ADB

Technical Assistance Report

Project Number: 47121
Capacity Development Technical Assistance (CDTA)
December 2013

Democratic Socialist Republic of Sri Lanka: Capacity Development for Project Implementation

Asian Development Bank

CURRENCY EQUIVALENTS

(as of 15 October 2013)

Currency unit	–	Sri Lanka rupee (SLRe)
SLRe1.00	=	$0.0075
$1.00	=	SLRs131.08

ABBREVIATIONS

ADB	–	Asian Development Bank
DPMM	–	Department of Project Management and Monitoring
ERD	–	External Resources Department
FIDIC	–	Fédération Internationale des Ingénieurs-Conseils (Federation of Consulting Engineers)
ICTAD	–	Institute of Construction and Training Development
NWSDB	–	National Water Supply and Drainage Board
MOFP	–	Ministry of Finance and Planning
NRW	–	nonrevenue water
TA	–	technical assistance

TECHNICAL ASSISTANCE CLASSIFICATION

Type	–	**Capacity development technical assistance (CDTA)**
Targeting classification	–	**General intervention**
Sector (subsectors)	–	**Water supply and other municipal infrastructure and services** (Urban sector development), , Energy (Energy sector development) ,Transport, and information and communication technology (Transport management and policies), and Education (Education sector development)
Themes (subthemes)	–	**Capacity development**, (institutional development)
Location (impact)	–	National (high)

NOTE

In this report, "$" refers to US dollars.

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I. INTRODUCTION

1. The Government of Sri Lanka recognizes the need for enhanced project management capacity for agencies implementing large-scale infrastructure projects, particularly foreign-funded projects.[1] Government staff engaged in project implementation experience complex implementation challenges and may not have been trained fully in up-to-date project management methods. The draft Sri Lanka country operations business plan indicates a total lending envelope for 2014–2016 of $1.07 billion.[2] The plan also proposes to introduce a nonlending program to blend hard infrastructure with soft interventions such as capacity development. This $0.5 million capacity development technical assistance (TA) will introduce and implement targeted capacity development programs. The TA will provide direct support to strengthen the project management and administration capacity of government staff undertaking ADB-funded projects. The TA will (i) enhance the project management capabilities of project management unit (PMU) staff by conducting training programs and workshops on project management and contract management in the water, energy, transport, and education sectors; (ii) introduce best project management practices supported by information technology (IT) tools in water sector projects, while ensuring the compatibility of the proposed project management system with the existing national project monitoring system; and (iii) upgrade the technical skills of the staff of the National Water Supply and Drainage Board (NWSDB) working on the Greater Colombo Water and Wastewater Management Improvement Investment Program which includes non-revenue water (NRW) reduction program.[3]

2. ADB's Strategy 2020 identifies capacity development as a driver of change that provides ADB with an opportunity to be a supportive development partner.[4] In June 2010, a project implementation working group was established with a mandate to identify key issues and good practices that could be applied widely across ADB to improve project implementation.[5] Ensuring effective project implementation by the implementing agencies was identified as one of the main recommendations. This TA will respond to this issue and will support and enhance project management skills for key sectors. The government concurs with the impact, outcome, output, implementation arrangements, cost, financing arrangements, and terms of references for consultants. The design and monitoring framework is in Appendix 1.

II. ISSUES

3. ADB's portfolio in Sri Lanka comprises primarily water, energy, transport, and education projects. These sectors account for 84% of ADB's ongoing lending in the country. It is important for these projects to have effective project management capacity supported by efficient IT-based systems. Robust IT tools are also useful to ensure better information sharing among the government agencies and development partners. Capacity enhancement for contract management is essential for overall project management capacity improvement.

4. Project executing and implementing agencies must report project implementation status to ADB and various government organizations including the Department of Project Management

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1 The Asian Development Bank (ADB) now supports 28 projects through 48 ongoing loans and grants with a net loan amount of $2.4 billion. In 2012, ADB approved four new loans for $352 million to Sri Lanka.

2 ADB. Forthcoming. *Country Operations Business Plan: Sri Lanka, 2014–2016.* Manila.

3 ADB. 2012. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the Democratic Socialist Republic of Sri Lanka for the Greater Colombo Water and Wastewater Management Improvement Investment Program. Manila.*

4 ADB. 2008. *Strategy 2020*: *The Long-Term Strategic Framework of the Asian Development Bank, 2008–2020,* Manila.

5 ADB. 2010. *Good Project Implementation Practice*. *Report of the Project Implementation Working Group*. Manila.

and Monitoring (DPMM) in the Ministry of Finance and Planning (MOFP). Many executing and implementing agencies lack appropriate IT tools for project management. This situation can compromise effective fund allocation and efficient project progress monitoring, which in turn may adversely impact project implementation. Providing field staff with specialized project management knowledge and equipping them with advanced IT application skills will ensure more effective and timely implementation, including early resolution of claims under bidding contract packages and other contractual matters.

5. The technically complex nature of water projects makes contract management challenging. Water projects, including the recently approved multitranche financing facility for the Greater Colombo Water and Wastewater Management Improvement Investment Program, involve implementing technically complex construction components (footnote 3). Evaluation of bidding documents calls for evaluators to have a good knowledge of procurement systems as well as technical requirements, which have a significant impact on the quality of bidders' proposal. Furthermore, design change is sometimes required under a contract to manage evolving situations, including social issues associated with the physical interventions. The TA will provide technical support to the government PMUs in the water sector with NRW reduction expertise and IT - based project management tools to enhance technical and project management capacity.

6. The technical complexity of energy and transport operations also necessitates capacity enhancement for effective project management. Energy projects have many subcomponents that cover large geographical areas, and each of these may have its own responsible project office. Transport projects have experienced major contractual disputes with contractors, and this trend is increasing across the Asia and Pacific region.[6] IT-based project management tools can provide early warning of possible implementation difficulties, and ensure that measures are taken to avoid escalation of any dispute. In addition, staff needs to have a sound knowledge of the contract conditions and contract management procedures of the Federation of Consulting Engineers (FIDIC) and the Institute of Construction and Training Development (ICTAD). Scheduling information for contract implementation needs to be shared with contractors and the DPMM. Efficient IT-based project management tools will ensure effective exchange of contract and project information, and will improve coordination among project offices.

7. Education projects usually have numerous small contracts for education facilities. These contracts are managed by government officials in local and provincial government organizations who have limited knowledge of project management. In addition, the newly approved Education Sector Development Program requires achievement of results indicators prior to disbursements.[7] Therefore, it is essential to provide training and capacity building opportunities to cover deficiencies in project and contract management.

III. TECHNICAL ASSISTANCE

A. Impact and Outcome

8. The impact of the TA will be enhanced operational effectiveness of ADB-funded projects in Sri Lanka.

[6] During contract implementation, contractual disputes occur due to changes in (i) physical component design; (ii) construction site handover schedule; (iii) market conditions such as unavailability of critical construction materials; and (iv) project completion, due to delay associated with any or all of the incidents described.

[7] ADB. 2013. *Report and Recommendation of the President to the Board of Directors: Proposed Results-Based Loans to the Democratic Socialist Republic of Sri Lanka for the Education Sector Development Program. Manila.*

9. The TA's outcome will be satisfactory implementation of projects in full compliance with ADB guidelines. The NWSDB, DPMM, MOFP and relevant agencies and ministries will have enhanced capacity in project implementation.

10. The TA outputs are as follows:

(i) **Enhanced knowledge of government project staff in various aspects of project management**. The government's move away from the dedicated PMU system demands enhanced project management capacity for the government staff working on project implementation. The TA will provide support to (a) build capacity and improve skills in project management in the water sector as a key sector, which will be replicated to other sectors; (b) train project staff to have sound knowledge of FIDIC and ICTAD conditions of contract and enhanced knowledge on contract management; (c) enhance skills of key implementing agencies in complex project structuring, bid packaging, bidding document preparation, and bid evaluation; and acquire required knowledge of procurement systems and technical requirements; and (d) develop a contract management and project management manual to ensure sustainability of an efficient project management system.

(ii) **Project management staff in the water sector apply best project management practices supported with information technology tools.** On a pilot basis, the knowledge-building activities for project management staff in ADB-funded water projects will be complemented with appropriate IT tools and IT training in consultation with the Information and Communication Technology Agency. To ensure sustainability of the expertise developed, program participants will be required to have advanced knowledge and skills in IT. An IT system application manual (a specific system user guide) for the water sector will be developed to allow replication of the system to other priority sectors such as energy, roads, and education. The specialized project management knowledge and advanced IT system application skills will ensure more effective and timely implementation of project activities, including early resolution of conflicting issues on bidding packages and other contractual matters. It will also ensure (a) sharing of the time schedule information for contract implementation with the contractors, the DPMM, and the External Resources Department (ERD) of the MOFP; (b) efficient exchange of contract and project information with ADB; (c) early warning of any disputes and the introduction of measures to avoid escalation; and (d) coordination among project offices in projects with multiple subcomponents.

(iii) **Staff of the National Water Supply and Drainage Board are equipped with improved technical skills for the NRW reduction program.** NRW project design requires extensive and advanced engineering knowledge on hydrology, water resources management, drinking water quality, leak detection, and water treatment and distribution systems. The TA will provide support to the NWSDB to gain the required NRW expertise, training, and capacity enhancement, which were not available to project staff in the past. This activity will be replicated in other ADB-financed water projects.

B. Methodology and Key Activities

11. The TA will provide support to (i) enhance project management skills and train government project staff on project management and contract management for ADB-funded projects in the water, energy, transport, and education sectors; (ii) train the trainers of the government project staff to ensure sustainability of training courses developed under the TA; (iii) develop a contract management and project management manual; (iv) enhance current project management systems through the use of effective IT project management software[8] and provision of additional hardware; (v) support the DPMM and the MOFP ERD project management system while ensuring the compatibility of proposed systems with the existing national contract monitoring system implemented by the DPMM through the Integrated National Development Information System; and (vi) provide technical support for the NRW reduction program for Colombo City by recruiting consultants to (a) provide overall NRW knowledge exchange to the staff for the NRW program, (b) provide expertise to the government project staff to update the network model of the existing water supply network, and (c) support institutional reforms and training for NRW reduction and software application for water supply network modeling.[9]

12. This TA will also support the planning and project management support for the proposed activities to be carried out at the national level under the Education Sector Development Program (footnote 7). This TA will not replicate activities being carried out under other TA projects in the education sector.[10]

C. Cost and Financing

13. The TA is estimated to cost $554,000, of which $500,000 will be financed on a grant basis by ADB's Technical Assistance Special Fund (TASF-V). The government will provide counterpart support in the form of counterpart staff, office accommodation, office supplies, taxes, and other in-kind contributions.

D. Implementation Arrangements

14. The executing agency is ADB, which will be supported closely by the DPMM. The TA will be implemented over 18 months from the fielding of consultants in February 2014, with physical completion by May 2015 and TA completion by June 2015. The TA will conduct regular consultative meetings with all stakeholder agencies, including the National Planning Department, the DPMM, the Ministry of Water Supply and Drainage, the NWSDB, and the ERD, as required. All consultants will be recruited in consultation with the MOFP.

15. The TA will engage individual consultants to provide 20 person-months of consulting services: 8.5 person-months of international consulting services and 11.5 person-months of national consulting services. The terms of reference will reflect the requirements of the executing and implementing agencies, subject to ADB review and agreement. ADB will engage

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[8] Project management and financial management software applications such as Microsoft Project Management and Primavera.

[9] Under another capacity development TA, ADB will strengthen capacity and expertise for NRW projects. The inputs proposed under this TA will be a continuation of the NRW technical support to strengthen project implementation and sustainability. ADB. 2013. *Technical Assistance to Sri Lanka for Capacity Development for Non-Revenue Water Reduction*. Manila (TA 8206-SRI).

[10] ADB. 2012. *Technical Assistance to the Democratic Socialist Republic of Sri Lanka for Human Capital Development Capacity and Implementation Support*. Manila (TA 8235-SRI).

individual experts in accordance with ADB's Guidelines on the Use of Consultants *(*2013, as amended from time to time). All TA-financed goods will be procured in accordance with ADB's Procurement Guidelines (2013, as amended from time time). Disbursements under the TA will accord with the *Technical Assistance Disbursement Handbook* (2010, as amended from time to time). Indicative consultant requirements and terms of reference are in Appendix 3.

16. The outputs of the TA will be disseminated through (i) regular reviews with focal agencies; (ii) frequent interaction and supervision of the consultants; and (iii) rigorous reviews of all consultants' outputs jointly by ADB, the MOFP, and the Ministry of Water Supply and Drainage. Progress reports will be requested from consultants, and good practices and lessons will be disseminated through (i) knowledge-sharing seminars in ADB; (ii) knowledge products; and (iii) the ADB website.

IV. THE PRESIDENT'S DECISION

17. The President, acting under the authority delegated by the Board, has approved the provision of technical assistance not exceeding the equivalent of $500,000 on a grant basis to the Government of Sri Lanka for Capacity Development for Project Implementation, and hereby reports this action to the Board.

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets and Indicators with Baselines	Data Sources and Reporting Mechanisms	Assumptions and Risks
Impact Enhanced operational effectiveness of ADB-funded projects in Sri Lanka	By 2018: Increase in completed sovereign projects rated *successful* to 80% (baseline: 60% in 2012)	Project completion reports and technical assistance completion reports	**Risk** New bureaucratic processes are introduced disrupting the delivery of results.
Outcome Satisfactory implementation of projects in full compliance with ADB guidelines	By 2015: 90% of ADB sovereign operations are rated *on track*(baseline: 86% in 2012) Increased contract awards ratio to 23% (baseline: 18.7% in 2012) Increased disbursements ratio to 25% (baseline: 24.3% in 2012)	e-Operations data e-Operations data	**Risk** Government does not provide adequate resources or adopts new tools and procedures in portfolio operations.
Outputs 1.Enhanced knowledge of government project staff in various aspects of project management 2.Project management staff in the water sector apply best project management practices supported with Information technology tools 3. Staff of the NWSDB are equipped with improved technical skills for the NRW reduction program	By 2015: 20 training programs conducted for at least 300 participants from the water, power, transport, and education sectors At least 75% of participants rate the quality and applicability of the training content and speakers as excellent or good Contract management and project management manual is adopted Four project management systems using IT tools are introduced to project management units in the water sector System application manual (specific system user guide for the water sector) developed 100 staff trained and knowledge imparted on NRW reduction technologies, including network modeling Geographic information system created to centralize the access to infrastructure data and	Attendance records of the trainings Post-training evaluation Project management manuals Quarterly progress reports NWSDB quarterly progress reports Workshop evaluation sheets Information systems in NWSDB	**Risk** High turnover of trained personnel may dilute institutional memory and expertise developed from the training. **Assumptions** Participants are able to consistently attend training sessions. The government staff implement NRW reductions program as planned.

<table>
<tr><th>Design Summary</th><th>Performance Targets and Indicators with Baselines</th><th>Data Sources and Reporting Mechanisms</th><th>Assumptions and Risks</th></tr>
<tr><td></td><td>locations</td><td></td><td></td></tr>
<tr><td colspan="3">Activities with Milestones
1. Enhanced knowledge of staff involved in project management
1.1 Recruit consultants by February 2014
1.2 Assess training needs of government project management offices by March 2014
1.3 Complete and deliver of training programs for project implementation, contract management, and capacity enhancement including training of trainers by December 2014
1.4 Conduct post-training evaluation by June 2015
1.5 Prepare contract and project management manual by January 2015

2. Project management staff in the water sector apply best project management practices supported with IT tools
2.1 Complete needs assessment in consultation with government project management offices and in coordination with the Information and Communication Technology Agency by April 2014
2.2 Complete procurement of equipment and IT tools by June 2014
2.3 Complete on-the-job training for application of IT tools by October 2014
2.4 Conduct post-evaluation of implementation of IT tools by May 2015
2.5 Complete IT system application manual (specific system user guide) for the water sector by November 2014

3. NWSDB staff are equipped with improved technical skills for the NRW reduction program
3.1 Recruit NRW reduction technical support consultants by February 2014
3.2 Prepare the proposed NRW reduction supporting program by April 2014
3.3 Provide the expertise to NWSDB to update the network model of the existing network by September 2014
3.4 Provide expertise to NWSDB to prepare the institutional reform plan for NRW reduction and complete the training for NRW reduction and software application for water supply network modeling by October 2014</td><td>Inputs
ADB: $500,000
(TASF-V)
<table><tr><th>Item</th><th>Amount ($'000)</th></tr><tr><td>Consultants</td><td>264</td></tr><tr><td>Equipment</td><td>143</td></tr><tr><td>Workshops, training, seminars, and conferences</td><td>60</td></tr><tr><td>Contingencies</td><td>33</td></tr></table>Note: The government will provide counterpart support in the form of counterpart staff, office accommodation and facilities, and taxes.</td></tr>
</table>

ADB = Asian Development Bank, IT = information technology, NRW = nonrevenue water, NWSDB = National Water Supply and Drainage Board, TA = technical assistance, TASF = Technical Assistance Special Fund.
Source: Asian Development Bank.

COST ESTIMATES AND FINANCING PLAN
($'000)

Item	Amount
Asian Development Bank[a]	
1. Consultants	
a. Remuneration and per diem	
i. International consultants (8.5 person-months)	170
ii. National consultants (11.5 person-months)	69
b. International and local travel	25
2. Equipment[b]	143
3. Workshops, training, seminars, and conferences	60
4. Contingencies	33
Total	**500**

Note: The technical assistance (TA) is estimated to cost $554,000, of which contributions from the Asian Development Bank are presented in the table above. The government will provide counterpart support in the form of counterpart staff, office accommodation and facilities, and taxes. The value of government contribution is estimated to account for 9.8 % of the total TA cost.

[a] Financed by the Asian Development Bank's Technical Assistance Special Fund (TASF-V).

[b] Equipment includes (i) one unit server; (ii) one package of Microsoft Project Server Solution or its equivalent (operating system with 20 client access licenses (CALs) Microsoft Project 2013 20 CALs, Share point server 20 CALs, project Pro 20 users); (iii) three units of financial management software; (iv) Microsoft Project Standard 20 licenses or its equivalent ; and (v) four desktop computers, two laptop computers, and one printer. Equipment will be turned over to the Ministry of Water Supply and Drainage, National Water Supply and Drainage Board, Ministry of Finance (External Resources Department) at the end of the project.

Source: Asian Development Bank estimates.

OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

A. Dealer for Information Technology Tools—Domestic Software Dealer, License, and Related Services

1. Scope of Services

1. Along with the license of the project management and financial management applications being procured through the license dealer, the dealer will provide the following for a 1-year period:[11]

(i) **Initial installation services.** The dealer shall review the hardware configurations of the government project offices to ensure the proper functioning of the applications. The additional hardware or platform software will be purchased by the Asian Development Bank (ADB). The dealer shall install the applications on the computers in the selected government project offices.

(ii) **Software training.** The dealer shall provide training on software applications for project management for the staff of water sector projects.[12] Up to five core users in each related project office will be trained on the applications' full functions. Other project office staff will be trained on basic use of the applications.

2. Requirements

2. The dealer shall have legal authority to provide licenses and accredited trainers for the software applications. The trainers shall have experience in application installation and training for clients that manage large-scale infrastructure projects.

B. Project Management Specialist Team

3. A team of international and national project management specialists (intermittent; international, 2 person-months; national, 3 person-months) shall provide training for government project staff to establish a project management system in each selected government project office using project management software (information technology [IT] tools). The IT tools (such as Microsoft Project, Primavera, or their equivalent, including financial management software) and related training will be procured under the technical assistance (TA) project.

1. International Project Management Specialist and Team Leader

4. The international project management specialist (2 person-months, intermittent) as team leader shall have responsibility for overall training on project management system implementation in the project offices with support from the national project management specialist and other consultants.

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[11] There are several software packages for project management. Microsoft Project or equivalent will be selected for this technical assistance (TA) project as it is used in the Asian Development Bank (ADB).

[12] ADB. 2008. *Report and Recommendation of the President to the Board of Directors*: *Proposed Loan to the Democratic Socialist Republic of Sri Lanka for the Dry Zone Urban Water and Sanitation Project*. Manila*;* ADB. 2009*. Report and Recommendation of the President to the Board of Directors*: *Proposed Loan to the Democratic Socialist Republic of Sri Lanka for Greater Colombo Wastewater Management Project.* Manila. ADB. 2010. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the Democratic Socialist Republic of Sri Lanka for the Jaffna Killinochchi Water Supply Project and Sanitation Project.* Manila; ADB. 2013*. Report and Recommendation of the President to the Board of Directors: Proposed Loan to the Democratic Socialist Republic of Sri Lanka for Greater Colombo Water and Wastewater Improvement Management Project*. Manila.

6. The specialist's tasks are as follows:

(i) Serve as team leader responsible for overall implementation of the TA.
(ii) Prepare a training needs assessment for project management in consultation with (a) project staff, (b) line ministry officials for project monitoring, and (c) officials of the Department of Project Management and Monitoring under the Ministry of Finance and Planning.
(iii) Review project implementation arrangements and resources available for project management as a basis for proposing the project offices' project management system.
(iv) Assist contract specialists in developing contract and project management manuals for training and future reference for the project offices' project management system implementation, and ensure sustainability of the expertise developed.
(v) Carry out training for project staff to implement the project management system developed by the consultant.
(vi) Plan and organize project management training programs for the project staff of the water, power, transport, and education sectors.
(vii) Procure required IT tools and hardware in consultation with the training coordinator and with the approval of ADB.
(viii) Create monitoring schedules and ensure that customized reporting templates are developed and implemented in line with the prevailing national system, and provide financial information to meet the financier's requirements.
(ix) Train staff in management information systems and application of international best practices in project management.

2. National Project Management Specialist

7. The national project management specialist (3 person-months, intermittent) should be a professional engineer and the specialist will report to and assist the international project management specialist.

8. The specialist's tasks are as follows:

(i) Carry out consultations with stakeholders and support the team leader and other consultants by providing local information.
(ii) Review project implementation arrangements and resources available for project management to support the team leader.
(iii) Prepare inputs for the project management system manual by providing local information.
(iv) Support the international project management specialist in the development of project management training plans, training, and implementation of IT systems in government project offices and agencies.
(v) Support the international project management specialist in carrying out project management training programs for government officials in the water, power, education, and transport sectors.

C. Contract Management Specialist Team

9. The team of international and national contract management specialists (intermittent; international, 2 person-months; national, 3 person-months) shall provide training for government

project staff in the water, power, transport, and education sectors on contract management for large-scale infrastructure implementation to minimize contractual disputes.

1. International Contract Management Specialist

10. The international contract management specialist (2 person-months, intermittent) shall have responsibility for the overall training on contract management system implementation in the project offices with support from the national contract management specialist. The specialist will report to the international project management specialist.

11. The specialist's tasks are as follows:

(i) Develop a training plan for project offices on contract management and provide training.
(ii) Carry out consultation with stakeholders to learn about contract management difficulties.
(iii) Review the project's implementation arrangement status and resources available in order to develop the training plan.
(iv) Provide inputs on project management system development related to contract management.
(v) Propose contract management training workshops for government officials in the water, power, transport, and education sectors; and carry out training.
(vi) Provide (a) training on advanced international best practices in contract management; (b) training on advanced techniques for contract management and dispute resolution including arbitration, claims management, and customizing official communications with contractors; (c) identification of key contract management milestones, linking them to the project management IT tools;
(vii) Preparation of a contract management and administration manual with the assistance of the project management specialists; and training of staff in application of conditions of contracts.

2. National Contract Management Specialist

12. The national contract management specialist (3 person-months, intermittent) will report to the international contract management specialist and the international project management specialist.

13. The specialist's tasks are as follows:

(i) Consult with stakeholders and support the international contract management specialist.
(ii) Provide inputs on project management system development.
(iii) Support the development of the international contract management specialist's contract management training plans, and carry out training in consultation with national professional bodies such as ICTAD and the National Construction Association of Sri Lanka.
(iv) Assess current training provision by Sri Lanka institutes on project implementation, and assist in establishing a plan for them to organize contract management training in the future.

D. International Geographic Information Systems and Hydraulic Network Modeling Specialist

14. The international geographic information systems (GIS) and hydraulic network modeling specialist (1.5 person-months, intermittent) is responsible for share and develop expertise among the government project staff in the following areas:

(i) Updating the GIS maps of pipe networks and hydraulic network model for the existing Colombo City water network system using WaterGEMS software.
(ii) Establishing the data-gathering protocols with the current water distribution system and input all relevant attributes into the GIS system and model.
(iii) Obtaining flow and pressure measurement data, and calibrating the updated hydraulic model without disrupting other services.
(iv) Reviewing the proposed district meter areas that were already designed and submitted to the National Water Supply and Drainage Board (NWSDB) by other consultants.
(v) Reviewing the Colombo City system input volume pipelines and identifying its validity.
(vi) Completing the GIS maps of pipe networks and the hydraulic model to an acceptable standard and turning them over to the NWSDB.
(vii) Carrying out training programs for NWSDB staff on GIS systems and hydraulic network modeling as required.

E. International Geographic Information Systems and Hydraulic Network Modeler

15. The international GIS and hydraulic network modeler (3 person-months, continuous) should be a qualified engineer, and will work with the other consultants to provide expertise in the following areas:[13]

(i) Using available data to establish the GIS system and a hydraulic network model for the existing Colombo City water network system using WaterGEMS software.
(ii) Compiling the necessary data to complete the GIS system and model.
(iii) Conducting field visits and investigating the pipe network and associated attributes in close collaboration with the NWSDB and government project staff.
(iv) Creating a GIS system to centralize access to infrastructure data and locations, including water mains, hydrants, valves, curb stops, pump stations, and storage tanks. Gathering records and map information stored in various locations and formats to consolidate these records and organizing the information into an interactive geographic database.
(v) Implementing a GIS that incorporates multiple points of data access by planners so that all of the components interconnect as one system.
(vi) Investigating a variety of field data including global positioning system field locations and data conversions. Scanning paper records and merging them with the electronic database formats.

[13] Consultants recruited under ADB. 2013. *Technical Assistance to Sri Lanka for Capacity Development for Non-Revenue Water Reduction*. Manila; and consultants expected to be recruited for Management Advisory and Supervision Consultants under ADB. 2013. *Technical Assistance to Sri Lanka for Greater Colombo Water and Wastewater Management Improvement Investment Program Tranche 1.* Manila.

(vii) Developing a hydraulic model, proposing distribution improvements, and planning for future growth. The hydraulic model is the tool that serves as a guide for analyzing, planning, budgeting, and constructing water distribution upgrades.
(viii) Making changes to the GIS database for calibrating and running the model.
(ix) Establishing data-gathering protocols with the NWSDB's operation and maintenance and modeling staff.
(x) Providing training to government project staff on network modeling using WaterGEMS software.
(xi) Implementing training programs on hydraulic modeling as necessary.

F. **National Water Utility Management Specialist**

16. The national water utility specialist (3.5 person-months, intermittent) should preferably be a civil engineer or human resources specialist will provide expertise to government project staff in the following areas:

(i) Initiating the implementation of institutional reform contained in the framework for action and detailed in the proposal of NWSDB to Establish Autonomous Business Centre for Western Central Regional Support Centre (RSC) and Preparation of an Operational Action Plan and Business Plan.
(ii) Identifying and implementing the priority institutional reforms that are critical to the implementation of the Greater Colombo Water and Wastewater Management Improvement Investment Program.
(iii) Following up each step of institutional reform.
(iv) Documenting the institutional reforms planned as well as those undertaken, for eventual takeover of the management advisory and supervision consultants.

G. Project Training Coordinator

17. The national training coordinator (2 person-months, intermittent) should preferably be an IT engineer and will report to the international project management specialist. His or her tasks are as follows:

(i) Assist project management and contract management specialists in carrying out their project management capacity building tasks efficiently.
(ii) Assist other consultants in assessing training needs and develop training plans in consultation with other consultants.
(iii) Provide all required guidance and mentoring for the implementation of IT tools, in consultation with and with guidance from the supplier.
(iv) Provide leadership and guidance to the project staff in planning, procurement, and installation of IT tools, and lead as a mentor and expert on trouble shooting during the TA implementation period.
(v) Coordinate with all relevant agencies to implement the training plan as scheduled and assist in providing all required logistical requirements.
(vi) Ensure that proper planning, monitoring, and evaluation methodologies are considered effectively at each stage of training program implementation to confirm that training outcomes are retained within the organizations.
(vii) Assist consultants in meeting reporting milestones and provide local input as required.