Operations and Maintenance Plan

Under the Ministry of Agriculture and Cooperatives (MoAC), the Royal Irrigation Dept (RID) is responsible for the operations and maintenance (O&M) of water management infrastructure, and well as sustainability of related investments. RID has committed USD 17.26 million from year 6 to 20 of the project life (please see Annex 13). Approximately USD 4.63 million will be allocated for Output 1 to ensure the long term effectiveness of investments in computing equipment and software for enhanced climate information. O&M for water management infrastructure and ecosystems-based measures are estimated at USD 11.60 million. USD 1.03 million has been committed for Output 3, to provide ongoing monitoring and support to farmers for informed household level agriculture planning.

Output 1: Enhance climate and risk informed planning in the water and agricultural sectors through improved climate information and cross sectoral coordination

Output 1 is a partnership between RID and King Mongkut's University of Technology North Bangkok (KMUTNB). While the financing for O&M is committed by RID, long term sustainability of interventions will continue with engagement of KMUTNB as appropriate. This includes O&M of computer hardware for forecasting, software and MIS/DSS software, peopleware for operations and related training for retention of knowledge as well as advancement of skills. Cost for hardware maintenance has been estimated for the years 6 to 20, while those for peopleware and training courses have been estimated for the years 6 to 20.

Output 2: Improve water management through strengthened infrastructure complemented by EbA measures, for greater resilience to climate change impacts

The project includes investments in grey infrastructure and ecosystems based adaptation measures to support water management. Related O&M activities for the grey infrastructure include maintenance of irrigated canals, headwork and roads; with complementary activities related to weed eradication, canal dredging, and general ecosystem improvement to ensure effective flow of water. Costs related to utilities, office supplies, safety, vehicles, petrol and technical expertise have been also been captured.

Importantly, the O&M plan includes a long term soil erosion and sedimentation monitoring plan, surface water quality monitoring plan and a hydrology and groundwater quality monitoring plan. This will ensure regular monitoring and when/if necessary trigger any needed additional work or complementary activities by a different department. Related civil works for instance may include protection or restoration of the flood plain area and fish migration passages. Similarly, surface water quality will be collected and monitored seasonally to inspect physical and chemical properties. And a seasonal groundwater quality inspection will be undertaken in order to identify and reduce any concentration of elements that can be released into groundwater.

Water User Groups will be engaged throughout and informed. Depending on issues identified, various departments may also be engaged in activities related to O&M under Output 2, these include but are not limited to the Department of Fisheries (DoF), Land Development Department (LDD), Department of Groundwater Resources (DGR), and the Sub-district Administrative Office (SAO).

Output 3: Reduce volatility of agriculture livelihoods in drought and flood prone areas through strengthened extension support and local planning, investment in on-farm adaptation measures and greater access to finance and markets

The O&M plan for Output 3 is focused on ensuring that farmers have the information and support needed for climate resilient agriculture going forward. The financial commitment from RID will support six long term plans under this Output; these include:

- Agricultural Training Plan: This will cover knowledge transfer to farmers including, for example, but not limited to, organic fertilizer application, efficient water use, formation of water user group.

- Soil Degradation Protection Plan: This plan aims to improve soil quality to suit with recommended cropping and to train farmers on soil conservation and sustainable agriculture.

- Agricultural Extension Plan: Proposed activities under this plan are training on an adoption of new cropping calendar in respond to new water allocation schedule; raising awareness in climate change adaptation; and site visiting in pilot projects where good agricultural practices have been executed.

- Land Slide and Soil Quality Monitoring Plan: The plan will look on vegetation to keep soil moist and prevent land slide in the project area. Water will be monitored seasonally as change of flow rate between rainy season and dry season may have impact on soil quality.

- Socio-Economic Monitoring Plan: The survey is to collect household information such as income, expenditures, and attitude towards water management as a result of the project operation.

  Health Monitoring Plan: The survey includes inspection of agricultural household sanitary condition and water-borne disease, as well as access to water, food and nutrition sources.

- IoT: As the IoT equipment (including drones) will be owned by district government, local authorities will be ultimately responsible for O&M. District authorities will provide commitments for O&M prior to any roll-out of IoT.

O&M activities under this Output will ensure engagement with relevant departments, as well as engagement with farmer field schools and cooperatives through relevant departments. These include: Department of Agriculture (DoA), Cooperative Promotion Department (CPD), Department of Agricultural Extension (DAE) and Department of Fisheries (DoF), Land Development Department (LDD) and the Sub-district Administrative Office (SAO).

Please see below table for more information.

O&M Budgets for Outputs

Output	Description	Year of O&M															Total
		6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	million THB
1	1.1) Operations and Maintenance of Climate Information System	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	150.00
	1.2) Peoplewares for operating climate centers	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	1.20
	1.3) Training staffs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.50
2	2.1) Maintenance of irrigation structure and project infrastructure, for example: maintenance of irrigated canals, headwork and road; weed eradication; canal dredging; ecosystem improvement; utilities and office supplies; safety; vehicle and petrol; and technical expertise	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	375.00
	2.2) Surface Water Quality Monitoring	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	5.25
	2.3) Soil Erosion and Sedimentation Monitoring	0.2	0	0.2	0	0.2	0	0.2	0	0.2	0	0.2	0	0.2	0	0.2	1.60
	2.4) Hydrology and Groundwater Quality Monitoring	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	1.05
3	3.1) Agricultural Training	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.50
	3.2) Soil Degradation Protection	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	7.50
	3.3) Agricultural Extension	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	18.00
	3.4) Land Slide and Soil Quality Monitoring	0.02	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	3.80
	3.5) Socio-Economic Monitoring	-	0.3			0.3			0.3			0.3			0.3		1.50

Output	Description	Year of O&M															Total
		6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	million THB
	3.6) Health Monitoring Plan	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.50
Total		37.71	38.07	37.97	37.77	38.27	37.77	37.97	38.07	37.97	37.77	38.27	37.77	37.97	38.07	37.97	**569.39**
																Total million USD	**17.26**