for pipeline layouts and design of pipe systems with hydrant – manifolds, metering and flow control devices.

33. Under MARD's guidance, DARDs have commenced preparation of the TOR for DED. The provincial authorities are expected to start recruiting the DED consultants by October 2017. ADB will provide additional assistance to support MARD with its oversight of the DED preparation process.<sup>13</sup> Support will be provided during the following milestone activities for each subproject:

Milestone 1: Briefing early in the detailed design assignment for the design firms / DARDs covering the detailed design scope and intent for each subproject.

Milestone 2: Discussion on the proposed design and presentation of any design modifications/ ideas/ improvements by the design firms.

Milestone 3: Submission of draft detailed design drawings and calculations for comments by MARD (i.e. CPO) and no objection by ADB to ensure that DED comply with design principles of the approved feasibility study reports and the DED guidelines.

Milestone 4: Submission of final designs including reports, maps, drawings, calculations, quantities and cost estimates revised taking into any comments made in milestone 3.

34. **Construction, operation and maintenance.** Construction of most of the subprojects will entail a variety of works, in addition to the usual civil works associated with traditional gravity canal systems. These will include: (i) electrification works; (ii) pumping stations; (iii) buried pressure pipelines; (iv) flow control and measurement/ metering systems; and (v) depending on the scheme, remote monitoring and control – SCADA. Construction/installation of these works and equipment may pose some challenge to local/ provincial contractors. Therefore, it is essential that the bidding documents require that the bidders demonstrate ability/ qualifications to carry out the range of works required.

35. Modern piped irrigation systems have low maintenance costs (compared with traditional gravity irrigation schemes) but may pose significant operational challenges. Maintenance requirements of the new, modern irrigation systems are significantly different from what is required for the existing schemes in the provinces. In addition to periodic maintenance of civil works infrastructure including canal banks, lining, and concrete structures, the new engineering control systems will need calibration and checking. Most importantly, broken or faulty equipment, valves, meters, pumps, and so on, need to be promptly replaced.

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<sup>13</sup> On July 5 2017, WFPF has approved \$100,000 to assist in DED.

36. Institutional arrangements for the management, operation and maintenance of the modernized systems include the following options: (i) IMCs working with water user associations (i.e., broadly as present), and (ii) IMCs with third-party private service providers under a PPP arrangement, again with water user associations, as required. At present, IMCs do not have all the necessary skills and staff to manage the modern systems. Expertise may most effectively be brought in through a PPP arrangement. Assessments under output 1 will support a review of these options, based on which, suitable institutional arrangements for operating and maintaining the modernized irrigation systems will be established.

37. Meanwhile, as part of detailed design carried out as an advance action, metering options are to be discussed and firmed up with MARD, PPCs, DARDs, and IMCs. As a minimum, for pipe systems, on-site local read meters will be provided at hydrants and at key points. However, the advantages of remote read meters or even pre-paid meters need to be compared against the cost of these more advanced systems.

### **3. Economic and Financial**

38. The economic analysis indicated that the project is viable with an economic internal rate of return (EIRR) of 19.7% (subject to change as a result of future cost revision), which is higher than the minimum economic cost of capital of 9% required by ADB. The analysis also confirms the economic viability of all subprojects, with EIRR ranging from over 12% to 24% (subject to change as a result of future cost revision). Sensitivity analysis indicated robustness of the project's economic viability against negative scenarios.

39. Financial analysis is expected to confirm financial sustainability of the project by showing that the executing agencies responsible for the operation and maintenance cost of the project facilities have capacity to bear the cost after the project implementation. At present, the incremental operation and maintenance cost is yet to be completed. ADB team requested the PPTA to complete the data collection in cooperation with the government and finalize the analysis.

### **4. Governance**

40. The financial management risks can be reduced by the mobilization of experienced staff in PMU and PPMUs, requiring participation in on-line training offered by ADB, close supervision by the CPO and implementation support by project implementation consultants (PICs). Each PMU will (i) maintain separate project accounts and records by funding source for all expenditure incurred under the project, (ii) cause the detailed project accounts to be audited following international auditing standards and ADB's requirements by an independent auditor acceptable to ADB, and (iii) involve local communities in monitoring subproject implementation.

41. All procurement to be financed by ADB loan funds will be carried out in accordance with ADB's Procurement Guidelines (2015, as amended from time to time) and Guidelines on the Use of Consultants (2013, as amended from time to time). The government's public procurement regulations (as acceptable to ADB) will be applied for packages procured using national competitive bidding and shopping procedures.

42. ADB reserves the right to investigate, directly or through its agents, any violations of the Anticorruption Policy relating to the project. All contracts financed by ADB shall include provisions specifying the right of ADB to audit and examine the records and accounts of the executing agency and all project contractors, suppliers, consultants, and other service providers. Individuals and/or entities on ADB's anticorruption debarment list are ineligible to participate in ADB-financed activity and may not be awarded any contracts under the project.



43. ADB's Anticorruption Policy (1998, as amended to date) was explained to and discussed with the government and MARD nationally together with the PPCs and DARDs/PPMUs in the provinces. The specific anticorruption policy requirements and supplementary measures will be further described in Project Administration Manual.

## 5. Poverty and Social

44. The project will directly benefit about 39,140 households, including about 7,050 ethnic minority households. The average poverty rate in project communes is 14.8% which is higher than the national average (9.88%) in 2016. Ethnic minorities account for around 18% of the populations in the project areas and make up a larger share of the poor population relative to the whole. Poverty is attributed to (i) lack of land and labor; (ii) low employment opportunities; (iii) lack of access to credit; (iv) limited production knowledge, especially among the poor ethnic minorities people who have limited education, have language barriers and tend to live in isolation from the Kinh group; and (v) limited access to irrigation that hampers their ability to entertain production of HVCs, even on relatively small areas. The investment in irrigation systems will benefit poor farmers through opportunities to provide labor on farms that scale up production due to increased reliability of water. Construction of irrigation systems and service roads will also provide additional employment opportunities and improve their access to markets.

## 6. Gender

45. The project is categorized “effective gender mainstreaming”. A gender analysis revealed that women have fewer opportunities than men to participate in public decision making, lesser access to information, training, and employment if these are not directly targeted to them. In some subproject areas, women play significant role in irrigating HVC whereas in other subprojects their role is insignificant as irrigating HVC with scarce water resource requires so much physical work. A gender action plan was prepared (Appendix 6) that promotes sharing of project benefits and opportunity between men and women through specific targets for women’s involvement: (i) in training and information dissemination regarding modern irrigation management (WEAT); (ii) as beneficiaries of WEAT grants; (iii) for increased representation in decision-making processes (e.g., participation in water allocation planning, detailed engineering design consultations in PMUs); (iv) in employment opportunities during civil works; and (v) reduction of social risks (HIV/AIDS transmission and human trafficking prevention) during civil works. Sex-disaggregated data will be collected for benefit monitoring and evaluation on these targets. The gender action plan specific budget totals \$30,128 to be financed from ADB financing.

## 7. Safeguards

46. **Environment.** The project is categorized as B. Given that few significant adverse impacts were identified, none of which being irreversible, all subprojects are recommended to be category B. Five draft provincial initial environment examinations (IEEs), covering the eight subprojects along with their environment management plans (EMPs), have been prepared following ADB Safeguard Policy Statement, 2009. The water balance calculation has been carried out to indicate that there will be no conflict of water uses caused by increasing use of water for irrigation in each subproject. No civil works will be carried out in sensitive biodiversity areas. All construction works would involve temporary impacts associated with upgrading of the existing irrigation canals, installation of the pipe irrigation system and upgrading of the roads within existing rights of ways (ROWs) for maintenance. IEEs will be sent to MARD by 25 August and MARD will coordinate with the provinces to



receive their no-objection for public posting of the IEEs in ADB's website by 15 September 2017.

47. After the preparation of DEDs of each subproject, the respective EMP will be updated to capture the impacts and mitigation measures and include changes, if any, that arise from the detailed designs. The updated EMPs will be approved by ADB and relevant clauses will be incorporated into the bid documents of civil works. The environmental specialist under the project implementation consultants will work closely with the construction supervision and environment monitoring consultants to support the PPMUs in monitoring and supervising the implementation of the EMP, to ensure environment compliance in each subproject. During construction phase, semi-annual environment monitoring reports will be prepared and submitted by PPMUs to ADB for review and uploading in ADB's website.

48. **Involuntary Resettlement (IR).** The project is categorized as B for IR. All eight subprojects have land acquisition, but the impact is minor because majority of the infrastructure involves rehabilitation of existing constructions. Where land will need to be acquired for construction of new pipelines, compensation and allowance at replacement cost shall be provided to affected parties according to regulations of the updated resettlement plan/updated resettlement and ethnic minority development plans (REMDP). In case of discrepancies between the government's laws, regulations, and procedures, and ADB's SPS 2009, ADB's SPS will apply.

49. In Ninh Thuan province, the Thanh Son - Phuoc Nhon subproject and Nhon Hai - Thanh Hai subproject proposed for financing under WEIDAP are linked with the ongoing construction of Tan My canal system which is funded by the government. Therefore, the Ninh Thuan PPC confirmed that construction of the Tan My will be completed before commencing any construction works on the Thanh Son - Phuoc Nhon and Nhon Hai - Thanh Hai subprojects. The PPC will also ensure that all resettlement on the Tan My canal will be done in accordance with ADBs policy on resettlement. Compensation for resettlement on all subprojects is estimated to be around VND83 billion. All five provinces committed to provide the sufficient and timely counterpart funds to cover resettlement costs during implementation.

50. **Indigenous Peoples (IP).** The project is categorized as B for IP. In the Vietnamese context, IPs are referred to as ethnic minorities. The ethnic minorities people accounts for about 18% of the population in the subproject areas' communes and represent a relatively larger share of the poor population. Impacts on ethnic minorities in the project areas are positive since the subprojects will result in an overall economic and social improvement for the total population. The project does not cause physical displacement from traditional or customary livelihood system of the ethnic minorities people. Out of the eight subprojects, seven require land acquisition from the ethnic minorities. The gender action plan will also include specific activities and targets to promote participation and benefit from access to project resources of ethnic people (e.g. water and WEAT grant).

51. Eight resettlement and ethnic minority development plans (REMDP) have been prepared for each of the subprojects. MARD will coordinate with the provinces to receive their no-objection for public posting of the REMDPs in ADB's website by 15 September 2017. They will be updated and approved by ADB to reflect any changes in the subproject after completing detailed engineering design. During the project implementation, the semi-annual monitoring reports will be prepared and submitted by PPMUs to CPMU for consolidation and submission to ADB for review and uploading on ADB's website.

## II. ASSURANCES AND CONDITIONS



52. The government has assured ADB that implementation of the project shall conform to all applicable ADB policies including those concerning anti-corruption measures, environmental and social safeguards, gender, procurement, consulting services, and disbursement. The agreed assurances are included in Appendix 7.

#### **A. Grievance Redress Mechanism**

53. Within six months from the date of loan effectiveness, the executing agencies will ensure that a safeguards grievance redress mechanism in accordance with the provisions of the IEEs, and REMDPs acceptable to ADB are established. The grievance redress mechanism should be translated to the local dialect and disclose in a place that are accessible to the local communities to make them aware of the grievance mechanism and their potential involvement and responsibilities in the project activities. The grievance redress mechanism should include the names of the focal persons in the PPMUs and the procedures in submitting their complaints.

#### **B. Counterpart Support**

54. MARD and the provincial authorities agreed on the following counterpart support and contributions: (i) to appoint suitably qualified staff to the CPMU and PPMUs; (ii) to allocate sufficient counterpart funds to the project, including funds to engage DED consultants; (iii) to provide suitable office facilities for the project implementation consultants.

#### **C. Operation and Maintenance**

55. As the engineering contractors are to provide support for operation during the first 12 months after completion of construction (maintenance period), it is recommended to adopt a single contract for each subproject, except for small schemes which could be bundled together. Roads, and hydraulically separate works, could be contracted separately.

56. Operation of modern pressure pipe irrigation systems to achieve a high level of service relies on control and monitoring systems which comprise valves, sensors and meters, data transmission and possibly a central computer control/ monitoring room. The control system needs to be well tested under usual operating conditions during the maintenance/ defects liability period. Further, in the first few months of operation most faults concerning equipment/ software will be exposed and need rectification. The construction contract should therefore include provision for an extensive commissioning/ testing period to sort out these problems. They should also include for the following during the maintenance period: (i) an operator to remain on site and on-call specialist(s) to carry out adjustment, repair and replacement of (faulty) equipment, (ii) training for the concerned Irrigation Management Company and any third-party operator, and (iii) equipping of a workshop with spare parts, equipment and components, for example: pumps, valves, flow control devices, pressure meters, etc.

### **III. COFINANCING AND OTHER ISSUES**

57. The Australian Water Partnership (AWP) provided very useful strategic inputs during the PPTA which was largely instrumental in developing the piped irrigation systems proposed under project. The AWP also supported a rapid groundwater assessment during the PPTA and provided guidance to design a more comprehensive groundwater monitoring activity that would be conducted in the subproject areas during the implementation period. The AWP has

committed to provide strategic technical support to complement WEIDAP during implementation in areas of: (i) water allocation planning, entitlements and charges; (ii) water resource planning and management; and (iii) technical system operation and maintenance.

58. The United Nations Development Programme (UNDP) is preparing a proposal for a grant from the Green Climate Fund (GCF), to complement the project. ADB has provided UNDP with the detailed assessments conducted during the PPTA, and agreed to support the proposal in whatever possible manner. UNDP expects to submit the proposal to the GCF Board for consideration in first quarter of 2018.

#### IV. CONCLUSION

59. The Mission wishes to express its sincere appreciation for the cooperation and assistance extended by the concerned government ministries and agencies and project stakeholders during the mission.

Appendixes:

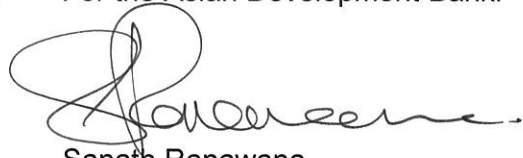
1. List of Persons Met
2. Design and Monitoring Framework
3. Summary of Modernization Works by Subproject
4. Project Organization Structure
5. Fund Flow Diagram
6. Draft Gender Action Plan
7. Agreed Assurances

Signed on 18 September 2017 in Ha Noi, Viet Nam:

For the Ministry of Agriculture and Rural Development:

  
Tran Kim Long  
Director General  
International Cooperation Department

For the Asian Development Bank:

  
Sanath Ranawana  
Senior Natural Resources Economist  
and Mission Leader



## APPENDIX 1: LIST OF PERSONS MET

NAME	POSITION	OFFICE
<b>Ministry of Planning and Investment - Foreign Economic Relations Department</b>		
Mr. Le Viet Anh	Deputy Director General (DDG)	
Mr. Nguyen Hoang Phuong	Expert	
<b>Ministry of Finance - Department of Debt Management &amp; External Finance</b>		
Ms. Duong Quynh Le	Head of Multilateral Division	
Ms. Pham Van Anh	Expert	
<b>State Bank of Viet Nam</b>		
Mr. Dinh Quang Thang	Expert	
Mr. Do Hong Hai	Deputy Division Head	
<b>Ministry of Agriculture and Rural Development (MARD)</b>		
Mr. Chu Van Chuong	Deputy Head	ICD
Mr. Nguyen Van Tinh	Deputy Director General (DDG)	Directorate of Water Resources
Mr. Nguyen Viet Anh	DDG of Dam Safety Department	General Department of Water Resources
Mr. Tran Minh Tuyen	Expert of Dam Safety Department	General Department of Water Resources
Mr. Vu Van Long	DDG of Infrastructure Construction	General Department of Water Resources
Mr. Nguyen Trong Uyen	Staff of Infrastructure Construction	General Department of Water Resources
Mr. Nguyen Thanh Dam	Division Head	ICD
Mr. Nguyen Hong Phuong	Director General	CPO
Mr. Pham Dinh Van	Deputy Director General	CPO
Mr. Vu Ngoc Chau	Project Director	CPO
Mr. Dang The Luong	Chief Accountant	CPO
Mr. Bui Huy Binh	Deputy Head of Planning Division	CPO
Mr. Nguyen Duc Mien	Project Officer	CPO
Mr. Tran Van Hang	Safeguard Officer	CPO
Mr. Dinh Dai Duong	Project Officer	CPO
Mr. Tran Viet Anh	Project Officer	CPO
Ms. Pham Thi Minh Yen	Project Officer	CPO
Ms. Nguyen Thanh Van	Interpreter	CPO
Mr. Dang Thi Kim Nhung	Consultant Team Leader	IWRP
Mr. Nguyen Van Manh	Deputy Division Head	IWRP
Mr. Tran Dinh Dung	Expert	IWRP
Mr. Dang Vi Nghiem	Deputy Division Head	IWRP
Mr. Nguyen Xuan Thinh	Division Head	IWRP
Ms. Le Thi Phuong Hong	Expert	IWRP
Mr. Ngo Dang Hai	ADB Specialist	University of Water Resources
Ms. Dang Thi Kim Nhung	Head of Division	Institute of Irrigation Planning
<b>Khanh Hoa Provincial People's Committee</b>		
Mr. Đào Công Thiên	Vice Chairman	Khanh Hoa PPC
Mr. Ngô Xuân Quán	Deputy head of office	Khanh Hoa PPC
Mr. Lê Bảo Trung	Staff	Khanh Hoa PPC

	NAME	POSITION	OFFICE
Mr.	Đỗ Trọng Thảo	Deputy Director	SBV – Khánh Hòa Branch
Mr.	Lê Tấn Bản	Director	DARD
Mr.	Nguyễn Duy Quang	Deputy head of Construction Division, ADB Preparing team	DARD
Mr.	Trịnh Duy An	Preparing team member	DARD
Ms.	Nguyễn Thị Hà	Deputy Director	Department of Planning
Ms.	Bùi Thị Khánh Vân	Deputy head of Budget Division	Department of Finance
Mr.	Tiêu Đại Thanh	Deputy head of Investment Division	Department of Finance
Ms.	Lê Thị Mai Liên	Vice Chairman	Khanh Hoa Women Union
Ms.	Trần Mai Thị Kim Hòa	Vice Chairman	Cam Lam District People's Committee
Mr.	Đình Văn Mỹ	Deputy Director in charge	IMC Nam Khanh Hoa
Mr.	Đình Văn Giang	Head of Technical and Construction Division	IMC Nam Khanh Hoa
<b>Ninh Thuan Provincial Peoples' Committee</b>			
Mr.	Tran Quoc Nam	Vice Chairman	PPC
Mr.	Trinh Minh Hoang	Director	PPC
Mr.	Dang Kim Cuong	Vice Director	DARD
Mr.	Nguyen Hoang Thai	Vice Director	Department of Planning & Investment
Mr.	Nguyen Quoc Huy	Deputy Head, Administrative Office	PPC
Mr.	Nguyen Van Binh	Head of Planning Division	DARD
Mr.	Nguyen Vinh Quang	Director of Project Management Unit	DARD
Mr.	Le Xuan Toan	Head of Sub-Division of PMU	DARD
<b>Binh Thuan Provincial People's Committee</b>			
Mr.	Pham Van Nam	Provincial Vice Chairman	PPC
Mr.	Nguyen Huu Phuoc	Deputy Director	Provincial Department of Agriculture
Mr.	Nguyen Dinh Truong	Expert	PPC
Mr.	Phan Thanh Hoang	Project Director	ADB Project Unit in Binh Thuan
Mr.	Le Duc Nhung	Project Vice Director	ADB Project Unit in Binh Thuan
Ms.	Dang Thi Thuy Hong	Staff	ADB Project Unit in Binh Thuan
Ms.	Tran Thi Minh Thuy	Staff	ADB Project Unit in Binh Thuan
Mr.	Ngo Minh Trang	Deputy Director	Provincial Sub-Department of Water Resources
Mr.	Nguyen Hoang Minh Tan	Deputy Director	Provincial Department of Planning and Investment
Ms.	Ngo Thi Bich Thuy	Deputy Director	Provincial Department of Finance
Mr.	Le Van Tien	Head of Water Resources Division	Provincial Department of of Natural Resources and Environment
<b>Dak Nong Provincial People's Committee</b>			
Mr.	Tran Xuan Hai	Vice Chairman	PPC
Mr.	Pham Huu Hao	Vice Director	DARD
Mr.	Le Viet Thuan	Director of Irrigation Department	DARD
Mr.	Le Van Quang	Vice Director of Department of Planning & Investment	DPI
Mr.	Duc	Vice Director	Department of Finance
Mr.	Nguyen Van Xuan	Deputy Director	PPMU



NAME		POSITION	OFFICE
Mr.	Luy	Vice Chairman of Dak Mil District	PPC
Mr.	Ouy	Vice Chairman of Cu Jut	DPC
Mr.	Pham Ngoc Tuyen	Deputy Head of Administration Office	PPC
Mr.	Chin	Vice Director	Dept of Foreign Affairs
Mr.	Lam	Vice Director	Department of Construction
Mr.	Nhan	Head of Foreign Economics Relationship Division	DPI (Department of Planning & Investment)
<b>Dak Lak Provincial People's Committee</b>			
Mr.	Ygiang Gry Nie Knoug	Vice- Chairman	Dak Lak PPC
Mr.	Nguyen Duc Vinh	Deputy head	PPC Office
Mr.	Cu Duc Con	Deputy Director	Dak Lak DARD
Mr.	Vu Minh Duc		Dak Lak DARD
Mr.	Tran The Hoan	Director	IMC
Mr.	Hoang Xuan Ngan	Deputy Director	Department of Natural Resources and Environment (DONRE)
Mr.	Tran Quoc Vinh	Vice Chairman	Krong Pac District People's Committee
Mr.	Le Dinh Chien	Vice Chairman	Ea Kar District People's Committee
Mr.	Vo Ngoc Tuyen	Deputy Director	Department of Planning and Investment (DPI)
Mr.	Pham Xuan Bach	Head of Division	DPI
Mr.	Pham Van Manh	Deputy Head of Division	Division of Financial investment of DOF
Mr.	Ho Tan Cu		Ea Ka district
Mr.	Pham Tan Dung		EaH'leo District People's Committee
Mrs.	Pham Thi Len	Deputy Head of Division	Division of Dak Lak Women Union
Mrs.	Nguyen Thi Xuan Tra	Deputy Head of Division	Division of Department of Foreign Affairs
Mr.	Nguyen Van Hai	Chairman	Xuan Phu Commune People's Committee (Ea Kar District)

## APPENDIX 2: DESIGN AND MONITORING FRAMEWORK

**Impact of the Project is Aligned with:**  
Climate resilience and water productivity in agriculture improved (Government's Agricultural Restructuring Policy<sup>a</sup> and the Law on Hydraulic Structures)<sup>b</sup>

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting	Risks
<b>Outcome</b> Climate resilient and modernized irrigation systems in the five provinces established <sup>c</sup>	In the subproject command areas, by 2025: a. Agricultural water productivity increased by 20% (2017 baseline =x) <sup>d</sup> b. At least 65% of farmers connected to modernized project irrigation systems of which at least 5% are female headed and 15% are ethnic minority households (2017 baseline = 0)	a. Project monitoring reports b. IMC / operator / commune records	Modernized irrigation design not incorporated during construction.
<b>Outputs</b> 1. Irrigation management services strengthened	In the subproject command areas, by 2024: 1a. Water allocation system prioritizing HVC operationalized. 2017 (baseline: none) 1b. A framework for allocating operational budgets based on irrigation asset condition accepted by 5 PPCs (baseline: none) 1c X farmers linked to an information system providing advice on irrigation scheduling (2017 baseline: xx)	1a. Seasonal reports of IMCs 1b. IMC annual reports and project generated reports; budget requests submitted by IMCs. 1c. Project monitoring reports	IMCs not familiar with implementing piped irrigation systems
2. Modernized irrigation systems implemented	2a. At least 70% of the command area served by modernized irrigation systems (baseline: 0) 2b. 185 km of piped irrigation systems installed and operated under management contracts (baseline: 0) 2c At least one piped irrigation system is operated by a third party (2017 baseline: 0)	2a-b. Project generated reports. 2c. PPC reports	IMCs lack funds to operate and maintain infrastructure



Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting	Risks
3. Efficient on-farm water management practices adopted.	<p>3a. At least 10,000 ha irrigated using on-farm WEAT, of which 5% are women-headed and 20% are ethnic minority HHs. (baseline: 0)</p> <p>3b. At least 1,500 farmers receive training on improving water productivity on-farm of which 10% are female-headed HHs and 50% are ethnic minority HHs (baseline: 0)</p>	<p>3a. Grant disbursement reports.</p> <p>3b. Project generated reports</p>	Limited uptake of WEAT due to cost

### Key Activities with Milestones

#### 1. Irrigation management services strengthened.

- 1.1 IWRP to do water resource assessment and allocation planning mobilized (Q2, 2018)
- 1.2 Commence water productivity initiative. (Q2, 2019)
- 1.3 Development of software and guidelines for subproject management. (Q2, 2018)
- 1.4 Formulation of water charging, crops water allocations within the project areas. (Q2, 2019)
- 1.5 Preparation of public and private partnerships framework. (Q3, 2020)

#### 2. Modernized irrigation systems implemented.

- 2.1 Mobilization of detailed engineering design for each five PPCs. Q4, 2017
- 2.2 Endorsement of the DED by each PPC. (Q4, 2018).
- 2.3 Update resettlement plan and IEEs and EMPs, (Q1, 2019)
- 2.4. Civil works construction started. (Q1, 2020)
- 2.5. Contracts to five construction supervisions consultants for each province awarded. (Q4, 2019)
- 2.6. Turnover of irrigation systems to IMC and PPP. (Q3, 2021 – Q3, 2023).
- 2.7. First round of cost recovery implemented. (Q4 2024)

#### 3. Efficient on-farm water management practices adopted.

- 3.1 Recruit and mobilized technical advisor for WEAT technical advisory. (Q3, 2020)
- 3.2 Information dissemination to farmers on water requirements. (Q1, 2021)
- 3.3 Identifying appropriate WEAT and link farmers with suppliers. (Q1, 2021)
- 3.4 Installation of WEAT and provision for technical guidance and monitoring and O&M. (Q3, 2021)

### Project Management Activities

Mobilization of construction engineering support consultant  
 Review and update the resettlement plan and IEEs  
 Mobilization of monitoring and evaluation consultants  
 Implementation of the gender action plan  
 Recruit and mobilized external auditors.

### Inputs

ADB: \$100.0 million (concessional OCR loan).  
 Water Partnership Fund: \$0.75 million (grant).  
 Climate Change Fund: \$0.30 million (grant).  
 Government: \$20.10 million.  
 Beneficiary: \$2.27 million.

### Assumptions for Partner Financing

#### Output 1 Australian Water Financing

ADB = Asian Development Bank; ADF = Asian Development Fund; DEDS = detailed design and supervision; DPI = Department of Planning and Investment (provincial); EMP = environmental management plan; HTAPZ = high-tech agricultural production zone; HH = household; HVC = high valued crops; IEE = initial environmental examination; IMC = irrigation management company; MCM = millions of cubic meters; PPC = provincial peoples' committee; Q = quarter; TRTA = transaction technical assistance; WEAT = water efficient application technologies.

Source: Asian Development Bank.

### **APPENDIX 3: SUMMARY OF MODERNIZATION WORKS BY SUBPROJECT**

#### **A. TRA TAN SUBPROJECT, BINH THUAN**

1. The scheme comprises an existing canal system to be rehabilitated and modernized, and a new pumped pipe system.

##### **1. Canal System**

2. The canal system has gross and net command areas of 920 ha and 854 ha respectively. Net command crop areas comprise 140 ha of rice, and 714 of pepper and cashew. The design duty is 1.4 l/s/ha giving a design flow at the head of the system of about 1.2 m<sup>3</sup>/s. The feasibility design proposes that the 7.52 km long main canal is lined, together with 14 of the 22 secondary canals. The total length of lining is 17.96 km. The density of the lined canal network will be 21.0 m/ha. At detailed design provision of balancing storage tanks at the end of the canal system will be considered, as well as measures for improved flow control and metering and the need for improved surface drainage.

##### **2. Pumped Pipe System**

3. The new pumped piped system will serve a pepper and cashew area of 236 ha. The design discharge is 0.94 l/s/ha giving 0.222 m<sup>3</sup>/s (796 m<sup>3</sup>/hr). The system will comprise an onshore intake and pumping station, a rising main, hill top header tank and a single distribution pipeline supplying hydrants each with a discharge of about 5 l/s. At detailed design the following will be considered further: (i) size of rising main and capacity of storage tank, (ii) design of pump station and choice of pumps, (iii) distribution pipe, residual heads and hydrant design, (iv) service roads, (v) electric connection, and (vi) a supervisory control and data acquisition (SCADA) system so that pumps operations are linked to water levels in the header tank, as well as for remote monitoring of pumping and flows from the head tank and from the hydrants.

#### **B. DU DU SUBPROJECT, BINH THUAN**

4. For Du Du, a new ring main piped distribution system is proposed to supply surface water to farmers growing dragon fruit, reducing reliance on pumped groundwater. The net command area is 1,960 ha and the design flow required is 1.1 m<sup>3</sup>/s. The adopted layout and design ensures that the 220 hydrants provide constant 5l/s flows, and the distance to farmers' fields is less than 500 m. The total length of pipeline is 34.7 km giving a pipeline density of 17.7 m/ha. Pipe diameters vary from 1,000 mm upstream to 160 mm downstream. The pipelines cross about 12 stream channels where protection is needed. A SCADA system shall allow remote monitoring of pressures and flows in the pipe system and also flows at all/ selected hydrants. Paved inspection roads will be provided along the larger pipelines, and about 17 km of paved road is proposed.

#### **C. THANH SON-PHUOC NHON SUBPROJECT, NINH THUAN**

5. The water allocation for this subproject is 1.8 m<sup>3</sup>/s and the net irrigable area to be developed under Water Efficiency Improvement in Drought Affected Provinces (WEIDAP) is set at 1,800 ha. The gross area available is 3,043 ha, but much of this comprises very poor soils. Six pipe systems shall be constructed under WEIDAP to command the better soils. Each system will take water from the large steel Tan My supply pipeline, currently under construction by Government of Viet Nam, and which conveys water from the Tan My diversion weir on the Cai River. The new pipe systems vary in size from 248 ha to 350 ha, and together require 28.66 km



of HDPE pipe, ranging in diameter from 160 mm to 500 mm, and giving an average pipe density of 15.9 m/ha for 1,800 ha. About 1,219 ha (68%) of fields will have access to water within 250 m, 446ha (25%) from 250 m to 500 m and only 135 ha (7%) beyond 500 m. Hydrant flows shall be 5l/s, with flow limiters so that flows remain constant in the face of changing water pressures in the pipelines. The natural surface drainage system is likely to require improvement, and roads shall be improved/ constructed, particularly in the proposed high tech. zone to be established for commercial farming. A SCADA system shall enable remote monitoring of pressures and flows in the pipe system and also flows at all/ selected hydrants.

#### **D. NHON HAI-THANH HAI SUBPROJECT, NINH THUAN**

6. This subproject is supplied from the tail of the Tan My supply steel pipeline, currently under construction by the Government of Viet Nam. The water allocation for this subproject is 1.0 m<sup>3</sup>/s and the net irrigable area is set at 1,000 ha. The total length of pipe required is 24.09 km, including for a 9.12 km feeder HDP pipeline from the end of the Tan My pipeline to the command area. HDP pipes sizes range from 1,000 mm to 550 mm. Considering only the pipeline within the command area the average density is 15.0 m/ha. The proposed layout means that 532 ha (53%) is within 250 m of the pipeline, 350 ha (34%) from 250 m to 500 m and 118 ha (12%) beyond 500 m. Hydrant flows shall be 5l/s, with flow limiters so that flows remain constant in the face of changing water pressures. A branch at the tail of the new pipe system would allow surplus flow to be directed to the Ong Kinh reservoir, (full storage level = 31.00 m). The pipelines cross several stream beds and safe crossing arrangements are required. The SCADA system shall allow remote monitoring of pressures and flows in the pipe system, and also flows at all/ selected hydrants. Paved inspection roads may be provided along the larger pipelines.

#### **E. SUOI DAU AND CAM RANH SUBPROJECTS, KHANH HOA**

7. These subprojects consist of two separate storage irrigation systems supplied from the Suoi Dau and Cam Ranh reservoirs. Proposed works include rehabilitation of the existing gravity canal systems and construction of five new pumped piped systems. The existing gravity canal systems supply both rice and mango areas, while the new pumped pipe systems will supply 1,966 ha of established and expanded mango areas.

8. The existing main canals are trapezoidal, 80 mm thick concrete lined, except for some buried flume sections. The Cam Ranh north main canal has been abandoned and the area is now supplied by the Suoi Dau south main canal. The Cam Ranh south main canal conveyance losses are currently very high as the lining is in poor condition and 8.1 km passes through sandy soils. About 15.3 km of concrete trapezoidal lining will be replaced with reinforced concrete flume sections with 150 mm thick walls and with a reinforced concrete cover slab 100 mm thick. Design discharges will also be reduced in line with proposed crop areas. Although bridges are in reasonable/ good condition, many of them (about 30) would have to be demolished and replaced to fit the new flume canal section. No work will be done for the 59 secondary and smaller canals, other than to provide new turnout gates. The main canal banks are largely unpaved sandy tracks, and paving is suggested.

9. The five new piped subsystems will pump water from the main canal, requiring electrification works, and construction of intakes and pumping stations. In total, 38.45 km of HDP pipeline is required, ranging in diameter from 75 mm to 450 mm and giving an average pipe density of 19.6 m/ha. The mango area to be served by the piped system (1,966 ha) will have a much higher level of service than the mango area served only by the canal system (2,034 ha).

Access to water for the pumped pipe system will be within 250 m for 963 ha (49%), between 250 m and 500 m for 668 ha (34%) and beyond 500 m for 335 ha (17%). The design flows for each of the five pumped systems are based on 0.98 l/s/ha. Hydrant flows are 5 l/s with flow limiters to maintain constant flows in the face of varying pressures in the pipeline. A header tank shall be located at the highest point along each pipeline.

10. A SCADA system shall allow remote monitoring of water levels, pressures and flows as appropriate in the reservoirs, main canals, pumping stations and in the pipeline systems at all/ selected hydrants. Pumping operations shall also be monitored. Pumps operation shall be linked to pipe pressures.

11. Drainage requirement and works shall focus on cross drainage structures.

## F. DAK LAK SUBPROJECTS

12. In Dak Lak province eight schemes are proposed, taking water from five reservoirs. Seven of the schemes are new pump – piped systems, while one includes modernization of an existing canal system. Engineering works include: (i) pumping stations (onshore or offshore) - if on-shore, submersible pumps have many advantages over vertical turbine pumps and are proposed, (ii) access roads to pumping stations, (iii) pressurized pipe systems supplying hydrants, (iv) header tanks, (v) control and monitoring systems, and (vi) electrification. The proposed irrigation systems are summarized below.

Reservoir	Irrigation System		Area (ha)	Length (km)	Density (m/ha)
	Supply	Distribution			
Ea Drang	New pump station	New piped	150	2.70	18.0
Buon Yong	New pump station	New piped	451	8.51	18.9
Ea Kuang	New pump station	New piped	422	15.78	18.7
	Existing open canal	New piped	424		
Krong Buk Ha	New pump station* <sup>1</sup>	New piped	200	3.45	17.3
	New pump station* <sup>1</sup>	New piped	400	6.86	17.2
	New pump station	New piped	200	3.85	19.3
		New piped	200	3.31	16.5
Doi 500	New pump station	New piped	203	4.07	20.0
<b>Total = 5</b>	<b>7 Systems</b>		<b>2,650</b>	<b>48.53</b>	<b>18.3</b>

\*1. Combining these systems with a single pumping station remains an option

13. The five systems have a combined net area of 2,650 ha of coffee and pepper on hill ridges/slopes. Rice (valley) areas are excluded. In most cases, pressure pipe (ring) systems shall be adopted, with a single small header tank located at the highest (and furthest) location in each pipe system, with pressures (or water levels) triggering pump operations. Design flows for each of the pumped pipe systems are based on 1.04 l/s/ha. The feasibility designs propose on-shore pumping stations with vertical turbine pumps. Due to large reservoir water level fluctuations, these are expensive structures with long intake channels. On-shore pumping stations with submersible pumps, and off-shore floating pumping station options, shall be considered. In each pumping station, at least one of the pumps shall be variable speed. The SCADA systems will allow remote monitoring of water levels, pressures and flows as appropriate in the reservoirs, canal and pipe



systems. Pumps operation shall be linked to pipe pressures.

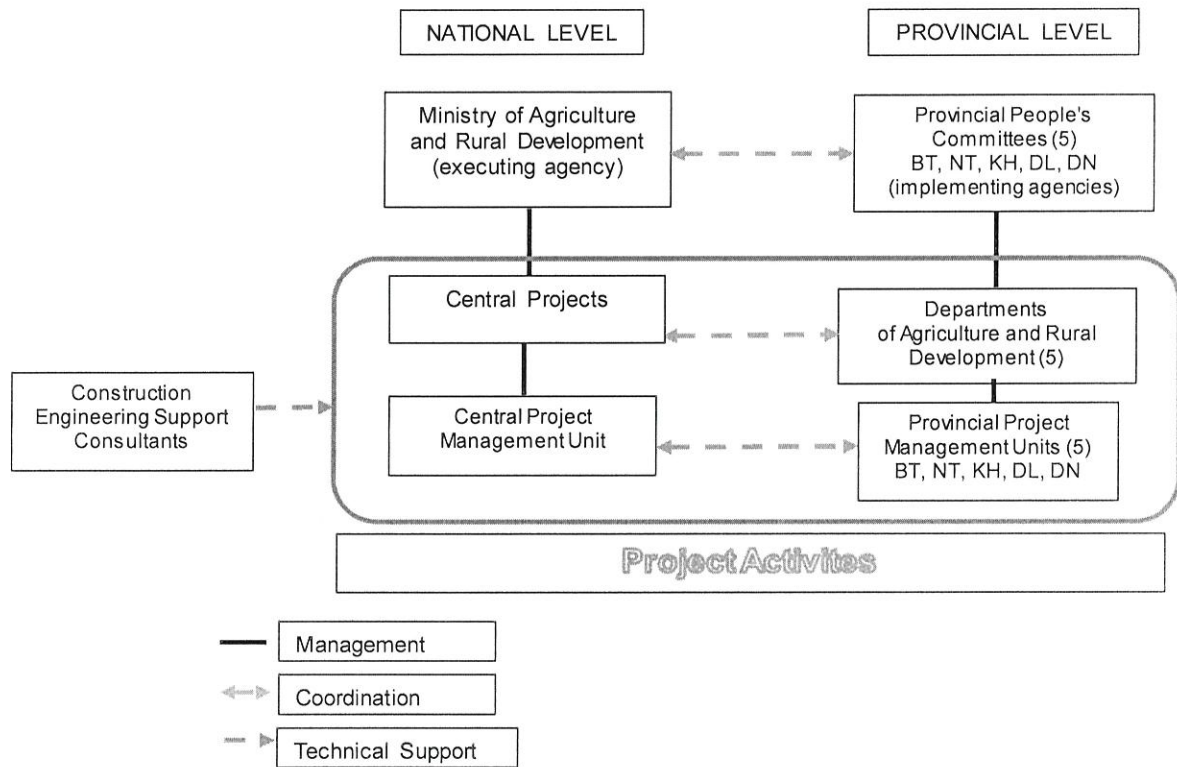
#### **G. CU JUT SUBPROJECT, DAK NONG**

14. The Cu Jut subproject comprises: (i) 10 permanent weirs to replace farmers' temporary weirs, supplied from the existing Dak Dier and Dak Drong reservoirs, five of which are to have bridges, (ii) two pumped piped demonstration irrigation systems, supplied from weirs 2 and 9, each serving about 50 ha, and (iii) upgrading/ paving of 10.95 km of access road. The design flows for each of the two pumped systems are based on 1.16 l/s/ha. Pressure pipe systems are suggested (not pumping to a header tank with gravity distribution from the header tank). A single small header tank shall be located at the highest (and furthest) location in each pipe system, with pressures (or water levels) triggering pump operations. Electrification works will provide the necessary 3-phase power to each pump house. Hydrants with valves and flow limiters shall be provide constant 5 l/s flows whatever the pressure in the pipeline. The SCADA system will enable monitoring of: (i) water levels in the reservoirs and in the last weir (No. 10) along the Ea Dier river; and (ii) pump operations, pipe pressures and pipe and selected hydrant flows.

#### **H. DAM MIL SUBPROJECT, DAK NONG**

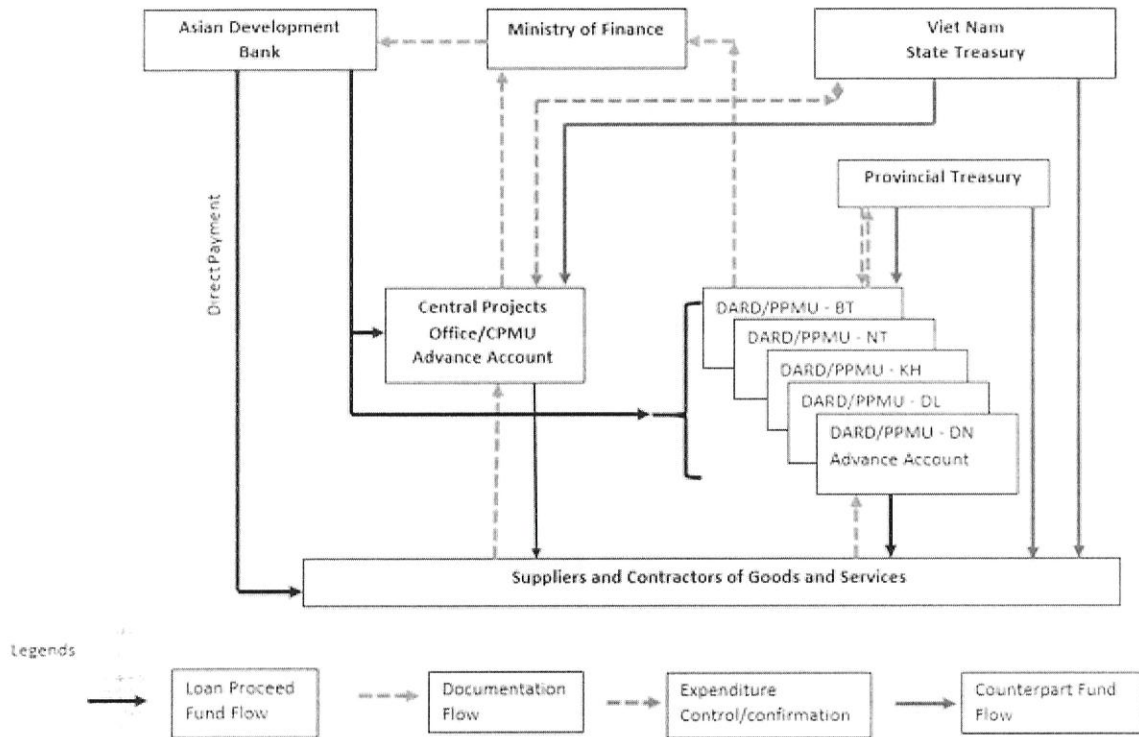
15. The Dak Mil subproject includes: (i) upstream works: rehabilitation of 24 existing structures including structures on four existing storage reservoirs, five existing diversion weirs, construction of 2.75 km of reinforced concrete box culvert, construction of a new pumping station, to replace a temporary one, on Reservoir #1; (ii) downstream works: replacement of farmers' temporary weirs with three permanent un-gated weir structures, and (iii) road upgrading together with bridge/ culvert crossings. A SCADA system to facilitate effective system operation with efficient water use is also proposed.

**APPENDIX 4: PROJECT ORGANIZATION STRUCTURE**





APPENDIX 5: FUND FLOW



- <sup>a</sup> Prime Minister Decision No.899/QD-TTg dated 10 June 2013 on approving the "Agricultural restructuring towards raising added values and sustainable development" Project Hanoi: Government Publishing Office.
- <sup>b</sup> National Assembly, 19 June 2017 No. 08/2017 / QH14 entitled 'Law on Hydraulic Structures', Hanoi, Government Publishing Office.
- <sup>c</sup> Participating provinces include Binh Thuan, Ninh Thuan, Khanh Hoa, Dak Lak and Dak Nong.
- <sup>d</sup> Baseline water productivity estimates of: Coffee, Pepper, Dragon Fruit, Mango, Vietnamese Apple and Grape to be provided by Cai's Study.

## APPENDIX 6: GENDER ACTION PLAN

Project Output	Gender Action Plan Actions and Targets
<b>Output 1: Irrigation management services strengthened.</b>	
1.1 Water allocation and planning and framework for water charging	1.1.1 Water allocation/planning and water charging framework developed taking into account needs and constraints as raised during consultations conducted with men and women in command areas. At least 50% women participants in the consultations. 1.1.2 Two facilitators trained per subproject commune with at least one woman facilitator. 1.1.3 Ethnic group <sup>1</sup> participation in consultations and dissemination sessions <sup>2</sup> (at least 20% - overall aggregate for all sub-projects areas), and with facilitators who can speak the concerned local ethnic languages or conducted in ethnic languages (in areas with 50% or more ethnic population). 1.1.4 At least 50% women participate in dissemination sessions. 1.1.5 Among the farmers linked to an information system providing advice on irrigation scheduling, at least 40% are female farmers and at least 30% are ethnic minority households.
1.2 Improved operation and maintenance mechanisms for IMCs in project irrigation systems.	1.2.1 At least 25% of IMC staff in technical training sessions on modern irrigation management are women. <sup>3</sup> 1.2.2 At least 30% of newly recruited irrigation staff for the project command areas are women.
1.3 Engage PPP irrigation operators to manage pumped systems	1.3.1 Potential PPP irrigation operators mapping in the project districts includes mapping of women led and/or owned operators/related enterprises. 1.3.2 Ensure PPP irrigation opportunity information encourages women to apply and is disseminated/reaches all potential bidder including female led and/or owned operators/related enterprises. 1.3.3 30% of participants in awareness raising and promotion of PPP initiatives/pilot meetings are women.
<b>Output 2: Modernized irrigation systems implemented.</b>	
2.1 Detailed engineering design	2.1.1 At least 50% of participants in community consultations in command areas are women and at least 20% of participants are from ethnic groups (overall aggregate – for all sub-project areas) <sup>4</sup> 2.1.2 At least one consultation per command area is conducted with Women's groups and Women's Union during the detailed design phase to identify routing of pipe alignments and locations of hydrant offtakes from the buried pipes. 2.1.3 Venue and timing of consultation meetings are convenient for women to attend. 2.1.4 Local ethnic language is used where and when needed, in areas with 50% or more ethnic population. <sup>5</sup>

<sup>1</sup> Target for subprojects are based on the proportion of ethnic minority as follows: Tra Tan subproject (Binh Thuan): 4.5%; Du Du- Tan Thanh subproject (Binh Thuan): 35%; Thanh Son- Phuoc Nhon subproject (Ninh Thuan): 35%; Thanh Hai- Nhon Hai subproject (Ninh Thuan): 0%; Khanh Hoa subproject: 5%; Dak Lak subproject: 50%; Dak Mil subproject (Dak Nong): 20% and Cu Jut subproject (Dak Nong):30%

<sup>2</sup> Dissemination sessions include information on water allocation/ planning framework associated priorities for crops; and water charging framework.

<sup>3</sup> Specific baseline and target for provinces based on staffing profile of Irrigation companies as followings: Binh Thuan: 25%; Ninh Thuan: 20%; Khanh Hoa: 30%; Dak Lak: 25% and Dak Nong: 30%.

<sup>4</sup> As stated in footnote 1 above.

<sup>5</sup> As stated in footnote 2 above.



2.2 Civil works	<p>2.2.1 Women's Union provides information on unskilled work opportunities to local women</p> <p>2.2.2 Contractor prioritizes at least 30% of the unskilled jobs opportunities for women and at least 20% for ethnic minority</p> <p>2.2.3 Contractors comply with national labor laws through their human resources policies and ensure equal pay for work of equal value between men and women performing unskilled work.</p> <p>2.2.4 Female workers are provided with training and equipment, including safety equipment, to perform their jobs.</p> <p>2.2.5 Female workers are provided with safe toilet and changing facilities.</p> <p>2.2.6 Contractors do not use child labor.</p>
2.3 Prevention of HIV/AIDS and human trafficking, as well as sexual harassment at the workplace	<p>2.3.1 All construction workers can identify at least two HIV prevention methods after attending HIV/AIDS awareness raising and human trafficking briefing sessions.</p> <p>2.2.1 Contractors have policy of zero tolerance for sexual harassment at the workplace; all construction workers are made aware of zero tolerance policy and mechanism of redress if needed.</p>
<b>Output 3: Efficient on-farm water management practices adopted.</b>	
3.1 Access to technical support services	<p>3.1.1 WEAT training materials is free from gender bias and promotes the participation of women in water management.</p> <p>3.1.2 At least 40% of the farmers receiving training on water productivity on-farm are women.</p> <p>3.1.3 Demonstrations of WEAT must be provided to at least 5% of women-headed and 20% are ethnic minority households.</p>
3.2 Project management and capacity building	<p>3.2.1 At least 30% of PMUs staff positions are held by women.</p> <p>3.2.2 Key PMU's staff, including management staff, will be briefed on gender mainstreaming in irrigation, agriculture and climate change to assist in implementing, monitoring and reporting of GAP.</p> <p>3.2.3 All IMC staff working at project districts will be trained/sensitized on gender and irrigation management as well as resilience to climate change.</p> <p>3.2.4 Provincial IMC staff and other stakeholders (contractors, supervision consultants, PPP operators, service suppliers etc.) will be oriented on the GAP and their associated responsibilities under GAP.</p> <p>3.2.5 30% of attendees in study tour to pumping system in Viet Nam are women</p> <p>3.2.6 Each PMU shall assign a gender focal point responsible for GAP implementation, monitoring and reporting.</p> <p>3.2.7 Gender consultant will be mobilized with 14 person-month inputs to support GAP implementation, monitoring and reporting.</p> <p>3.2.8 Sex-disaggregated project performance and monitoring system instituted to report on gender and ethnic minority indicators and aid in monitoring the GAP implementation and design and monitoring framework (DMF).</p>

CPMU = central project management unit, GAP = gender action plan, HVC = high value crop, IMC = irrigation management company, PMU = project management unit, PPP = public-private partnership, WEAT = water efficient application technology.

**Budget and Implementation Arrangements.** The executing agencies for the project will be the Ministry of Agriculture and Rural Development (MARD) nationally and the Provincial People's Committees (PPCs) from the five participating provinces of the Central Highlands and South

Central Coast Region (project owners).<sup>6</sup> Nationally, implementation responsibility will be assigned to a Project Management Unit (PMU) within the Central Projects Office of MARD while in the provinces, implementation will be assigned to a suitably qualified provincial agency nominated by the PPC (likely to be the Departments of Agriculture and Rural Development - DARD) as implementing agencies. The DARDs, with the assistance of staff appointed to the provincial project management units (PPMUs) will implement and monitor the gender action plan (GAP) with support from the social-gender-communications specialist appointed under the project implementation consultants contract. The GAP specific implementation budget is estimated to be \$30,128 from Asian Development Bank financing. The PMUs will incorporate GAP monitoring in their quarterly progress reports, (using the ADB GAP Progress Report template) to government and ADB.

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<sup>6</sup> Participating provinces include Binh Thuan, Ninh Thuan and Khanh Hoa and Dak Lak and DakNong provinces- all seriously drought affected during the extended drought between 2013 and 2016.