Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management

THE CAPACITY DEVELOPMENT PROJECT FOR THE IMPROVEMENT OF WATER SUPPLY MANAGEMENT IN SEMI-URBAN AREAS PHASE 2 (WASMIP-II) IN NEPAL

FINAL REPORT

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JAPAN INTERNATIONAL COOPERATION AGENCY

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Summary

1 Project Background and Issues

There are more than 42,000 water supply facilities that have been constructed in rural and urban areas in Nepal. The responsibility for management and Operations and Maintenance (O&M) of facilities is transferred to the Water Users and Sanitation Committees (WUSCs). However, not all WUSCs have the capacity to properly conduct management and O&M of their water services. The issues faced by WUSCs and their responses can be summarised as follows.

Table 1 Issues faced by WUSCs and Response Actions

	Issues faced by WUSCs	Response Actions
1	Need transfer knowledge and skills for management of water supply service operation, and facility O&M.	Development of standard operating procedures (SOPs) and manuals that can be used on-site.
2	Need to train personnel related to management and O&M.	Improvement of knowledge and skills through training.
3	Implementation of stable and safe water supply.	Accumulation and analysis of basic data (water quantity and quality), and disinfected water supply.

This project has been carried out in two phases. The phase 1 is a technical cooperation project, the "Capacity Development Project for the Improvement of Water Supply Management in Semi-urban Areas (WASMIP-I)" conducted from January 2010 through September 2013. The target area is Jhapa and Morang districts in the eastern region in Nepal, and the project targets the support for management, and O&M of water supply facilities to the 20 WUSCs in semi-urban towns. Under the WASMIP-I, two models were developed: the "Small and Medium Scale Water Utility Management Model" (training materials) and the "Small and Medium Scale Water Utility Support Model" (support system). The foundation for the support for WUSCs in semi-urban towns was developed by these models. However, in order to disseminate these two models throughout Nepal, it was necessary to revise the training materials and the support system to make them more versatile and applicable to semi-urban town WUSCs in other regions.

Therefore, the phase 2, the technical cooperation project the "Capacity Development Project for the Improvement of Water Supply Management in Semi-urban Areas, Phase 2 (WASMIP-II)" was implemented from June 2016 through March 2022. The project aims to enhance the versatility of the two models by expanding the target WUSCs to 68 semi-urban WUSCs in 13 districts in five provinces, revising them as management and support models, and strengthening the support for the WUSCs in semi-urban towns by the Department of Water Supply and Sewerage Management (DWSSM) and the National Water Supply and Sanitation Training Center (NWSSTC).

2 Approach and Revision Process of WASMIP-II

This Project (WASMIP-II) has taken the following approach to addressing each of the issues faced by the WUSC in semi-urban towns listed in Table 1. 1) needs assessment and identification of issues at the WUSCs,

2) development of SOPs and facility rehabilitation manuals to address current issues of WUSCs, 3) establishment of necessary trainings based on the current condition of support for WUSCs, 4) Training of Trainers (ToT) to conduct training, 5) development of training plans, 6) implementation of training, and 7) training evaluation and feedback.

Firstly, 1) in the needs assessment, a baseline survey was conducted for the 13 target WUSCs. In this process, O&M data of water supply facilities were reviewed and analysed, and the problems of the WUSCs were identified. 2) SOPs are applicable to several types of water supply systems at the WUSCs, and were developed with the aim of ensuring that O&M of water supply facilities is carried out properly and easily. In addition, many WUSCs are unable to carry out the basic functions of water utilities, such as measuring volume of water production and distribution, disinfection and water quality testing. Therefore, facility rehabilitation manuals were developed to restore these functions. 3) In order to conduct technology transfer based on the SOPs, a training program was set up considering classroom lectures, practical training and on-site practice. 4) Trainer candidates were selected from counterparts (C/Ps) of DWSSM, NWSSTC and FWSSMP (Federal Water Supply and Sewerage Management Project) and were trained to enable to conduct each training course by them. 5), 6) Each training plan was developed and implemented, including setting training subjects and scheduling based on the SOPs, and selecting trainees from the target WUSCs. 7) After the implementation of the training, based on the feedback from the trainers and trainees, training materials, training methods and subjects, evaluation method of training results, and evaluation based on KPIs for waterworks, were reviewed and reflected in each training. Figure 1 shows the revision process for the training.

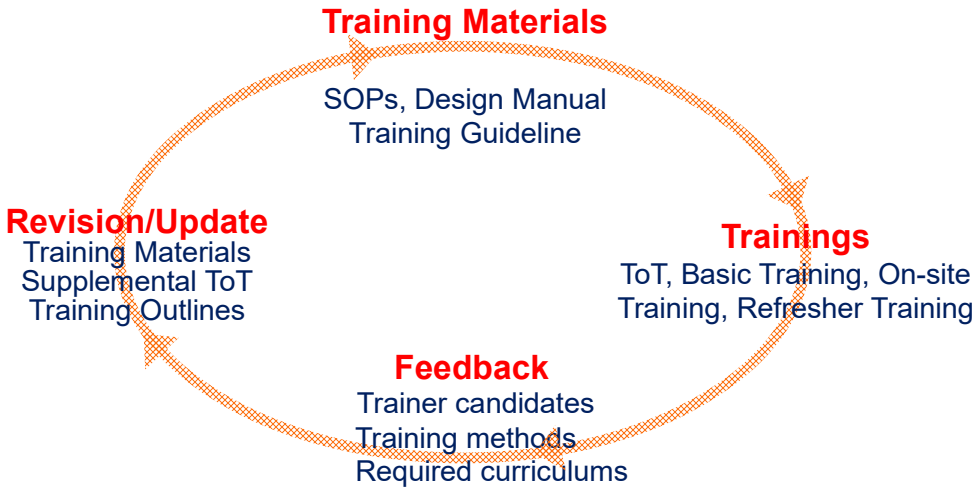


Figure 1 Revision Processes of Management and Support Models

3 Achievement of Each Output and Its Indicators

The overall goal, project purpose and outputs of the Project are shown below;

Table 2 Overall Goal, Project Purpose, and Outputs

Overall Goal	**Continuous support to WUSCs in semi-urban towns is provided by DWSSM and NWSSTC.**
Project Purpose	**Support to the WUSCs in semi-urban towns is provided and strengthened by DWSSM and NWSSTC using government and non-government organizations' personnel. (*)**
Outputs	1) Baseline survey and capacity assessment of DWSSM, NWSSTC, FWSSMP and the target WUSCs are conducted, and project implementation plan is finalized. 2) Supporting capacity of DWSSM regarding O&M and management for WUSCs in semi-urban towns is strengthened. 3) Implementing capacity of NWSSTC regarding the training for WUSCs in semi-urban towns is strengthened.

*) Government and non-government organizations consist of FWSSMP, NGOs, academic institutions, and so on.

The achievements of each output based on the Project Design Matrix (PDM) are presented below;

Table 3 Achievements of Each Output

Output 1: **Baseline survey and capacity assessment of DWSSM, NWSSTC, FWSSMP, and the target WUSCs are conducted, and project implementation plan is finalized.**	
Indicators	Achievement level
1.1 Results of the baseline survey and capacity assessment in DWSSM, NWSSTC, FWSSMP, and target WUSCs are shared with counterparts.	1.1 Achieved - Baseline surveys were conducted for DWSSM, NWSSTC, and Target-A WUSCs (13) in April 2017 and for Target-B WUSCs (55) in December 2017. - Baseline surveys were conducted for 49 local governments, 5 Ministry of Physical Infrastructure Development (MoPIDs), 10 WSSDOs, and 7 FWSSMPs (total 71 institutions/organizations) - Basic data to calculate Key Performance Indicators (KPIs) were collected from 64 WUSCs. 4 WUSCs have no data, as they do not operate water supply facilities. - KPIs were calculated for 2020 and 2021 to compare performance with KPIs in 2016, which are based on the baseline survey results.
1.2 Project Design Matrix (PDM) and Plan of Operation (PO) are finalized.	1.2 Achieved The latest versions were approved in Munities of Meeting of 18 June, 2020 (Supports for COVID-19 measures were added)
Output 2: **Supporting capacity of DWSSM regarding O&M and management for WUSCs in semi-urban towns is strengthened.**	
Indicators	Achievement level
2.1 The Management Model/Support Model for WUSCs in semiurban towns formulated during phase-I project is revised in the context of the actual situation of WUSCs in semi-urban towns.	2.1 Achieved Management Model/Support Model has been continuously re-updated receiving feedback from Output-3. <Deliverables and Training Materials> - Video materials (51 videos) for Basic training - Handy-type Standard Operation Procedures (SOPs) were finalized (April 2021) - Finalized SOPs were submitted to DWSSM (May 2021) - Nepalese versions of SOPs and PowerPoint slides were being revised.
2.2 Design manual of	2.2 Partially achieved

specifications on rehabilitation works for target WUSCs in semi-urban towns are shared in annual progress review meeting of FWSSMP.	- Design manual was finalized and submitted to DWSSM. - Due to the COVID-19 pandemic situation, the duration of annual progress review was shortened from 3 days to a single day. Though short information was given in the NWSSTC progress presentation on the 'Design manual of specifications on rehabilitation works, a copy of the manual along with the SOPs will be shared with FWSSMPs shortly. Also, these documents are being prepared for submission to departmental approval.
2.3 Rehabilitation works are carried out in more than 50 target WUSCs in semi-urban towns.	Achieved. - Rehabilitation works (Procuring and installing equipment necessary to recover the basic function of WUSCs) for 68 target WUSCs were completed. As a result, WUSCs have recovered their basic functions of grasping the water production volume and chlorination. <Items> - Flowmeter, Chlorination unit, Pressure gauge, Water quality test kit, Electric Devices (digital clamp meter, insulation continuity tester, earth tester), Safety tools (mask, glove, goggles), Aeration filter media
Output 3: **Implementing capacity of NWSSTC regarding the training for WUSCs in semi-urban towns is strengthened.**	
Indicators	Achievement Level
3.1 Training implementation guideline, training plan, training curriculums and training materials for WUSCs in semi-urban towns are formulated.	3.1 Achieved The documents were formulated. The final version of 1) Management Model, 2) Training Implementation Guideline, 3) Training Plan, 4) Training Curriculums for WUSCs in semiurban towns are to be officially approved/authorized by DWSSM.
3.2 The Management Model for WUSCs in semi-urban towns is utilized in trainings in NWSSTC.	3.2 Achieved After the Management Model was revised in 2017/18, the Model was utilized in Training of Trainers (ToT) (January 2018), revised based on the ToT (in2018/19), and utilized in supplementally ToT and Basic Training (December 2018).
3.3 More than 80% of target WUSCs attend the Basic Training on the Management Model.	3.3 Achieved All of the 68 WUSCs participated in the Basic Training Outline of the training conducted under the Project including the Basic Training is as follows: - ToT: 5 times (67 individuals) - Basic training: 6 times (among them 1 training course was online training. 68 WUSCs participated. - On-site training (64 WUSCs) - Refresher training (3 times, 59 WUSC) A total of 1,751 individuals took part in the training at the time of terminal evaluation.
3.4 Monitoring and Evaluation of more than 80% of target WUSCs are carried out.	3.4 Achieved - KPIs were collected in 2020 and 2021 to compare the status with the baseline. <Changes in KPI> - Data deficiency rate improved 63% before the project to 1% in 2021. Before the project, WUSCs did not have measuring devices and had no awareness about data collection. As a result of onsite training/refresher training, they have kept the record. - KPI will be taken over by Institutional Support and Service Advisory Unit (ISSAU) under DWSSM

The achievement of the Project Purpose is shown below;

Table 4 Achievements of Project Purpose

Project Purpose: **Support to the WUSCs in semi-urban towns is provided and strengthened by DWSSM and NWSSTC using government and non-government organizations' personnel.**	
Indicators	Achievement level
1. The revision process and sections of DWSSM responsible for the Management Model and Technical Support Mechanism for WUSCs in semi-urban towns are identified.	Achieved - Mainly the Planning, Monitoring, and Evaluation Section and NWSSTC will be responsible for the revision. Part of it goes to ISSAU. ISSAU in consultation with NWSSTC is working on developing a support and management model to backstopping the WUSCs. The work is close to each other and joint planning is needed. The Management Model is expected to be revised/integrated under the framework in the future. Department is changing the name of the sections and TOR as well in coming future. - Though the job description of DWSSM has been a draft since 2018, the job description of those sections are as follows: <NWSSTC> Job description NWSSTC including "Work for the capacity development, promotion of innovation, and technological development of stakeholders and service providers of water supply and sanitation sector, and "Develop necessary manuals, online courses and information management system for training" among others is relevant to the Project. <Planning Monitoring and Evaluation Section> Provide necessary technical assistance to concerned parties or bodies to collect and update data related to drinking water and sanitation.
2. The sections of DWSSM responsible for the training on the Management Model for WUSCs in semi-urban towns and revision process of training implementation guideline are identified.	Achieved - Though the job description of DWSSM including NWSSTC has been still a draft since 2018, job description NWSSTC includes "Work for the capacity development, promotion of innovation, and technological development of stakeholders and service providers of water supply and sanitation sector", "Develop necessary manuals, online courses and information management system for training" among others are relevant to the Project. - DWSSM and NWSSTC confirmed that NWSSTC has been and will be responsible. And Business plan of NWSSTC is being prepared by ISSAU.
3. More than 15 trainers, who can carry out the training on the Management Model for WUSCs in semi-urban towns, are developed. From this trainer batch, at least six must be employees of FWSSMP.	Achieved - 70 trainers were trained. Among them,17 persons are from DWSSM/NWSSTC/MoWS, 19 are from FWSSMP.
4. Capacity assessment results of trainers on the Management Model for target WUSCs in semi-urban towns are improved compared to the baseline	Achieved The results of the capacity assessment (self-assessment) on General skills (self-management, communication, achievement, process, logic, information) and Specific skills (water supply system, O&M of water treatment plant, construction and O&M of network, financial management, and public relation) improved **Average of 70 trainers**

	<table><tr><td></td><td>Pre</td><td>Post</td></tr><tr><td>General skills</td><td>3.54</td><td>3.94</td></tr><tr><td>Specific skills</td><td>3.16</td><td>3.50</td></tr></table> *5 point scale
5. The final version of the Management Model, training implementation guideline, training plan, and training curriculums for WUSCs in semi-urban towns are officially approved/authorized by DWSSM.	Likely to be achieved According to DWSSM and NWSSTC, the final version of 1) Management Model, 2)Training Implementation Guideline, 3)Training Plan and 4)Training Curriculums for WUSCs in semiurban towns are to be officially approved/authorized by DWSSM. They will be approved after a due process such as review by other sections and inputs from the ISSAU team. After the approval from DWSSM, they will seek approval from MoWS, and those documents will be distributed nationally (Provincial governments and local governments).

The achievement of the Overall Goal is as follows;

Table 5 Achievements of Overall Goal

Overall Goal: **Continuous support to WUSCs in semi-urban towns is provided by DWSSM and NWSSTC.**	
Indicators	Prospects for achievement
1. The trainings are continuously implemented by NWSSTC on the Management Model for WUSCs in semi-urban towns.	- 70 trainers were trained under the ToT of the project. However, the number of trainers who actually can serve as trainers for the Basic Training is limited (around 34-36 individuals from DWSSM/NWSSTC/MoWS/FWSSMP), as many are retired/promoted/transferred. So, whether or not securing a sufficient number of trainers is an issue. As for the On-site Training, 19 individuals of FWSSMPs are expected to continue facilitating, however, considering the limited number of staff and the volume of their duties, it might be difficult for them to conduct onsite training.
2. The contents of the Management Model are utilized for the management of the water supply of WUSCs in semi-urban towns.	- The KPIs based on data for 2020 and 2021 show an improving trend compared to KPIs at the start of the project (2016). It was mainly due to the provision of measuring equipment by DWSSM, and the improvement of facility O&M capacity and motivation of the WUSCs through Basic Training, On-site Training, and Refresher Training. - Although there has been some improvement in the KPIs of the target WUSCs, there are differences among WUSCs, so continuous support (continuing basic training and on-site training) is needed.

4 Involvement of Stakeholders and Organizations in WASMIP-II

Joint Coordinating Committee (JCC) and workshops and various trainings have been held during the period of WASMIP-II from June 2016 through March 2022. The main C/Ps (target organisations) has changed in 2018 with transition to a federal government. As shown in Table 6, many stakeholders and organizations have participated in the 131 events held by WASMIP-II, with a total of 2,059 having participated.

Table 6 Number of participants in WASMIP-II workshops and training etc.

Fiscal Year	MoWS	DWSSM/ NWSSTC	FWSSMP	MoPID	RMSO/ WSSDO	WUSC	Others	Total
2016	-	38	-	-	42	129	19	228
2017	4	92	-	-	12	-	25	133
2018	1	49	-	2	30	245	10	337
2019	7	88	29	0	2	281	13	420
2020	0	6	46	1	6	91	32	182
2021	5	40	76	4	2	615	17	759
Total	17	313	151	7	94	1,361	116	**2,059**

JCC: 4 times, JPCM: 5 times, Workshop: 23 times, ToT: 19 times, Basic training: 6 times, On-site training: 67 times, Refresher Training: 4 times, Training in Japan: 3 times

5 Revision of Management and Support Models

For the Management Model, eight SOPs were revised based on the results of needs assessment of the target WUSCs, and the Design Manual on Rehabilitation Works and the Training Implementation Guideline were developed. The facility rehabilitation manual was developed to support the provision of equipment by the DWSSM to restore functioning of water supply facilities in WUSCs (waterflow measuring, facility management, and disinfection). For the Support Model, 4 training courses consisting of ToT, Basic Training, On-site Training and Refresher Training, were designed to promote effective use of the Management Model. The structure of the Management and Support models is shown in Figure 2.

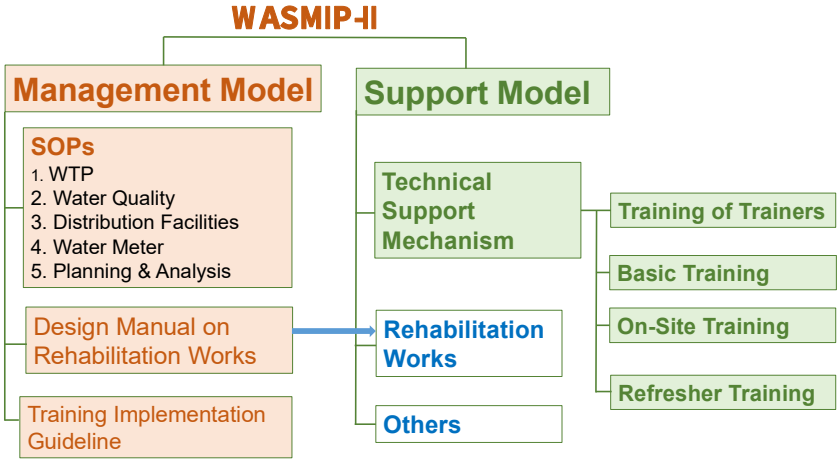


Figure 2 Structure of Management and Support Models

6 Support systems for WUSCs

Support to WUSCs in semi-urban towns can be divided into two main categories. Hard support, which provides the WUSCs with the necessary equipment and materials to restore the functioning of water supply facilities. The other is soft support, which is the transfer of knowledge and skills by implementation of training to ensure proper O&M of water supply facilities.

Hard support is provision of equipment by the DWSSM to the WUSCs in semi-urban towns, as shown by the red line in Figure 3. In the Project, a baseline survey was carried out to understand the water supply system in the 68 target WUSCs and to confirm the necessary equipment, its specifications, quantity and installation location. Based on its activities, the DWSSM procured and provided the WUSCs with flowmeters, chlorination units, valves and simple water quality testing kits. This made it possible to monitor the amount of water, to supply safe water, and to collect basic information (amount of water production and distribution, water quality) necessary for O&M of water supply facilities.

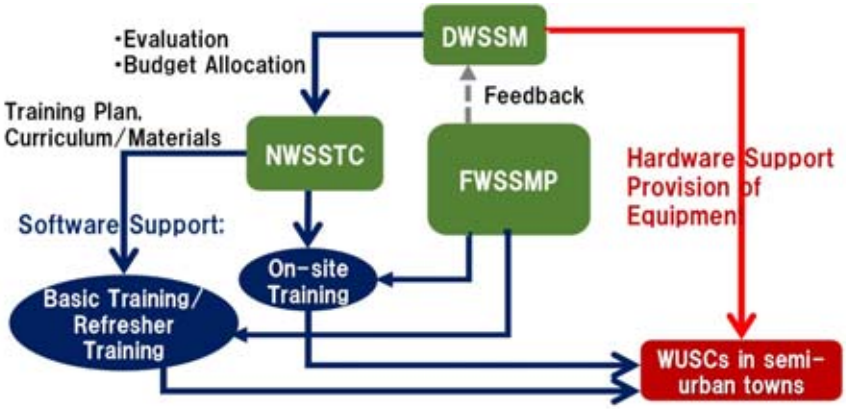


Figure 3 Support system for WUSCs

On the other hand, in terms of soft support, various trainings were provided to WUSCs by NWSSTC, which is responsible department for the training within the DWSSM. For the purpose of technology transfer for proper O&M of water supply facilities, the following training programs were set up; 1) Basic Training with classroom lectures and exercises, 2) On-site Training with direct instruction at the WUSC sites to consolidate the acquired knowledge and skills, and 3) Refresher Training with information sharing among the WUSCs, opinion exchange, introduction of good practices, and site visits to water supply facilities. Trainer candidates were selected mainly from NWSSTC and FWSSMPs under DWSSM, and ToT was conducted. The positioning of each training is shown in Figure 4.

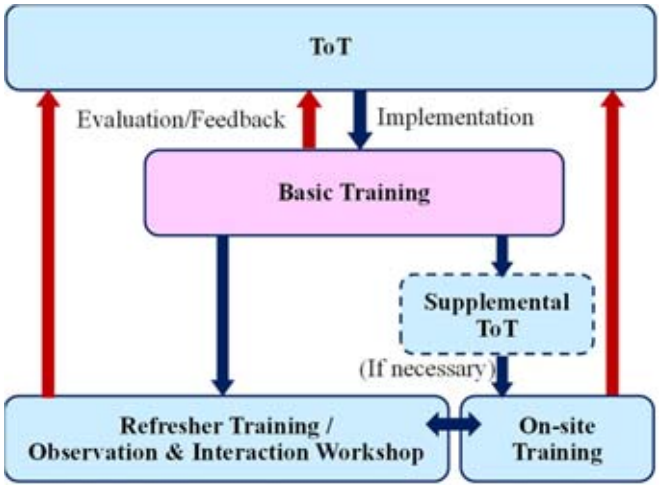


Figure 4 Positioning of Each Training

Training materials were also developed. Based on the Management Model developed under WASMIP-I, the training materials were revised by expanding the target group to 68 WUSCs to understand the current issues, surveying the knowledge and skills required in the field, and reflecting these needs in the Management Model. The revised Management Model was applied in the Basic Training and revised again as appropriate through repeated training sessions. The Training Implementation Guideline was also developed to ensure efficient implementation of the training designed.

7 Rehabilitation Works of Water Supply Facilities in WUSCs

In order to make hard support more efficient and effective, the "Design Manual of Specifications on Rehabilitation Works for WUSCs in Semi-urban Towns" has been developed.

In the target WUSCs, amount of water production and distribution were not monitored and recorded, and safety of supplied water was not ensured, mainly due to the failure or lack of maintenance of flowmeters and chlorination units.

According to the above situation, the design manual of specifications on rehabilitation works were prepared which includes procedure from the identification of the necessary equipment through its procurement. The procedures are as follows; 1) understanding of current status of water supply system, 2) preparation of a diagram of the water supply system, 3) identification of the necessary equipment (number and location), 4) determination of the equipment specifications, and 5) procurement and installation of equipment.

Figure 5 shows an example of water supply system diagram for a WUSC. Based on this diagram, necessary equipment, its number and location were decided. In the Project, the water supply system diagram of the 68 target WUSCs were prepared, and DWSSM supported the procurement of equipment and installed the equipment in each WUSC.

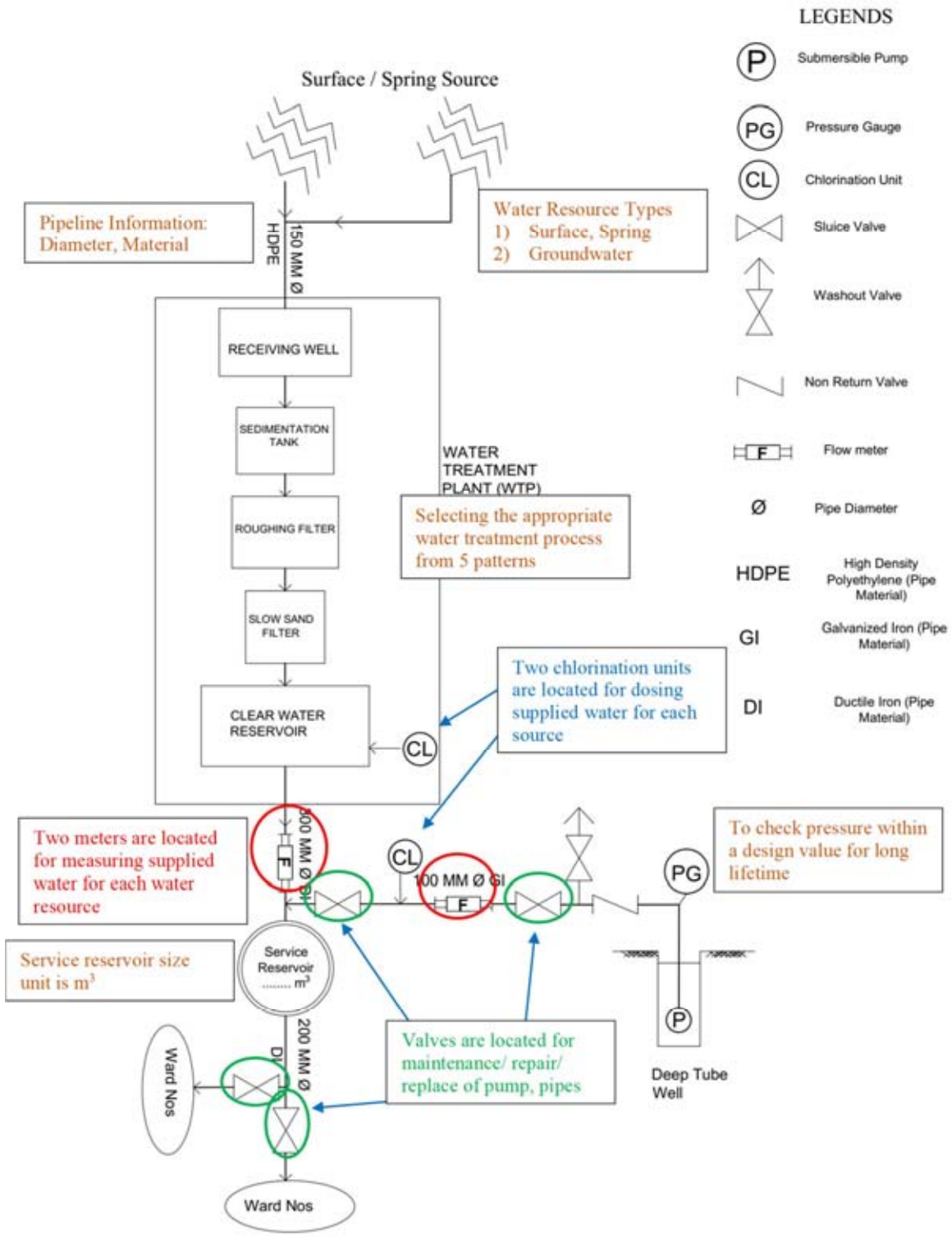


Figure 5 Water Supply System Diagram of WUSC (Example)

8 Capacity Building of WUSCs by Trainings under WASMIP-II

As shown in Figure 3, WASMIP-II was conducted based on two types of supports; 1) support for the provision of equipment to the target WUSCs by DWSSM (hard support), 2) support for the implementation of training for the WUSCs by developing training materials, setting up training courses, and implementing ToT according to needs of the WUSCs (soft support).

At the beginning of the Project (2016), a baseline survey was conducted for the 68 target WUSCs to collect basic data on water supply operations. Afte the implementation of above two supports, data was collected again in 2020 and 2021. Eleven (11) KPIs were set and calculated to assess the improvement of the WUSC's capacity for water supply management and facility O&M.

As the results, significant improvement in missing data rate is one of outcomes of the training activities. The missing data rate improved from 62% in 2016, to 10% in 2020 and to 1% in 2021. In particular, no data was recorded to calculate the KPIs as of 2016 for water quality compliance ratio, water production ratio, operating ratio (cost/revenue) and collection rate of water tariff. However, the targeted WUSCs have received the necessary trainings and all the target WUSCs begun to recording data as of 2021. Figure 6 shows the average KPIs of the target 68 WUSCs.

a) Improved water supply: water coverage ratio improved by 7% from the point in 2016 to 53% in 2021.
b) Improved water quality compliance: water quality was not measured at any WUSCs in 2016. However, water quality is now being measured and the water quality compliance ratio reaches 97% in 2021, satisfying with drinking water quality standards.
c) Improved water meter installation: metered ratio improved by 6% to 99% in 2021.
d) Increased water production: water production improved from 101.2 L/capita/day (2016) to 130.6 L/capita/day (2021), an increase of approximately 1.3 times.
e) Reduced Non-Revenue Water (NRW): NRW rate was reduced by 6% from 23% (2016) to 17% (2021).
f) Increased water consumption: water consumption increased by approximately 17 L/capita/day from 91.5 L/capita/day (2016) to 130.6 L/capita/day (2021) due to improved water production and reduced NRW.
g) Improved water tariff coverage: operating ratio (operating cost/tariff income) has improved from an excess of 105% (2020) to a surplus of 88% (2021).
h) The tariff collection ratio remains high at 93%.

By learning and practicing proper O&M of water supply facility thorough the WASMIP-II trainings, following improvements were observed such as; 1) significant improvements in water coverage ratio and service hours, 2) compliance with water quality standards, 3) increase in water production and consumption, 4) improvement in NRW rate, and 5) improvement in collection ratio of water tariff.

As the KPIs established in this project will serve as indicators for the improvement of WUSC's water utility operations and hence water services. The KPIs are expected to be incorporated into the targets of future annual plan and it can be help identify weaknesses and develop policies for improvement.

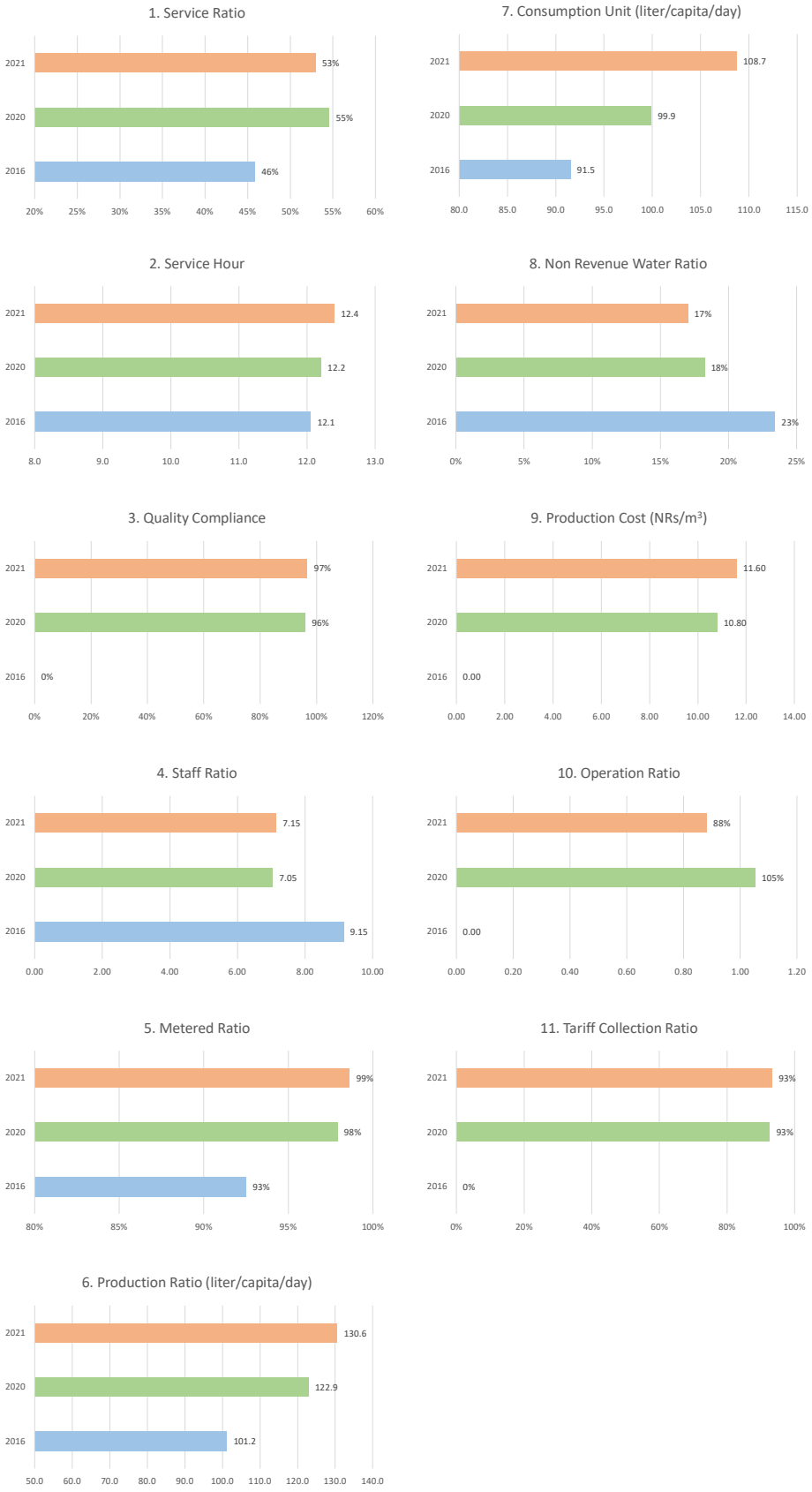


Figure 6 Comparison of Average KPIs of the 64 Target WUSCs

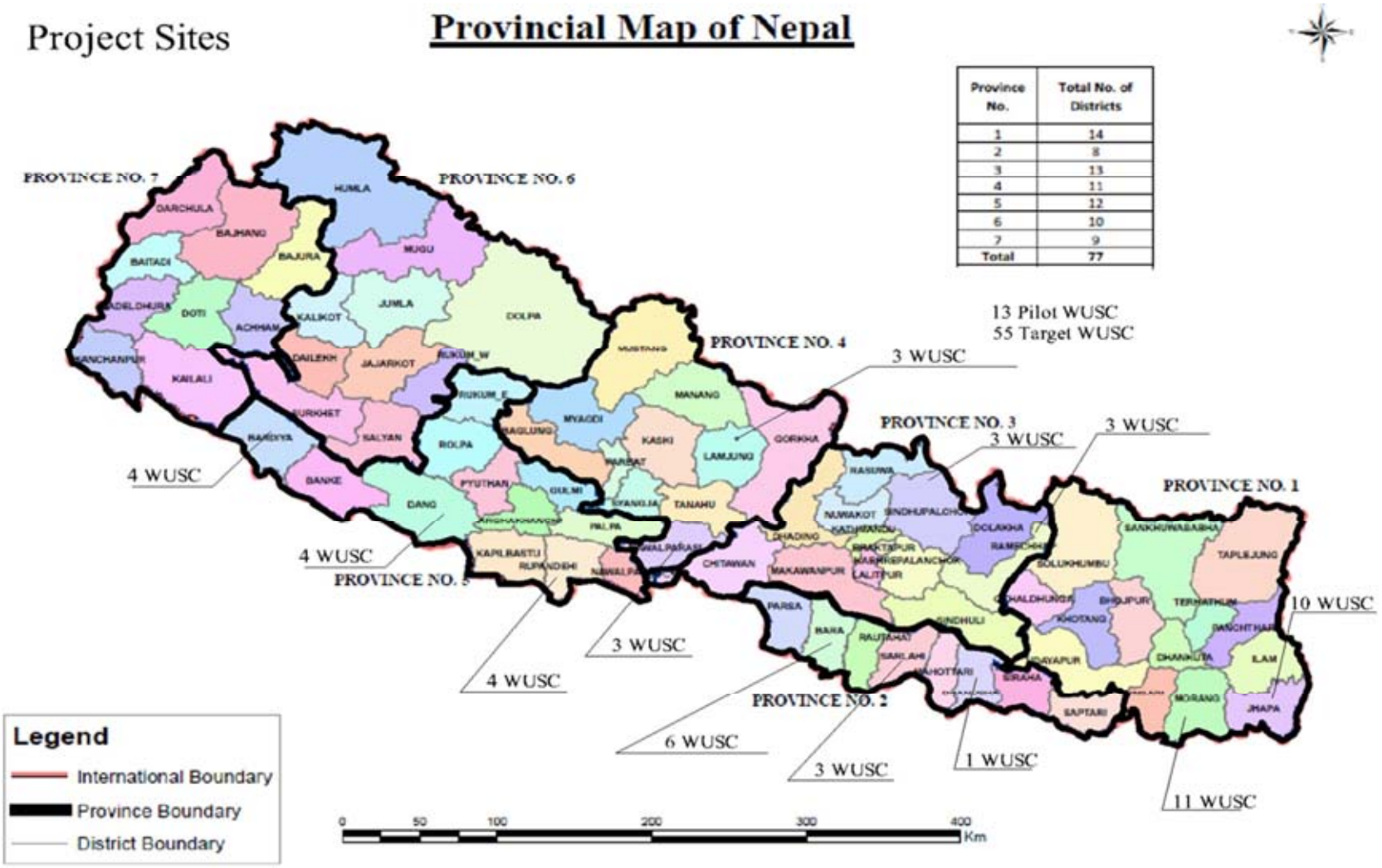
9 Deliverables of WASMIP-II

The training materials shown in Table 7 were developed in WASMIP-II. These materials can be used in future trainings.

Table 7 Training Material List

No.	Training Material	Purpose/ Usage
1	Management Model	
1.1	SOP (English / Nepali)	・ Reference for O&M procedures of water supply facilities ・ Training material for the Basic Training and the On-site Training
1.2	Lecture Material (PowerPoint, English / Nepali)	・ Training material for ToT and the Basic Training
1.3	Video Material (Nepali narration and English capture)	・ Reference for O&M of water supply facilities consisting of 51 videos ・ Training material for ToT and the Basic Training
1.4	Simplified SOP (English / Nepali)	・ Simplified version of SOP consisting of 31 parts ・ To display near equipment and facilities at the WUSC site ・ A4 size and laminated
2	Training Implementation Guideline (English)	・ Guideline for training implementation by NWSSTC engineers ・ Outline of training planning, lecture contents and curriculum
3	Design Manual of Specifications on Rehabilitation Works for Target WUSCs in Semi-urban Towns (English / Nepali)	・ Manual for WUSCs to request necessary materials and equipment for facility rehabilitation ・ Manual for DWSSM / NWSSTC / FWSSMP to support procurement of materials and equipment to WUSCs according to the above request ・ Understanding of WUSC's water supply system, development of a schematic flow diagram, and design of specification for materials and equipment
4	ToT Material for On-site Trainings (PowerPoint, English / Nepali)	・ Training material for ToT of the On-site Training ・ Aim, contents and implementation procedures of the On-site Training
5	Management Checklist	・ Check list for interviewing WUSCs during the On-site Training

Table of Contents



【Location Map】

【List of Figures & Tables】

【List of Abbreviation】

Abbreviation	Definition/Name in English
ADB	Asian Development Bank
B/S	Baseline Study
CHRDU	Central Human Resource Development Unit
C/P	Counterpart
DWSS	Department of Water Supply and Sewerage
DWSSM	Department of Water Supply and Sewerage Management
ERMSO	Eastern Regional Monitoring and Supervision Office
FWSSMP	Federal Water Supply and Sewerage Management Project
IEC Material	Information, Education, and Communication Material
JCC	Joint Coordinating Committee
JICA	Japan International Cooperation Agency
JWWA	Japan Water Works Association
KPI	Key Performance Indicator
KUKL	Kathmandu Upatyaka Khanepani Limited
NPR	Nepalese Rupee
NWSSTC	National Water Supply and Sanitation Training center
M/M	Minutes of Meeting
MoPID	Ministry of Project Implementation Development
MoWSS	Ministry of Water Supply and Sanitation
MoWS	Ministry of Water Supply
NJSC	NJS Consultants Co., Ltd.
NTU	Nephelometric Turbidity Unit
NWSC	Nepal Water Supply Corporation
NWSSTC	National Water Supply and Sanitation Training Center
OJT	On-the-job Training
WASMIP Model	An operational model for WUSCs which was developed in the Phase 1 Project (WASMIP-1)
O&M	Operation and Maintenance
PDCA	Plan, Do, Check and Action
PDM	Project Design Matrix
PI	Performance Indicator
PMC	Project Management Committee
PO	Plan of Operation
PPP	Public-Private Parties
R/D	Record of Discussion

Abbreviation	Definition/Name in English
RMSO	Regional Monitoring and Supervision Office
SEIU	Sector Efficiency Improvement Unit
SDGs	Sustainable Development Goals
Semi-Urban WUSC	WUSCs that located in semi-urban scale cities in Nepal. The city size of "semi-urban" means same as "small town". According to "Updated Fifteen-Year Development Plan for Small Town Water Supply and Sanitation Sector" by Government of Nepal, definition of "Small Town" is population of more than 5,000 persons but less than 40,000 persons, and 229 towns are applicable to the definition.
SOP	Standard Operational Procedure
Target-A WUSC	The 13 WUSCs: Gulariya, Beljhundi, Pragatinagar, Ramgram, Shankarnagar, Besisahar, Amlekhgunj, Karmaiya, Manthali, Chautara, Dhulabari, Gauradaha, and Mangadh.
Target-B WUSC	The 55 WUSCs: Rajapur, Gulariya II, Kusumba/Sanoshree, Naulapur, Tripur, Bharatpur, Chaughera, Jhakredhunga, Rajahar, Gaidakot, Agauli, Devdaha, Anandban, Sainamaina, Sauraha-Farsatikar, Sundarbazar, Bhotewodar, Lasunekhola, Nijgadh, Simara, Kolhabi, Jitpur, Dumarbana, Bharatgunj, Dhalkebar, Hariyon, Barhathwa, Ishworpur, Ramechhap, Pakarwas, Scheme II, Melamchi, Barahbise, Urlabari, Pathari-Sanichare municipality, Jamunagachi, Rangeli municipality, Tankisinuwari, Itahara, Madhumalla, Pichhra, Sorabhag (Karsiya), Bayerban, Katahari, Jhorahat, Shani-Arjun, Shivasatachhi, Prithvinagar (Gaurisankar), Garamani, Topgachhi-1, Topgachhi-2, Topgachhi-3, Juropani, Chandragadhi-1, and Chandragadhi-2.
Target WUSC	The 68 WUSCs of target of the Project, which is total of Target-A WUSC and Target-B WUSC.
Third Small Town Project	Third Small Towns Water Supply and Sanitation Sector Project by Asian Development Bank
ToT	Training of Trainers
WASMIP	Water Supply Management Improvement Project (another project name for "Capacity Development Project for the Improvement of Water Supply Management in Semi-Urban Areas")
Phase 1 Project	Capacity Development Project for the Improvement of Water Supply Management in Semi-Urban Areas (2010-2013)
WSMB	Water Supply Management Board
WSSDO	Water Supply and Sanitation Division Office
WUSC	Water Users and Sanitation Committee
YWC	Yokohama Water Co., Ltd.

Chapter 1 Outline of the Project

1.1 Background

In the rural and urban areas of the Federal Democratic Republic of Nepal (hereinafter referred to as Nepal), the Department of Water Supply and Sewerage (DWSS, currently Department of Water Supply and Sewerage Management (DWSSM)), a government agency, is responsible for water supply services. DWSS is set up under the Ministry of Water Supply and Sanitation (MoWSS, currently Ministry of Water Supply (MoWS)), and in addition to its headquarters in Kathmandu, it has Regional Monitoring and Supervision Offices (RMSOs) in each of the five Regions, outposts called District Water Supply and Sanitation Division Offices (WSSDOs) in each of the 75 Districts, and the National Water Supply and Sanitation Training Center (NWSSTC) in Nagarkot, Bhaktapur District.

More than 42,000 water supply facilities have been constructed in rural and semi-urban areas of Nepal so far through the collaboration of the Government of Nepal and various development partners. Most of the water supply facilities in rural areas are small and simple in structure, often supplied by public taps, and have relatively simple maintenance systems. On the other hand, most of the water supply facilities in semi-urban areas are larger, are usually supplied by individual households, and are often equipped with electricity, which makes the maintenance system more complex.

The responsibility for the maintenance and management of all these water supply facilities is transferred to the Water Users and Sanitation Committees (WUSCs). The WUSCs are obliged to provide a sufficient quantity of water supply to users, to control water quality, to collect water tariff payments, and to manage human and financial resources to keep the water supply facilities in good condition.

However, DWSS had mainly focused on the construction of facilities until 2010, and had not been able to perform the activities related to strengthening the capacity of WUSCs in the areas of maintenance and management. Therefore, based on the request from DWSS, JICA has been working on strengthening the maintenance and management capabilities of WUSCs by implementing the technical cooperation project "The Project for Capacity Development on Water Supply in Semi-urban Areas" (hereinafter referred to as WASMIP-I) from January 2010 to September 2013.

As outcomes of the project activities in WASMIP-I, two models (guidelines) were developed for pilot organizations selected from eastern Nepal; the WSSDOs, Dulabari WUSC and Gauradaha WUSC in Jhapa District, and the WSSDOs and Mangadh WUSC in Morang District . “The Model for the Maintenance of Small and Medium Water Supply Facilities” is a set of guidelines for the proper operation and maintenance of water supply facilities, consisting of Standard Operating Procedures (SOPs) and business plans for the operation and maintenance of water treatment plants and distribution facilities, water quality management, water meter reading, etc.,” the Model for Support by WSSDO” is a set of guidelines for technical and financial support to the WUSCs.

The DWSS recognizes the importance of the model in maintaining a sustainable and functional water supply system and has made it a key tool for the implementation of the Water Supply Operation Directives developed in 2012. However, other than the above pilot WUSCs, the model has not been fully implemented and there is a need to systematically expand efforts to strengthen WUSC's operations and maintenance.

In view of the above background, the Government of Nepal requested technical cooperation from Japan for the improvement of these models and their dissemination to other regions. In response to this request, the project decided to develop the project content in stages in order to achieve a rapid start of the project, and based on the basic plan developed during the field survey conducted in September 2015, the project started in June 2016 with the Record of Discussion (R/D) signature on 22 December 2015.

Subsequently, after the start of the project, the details of the project were discussed and the final details of the cooperation were agreed at the Joint Coordination Committee (JCC) meeting held in February 2018, and the Minutes of Meeting (M/M) for R/D changes were signed and exchanged on 2 April 2018. The project was based on the same modified R/D and was implemented for approximately 5 years and 10 months, from June 2016 to March 2022.

1.2 Objectives

The revised overall goals and purpose of the Capacity Development Project for the Implementation of Water Supply Management in Semi-Urban Areas (the Project) are as follows:

Overall Goals	**Continuous support to WUSCs in semi-urban towns is provided by DWSSM and NWSSTC.**
Project Purpose	**Support to the WUSCs in semi-urban towns is provided and strengthened by DWSSM and NWSSTC using government and non-government organizations' personnel. (*)**

*) Government and non-government organizations consist of Federal Water Supply and Sewerage Management Project (FWSSMP), NGOs, academic institutions, and so on.

With the transition to the federal government, the WSSDO, which was an umbrella organization of the DWSS (present DWSSM), came under the umbrella of the state government MoPID (Ministry of Public Works and Development) (see Chapter 2, Figures 2.3 and 2.4). As a result of this transition, the original Overall Goal, Project Purpose, Outputs, and Activities were reviewed and revised because of the change in the target organization of the project and the change in the support structure of WUSC.

Considering the above situation, the revised basic policy and contents of this project were agreed at the first Joint Coordination Committee (JCC) held on 28th February, 2018. Specifically, the revised PDM (Project Design Matrix) and the PO (Plan of Operation) were approved, and the original overall goal and project purpose of the Project were revised accordingly.

In the second JCC, the change of the PDM and the PO were approved for the rename of the related organization according to the federal transition. Then, on June 18, 2020, emergency support was added to the previous version of PDM to provide emergency countermeasures support for COVID-19.
The PDM final version and PO are shown in Appendix 1.1 and 1.2 respectively**.**

1.3 Project Sites

The Project sites are as follows:

Project Sites	Bardia, Dang, Nawalparsi East, Nawalparsi West, Rupandehi, Lamjung, Bara, Dhanusa, Sarlahi, Ramechhap, Sindhupalchowk, Jhapa and Morang Districts

1.4 Outputs and Activities of the Project

Table 1.1 shows the revised Narrative Summary and Objectively Verifiable Indicators.

Table 1.1 The Revised Narrative Summary and Objectively Verifiable Indicators

Narrative Summary	Objectively Verifiable Indicators
Overall Goal	
Continuous support to WUSCs in semi-urban towns is provided by DWSSM and NWSSTC.	1. The trainings are continuously implemented by NWSSTC on the Management Model for WUSCs in semi-urban towns. 2. The contents of the Management Model are utilized for the management of water supply of WUSCs in semi-urban towns.
Project Purpose	
Support to the WUSCs in semi-urban towns is provided and strengthened by DWSSM and NWSSTC using government and non-government organizations' personnel.(*3) *3: Government and non-government organizations consist of FWSSMP, NGOs, academic institutions, and so on.	1. The revision process and sections of DWSSM responsible for the Management Model and Technical Support Mechanism for WUSCs in semi-urban towns are identified. 2. The sections of DWSSM responsible for the training on the Management Model for WUSCs in semi-urban towns and revision process of training implementation guideline are identified. 3. More than 15 trainers, who are able to carry out the training on the Management Model for WUSCs in semi-urban towns, are developed. From this trainer batch, at least six must be employees of FWSSMP. 4. Capacity assessment results of trainers on the Management Model for target WUSCs in semi-urban towns are improved compared to the baseline. 5. The final version of the Management Model, training implementation guideline, training plan, and training curriculums for WUSCs in semi-urban towns are officially approved/authorized by DWSSM.
Outputs	
(1) Baseline survey and capacity assessment of DWSSM, NWSSTC, FWSSMP and the target WUSCs are conducted, and project implementation plan is finalized.	1.1 Results of the baseline survey and capacity assessment in DWSSM, NWSSTC, FWSSMP and target WUSCs are shared with counterpart. 1.2 Project Design Matrix (PDM) and Plan of Operation (PO) are finalized.
(2) Supporting capacity of DWSSM regarding O&M and management for WUSCs in semi-urban towns is strengthened.	2.1 The Management Model / Support Model for WUSCs in semi-urban towns formulated during phase-I project is revised in the context of the actual situation of WUSCs in semi-urban towns. 2.2 Design manual of specifications on rehabilitation works for target WUSCs in semi-urban towns are shared in the annual progress review meeting of FWSSMP.(*5) 2.3 Rehabilitation works are carried out in more than 50 target WUSCs in semi-urban towns.(*5) *5: Rehabilitation works are to be provided to WUSCs in semi-urban towns for equipment in order to recover the function of water supply facilities.

Narrative Summary	Objectively Verifiable Indicators
(3) Implementing capacity of NWSSTC regarding the training for WUSCs in semi-urban towns is strengthened.	3.1 Training implementation guideline, training plan, training curriculums and training materials for WUSCs in semi-urban towns are formulated. 3.2 The Management Model for WUSCs in semi-urban towns is utilized in trainings in NWSSTC. 3.3 More than 80% of target WUSCs attend the Basic Training on the Management Model. 3.4 Monitoring and Evaluation of more than 80% of target WUSCs are carried out.

The revised project activities for each output are listed in Table 1.2.

Table 1.2 The Revised Activities for Each Output

Output	Activities
Output-1	1.1 Conduct a baseline survey and technical, financial, management and organizational capacity assessment of DWSSM, FWSSMP, NWSSTC and the target WUSCs. 1.2 Conduct a situation analysis surrounding water supply sector in semi-urban towns including legislation and development plans. 1.3 Analyze the supporting mechanism for WUSCs by DWSSM, NWSSTC and FWSSMP. 1.4 Coordinate and consult with the Third Small Town Project and Sector Efficiency Improvement Unit (SEIU) on support for WUSCs in semi-urban towns. 1.5 Revise PDM and PO reflecting the result of aforementioned activities.
Output-2	2.1 Study the monitoring and management evaluation indicators suited on the current condition of WUSCs in semi-urban towns, and revise the Management Model for enhancing the usability of the model for WUSCs in semi-urban towns by DWSSM. 2.2 Plan necessary rehabilitation works for some of target WUSCs in semi-urban towns by DWSSM.(*5) 2.3 Conduct necessary rehabilitation works for some of target WUSCs in semi-urban towns by DWSSM. (*5) 2.4 Prepare a design manual of specifications on rehabilitation works for target WUSCs in semi-urban towns by DWSSM. (*5) 2.5 Identify and document the section of departments responsible for training implementation for WUSCs in semi-urban towns by DWSSM. 2.6 Formulate an outline of the Training of Trainers (ToT) regarding the Basic Training and On-site Training and instruct NWSSTC to implement the training by DWSSM. 2.7 Formulate an outline of the Basic Training for the WUSCs in semi-urban towns and instruct NWSSTC to implement the training by DWSSM. 2.8 Formulate an outline of the On-site Training for the WUSCs in semi-urban towns and instruct NWSSTC to implement the training by DWSSM. 2.9 Formulate an outline of the Refresher Training for the WUSCs in semi-urban towns and instruct NWSSTC to implement the training by DWSSM. 2.10 Evaluate the above-mentioned trainings conducted by NWSSTC, and reflect its results on the training on the Management Model for WUSCs in semi-urban towns in following years by DWSSM. 2.11 Allocate a budget for NWSSTC to implement the above-mentioned trainings by DWSSM. 2.12 Re-update the Management Model for WUSCs in semi-urban towns upon receiving feedbacks from Output 3. 2.13 Conduct the support activities in response to the COVID-19 emergency.

Output	Activities
Output-3	3.1 Evaluate the training implementation mechanism and equipment by NWSSTC. 3.2 Draft a training implementation guideline and a plan for the training on the Management Model for WUSCs in semi-urban towns by NWSSTC. 3.3 Select candidates for ToT regarding the training on the Management Model for WUSCs in semi-urban towns from MoWS, DWSSM, NWSSTC, FWSSMP, WUSCs and other organizations by NWSSTC. 3.4 Plan the ToT regarding Basic Training and On-site Training by NWSSTC. 3.5 Implement the ToT regarding Basic Training and On-site Training by NWSSTC. 3.6 Plan the Basic Training for the WUSCs in semi-urban towns by NWSSTC. (*4) 3.7 Implement the Basic Training by NWSSTC.(*4) 3.8 Plan the On-site Training for the WUSCs in semi-urban towns by NWSSTC. 3.9 Implement the On-site Training for WUSCs in semi-urban towns by NWSSTC. 3.10 Plan the Refresher Training for the WUSCs in semi-urban towns by NWSSTC. 3.11 Implement the Refresher Training for WUSCs in semi-urban towns by NWSSTC. 3.12 Re-update the following: (i) training implementation guideline, (ii) training plan, (iii) training curriculums, and (iv) training materials upon receiving feedbacks from results of aforementioned trainings by NWSSTC.

1.5 Project Duration

The duration of the Project extends over a period of about 6 years -from June 2016 to March 2022.

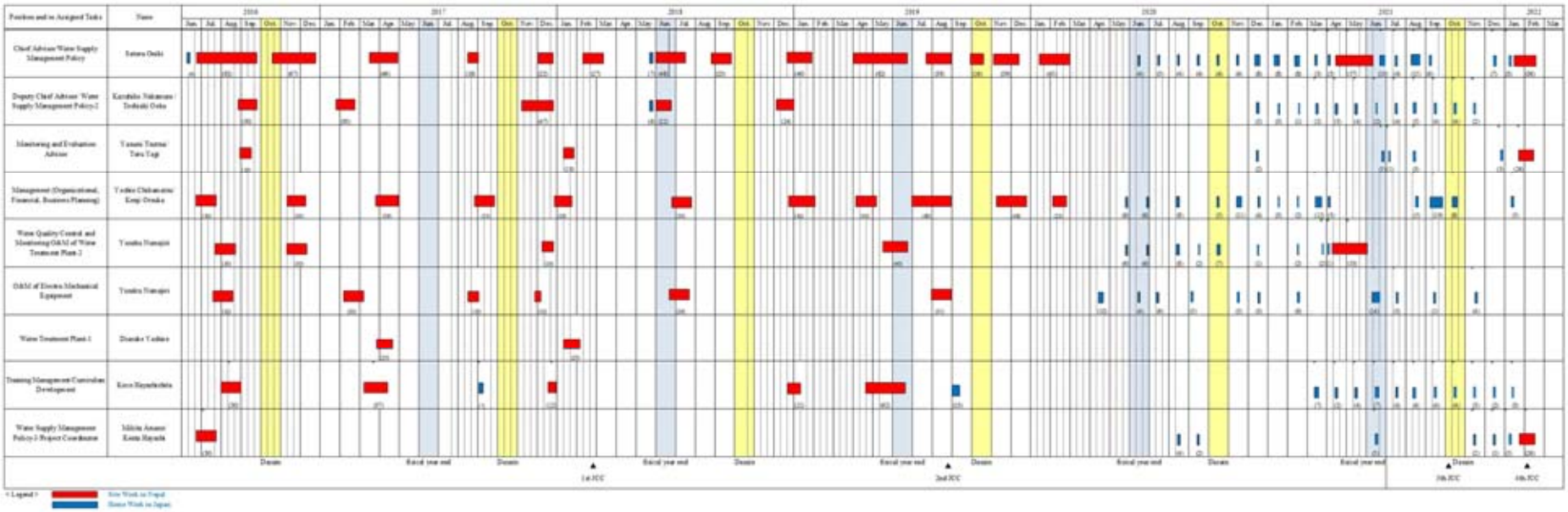
1.6 JICA Expert Team

The JICA Expert Team (hereafter, "WASMIP Team") is comprised of nine members. Their names, positions, assigned tasks are shown in Table 1.3 and the dispatched schedule is shown in Table 1.4 .

Table 1.3 JICA Expert Team Members

No.	Position and/or Assigned Tasks	Name
1	Chief Advisor/Water Supply Management Policy-1	Satoru Oniki
2	Deputy Chief Advisor/ Water Supply Management Policy-2	Kazuhiko Nakamura/ Toshiaki Ooka
3	Monitoring and Evaluation Advisor	Yasumi Tsutsui/ Toru Yagi
4	Management (Organizational, Financial, Business Planning)	Yoshio Chikamatsu/ Kenji Otsuka
5	Water Quality Control and Monitoring/O&M of Water Treatment Plant-2	Yusaku Numajiri
6	O&M of Water Treatment Plant-1	Daisuke Yashiro
7	O&M of Electro-Mechanical Equipment	Akira Hasebe/ Yusaku Numajiri
8	Training Management/Curriculum Development	Kozo Hayashishita
9	Water Supply Management Policy-3/Project Coordinator	Mikita Amano/ Kenta Hayashi

Table 1.4 Assignment of JICA Expert Team



1.7 Counterpart (C/P)

The C/P organization and members designated by DWSSM are shown in Table 1.5 to

Table 1.9 as of January 2022.

Table 1.5 C/P Organizations

Counterparts	DWSSM: Department of Water Supply and Sewerage Management NWSSTC: National Water Supply and Sanitation Training Center FWSSMP: Federal Water Supply and Sewerage Management Project WUSC: Water Users and Sanitation Committee

Table 1.6 C/P in JCC Chair

Position on the project	Position and Organization	Name
JCC Chair person	Joint Secretary, Water Supply and Environment Division, MoWS	Ms. Meena Shrestha （Previous） Mr. Anil Bhadra Khanal Mr. Sunil Kumar Das
JCC Co-Chair person	Director General, DWSSM	Mr. Tiresh Prasad Khatri （Previous） Mr. Ramchandra Devkota Mr. Tej Raj Bhatt Mr. Sunil Kumar Das

Table 1.7 C/P Personnel in Nepalese side

Position on the project	Position and Organization	Name
Project Director	Deputy Director General, DWSSM	Mr. Madhav Prasad Adhikari (Previous) Ms. Meena Shrestha Mr. Anil Bhadra Khanal Mr. Anil Bhadra Khanal Mr. Surya Raj Kadel
Project Manager	Chief, NWSSTC	Mr. Kabindra Bikram Karki (Previous) Mr. Rajeeb Ghimire
Coordinator	Chief, Planning Monitoring and Evaluation Section, DWSSM	Mr. Laxmi Prasad Upadhyaya (Previous) Mr. Arun Kumar Simkhada Mr. Ratna Lamichhane
Member	Senior Divisional Engineer, Sector Efficiency Improvement Unit, MoWS	(vacant)
Member	Chief, Water Quality Improvement and Service Regulation Section, DWSSM	Mr. Narayan Prasad Acharya (Previous) Mr. Narayan Prasad Khanal
Member	Chief, Electro-Mechanical and Hydrogeological Section,	Mr. Bipin Kumar Thakur
Member	Chief, Sewerage Management and Environmental Sanitation Section, DWSSM	Mr. Prabhat Shrestha

Position on the project	Position and Organization	Name
Member	Engineer, Planning Monitoring and Evaluation Section, DWSSM	Mr. Bedraj Regmi (Previous) Ms. Jyoti Tamang Mr. Aarti Shrestha

Table 1.8 Representatives in each FWSSMP

Province No.	FWSSMP Office	Chief Name	Chief Engineer
1	Biratnagar	Mr. Madhav Adhikari	Mr. Bipul Kumar Lal Das
	Illam	Mr. Surat Lal Chaudhary	Mr. Rupak Parajuli
	Khotang	Mr. Hira Kaji Maharjan	Ms. Sujata Joshi
	Dhankuta	Mr. Binod Bhujel	Mr. Abnish Kr. Yadav
Madhesh	Janakpur	Mr. Rajesh Kushwaha	Mr. Ganga Prasad Mahato
	Birgunj	Mr. Maheshi Mahato	Mr. Pradeep Kumar Shah
Bagmati	Hetauda	Mr. Mohan Lal Jaisi	Ms. Manina Baidya
	Ramechhap	Mr. Rajendra Sapkota	Mr. Sudhir Kumar Shah
	Chitwan	Mr. Jagarnath Das	Mr. Chirinjibi Sedhai
	Bhaktapur	Mr. Rajendra Shrestha	Mr. Arun Kharel
Gandaki	Pokhara	Mr. Balmukunda Shrestha	Mr. Shekhar Chandra KC
	Lamjung	Mr. Devendra Kumar Jha	Mr. Naresh Regmi
	Myagdi	Mr. Ram Udgar Yadav	Mr. Pradeep Regmi
Lumbini	Butwal	Mr. Basu Paudel	Mr. Utsav Pokharel
	Arghakhachi	Mr. Ram Prasad Ghimire	Mr. Bijay Kharel
	Nepalgunj	Mr. Manish Kumar Raj	Mr. Ajay Chaudhary
Karmali	Surkhet	Mr. Narayan Prasad Kafle	Mr. Samit Kumar Yadav
	Jumla	Mr. Mahesh Neupane	Mr. Jivan Chand
Sudurpaschim	Dhangadi	Mr, Prakash Bahadur Rawal	Mr. Sandesh Sharma
	Kanchanpur	Mr. Kiran Acharya	Mr. Angad Thapa

Table 1.9 Name of Chairperson in each Target WUSC

No.	WUSC	Chairperson Name	Manager Name
1	Shani-Arjun	Shankar subedi	Bipana Thapa
2	Shivasatachhi	Sinha Bir thamsuhang	Rajendra Kumar Khadka
3	Prithvinagar(Gaurisankar)	Falgu Subba	Roshan Bajgai
4	Garamani	Ek Raj Karki	Laxmi Prasad Sitaula
5	Topgachi I	Surya Prasad limbu	Chandra Pokharel
6	Topgachi II	Hari Parajuli	Dilip Bhandari
7	Topgachi III	Mahendra Kumar Adhikari	Mitral lal Pokhrel
8	Juropani	Dev Raj Wasti	Rahar Man Tamang
9	Chandragadhi I	Purusottam Adhikari	Bishal Adhikari

No.	WUSC	Chairperson Name	Manager Name
10	Chandragadhi II	Chudamani Mainali	Nar Bahadur Magar
11	Dhulabari	Ajay Ghimire	GP Dhungana
12	Gauradaha	Babu Ram Bhandari	Shree P. Tajpuriya
13	Urlabari	Bhupal Singh Rai	Raju Budathoki
14	Pathari- Sanichare	Chatra mani Dhakal	Bipana Chapagai
15	Jamuna Gachi	Som Nath adhikari	Laxmi Adhikari
16	Rangeli	Pradeep Kumar Shah	Shiva Raj Dahal
17	Tankisnuwari	Nawa Raj Bista	Amana Karki
18	Itahara	Megh Raj Kattel	Rajesh Karki
19	Madhumalla	Bal Kumar Bhandari	Radha Basnet
20	Pichara	Bhola Baral	Manoj Poudel
21	Sorabhag (Karsiya)	Chet Raj Shrestha	Puspa Lata shrestha
22	Bayerban	Hari Prasad Paudel	Kedar Poudel
23	Katahari	Bidhya Nanda Chaudhary	Kiran Kumar Rajbanshi
24	Jhorahat	Madan Purasaini	Bhola Prasad Neupane
25	Mangadh	Ram Bahadur Ghimire	Uttam Shrestha
26	Rajapur	Netra Prasad Choti	Rishi Baskota
27	Gulariya II	Suresh Gautam	Ashok Raj Sharma
28	Kusumba/Sanoshree	Nar Bahadur Khadka	Nar Bahadur Magar
29	Bhurigaun wusc	Bipin Bhandari	Chandra Pokharel
30	Gulariya I	Min Raj Sharma	Madhav Prasad Pokharel
31	Narayanpur/tripur	Kul Prasad Rajhaure	Urmila Neupane
32	Bharatpur	Shankar Gautam	Binod Shrestha
33	Chaughera	Raju Lal Sharma	Krishna Bahadur Yogi
34	Jhakredhunga/ Amritpur	Chandra Kant Kharel	Sushil Kumar Kafle
35	Beljhundi	Pradip Gautam	Madan Kumar Acharya
36	Ramgram	Khageswor Panthi	Parbandha Sapkota
37	Devdaha	Guman Singh kunwar	Anil Neupane
38	Anandban	Keshab Raj Neupane	Nawraj Neupane
39	Sainamaina	Kabi Kunwar	Suman Pariyar
40	Sauraha-Farsatikar	Om Bahadur Faudar	Mina Poudel Chhetri
41	Shankarnagar	Hari Prasad Tiwari	Deepak Pandey
42	Melamchi	Jagannath Chalise	Manoj Paudel
43	Barahbise	Nahendra Bahadur Shrestha	Narendra Shakya
44	Chautara	Subash Karmacharya	Anuj Shrestha
45	Nijgadh	Sudarshan Prasad Koirala.	Kedar Prasad Gautam
46	Simara	Kasim Hussein	Sashi kumar Gautam
47	Kolhabi	Raj Haran Chaudhary	Raj Haran Chaudhary
48	Jitpur Gadimai	Ajit Singh	Bharat lal chaudhary

No.	WUSC	Chairperson Name	Manager Name
49	Dumarbana	Ram Prasad Lamichane	Lalita basnet
50	Bharatgunj	Laxman Lamichane	Laxman Lamichane
51	Amlekhgunj	Narayan Lamichane	Narayan Lamichane
52	Dhalkebar	Ananda Shrestha	Min Bahadur Lama
53	Hariyon	Yagya Binod Dhungel	Gaurav Bogati
54	Barhathwa	Dukhi lal Mahato	Thakan Mahato
55	Ishworpur	Aita Bahadur bomjon	Ramita chaudhary
56	Karmaiya	Ripu Marjan Ale	Dil Bahadur Acharya
57	Sundarbazar	Tata Bahadur Gurung	Nabin Pokharel
58	Bhotewodar	Dambar Bahadur Adhikari	Rajan Adhikari
59	Lasunekhola	Prem GC	Chandra Bdr. Gurung
60	Besishahar	Bishnu Bahadur Adhikari	Bishnu badadur Adikari
61	Rajahar	Ganga Bahadur Thapa	Jagdish Neupane
62	Gaidakot	Shovakhar Rimal	Rabindra Raj Ghimire
63	Agauli	Sovit Sharma	Saroj Bhandari
64	Pragatinagar	Khimanada Bhusal	Ishwor Bahadur Pandey
65	Manthali	Purna Bahadur Subedi	Jagdish Subedi
66	Pakarwas Scheme I	Bhakta Bahadur Shrestha	Narayan Bahadur Shrestha
67	Pakarwas Scheme II	Netra Bahadur Kc	Nawaraj Shrestha
68	Ramechhap	Gauchan Kumar Shrestha	Niraj Magar

Chapter 2 Activity and Achievement

2.1 Development and Discussion on the Work Plan

The draft work plan of the Project was developed based on analyses of the documents and data available in Japan. The WASMIP-II team attended a meeting with JICA on June 27th, 2016, to explain the draft work plan prior to dispatch.

The main discussion points are shown below, and the meeting material is attached in Appendix 2.1.

1) Activities and achievements of the WASMIP-I
2) Outline of the WASMIP-II
3) Revise and update the WASMIP Model
4) Request for the counterpart assignment

The draft work plan was also discussed by the WASMIP-II team with the C/Ps, JICA Nepal Office and the relevant authorities.

2.2 Baseline Survey and Capacity Assessment (Activity 1.1)

2.2.1 Outline of Activities

The primary objective of the baseline survey is to assimilate the current situation, obtain information on financial status, understand the existing organizational systems, and assess the technical capabilities and current practices adopted for O&M of the water supply facilities in DWSS (DWSSM[1]), NWSSTC, RMSOs, WSSDOs and the target WUSCs which are the main stakeholders of the Project. In addition, the capacity assessment of trainers and institutions was conducted to arrive at an appropriate structure for the required support system to the target WUSCs. After completing the baseline surveys, the WASMIP-II team has regularly visited the target organizations to obtain updates.

(1) Baseline Survey for Organizations in Water Supply Sector

The baseline survey of DWSS, NWSSTC, RMSOs, and WSSDOs was conducted from July to September 2016. In addition to the regular coordination meetings with DWSS, the WASMIP-II team also visited the 5 RMSOs and 11 WSSDOs and conducted interviews with the C/Ps of each organization.

In the baseline survey of NWSSTC, the WASMIP-II team assessed their training materials, training facilities, trainers, training programs, and so on. NWSSTC training records by the end August 2017 (see Appendix 2.2), and Training Needs Assessment (TNA) results conducted by NWSSTC (see Appendix 2.3) were collected and analysed.

In addition, capacity assessment and training needs survey of the DWSS Central Laboratory and Regional Laboratories were conducted by site survey of laboratory equipment/material and interview with engineers/chemists. The outline of assessment is shown in Table 2.1.

[1] Noted that DWSS was renamed DWSSM as of November 21, 2018, after the transition to the federal system in 2017. Thereafter, to avoid confusion, it is referred to as DWSSM unless otherwise necessary.

Table 2.1 Outline of Capacity Assessment and Needs Survey for DWSS Laboratory

No.	Activity	Survey Method	Target Persons of Interview	Place	Date of Survey
1	Capacity Assessment	Site Survey & Interview	Assistant Chemist	Nepalgunj Regional Laboratory	28/07/2016
2	Capacity Assessment Needs Survey	Interview	Section Chief of Water Quality Section of DWSS	DWSS (Kathmandu)	14/08/2016
3	Capacity Assessment Needs Survey	Interview	Chemist of DWSS Central Laboratory	ditto	22/11/2016

(2) Baseline Survey for Target WUSCs

For the WUSC, Target-A WUSCs, which are "pilot WUSCs for the revision of Management Model formulated in WASMIP-I", and Target-B WUSC, which are "WUSCs for the revision of Management Model revised in WASMIP-II (this project)", were set up and their surveys were conducted.

Thirteen (13) Target-A WUSCs were visited to conduct situation analyses of their management, operation and maintenance as well as promotion of awareness on their capacity through interview and questionnaire surveys. The WASMIP-II team also visited the water intakes and water treatment facilities of Target-A WUSCs to gain a clear understanding on the different types of water treatment systems used by the WUSCs. The WUSC list of Target-A is shown in Table 2.2.

Table 2.2 List of Target-A WUSCs

No.	District	No. of WUSC	Name of WUSC
1	Morang	1	Mangadh
2	Jhapa	2	Dhulabari
3			Gauradaha
4	Sindhupalchok	1	Chautara
5	Ramechhap	1	Manthali
6	Sarlahi	1	Karmaiya
7	Bara	1	Amlekhgunj
8	Lamjung	1	Besisahar
9	Rupandehi	1	Shankarnagar
10	Nawalparasi	2	Ramgram
11			Pragatinagar
12	Dang	1	Beljhundi
13	Bardiya	1	Gulariya

The baseline survey on 13 Target-A WUSCs for understanding of the operational situation of facilities was completed in March 2017. In addition, a similar survey was conducted for 55 Target-B WUSCs, and questionnaires had been collected from 52 Target-B WUSCs as of the end of August 2017. The WUSC list of Target-B finalized is shown in Table 2.3.

Table 2.3 List of Target-B WUSC

No.	District	No. of WUSC	Name of WUSC
1	Bardiya	4	Rajapur, Gulariya II, Kusumba/Sanoshree, Naulapur
2	Dang	4	Tripur, Bharatpur, Chaughera, Jhakredhunga

No.	District	No. of WUSC	Name of WUSC
3	Nawalparasi	3	Rajahar, Gaidakot, Agauli
4	Rupandehi	4	Devdaha, Anandban, Sainamaina, Sauraha-Farsatikar
5	Lamjung	3	Sundarbazar, Bhotewodar, Lasunekhola
6	Bara	6	Nijgadh, Simara, Kolhabi, Jitpur Gadimai, Dumarbana, Bharatgunj
7	Dhanusa	1	Dhalkebar
8	Sarlahi	3	Hariyon, Barhathawa, Ishworpur
9	Ramechhap	3	Ramechhap, Pakarwas-1, Pakarwas-2
10	Sindhupalchowk	2	Melamchi, Barahbise
11	Morang	12	Urlabari, Pathari-Sanichare, Jamunagachi, Rangeli, Tankisinuwari, Itahara, Madhumalla, Pichhra, Sorabhag (Karsiya), Bayerban, Katahari, Jhorahat
12	Jhapa	10	Shani-Arjun, Shivasatakchi, Prithvinagar(Gaurisankar), Garamani, Topgachi-1, Topgachi-2, Topgachi-3, Juropani, Chandragadhi-1, Chandragadhi-2

To the contrary, questionnaires to the following three WUSCs have not been collected due to lack of information and the inability to complete the forms.

a) Itahara WUSC (Morang): PI not collected
b) Hariyon WUSC (Sarlahi): PI and Check list not collected
c) Ishworpur WUSC (Sarlahi): Check list not collected

The questionnaires collected through the above activities were tabulated.
In this project, Key Performance Indicators (KPIs) were established as indicators to evaluate the outcomes of the training activities, and a comparative evaluation was made between the KPIs calculated as of 2016 based on the results of the baseline survey and the KPIs based on the data for 2020 and 2021 after the implementation of the training. The evaluation result of the training activities based on the KPIs is described later in Section 2.14.

(3) Additional Baseline Survey after Transition to Federal Government

The draft WaSH Bill clearly stated that local governments are responsible for the maintenance of water supply facilities in WUSCs. Once the draft Wash Bill is approved, the local government's responsible for WUSCs will increase. Therefore, it was necessary to understand the capacity of the local government to support the WUSCs at that time. In addition, the level of local government capacity to support WUSC could affect the policy of DWSSM/NWSSTC to support WUSCs.

For that reason, a baseline survey of federal and local governments was conducted. The survey covered a total of 71 organizations, including 5 MoPIDs, 10 WSSDOs, 7 FWSSMPs, 1 MNP (Maha Nagarpalika), 3 UMNPs (Upa Maha Nagarpalika), 36 NPs (Nagarpalika), and 9 GPs (Gaupalika). The survey was completed by the end of February 2020. The survey was conducted smoothly as a result of a request letter for survey cooperation issued by DWSSM in advance.

2.2.2 Outputs

(1) DWSS (DWSSM)

The summary of the survey results for DWSSM is shown below;

a) DWSS was established in 1972 and is a department of MoWS. According to the Directives on Operation of Water Supply Services (Bikram Sambat: BS 2069), DWSS is responsible for inspection, monitoring, assessment, supervision and regulation on the work and activities of water service providers, including WUSCs.

b) There was no change of the organization structure and duties of DWSS when some federal government ministries were reorganized in February 2018, while the MoWSS was renamed as the MoWS.

c) DWSSM secured counterpart budget of NPR 15,000,000 to be used exclusively for activities related to WASMIP-II implementation in the financial year BS 2073/74 (from July 16th, 2016 to July 15th, 2017). The budget was used for rehabilitation works within the DWSSM jurisdiction. The counterpart budget allocated regularly for the financial year BS 2074/75 (from July 16th, 2017 to July 15th, 2018), and totalled NPR 72,800,000 consisting of NPR 53,500,000 for rehabilitation works, NPR 2,500,000 for NWSSTC, NPR 2,800,000 for the Far Western RMSO, and NPR 3,500,000 for the other four RMSOs.

d) In the financial year BS 2075/76 (from July 16th, 2018 to July 15th, 2019), DWSS allocated a counterpart budget of NPR 12,500,000, consisting of NPR 10,000,000 for rehabilitation works and NPR 2,500,000 for NWSSTC.

(2) RMSO/WSSDO

The summary of the survey results for RMSO/WSSDO is shown below;

a) RMSO/WSSDO are the affiliate organizations of DWSS to facilitate the responsibilities of the department at regional and district levels. There were 5 RMSOs and 75 WSSDOs. There was no change in the number of RMSOs/WSSDOs during the reforms performed within the local government in March 2017. The reform process replaced the existing 5 regions with 7 provinces and added two districts.

b) The RMSOs and WSSDOs are responsible for providing technical supports to WUSCs in their respective districts. Although RMSO has an additional function to monitor and supervise the activities at a regional level, in reality such monitoring and supervision activities are limited due to lack of sufficient staff resources allocated for that purpose.

c) The RMSOs/WSSDOs are staffed with engineers who mainly provides support for construction of new water supply facilities. The workload of the RMSOs/WSSDOs had generally increased in recent years due to the increased demands for new facilities. Also, RMSO/WSSDO staff usually had a tenure of two or three years before being transferred to other districts/provinces, causing a lack of continuity.

(3) NWSSTC

The summary of the survey results for NWSSTC is shown below;

a) NWSSTC is an affiliate organization under DWSSM and is responsible to provide a variety of training modules in the field of water supply and sanitation. It was renamed in 2014 and formerly known as CHRDU. NWSSTC also works for the capacity building of WSSDO and WUSC staff.

b) NWSSTC is located in Nagarkot. It is fully equipped with training facilities, accommodation and dining facilities for the attendees/trainees. The training facilities in NWSSTC include: three conference rooms; a computer room; a water quality testing laboratory; a garage/workshop; and a water flowmeter testing facility for conducting field related training.

c) There are three types of conference-rooms in NWSSTC, with varied capacity. Depending upon the number of trainees, the conference room type is selected for the training. The large and medium-sized conference rooms are each equipped with a microphone and a projector, and each is adequate for conducting the training sessions for a large number of audience/trainees. For this reason, these large and medium-sized venues are utilized for regional level conferences and are sometimes rented to local universities and other donors to facilitate their programmes.

d) There are 14 personal computers in the computer room within the training facility. They are mostly utilized for training on AutoCAD and accounting software. A garage/workshop is utilized for training sessions for welding pipes of HDPE, uPVC, and steel. The trainers for welding are usually outsourced. There is an open space where several water flowmeters are connected to a water tap, and the trainees are given an opportunity to gain experience on the series connection of meters and the method of measuring water flow for the meter calibration. This also helps the technicians gain adequate skills on water meter installation and monitoring practices.

e) For assessing the requirements of the trainees, NWSSTC requests them to complete a questionnaire, called “META card”, regarding their needs for training. Once the submissions from trainees are collected, the cards are sorted, based on the category of training requested, and the appropriate training programs to be implemented are considered.

f) NWSSTC usually conducts around 25 training sessions in a year, based on its annual training requirements and plans. Training courses provided by NWSSTC in the past are documented in Appendix 2.2 and 2.4. The contents of the technical training are meter reading, operating pumps, design of water distribution networks, water blockage, water quality and non-revenue water (NRW). The contents of business training are generally related to documentation, communication, and reporting. Communication among the trainers is fostered in the training sessions, so that they can solve problems not only by learning through online practices on the internet but also by communicating with each other.

g) NWSSTC provides training materials such as textbooks and training notes. However, most textbooks are relatively old and have not been revised for a long time. Thus, updating NWSSTC training material is a priority.

h) For monitoring/measuring the effectiveness of the training programmes, NWSSTC asks the trainees to fill out an evaluation form for acquiring their constructive feedback and opinions. NWSSTC then revises (if required) the contents of the training programs according to the feedback provided by trainees. A trainer conducts a quiz among the trainees before/after each training session for assessing the level of understanding they have achieved from the training session. For evaluating the training achievements, NWSSTC selects one of the trainees at random and contacts with the organisation the trainee belongs to, requesting the trainee's supervisor to report an evaluation of whether, or not, the benefit of the training is observed in the trainee's work performance.

i) NWSSTC has maintained a list of 31 trainers who have conducted training programs, as shown in Appendix 2.5. Although some trainers are from NWSSTC, the majority of trainers come from DWSSM and from other external resources such as the Ministry of Water Supply, non-governmental organizations, international donors, suppliers, and engineering consulting companies.

j) From initial discussions with the personnel of NWSSTC, problems/issues related to training at NWSSTC can be summarized as follows:
   - No standard formats to evaluate the enhancement of skills of trainees after training.
   - Lack of skilled trainers at the regional and district level.
   - No special methods/approaches to check if the training contents are appropriately implemented.
   - Shortage of standard training manuals.

k) NWSSTC has several mid-terms plans to enhance and improve its training functions including: online training for remote areas; capacity development plans for securing human resources and enhancing technical knowledge; building-up of a network with international water agencies; and establishment of branches nationwide.

(4) DWSS Laboratories

The summary of the survey results for DWSS Laboratories is shown below;

a) DWSS Central Laboratory is responsible for regulation of the Regional Laboratories and solving issues related to the water quality, while the Regional Laboratories in the five regions are responsible for providing support and training on use of water quality test kits (POTATEST) for WUSCs.

b) The interview survey indicated that both the DWSS Central Laboratory and the Nepalgunj Regional Laboratory require additional human resources. Nepalgunj Regional Laboratory has the following issues in addition to shortage of human resources: inadequate skills; insufficient equipment and instruments; and unsatisfactory maintenance of equipment and instruments.

c) NWSSTC also has a water testing laboratory to conduct practical training on water quality analysis. One Assistant Chemist conducts training and also maintains the laboratory equipment and reagents. Appendix 2.6 provides a comprehensive list of available equipment in the NWSSTC Laboratories, and Table 2.4 shows the measurable water quality parameters at the NWSSTC Laboratories. Four instruments out of 13 in the water testing laboratories are malfunctioning due to lack of maintenance and repair. Equipment repair/replacement works are necessary. The other facilities and equipment

are relatively old but are currently usable without any rehabilitation or replacement works. It is necessary to keep the facilities/equipment well-maintained in order to conduct the training in NWSSTC effectively.

d) The national water quality standards stipulate that water service providers should conduct water quality tests for 27 parameters and should report the results for 16 parameters from each sample. None of the DWSS laboratories have test facilities to cover all 27 parameters, i.e., 26 parameters at the DWSS Central Laboratory, 13 parameters at Nepalgunj Regional Laboratory, and 12 parameters at the NWSSTC Laboratory. Appendix 2.7 shows the survey results of Nepalgunj Regional Laboratory.

Table 2.4 Measurable Parameters at Each Laboratory

No.	Category	Parameter*	Concentration Limit*1)		DWSS Central Lab	NWSSTC Lab	Nepalgunj Regional Lab	Remarks
1	Physical	Turbidity	5	NTU	○	○	○	
2		pH	6.5-8.5	-	○	○	○	
3		Color	5	TCU	○	○	○	
4		Taste and Odor	Non-objectionable		○	○	○	
5		TDS	1,000	mg/L	○		○	
6		Electrical Conductivity	1,500	mg/L	○	○	○	
7	Chemical	Iron	0.3	mg/L	○	○	○	
8		Manganese	0.2	mg/L	○			
9		Arsenic	0.05	mg/L	○	○*3)	○	
10		Cadmium	0.003	mg/L	○			
11		Chromium	0.05	mg/L	○			
12		Cyanide	0.07	mg/L				
13		Fluoride	0.5-1.5	mg/L	○			
14		Lead	0.01	mg/L	○			
15		Ammonia	1.5	mg/L	○	○	○	
16		Chloride	250	mg/L	○	○		
17		Sulphate	250	mg/L	○			
18		Nitrate	50	mg/L	○			
19		Copper	1	mg/L	○			
20		Total Hardness (as CaCO3)	500	mg/L	○		○	
21		Calcium	200	mg/L	○		○	
22		Zinc	3	mg/L	○			
23		Mercury	0.001	mg/L	○*2)			
24		Aluminium	0.2	mg/L	○			
25		Residual Chlorine	0.1-0.2	mg/L	○	○		
26	Micro biological	*E.Coli* (MPN/100mL)	0		○	○	○	
27		Total Coliform (MPN/100mL)	0 in 95%samples		○	○	○	

*1) Parameters and concentration limits are based on "National Drinking Water Quality Standards, 2005".

*2) Pre-concentration is necessary because the detection limit of the current instrument is 0.05 mg/L.

*3) Arsenic can be measured by using HACH Test Kit.

(5) Target WUSCs

The summary of the survey results for Target WUSCs is shown below;

a) WUSC is a community-based entity for management, operation, and maintenance of the water supply system in specific areas. They are established based on the Water Resources Regulation and Drinking Water Regulation.

b) In recent years, the number of WUSCs has increased significantly, following the community-based, community-led and demand-driven approach being adopted in the water supply sector. It is estimated that there are approximately 42,000 WUSCs throughout the country. Among them, 229 WUSCs are defined as a WUSC in semi-urban area (as of 2015). 68 WUSCs were selected as the target WUSCs in semi-urban areas for WASMIP-II, consisting of 13 Target-A WUSCs and 55 Target-B WUSCs.

c) The data and information obtained from the baseline survey of Target-A WUSCs is attached in Appendix 2.8. Photographs of 13 Target-A WUSC sites as of 2016 are also shown in Appendix 2.9. The key points are summarized as below:

- Average water supply coverage ratio was 67%. Two thirds of WUSCs were below the average. The expansion of the water supply area for seven WUSCs was urgent, while the other WUSCs also needed to expand their water distribution areas.
- The average NRW ratio, excluding four WUSCs having no data, was 23%. For five Target-A WUSCs, the ratio exceeded the average figure. This was due to a lack of awareness of the need for water quantity control in daily operation. It is important to prevent water leakage and to monitor water distribution amount on a regular basis.
- The average number of water quality parameters tested was eight, but 10 Target-A WUSCs conducted less than the average number of water quality parameters. The number of parameters being tested by the 13 Target-A WUSCs was significantly lower than number of parameters required by the national water quality standards, which is 27 parameters.
- According to the result of self-assessment by the 13 Target-A WUSCs. conducted during the baseline survey, two activities were identified as needing support by WASMIP-II as a priority. They were: (1) Planning; and (2) Operation and Maintenance. It was also found that Target-A WUSCs had benefited from WASMIP-I, i.e. the Gauradaha, Mangadh, and Dhulabari WUSCs are more confident in their capacity, which they marked with a higher score than the average for the WUSCs.
- As a result of this site survey of water treatment facilities, the treatment processes of Target-A WUSC were categorized into five types as shown in Figure 2.1.
- Some problems were observed during the site survey of Target-A WUSCs, including: incomplete construction of some water treatment facilities; absence of critical equipment, such as flowmeter, chlorine injection units, sluice valves for O&M etc.; insufficient instruments and tools for O&M; and lack of SOPs, O&M records and as-built drawings.

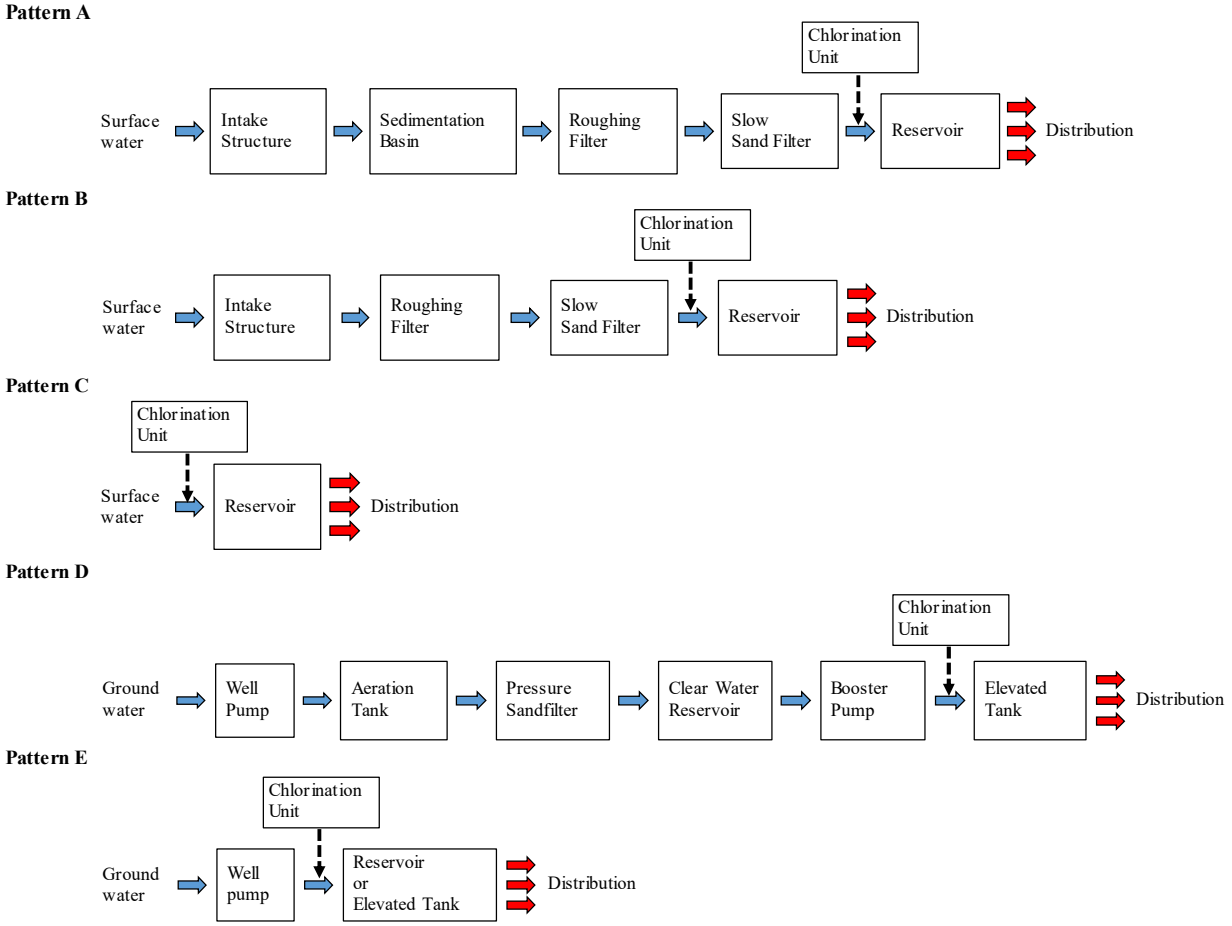


Figure 2.1 Type of Water Treatment Process of Target-A WUSC

Table 2.5 Treatment Process of Target-A WUSC

No.	WUSC	Treatment Process*	Remarks
1	Gulariya	E	
2	Beljhundi	A	
3	Pragatinagar	A, E	
4	Ramgram	E	
5	Shankarnagar	E	
6	Besisahar	A, C, E	Distribution network is divided into rural and urban.
7	Amlekhganj	C	
8	Karmaiya	E	
9	Manthali	A, C, E	
10	Chautara	B	
11	Dhulabari	A, E	pilot WUSC of WASMIP I
12	Gauradaha	D	pilot WUSC of WASMIP I
13	Mangadh	D	pilot WUSC of WASMIP I

* The alphabetical notation of the "Treatment Process" corresponds to Figure 2.1.

d) Based on the results of the baseline survey, the capacity level of the WUSCs was classified into four major categories as shown in Table 2.6; 1) WUSC does not understand the importance of measurement equipment (flowmeters, water quality) and safe water supply (chlorine injection). Therefore, WUSC has not installed the equipment provided by DWSSM. 2) WUSC does not

understand the importance of data recording, and have not recorded the data although they have installed the measurement equipment. 3) Data is recorded, but not analysed. 4) WUSC conducts data recording and analysis and can predict the facility operation status and functional deterioration based on it.

Table 2.6 Capacity Level Category of WUSCs

Level	Situation	Cause
1	NO Installation of Equipment	NO understanding of equipment importance/ proper positions, NO fittings (flowmeter, maintenance valve etc.)/ Insufficient budget
2	Installation but NO Record	NO understanding of record importance
3	Keep recording, but NO Analysis	NO understanding of data analysis, how to analyse data
4	Analysing data and Detect/ Preventive Errors	Next stage: securing budget, human resources

e) At the time of the survey, Pragatinagar WUSC, which was the most cooperative, was classified as the category of 3) above. On the last day of the survey, WASMIP-II team suggested improvements to Pragatinagar WUSC in terms of soft (linking map data with complaint data, data analysis) and hard (using water quality testing kits, improving intake weirs, equalizing inflow at sedimentation basins, equalizing outflow weir height at slow sand filter). WUSC agreed to work on these.

(6) Additional Baseline Survey after Transition to Federal System

With Nepal's transition to a federal system, the organizations targeted by WASMIP-II have also changed. (See details in 2.3.2 (4) and 2.4.1) Therefore, the Baseline survey was also conducted for FWSSMP, MoPID, WSSDO and local governments. The summary of the survey results is given below, and the detail is shown in Appendix 2.10.

a) Although MoPID, WSSDO and FWSSMP have organization charts, NP and GP do not.
b) None of organizations have defined the descriptions.
c) As for training needs, MoPID, WSSDO and FWSSMP engineers expected training on the design of water supply facilities, while NPs and GPs expected training on the overall O&M of water supply facilities.
d) The ratio of the construction budget for water supply facilities to the total budget is 11% for MoPID, 99.8% for WSSDO, 49% for FWSSMP, 0-0.5% for NP, and 0-0.03% for GP. The ratio of the maintenance budget for water supply facilities to the total budget is 0% for MoPID, 0.2% for WSSDO, 0% for FWSSMP, 0% for NP, and 0.07% for GP.
e) Local governments are facing a shortage of human resources. Furthermore, if the draft WaSH (Water, Sanitation and Hygiene) Bill is approved, the local governments will become responsible for the maintenance and repair of WUSC-owned water supply facilities. Appendix 2.11 shows an excerpt of the draft WaSH Bill.
f) The WSSDO and local governments have been providing equipment to the WUSCs, although the

budget allocation is small. Most of the equipment is provided based on requests received from the WUSCs. However, the WUSCs need to understand the requirement for key equipment to recover the proper functioning of water supply (monitoring water supply volume and delivering safe water). Therefore, capacity development on O&M of water supply systems for the local governments is very essential. Especially, it is necessary to promote understanding of: (1) important equipment in water supply facilities (flowmeters, chlorine injection units, etc.); (2) appropriate installation locations; and (3) appropriate equipment specifications.

From the above baseline survey for local governments, it is seen that the main problems NPs and GPs are facing are as listed below:

a) Insufficient water supply to meet increasing water demand due to population growth (water resource development and facility expansion are required);
b) Lack of knowledge and skills related to O&M;
c) Lack of human resources (a small staff of engineers is responsible for road, irrigation, construction, and water works);
d) Lack of knowledge and capacity for design and cost estimation (left to private design companies);
e) Lack of supervisory capacity for construction and repair works;
f) Small budget for construction of water supply facilities and facility O&M due to lack of awareness of the importance of water supply service by the top management of NPs and GPs, and priority usually being given to road construction;
g) Preference of water consumers to use shallow wells due to low consciousness of water quality issues and safety;
h) The ratio of the budget for water supply to the total budget of NPs and GPs is 0.1-1.0% in 20 municipalities, 1.0-5.0% in 20, 5.0-10% in 1, and 9 municipalities having refused to disclose data. Although it cannot be evaluated precisely without comparing with other businesses, the percentages of budget allocated to water supply works seem to be low considering the scale of construction works;
i) In NPs and GPs, budget allocation for construction and maintenance of water supply facilities is low due to the priority given to road construction projects. In order to increase budget allocation for water supply and supports to WUSC, it is important to have NPs and GPs understand the outline of water supply by participating in basic training provided by WASMIP-II, and to have the top management of city halls understand the importance of water supply service.

2.3 Situation Analysis of Water Supply Sector (Activity 1.2)

The current situation surrounding the water supply sectors, including legislation and policy documents, was surveyed to analyse possible impacts on WASMIP-II.

2.3.1 Activities

From November to December 2016, key legislation and policies of water supply sector, including Acts, Regulations, Directives, Guidelines, and policy documents were studied by the WASMIP-II team. I In order to review and propose a meaningful support mechanism, the impacts of the March 2017 local government reforms have been assessed. The WASMIP-II Team regularly studied the development of changes in legislation, and policies, etc. as more changes were expected in a transitional period for the country.

In December 2018, further subjects related to the transition to the federal system were surveyed:

(i) Organizations of water supply sector and their functions before and after the transition to the federal system.
(ii) DWSSM's budget for WASMIP-II after the organization restructuring.
(iii) Relationship between federal, provincial and local level organizations.
(iv) Current work placement of the WASMIP trainers and their availability to attend at the training.
(v) Issues on sustainability after WASMIP-II completion.

Translation and analysis have been conducted on the draft Coordination Bill (Nepali language documents were received on July 30th, 2019) prepared by MoFAGA (Ministry of Federal Affairs and General Administration) to understand the inter-relationship among the 3 tiers of the Nepal government i.e. Federal, Provincial and Local. In addition, the draft WaSH Bill (Nepali language documents were received on June 23rd, 2019) prepared by the MoWS was also translated and analysed to understand its relevance to WASMIP-II.

2.3.2 Outputs

(1) Legislation

The basic law on water supply management is the Water Resource Act, BS 2049 (1992). The Water Resources Regulation, BS 2050 (1993) and the Drinking Water Regulation, BS 2055 (1998) are the regulations that stipulate the establishment of WUSCs for O&M of water supply systems. The Directive on Operation of Water Supply Services, BS 2069 (2012) stipulates the duties of DWSS and its affiliate organizations, including the WUSCs. According to the Directive, DWSS is responsible for the WUSCs' day to day management, capacity development programs and technical and managerial supports.

"Guidelines on Operation of Drinking Water Services, BS 2071" (2014) was formulated to facilitate the implementation of the Directive. The Guidelines consists of 12 chapters and widely incorporates the recommendations of WASMIP-I; such as the decentralised approach to provide training and monitoring activities for WUSC by WSSDO, as well as the introduction of multi-layer platforms for knowledge-sharing, including dissemination workshops at a regional level and liaison conferences at a district level. However,

the Guideline requirements have not been completely implemented, mainly due to insufficient human resources being allocated for support of the O&M activities of the WUSC, particularly at district level. WSSDOs are often understaffed, and the engineers are overloaded with the increasing demands of construction projects. This required WASMIP-II to review and revise the supporting mechanism to WUSCs.

(2) Impacts of Enactment of the Constitution and the Local Government Reform

The new Constitution of Nepal, 2015, came into effect on September 20th, 2015, replacing the Interim Constitution formulated under the federal democratic republic system that was implemented a decade earlier. The 2015 Constitution stipulates that the government is classified into three layers nationwide: federal, provincial, and local levels.

In 2017, there were developments to enforce the local government reform and decentralization process. In March 2017, local government reforms started with the declaration of 744 local bodies replacing the previous Village Development Committees (VDCs), the lower administrative part of Ministry of Federal Affairs and Local Development (MoFALD). After some new local bodies were added, the number of local entities amounts to 753. The country is also administratively divided into seven provinces reshuffling the former five regions. The temporary provincial capitals were declared in January 2018, some of which may be relocated after the transition to the new administration is completed. The district borders remain unchanged except for Nawalparasi and Rukum, Districts, which were created by division of a single region into two provinces. The number of Districts reaches 77.

Elections were conducted at federal, provincial, and local level in phases, where the local level elections were conducted for the first time in Nepal since 1997. The legislative election was conducted in November and December 2017, and the parliamentary election in February 2018.

The successful implementation of the local and provincial elections enabled the country to establish local and provincial governments. The budget from the federal to provincial/local, not for specific purposes, is aggregately allocated according to the priority.

After the enactment of the Constitution, a lot of Acts and Regulations needed to be revised at the federal government, and newly legislated at the provincial/local governments. The MoWS and DWSS drafted a new Water Act to replace the previous Acts. The status of affiliated organizations of DWSS at regional (RMSO) and district (WSSDO) levels was finalized in 2018, while it is anticipated that the roles/presence of DWSS and NWSSTC remain unchanged.

(3) National Policies on Water Supply

The key policies on water supply management in semi-urban areas include: (1) “Sustainable Development Goals 2016-2030” (SDGs) by the National Planning Commission (NPC); (2) “Nepal Water Supply, Sanitation and Hygiene Sector Development Plan (SDP) (2016-2030)” by MoWSS (present MoWS); and (3) “Updated Fifteen Year Development Plan for Small Town Water Supply and Sanitation Sector” (Updated 15-Year Plan) by DWSS.

Nepal has been actively working to formulate the national plans on SDGs. The SDGs consists of 17 global goals set by the United Nations (UN). SDG6 is "Clean Water and Sanitation" which aims to provide clean drinking water and sanitation for everyone and everywhere. According to the SDG National Preliminary Report in 2015, Nepal had achieved the Millennium Development Goals (MDG) target of substantially reducing the proportion of people without sustainable access to basic drinking water, as Nepali households with access to an improved source of drinking water increased from 46% in 1990 to 83.6% in 2015. The proposed targets of SDG6 for 2030 include that 95% of households should have access to piped water supplies.

SDP, covering 15 years from 2016 to 2030 in alignment with the SDGs, introduced concepts of classifications of water supply systems/services consisting of five categories: Point, Small, Medium, Large, and Mega. WASMIP-II target areas are mostly classified in the Medium or Large category. The role delineation described in SDP assumes key players for service delivery for each category, Medium and Large water supply systems, would be provided by local governments and operated by user committees and/or utility managers. It should be noted that this model is an expected plan, as the establishment of local governments is an on-going process. The construction of water supply systems in semi-urban towns are planned and implemented by DWSS and its affiliated entities as stipulated in the earlier legislation.

The 15 Year Plan was initially issued in 2000. The plan was revised in 2014 in response to several developments These developments included declaration of new municipalities expected in early 2015, the launch of "Third Small Town Water Supply and Sanitation Sector Project" (STWSSSP-III) supported by the Asian Development Bank (ADB), and a policy of the national government to adopt the standard definition of a "Small Town". The Updated 15 Years Plan has updated the definition of "Small Town" regarding population, density, potential growth, and linkage with an administrative boundary. In total 229 small towns were specified as Small Towns, from which the target WUSCs of WASMIP-II were selected.

(4) Transition to the Federal System

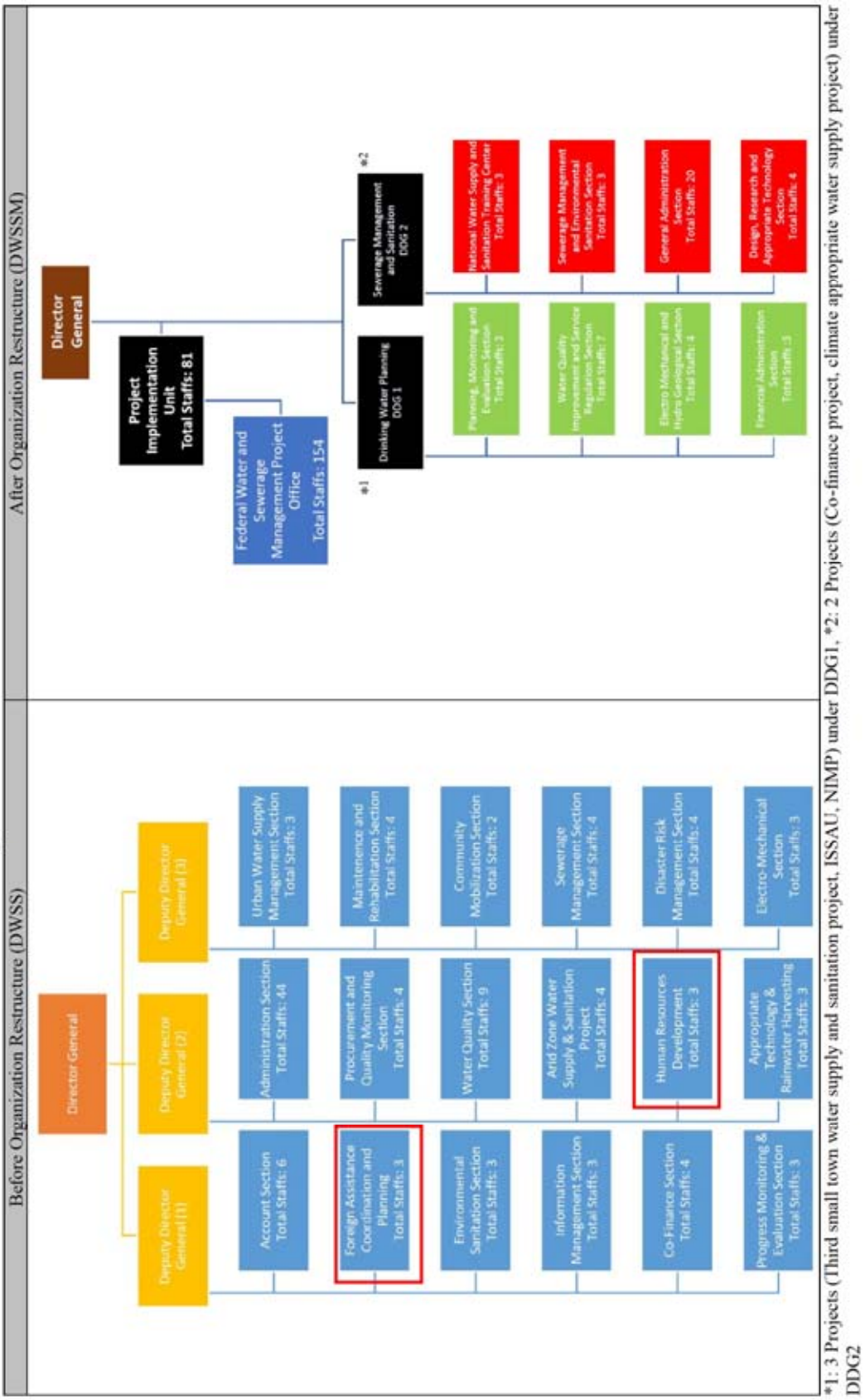
In the past, WUSC received technical supports and staff training for the construction and rehabilitation of water supply facilities from DWSS and its affiliated RMSOs and WSSDOs. Accordingly, in the WASMIP Project the technical support mechanism was implemented by these organizations.

After the transition to the federal system in 2017, DWSS was renamed DWSSM on November 21, 2018, where the number of sections was reduced from 18 to 8. The organizational structures of the DWSS and the DWSSM are shown in Figure 2.2., and the draft Job Descriptions in Appendix 2.12. In addition, the RMSOs were dissolved while 15 FWSSMPs were newly established in the 7 provinces as branches of DWSSM. The main function of the FWSSMPs is to provide technical advices to the WUSCs, which are responsible for constructing large-scale of water supply facilities and operating the facilities during and after the construction. The number of planning/design and construction projects and the number of engineers assigned to FWSSMP as of 2019 are shown in Appendix 2.13, which indicates each engineer is responsible for an average of 53 projects.

At the provincial government level, MoPID has become responsible for water supply, and accordingly the existing WSSDOs were dissolved and 3 to 5 new WSSDOs were established in each province, as affiliated organization to MoPID. The projects for constructing small-scale water supply facilities were transferred to provincial and/or local governments. The pictural overview of Nepali governments before and after the transition to the Federal system is shown in Figure 2.3 and Figure 2.4.

The locations of the affiliate organizations are shown in Appendix 2.14. This information will be useful to consider the locations of WUSCs when planning trainings and organizing workshops.

Figure 2.2 Organization Charts of DWSS and DWSSM



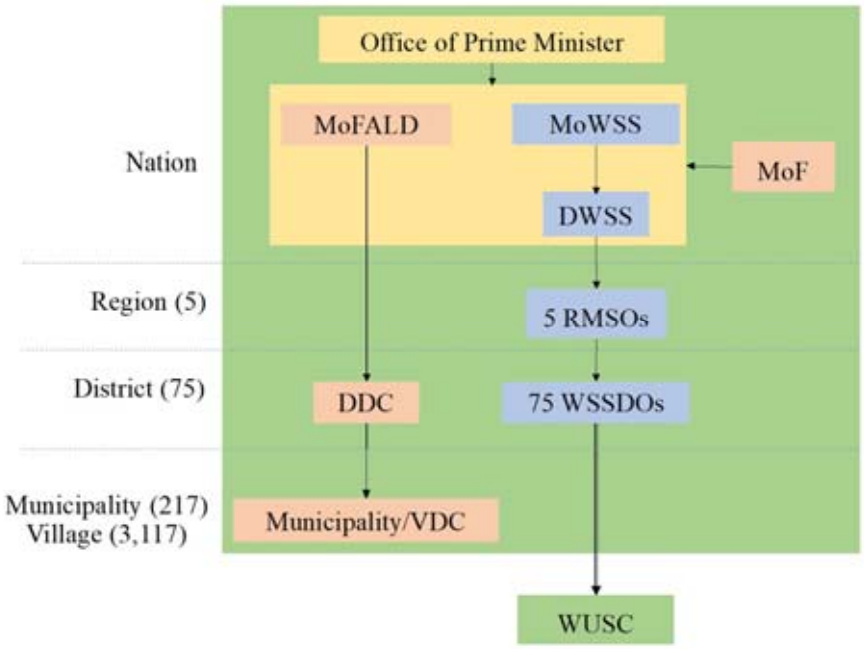


Figure 2.3 Structure of Nepali Government (Before the Transition to the Federal System)

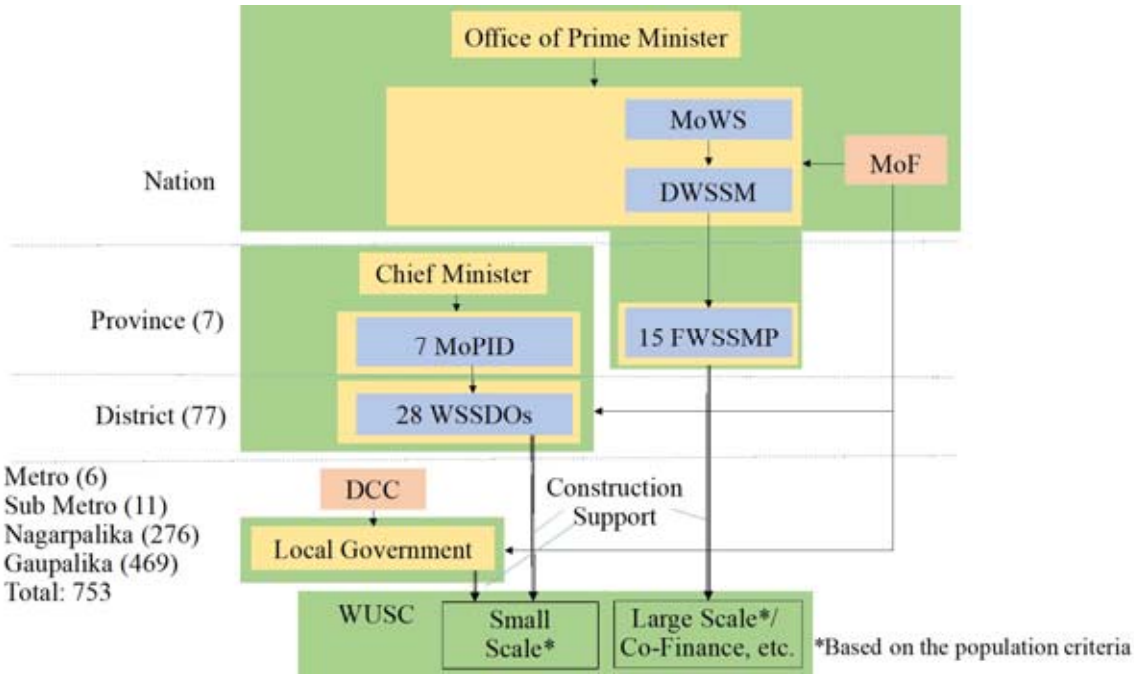


Figure 2.4 Structure of Nepali Government (After the Transition to the Federal System)

2.4 Supporting Mechanism for WUSC (Activity 1.3)

The optimal support system to the target WUSCs was discussed and finalized by analysing the effectiveness of the current supporting mechanism on the basis of the results of the baseline survey.

2.4.1 Activities

Based on the results of the baseline survey, the technical supporting mechanism for WUSCs in semi-urban towns by DWSS/NWSSTC was analysed.

In order to improve the support model to be more applicable and sustainable, the current situation and problems have been confirmed through site inspections on and hearings with respective organizations such as DWSS, NWSSTC, pilot WUSCs. The situation after the WASMIP-I and problems found are summarized below in Table 2.7.

Table 2.7 Problems for Improving the Support Model

Category	Situation	Problems Found
Policy	・ The concepts from WASMIP-I model have been adopted in the latest policies, such as the Operation Guidelines and the Sector Development Plan. ・ However, detailed job descriptions, persons in charge and concrete procedures for model dissemination have not been fully articulated. ・ In addition, those policies have not been sufficiently cascaded for implementation at the district level.	・ Lack of action plans to support WUSCs ・ Insufficient awareness and understanding of the policies and the WASMIP Model.
Budget Allocation	・ DWSS planned to allocate the budget for implementing rehabilitation and service support works in each region after the completion of the WASMIP-I in accordance with the support model. ・ However, the Rehabilitation and Service Improvement Section of DWSS, which is responsible for executing the budget, was not able to implement the planned activities due to lack of human resources and a limited understanding of the model.	・ Lack of action plans for responsible staff for supporting WUSCs ・ Limited understanding of the WASMIP Model ・ O&M instructions to WUSCs not given as high priority.
Human Resource	・ The workload of WSSDO engineers has been steadily increasing each year, given the new construction projects being implemented. Staff are too busy with their regular duties and unable to provide service support to the WUSCs.	・ Priority was placed on the construction projects. ・ O&M instructions to WUSCs not given as high priority. ・ Lack of engineers for service supports due to excessive workload of the construction projects.
Technical Transfer	・ The role of technical transfer to WUSCs was given to the WSSDOs engineers in the WASMIP-I model, to be conducted, through site visit activities. ・ However, almost all the trained engineers were transferred to other WSSDOs without proper knowledge sharing, so technical transfer activities to WUSCs as mentioned above were suspended so far. ・ Accordingly, it was impossible to increase or leverage as trainers skilled engineers. It was also difficult to expect the WSSDOs to conduct internal technical transfer training by themselves.	・ Lack of implementation/system for knowledge sharing. ・ Frequent personnel transfers. ・ Lack of internal training/development systems and severely limited human resources able to take on the role and responsibility as O&M trainer / instructor in DWSS.

Considering above issues, the impact of the support to WUSC after the transition to federalism is as follows.

【Support mechanisms after the transition to federalism】

- As a result of the transition to the federal government, maintenance support, such as the repair of water supply facilities, will be transferred from DWSSM to the state and local governments.
- Of the engineers and technicians who had worked at the WSSDO, the technicians were transferred to the local government. As a result, the WSSDO is now mainly responsible for the maintenance of small-scale water supply facilities, and the local government is now responsible for the rehabilitation of water supply facilities of the WUSC.
- With the transition to the federal government, the new FWSSMPs (20 offices) have been newly established under the umbrella of the DWSSM to implement federal level projects across Nepal. The main function of the FWSSMPs is to manage large scale water supply facility construction projects.
- In terms of support for the construction of water supply facilities, the DWSSM (federal government), MoPID (state government) and local governments have defined and classified support targets in mountainous, hilly and plain areas according to the size of the planned water supply population. In the latest financial year (July 16th 2018 to July 15th 2019), there were 406 projects nationwide. All ADB-supported projects are included in the projects under the jurisdiction of the Federal Government. Table 2.8 shows the share of support for the construction of water supply facilities by population size.

Table 2.8 Sharing of construction support by population size by region

Government Organization	Federal	Provincial	Local
Mountains	More than 1,000	500-1,000	Up to 500
Hill	More than 5,000	3,000-5,000	Up to 3,000
Plain	More than 15,000	5,000-15,000	Up to 5,000

Based on the designed population
Source: Budget and Program, FY BS 2076 / 77, MoWS

- On the other hand, operation and maintenance support to WUSCs is not strictly demarcated by federal, state and local governments, and in the current year, support is provided according to the allocated budget. However, the draft WaSH law states that local governments will provide support for the repair, operation and maintenance of water supply and sanitation facilities regardless of the size of the WUSC.
- A baseline survey (pilot selection) of local governments was conducted to understand their support systems and capacities. This was done because understanding the capacity of local governments will have a significant impact on the scope and content of NWSSTC's support (training) after WASMIP-II. The results are detailed in Activity 1.1.

【WUSC support policy at WASMIP-II】

- Based on the results of the baseline survey of local governments, it can be said that, even after the passage of the WaSH Law, there is a lack of human resources and low capacity in local governments to take charge of WUSC support.

- WASMIP-II developed and proposed a plan for a model of support through training and workshop implementation, with the NWSSTC, which is assumed to be unaffected by local restructuring and decentralisation, at the centre of the support structure.
- Training (Basic Training/ Refresher Training) will be conducted mainly at NWSSTC using central level human resources (DWSSM/ NWSSTC).
- Monitoring of WUSC sites will be carried out at each WUSC site, primarily through the use of human resources at the local level (FWSSMP).
- Despite the role of local government, due to lack of human resources, skills and budget, during WASMIP-II, DWSSM will provide training, operation and maintenance support and facility repair (provision of major equipment) to the local town WUSC.

【WUSC's relationship with the local government】

The following is a good example of how WUSC is supported by the local government in Pragatinagar WUCS.

- The WASMIP-II team visited and interviewed Devchuki municipality personnel (Pragatinagar WUSC office, Nawalparasi district, Gandaki province) to check the status of WUSC support by the local government. The results are presented below.
  - Pragatinagar WUSC has been allocated a budget of NRP 1.3 million this year by Devchuki municipality. Pragatinagar WUSC is under the jurisdiction of the federal government, given its population size, but it also receives support from the provincial and local governments.
  - The budget allocation to the WUSC is determined by the Devchuki municipality on the basis of the WUSC's requirements and on the basis of the WUSC's operational status.
  - Devchuki municipality has one engineer, but he is responsible for all construction work and is short of manpower.
  - Devchuki municipality does not intervene in the policy of Pragatinagar WUSC, but supports it as a major WUSC.

As a result, a relationship of trust has been established between the WUSC and the local government, and the WUSC reports on the operation of the WUSC as appropriate, and receives necessary support.

【Water pipe breakage due to road construction】

At present, water pipes (distribution pipes) breakage, due to road construction, is a problem throughout Nepal. Many WUSCs have been forced to stop water supply due to this accident, and this has been raised as a problem in the field during basic training.

- Therefore, the WASMIP team interviewed major WUSCs to collect good practices on prevention and response to WUSC water main breaks due to road works. The major WUSCs are Pragatinagar WUSC, Mangadh WUSC, Shankarnagar WUSC and Urlabari WUSC. Of these, the response of Pragatinagar WUSC can be introduced as a good example.
- Pragatinagar WUSC formed a task force within Pragatinagar WUSC in relation to the construction of a road spanning 12 WUSCs (the Narayanghat-Butwal Highway) and submitted the data (pipeline routes,

extension, number of consumer connections) to Roads Board Nepal (under the Ministry of Physical Infrastructure and Transport, The Roads Board Nepal hired a consultant to estimate the potential damage to water supply infrastructure by the road construction.

- Based on the experience of the Pragatinagar WUSC, specific measures that can be applied to other WUSCs include: i) preparing a water pipe network map and submitting it to the road works agency; ii) consulting with the agency at the start of construction; and iii) requesting that the cost of repairing water pipe breaks be included in the road construction cost estimate.
- As mentioned above, water pipeline breakage due to road construction is common throughout Nepal, and we have investigated the measures to be taken to prevent such breakage, drawing on the case study of Pragatinagar WUSC, one of the 68 target WUSCs, to compile procedures for avoiding pipeline breakage. These procedures have been translated into Nepali and disseminated through training and visits to WUSCs. The procedures are given below.
  - At the time of the preliminary survey, a public hearing is held by the relevant authorities (road authority, local authority). WUSC can use this opportunity to draw the attention of the authorities to the existing water pipelines.
  - WUSC will prepare a pipe network diagram (including location, material and size of pipes) including both transmission and distribution pipelines.
  - WUSC provides the network map to the road construction authorities (road authorities, local authorities) in order to avoid damage to water pipelines.
  - Once road construction begins, the WUSC will contact the road construction authorities (federal, provincial and local governments) to disseminate the information on the pipeline network map.
  - To ensure that water pipelines are not damaged during road construction, the WUSC will issue a letter requesting the relocation of water pipes.
  - If water pipelines are damaged, WUSC will submit a provisional estimate of damages to the relevant authorities.

【WUSC's Network Conference】

- A team of experts participated in the 3rd Network Conference of WUSCs in Dang district (where WUSCs in Dang district came together to share information and express their views), which was held on 6th and 7th June 2019 (2 days). Out of 133 WUSCs in Dang District of Lumbini Province, 74 WUSCs (about 80% of the total) participated in the network conference. This network conference has been held only in Dang District.
- The following is a summary of the 3rd Network Conference.
  - In addition to the participation of the 74 WUSCs, the conference was also attended by two Ministers from the Ministry of Water Supply and the Ministry of Communication and Information Technology.
  - The participating WUSCs were given about two minutes to make a presentation and explain the activities and current situation of the WUSC. The main points raised were the demands of the government, the complaints of the people and the problems of WUSC.

- In addition, the organizing WUSC allowed time to explain the activities and achievements of WASMIP-II. This was made possible by the participation of MoWS and WSSDO, who provide WASMIP trainers, and also because the Chairpersons of the target WUSCs were part of the organising team.
- During the network conference, most of the WUSC representatives mentioned the following problems/challenges: 1) depletion of water sources, 2) scaling of pipes, 3) damage to water pipelines due to road construction, 4) need for water treatment plants, 5) lack of skilled staff, and 6) high cost of electricity.

The presentation by the participating WUSCs was adopted in the Refresher Training conducted by WASMIP as a participatory workshop.

【WUSCs that cannot be put into service】

- Out of 68 target WUSCs, 5 WUSCs i) Garamani WUSC, ii) Kolhabi WUSC, iii) Jitpur Gadimai WUSC, iv) Barhathwa WUSC and v) Melamchi WUSC have not been put into service. The reason for this is that WUSC has not developed its water distribution network. Normally, the scope of responsibility for the construction of DWSSM facilities is from the water intake facilities to the water treatment plant and elevated water tanks (distribution reservoir), while the construction of the distribution network is the responsibility of WUSC. As this issue is likely to continue in the future, it is necessary to discuss with DWSSM how to provide support to WUSCs for distribution network construction.
- The specific reasons for the inability to carry out pipeline installation at the five WUSCs mentioned above are as follows. The common issues in these 5 WUSCs are lack of budget for construction of distribution pipelines, damage of water pipelines due to road works and lack of awareness of the Chairperson of the WUSC.
  - Garamani WUSC:.
    The WUSC has received support from the local government for the payment of electricity bills.
    In the current fiscal year (2077/78), the Provincial Government has granted NPR 4 million to be used for pipeline maintenance. The WUSC aims to commence water supply service by the end of this fiscal year.
  - Kolhabi WUSC, Gadimai WUSC:.
    Shortage of pipelaying personnel.
  - Barahathawa WUSC, Melamchi WUSC.
    Water pipelines destroyed by road construction and no longer usable.
- It is the National Planning Commission (NPC, 2076) that defines the scope of responsibility for construction. The division of responsibility differs between urban, semi-urban and underdeveloped areas.
  1) Urban areas, 70% of the construction cost is subsidised and the remaining 30% is borne by WUSC. Pipeline materials will be provided by WSSDO.

2) Semi urban areas: 80% subsidy and 20% WUSC contribution, other conditions are the same as in 1) above.
3) Depopulated areas: 100% funded by DWSSM.

These subsidies are provided by the provincial and local governments.

- At Garmani WUSC (Province No.1, Jhapa District), the water intake facility, water treatment plant and distribution reservoir were constructed by DWSSM. Due to lack of funds and construction staff at WUSC, the distribution pipeline system had not yet been installed (water pipes) and has not been put into service. However, with the help of a NPR 1.2 million grant from Birtamod NP (to cover the cost of pipeline installation, labour and electricity) and 1.5km of pipe material provided by WSSDO, Garmani WUSC installed the water pipelines and put them into service in January 2021. At present (end of July 2021), one staff member (manager only) is responsible for operation and maintenance, meter reading and accounting. During busy periods, additional staff are hired on a daily basis.
- As of July 2021, Garmani WUSC has 154 houses connected to the distribution network and the water tariff has already been approved by WUSC. This is encouraging the people to get connected to the distribution network and increase the water supply coverage.
- The fundamental reason why Garamani WUSC was able to be commissioned was due to the financial support and materials provided by the local government and WSSDO. As the Chairperson was a councillor of Province No.1, the request for support from the WSSDO and the local government received a positive response. This is not an example that can be generalised to other WUSCs that are not yet in service.
- This reduces to four the number of WUSCs (Kolhabi WUSC, Jitpur Gadimai WUSC, Barhathwa WUSC and Melamchi WUSC) that have not been able to put water supply into service due to lack of a water distribution network.

【NWSSTC's participation in the training】

- The possibility of inviting provincial and local government engineers for basic training was confirmed. The PM (Mr. Kabindra Karki, NWSSTC Chief) mentioned as follows. "Inviting state and local government engineers directly is a procedure. By promoting the training programme to the province and local governments and getting their understanding, the NWSSTC will be able to invite them smoothly. The cost of the training, both online and face-to-face, will be covered by NWSSTC."
- In order to attract not only WUSCs but also other institutions to the training, the results of WASMIP-II were summarized in the project news, and five of them were submitted to DWSSM and posted on the website. The URL of the website is as follows.

  WASMIP-II News: nwsstc.gov.np/news

2.4.2 Outputs

(1) Key Considerations on Supporting Mechanism

Key considerations to be accounted for when developing the supporting mechanism for the WUSCs included: 1) inadequate human resources to provide supports at a district level; 2) influence of the local government restructuring, and 3) effective utilization of NWSSTC facilities.

The supporting mechanism applied in WASMIP-I was to provide direct supports to the WUSCs by DWSS and its affiliated organizations at a district level in cooperation with Japanese experts. In WASMIP-I, WSSDO engineers and Japanese experts were extensively mobilized for at least a month, to provide the On-site Training in each of three pilot WUSCs in Morang and Jhapa Districts. The results of the baseline survey conducted by WASMIP-II team showed the positive effects WASMIP-I had on capacity development of the WUSCs, in comparison with the capacity of the other target WUSCs of WASMIP-II.

However, the supporting mechanism applied in WASMIP-I required very substantial human resources, especially from WSSDO. It was difficult for the WSSDO engineers to allocate sufficient time, mostly mobilized to address increasing demands of construction projects for water supply schemes, to conduct the On-site Training in the WUSCs for O&M as was exercised in WASMIP-I. The number of WUSCs in the country is estimated at about 42,000. WASMIP-II focused on small town WUSCs, as defined in "Updated 15 Year Plan", and there were 229 small town WUSCs, many of which are allocated in the Terai region. Human resources were limited in each level to roll out the supporting mechanism applied by WASMIP-I to small town WUSCs.

The local government restructuring and decentralization were another factor to be considered as part of the proposed supporting mechanism. Since the ongoing process of local government restructuring and decentralization involved significant change in institutions and legislation, and mobilization of human and financial resources. There was an uncertainty regarding the transition schedule, which overlaps with the duration of WASMIP-II. To facilitate the implementation of WASMIP-II, there was a need to consider schedule that unlikely to be severely impacted by the local government restructuring and decentralization process.

It was also necessary to consider the efficient and effective utilization of NWSSTC facilities for sustainable rollout of the supporting mechanism. WASMIP-I adapted the direct supporting mechanism to 3 pilot WUSCs with support primarily by DWSS and WSSDO. The involvement of CHRDU (currently NWSSTC) was minimal. The baseline survey indicated that NWSSTC has sufficient physical capacity to conduct a series of group training, and that NWSSTC is unlikely to be affected by the ongoing local government restructuring and decentralization process.

Other important factors for building the supporting mechanism included: 1) an organizational structure that would not be influenced by personnel reshuffle; 2) provision for adequate best practices training (e.g. training at a fully equipped training facility); 3) sustainability of conducting training (e.g. securing budget, reduction of transportation cost for trainers and trainees); 4) securing training quality; efficiency in

providing training to staff of many WUSCs; and 5) provision of a series of training programs (e.g. Basic Training, On-site Training, Refresher Training).

(2) Definition of Management Model and Support Model

In WASMIP-I "Management Model of Small to Medium-sized Water Supply Facilities" and "Support Model by WSSDO" were referred to as Management Model and Support Model, respectively, while in DWSSM's model both models were combined as one. In order to match the recognition of both the Nepal side and the Japan side, definitions of Management Model and Support Model are shown in Figure 2.5 as agreed at the JCC held on February 28, 2018.

a) **Management Model**: Consists of the management manual and SOPs established for proper management of WUSCs in semi-urban towns under WASMIP-II.

b) **Support Model**: Consists of technical supporting mechanism, rehabilitation works and other financial supports. Only the technical supporting mechanism for WUSCs in semi-urban towns is covered under WASMIP-II.

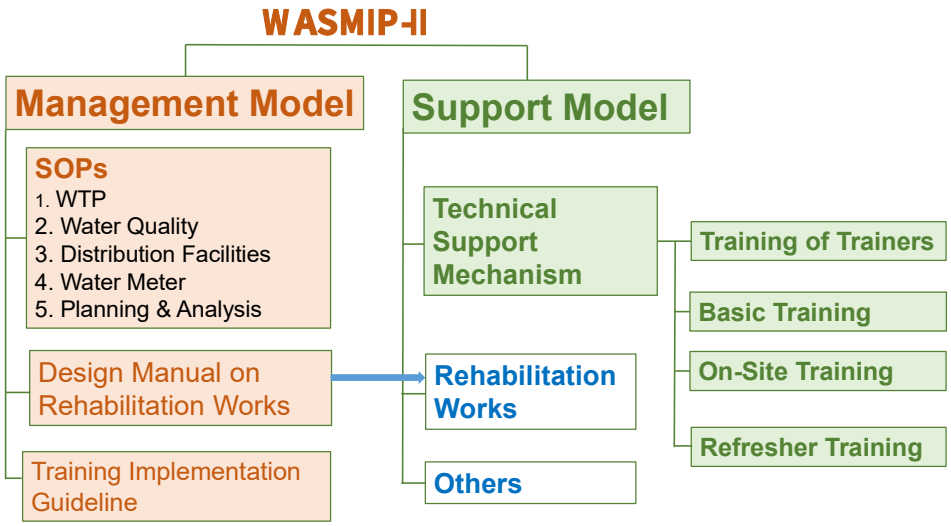


Figure 2.5 Management / Support Model in DWSS's Model

Support provided to WUSCs in WASMIP-II framework included: capacity development on their water supply management/O&M in accordance with "Management Model"; and improvement of water supply facilities to enhance the effectiveness of capacity development.

The supporting functions in WASMIP-II are centralized at DWSSM/NWSSTC level. DWSSM is primarily in charge of mobilization of human and financial resources necessary to conduct various training and monitoring activities at all levels and to perform essential rehabilitation works at the WUSCs in semi-urban towns. In addition, DWSSM is responsible for nomination/selection/assign of appropriate trainers for various training and monitoring activities from MoWS, DWSSM, NWSSTC, FWSSMP and other non-government organizations. DWSSM will also facilitate the necessary budget for training and monitoring activities as well as facility improvement along with WASMIP-II implementation.

The above supporting mechanism was detailed in the "Training Implementation Guidelines", which was drafted by the WASMIP-II team in close coordination and consultation with DWSSM/NWSSTC and which has been regularly revised throughout the project period.

In addition, DWSSM is also responsible for providing essential equipment (hardware supports) and training programs to the target WUSCs in semi-urban towns during the Project. The essential equipment includes flowmeter, valves, chlorination equipment, water quality test kit. The training programs consist of training on O&M of facilities and water supply management.

The outline of the Proposed Supporting Mechanism for WUSCs is shown in Figure 2.6. There are two main types of support provided to the WUSC. One is software support to maintain and improve the quantity, and the other is quality of the water supply by guiding the operation and maintenance of the water services.

Hardware support involves checking the current water supply system at the WUSC and identifying and providing the minimum necessary equipment (flowmeters, chlorine injection units, etc.) that is missing or broken. This will make it possible to monitor the amount of water produced and distributed, and to supply safe water (with disinfection). Without this basic function, the knowledge and skills acquired during the various training courses at WASMIP-II will not be put to use.

Software support, on the other hand, provides the WUSC with appropriate operation and maintenance guidance through various training courses, with the aim of ensuring a safe and stable water supply and extending the life of the facilities. In turn, WASMIP-II guides WUSC to run a sound water supply business. The training included Basic Training, to learn basic knowledge and skills, On-site Training to check the acquired knowledge in the field, and Refresher Training to provide information on each WUSC, exchange opinions, introduce good practices in WUSC management and O&M. DWSSM/NWSSTC and FWSSM will be the instructors for the training.

WASMIP-II developed a facility refurbishment manual to support WUSC hardware, to help understand the water supply system, and to identify and specify the equipment required. The software support included the development of training materials, the design of training courses and the training of trainers based on a needs assessment at WUSC.

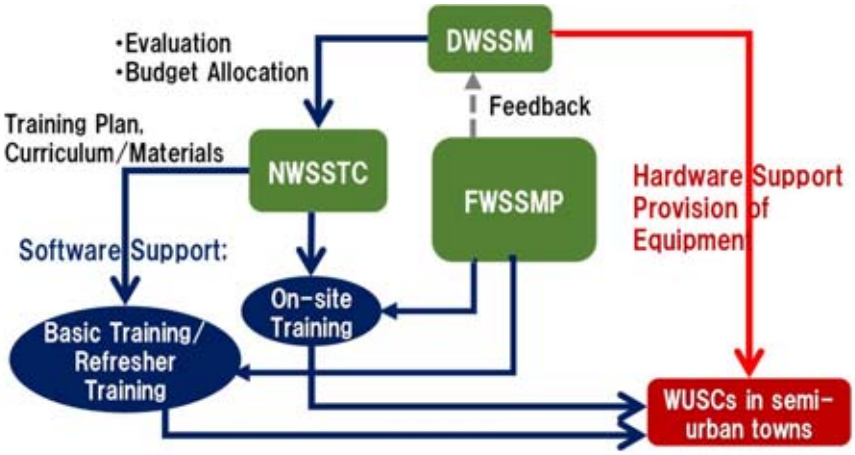


Figure 2.6 Outline of Proposed Supporting Mechanism

(3) Training

The training that constitutes the technical supporting mechanism is listed in Table 2.9.

Table 2.9 Training that Constitutes the Technical Supporting Mechanism

Activity/Training	Purpose	Summary
ToT for Basic Training	The selected candidates for instructor acquire necessary knowledge, skills and teaching method for implementing training regarding Management Model (hereinafter "Basic Training").	• Lecturer/Instructor: Japanese experts, persons who completed ToT • Trainees: Candidates selected by NWSSTC for training • Training venue: NWSSTC • Duration: Approx. 2-4 days
ToT for On-site Training	The selected candidates for instructor deepen his/her understanding of implementation method, points of attention and checklist, etc. of the local training.	• Lecturer/Instructor: Japanese experts, persons who completed ToT • Trainees: Local human resources (WSSDO staff, etc.) • Training venue: NWSSTC • Duration: Approx. 2 days
Basic Training	Target WUSCs acquire necessary knowledge and skills related to technology and management for operating water supply business based on the Management Model.	• Lecturer/Instructor: Persons who completed ToT for Basic Training (supported by Japanese experts if necessary) • Trainee: 1-2 persons each from the target WUSCs (Manager or board member and key technician) • Training venue: NWSSTC • Duration: Approx. 5 days (Management training: 1.5 days & SOP training: 3.5 days)
On-site Training	Trainers of the On-site Training give guidance and advice on how to utilize technical skills and knowledge acquired at Basic Training.	• Lecturer/Instructor: Persons who completed ToT for the On-site Training (supported by Japanese experts if necessary) • Trainee: Target WUSCs • Training venue: Target WUSCs • Duration: Approx. 1 day
Refresher Training (Observation and Interaction Workshop)	In the target WUSCs, • Feedback the results and issues of training attended. • Share good practices. • Acquire new knowledge which was not covered by previous Basic Training	• Lecturer/Instructor: Japanese experts, persons who completed ToT • Trainee: 2 persons each from the target WUSCs (Chairperson and Manager) • Training venue: NWSSTC • Duration: Approx. 2 days

Each training module repeats a series of training curricula over Term 1 (2017 to 2018), Term 2 (2018 to 2019), and Term 3 (2019 to 2020). Term 1 is a pilot phase to focus on practicing the supporting mechanisms, assessing the content of each training, and capacity and understanding of the participating trainees. The targeting plan was 13 Target-A WUSCs in Term 1, 27 Target-B WUSCs in Term 2, and the 28 remaining of Target-B WUSCs in Term 3.

It was proposed to utilize human resources available in the region (assume to be FWSSMP staff) as trainers for the On-site Training. The trainers for the On-site Training received a Training of Trainers (ToT) for efficient implementation of the On-site Training, especially on diagnosis using a checklist and

troubleshooting. In consideration of the workload of FWSSMP staff and the human resources shortage, it was proposed to allow some flexibility depending on the situation of human resource availability.

The 3rd Dang WUSC's Network Conference was a good platform to identify problems related to water supply in Dang district, and was also useful for federal, provincial and local governments to develop plans and policies to solve/mitigate the problems.

The WASMIP-II team suggested that DWSSM/NWSSTC should introduce a procedure of requiring a 5 minutes presentation from each WUSC during the Refresher Training (the Observation and Interaction Workshop) organized by NWSSTC, referring to the 3rd Dang WUSC's Network Conference. In June 2019, NWSSTC introduced this practice of 5 minutes presentation in the program of the 3rd Observation and Interaction Workshop. All participants were given an opportunity to share their good practices and their challenges.

The major problem faced by many WUSCs was with the water distribution pipelines being damaged by road construction projects. This problem was confirmed and witnessed through the site survey conducted for the target WUSCs and was twice highlighted in the Observation and Interaction Workshops. The main cause for the damaged water distribution network system was a lack of coordination, planning and effective communication among WUSCs, the Department of Roads and Road Users Committees.

As a result of extensive consultations during the workshops, the WASMIP-II team has identified, and introduced, a solution/mitigation measure to the pipeline damage due to the road construction activities. The suggested mitigation measure is as adopted and put in practice by Pragatinagar WUSC. This WUSC was the first in Nepal that persuaded the municipality office to allocate a budget for maintenance and replacement of water supply pipelines that are affected/damaged by road construction activities.

DWSSM's support to WUSCs, in particular for the human resource capacity development, is basically unchanged after the organizational restructuring. However, the maintenance of WUSC's facilities and the related support system was affected significantly due to the shortage of relevant human resources in local governments. After the organizational restructuring, some potential candidates as trainers for the Basic Training and the On-site Training were moved from DWSSM to provincial/local governments. Securing the use of experienced and suitable trainers was one of the critical issues for successful implementation of WASMIP-II.

2.5 Coordination with ADB/SEIU (Activities 1.4)

The WASMIP-II team coordinated with ADB and SEIU (Sector Efficiency Improvement Unit), both of who were key stakeholders for the support of the WUSCs. Technical support proposals were shared between the parties.

2.5.1 Activities

(1) ADB/ISSAU

Frequent discussions with the Third Small Town Project (STWSSSP-III) of DWSSM, which is financed by ADB, have been held by the WASMIP-II team to share the working progress and avoid overlapping of the scope of support by the two projects. The following is a chronological list of consultations and coordination with ADB/ISSAU (Institutional Support and Service Advisory Unit).

a) The ISSAU was established to strengthen the organizational capacity of DWSS.
b) The target WUSCs of STWSSSP-III were willing to participate in WASMIP training.
c) The Inception Report (IC/R) prepared by the ISSAU Consultant Team was discussed. The team was also briefed on the draft WASMIP-II work plan based on the revised PDM. ISSAU explained their IC/R, their main support is for both semi-urban towns and also for the rural WUSCs. ISSAU's support to WUSCs is mainly focused on water tariff and leakage reduction, and it was confirmed that there was no overlap in the contents of support provided and the WUSCs covered by ISSAU and by WASMP-II.
d) ISSAU members were invited to the Supplemental ToT in December 2018 and to the Basic Training in January 2019 to observe the WASMIP training content. ISSAU was provided the set of materials used in the WASMIP-II Basic Training.
e) In consultation with the ISSAU Consultant Team in January 2019, an interview was held with ISSAU regarding post-construction phase support and capacity building for WUSCs, which were under planning by ISSAU. The main points to be noted are as follows:
   - The support areas are (1) NRW reduction (e.g. installation of flowmeters), (2) water quality monitoring (e.g. distribution of water quality testing kits), (3) tariff billing application (partnership with application providers), and (4) cost reduction (especially electricity).
   - The total number of WUSCs covered by the project is 106, including 70 under the STSWSSSP and 36 others.
f) ISSAU conducted (i) Billing software training (May 2 to May 6 2019, 18 WUSCs participated) and (ii) Water quality measurement training (May 7 to May 10 2019, 59 WUSCs participated). Both covered WUSCs different from the WUSCs covered by WASMIP. The WASMIP-II team also attended the training sessions as an observer. Billing software used in the training was provided free of charge to the WUSCs by the software vendors. These software costs will be recovered by the vendor through a maintenance contract. The training on water quality measurement was conducted by Mr. Narayan (Water Quality Section Chief) who gave a lecture and explained the use of

measurement kits (Wagtech and Palintest).

g) The WASMIP-II team discussed with ISSAU on the project progress and activities on May 3 and June 17, 2019.

h) ISSAU was invited to the 5th Joint Project Coordination Meeting (JPCM) on June 16, 2019 to share the activities, achievements and challenges of WASMIP-II. ISSAU members attended the JPCM and participated in the coordination and discussions.

i) On July 22, 2019, the WASMIP-II team participated in a workshop related to the business plan for DWSSM delivered by ISSAU. This was for WASMIP-II to learn and understand the draft contents of the plan.

j) In consultation with ISSAU on August 30, 2019, data from target WUSCs of WASMIP-II were collected using a survey form prepared by ISSAU during a training course organized by WASMIP. This enabled the development of KPIs and information sharing.

k) The ISSAU contract ended on July 15, 2020. The main outputs of the activities of ISSAU were 1) benchmarking report on 52 Small Town WUSCs and 2) draft business plan of DWSSM and NWSSTC.

l) The "Status of KPIs of Drinking Water Committees" was held by NWSSTC for two (2) days from March 30 and March 31, 2021. The main purpose of the meeting was to explain the results of KPI analyses for the target WUSCs by the WASMIP-II team (Mr. Otsuka, JICA expert) and to share the information among the stakeholders (DWSSM, ISSAU and WUSC). The NWSSTC Chief, Mr. Kabindra Bikram Karki (WASMIP-II Project Manager), and the NWaSH consultant gave presentations on the benchmarking of 52 WUSCs (ISSAU), KPIs and the WaSH plan.

m) Mr. Otsuka illustrated the results of KPI analyses of targeted WUSCs including those by region and size of town with recommendations to improve water supply management including:
   1) Use KPIs continuously for improvement of the level of water supply management.
   2) Fully understand the attributes of KPIs by reviewing WASMIP management manual.
   (both relate to Activity 1-1 and 2)

n) The second phase of ISSAU, called ISSAU-II, started from January, 2021. The members are as follows; Raji Ojha (ISSAU chief, WASMIP trainer), Rajeeb Ghimire (ISSAC chief, former WASMIP PM), Deepak Puri (ISSAC consultant, main C/P in WASMIP-I), Harka Chhetri (ISSAC[2] consultant). The activity of the WASMIP II team was well known to all members of ISSAU, including the chief, who was already acquainted with the WASMIP-II team.

o) The WASMIP-II team received the IC/R of ISSAU-II and confirmed their activities.

p) ISSAU conducted the training on MIS (Management Information System) of NWaSH (National Water Sanitation and Hygiene), targeting 36 WUSCs, on August 2 and 9, 2021. Of the WUSCs that attended the training, 14 WUSCs were also the target WUSCs of WASMIP-II. The reason for the

[2] ISSAC (Institutional Support and Service Advisory Consultant) is a consultant team employed by a unit of ISSAU (part of DWSSM).

selection of those 14 WUSCs was 1) large-sized operation, 2) successful water supply operation, and 3) staff's high capacity. In addition, according to the local consultant of WASMIP-II team, who attended the training:

- The purpose of the training comprises: WUSCs formulate their plans to achieve their sustainable development goals by collecting the data related to water supply services using the NWaSH application software; and simple, accurate and reliable comprehension can be realized by concentrating all data to one place (ISSAU chief)
- The lectures had logical contents and included practical demonstrations using NWaSH application software.
- The COVID-19 lockdown prevented most WUSCs from collecting the data needed for input to the software. Only 6 WUSCs could input their data, out of 36 WUSCs total.

(2) SEIU

The SEIU, institutionalized in June 2012 as a secretariat of the Ministry of Urban Development at the time. SEIU is in charge of sector-wide coordination, planning, and monitoring of the water supply and sanitation programs of the Government of Nepal. SEIU is also responsible for promoting WASH sector-wide coordination, policy development, information management and communication, and to provide guidance and information on the water supply and sanitation programs of the Government of Nepal.

In June 2016, WASMIP-II held discussions with SEIU to identify and study the possible inputs for WASMIP-II from the outputs available with SEIU. SEIU has compiled information on 52 WUSCs into the "Water Service Providers Benchmarking Data Calculation Handouts (2016) ", which is widely used. Currently, SEIU is not staffed and is inactive.

2.5.2 Outputs

(1) ADB/ISSAU

a) In the STWSSSP-III of DWSSM financed by the ADB, ISSAU is established to strengthen the capacity of small town WUSCs. ISSAU provides institutional supports, and is staffed with the Team Leader, Financial and Institutional Expert, Legal Expert and IT Expert, and Program Associate. Two officials, the ISSAU Chief and an engineer, were assigned from DWSSM staff.

b) In the second discussion with the STWSSSP-III held in December 2017, the expert team explained the activities and schedule, and confirmed that the 76 target WUSCs of the project would like to join the WASMIP-II training. Both parties have a common understanding to work together to avoid duplication of works, as specified in a memorandum signed in November 2015.

c) DWSSM invited ISSAU to the 4th JPCM and to the Basic Training held from December 30, 2018 through January 4, 2019 (6 days) to share the training contents and methods.

d) DWSSM invited ISSAU to the 5th JPCM to share the project's progress status and discuss the challenges, which include:

- Securing human resources (trainers/monitors) and training modules implemented (ToT, Basic Training, On-site Training and Refresher Training/Observation & Interaction Workshop); and
- Follow-up of the rehabilitation works (procurement, delivery, installation, and application) on water supply systems at WUSCs, and securing the budget for training and rehabilitation works after WASMIP-II.

(2) SEIU

a) Some outputs from SEIU activities were shared with the WASMIP-II team, including "Water Supply Providers Handbook (2015)", and "Water Service Providers Benchmarking Data Calculation Handouts (2016) ". The SEIU compiled "Water Supply Providers Handbook" by collecting operation data and information from 63 water service providers, including some WUSCs. The "Water Service Providers Benchmarking Data Calculation Handouts" proposes 11 KPIs applicable for water service providers incorporating lessons learnt from the data collection for "Water Supply Provider Handbook". Both materials are evaluated as extremely useful to objectively evaluate the performance of water service providers.

b) It was confirmed that although existing as a unit in the Ministry of Water Supply, SEIU is not active or provided with budget and human resources. The former SEIU chief is now the chief of the NWSSTC.

2.6 Project Design Matrix (Activity 1.5)

The Project Design Matrix was revised to reflect the result of the precedent activities.

2.6.1 Activities

Based on the results of precedent activities, the contents of PDM and PO, which were not wholly confirmed, were discussed with the C/Ps from September 2017 onward and were confirmed in the 1st JCC meeting held in February 2018. In the 1st JCC, the goals and activities were changed to mainly focus on DWSSM and NWSSTC due to the transition to federalism (2017).

The 2nd JCC was held on August 26, 2019 and the changes to PDM and PO were approved. The main objective of the 2nd JCC was to share the role of DWSSM in supporting the construction and O&M of water supply facilities by the WUSCs, as the reorganization of DWSSM and change/transfer of subordinate organizations had occurred in November 2018. The challenges WASMIP team facing were also shared with the stakeholders.

2.6.2 Outputs

The initial PDM was prepared based on the Record of Discussions (R/D) exchanged between the Ministry of Urban Development, DWSS and JICA on December 22, 2015. Afterwards, since the local level governance in Nepal had been changed drastically compared to the situation at the beginning of WASMIP-II, PDM needed to be revised to keep up with the new situation.

At the 1st JCC on February 28, 2018, the revised PDM (ver. 2) was approved. The contents of the revised PDM (ver. 2) are shown in Table 2.10.

Table 2.10 Comparison of Original PDM and Revised PDM

Original PDM	Revised PDM (ver. 2)
Overall Goal	
Supporting mechanisms for WUSCs of semi-urban towns* by DWSS/NWSSTC/RMSO/WSSDO is established. (* Towns with population of over 5000 except those covered by ADB's STWSSSP projects)	Continuous support to WUSCs in semi-urban towns is provided by DWSS and NWSSTC.
Project Purpose	
Supporting mechanism for target WUSCs by DWSS/NWSSTC/RMSO/WSSDO is established	Support to the WUSCs in semi-urban towns is provided and strengthened by DWSS and NWSSTC using government and non-government organizations' personnel. (*)
Outputs	
(1) Support & Management Model (WASMIP Models) established in WASMIP I is reviewed/ and its implementation modality is established, contributing in finalization of PDM/PO. (2) Training Capacity of National Water Supply and Sanitation Training Center (NWSSTC) is strengthened.	(1) Baseline survey and capacity assessment of DWSS, NWSSTC, RMSO, WSSDO and the target WUSCs are conducted, and project implementation plan is finalized. (2) Supporting capacity of DWSS regarding O&M and management for WUSCs in semi-urban towns is strengthened.

Original PDM	Revised PDM (ver. 2)
(3) Human resource development and capacity enhancement system for target RMSO/WSSDO is established. (4) Trainingystem for target WUSCs by DWSS/NWSSTC/RMSO/WSSDO is established. (5) Monitoring System based on Performance Indicators (PIs) of target WUSCs are established in DWSS	(3) Implementing capacity of NWSSTC regarding the training for WUSCs in semi-urban towns is strengthened.
PDM, Objectively Verifiable Indicators	
<For Overall Goal> 1. More than XX% of target WUSCs adopt the business plan, SOPs and financial plan based on WASMIP Models. 2. More than XX% of target WUSC are annually monitored by DWSS.	**<For Overall Goal>** 1. The training are continuously implemented by NWSSTC on the Management Model for WUSCs in semi-urban towns. 2. The contents of the Management Model are utilized for the management of water supply of WUSCs in semi-urban towns.
<For Project Purpose> 1. More than XX% of target WUSC adopt the business plan, SOPs and financial plan based on WASMIP Models. 2. More than XX% of target WUSC are annually monitored by DWSS.	**<For Project Purpose>** 1. The revision process and sections of DWSS responsible for the Management Model and Technical Support Mechanism for WUSCs in semi-urban towns are identified. 2. The sections of DWSS responsible for the training on the Management Model for WUSCs in semi-urban towns and revision process of training implementation guideline are identified. 3. More than 15 trainers, who are able to carry out the training on the Management Model for WUSCs in semi-urban towns, are developed. From this trainer batch, at least six must be employees of RMSO or WSSDO. 4. Capacity assessment results of trainers on the Management Model for target WUSCs in semi-urban towns are improved compared to the baseline. 5. The final version of the Management Model, training implementation guideline, training plan, and training curriculums for WUSCs in semi-urban towns are officially approved/ authorized by DWSS.
<For Output 1> 1.1 Various WASMIP Models for type of water supply condition (water source, treatment method, etc.) are developed. 1.2 Revised PDM and PO	**<For Output 1>** 1.1 Results of the baseline survey and capacity assessment in DWSS, NWSSTC, RMSO, WSSDO and target WUSCs are shared with counterpart. 1.2 Project Design Matrix (PDM) and Plan of Operation (PO) are finalized.
<For Output 2> 2.1 NWSSTC has standardized training curriculum for water supply. 2.2 NWSSTC adopts/implements standardized SOPs and manual based on updated WASMIP Models. 2.3 Training implementation guideline is adopted by NWSSTC	**<For Output 2>** 2.1 The Management/Support Model for WUSCs in semi-urban towns formulated during WASMIP-I project is revised in the context of the actual situation of WUSCs in semi-urban towns. 2.2 Design manual of specifications on rehabilitation works for target WUSCs in semi-urban towns are shared in the annual progress review meeting of WSSDO.

Original PDM	Revised PDM (ver. 2)
<For Output 3> 3.1 Target WSSDOs have annual plans for training, monitoring as such. 3.2 Target WSSDOs & RMSOs receive training and OJTs from NWSSTC and deliver it to WUSCs. **<For Output 4>** 4.1 More than XX% of pilot WUSCs adopt the business plan, SOPs and financial plan based on WASMIP Models. **<For Output 5>** 5.1 Annual Monitory and Evaluation record/report of DWSS for target WUSCs are established. 5.2 Reward system/record of best performing WUSCs is established.	2.3 Rehabilitation works are carried out in more than 50 target WUSCs in semi-urban towns. **<For Output 3>** 3.1 Training implementation guideline, training plan, training curriculums and training materials for WUSCs in semi-urban towns are formulated. 3.2 The Management Model for WUSCs in semi-urban towns is utilized in training in NWSSTC. 3.3 More than 80% of target WUSCs attend the Basic Training on the Management Model. 3.4 Monitoring and evaluation of more than 80% of target WUSCs are carried out.
Other than above	
Other contents are amended as attached PDM and PO.	

At the 2nd JCC on August 26, 2019, the revised PDM (ver. 3) was approved. The revised PDM (ver. 3) is shown in Table 2.11.

The main revised items of PDM are as follows.

a) Change of organization names (DWSS >>DWSSM, RMSO >> FWSSMP, and WSSDO deleted)

b) Performance indicators were modified, but change of the R/D was deemed unnecessary for the following reasons:

- Although supporting WUSC on O&M of water supply facilities is a the key role and responsibility of the provincial and local governments, there is a difficulty due to lack of human resources and supporting capability. In addition, the components and scale of water supply facilities are different between small-scale WUSCs and large-scale WUSCs. O&M requirements for larger-scale WUSCs include expertise in civil, mechanical and electrical engineering, and water quality management. However, local governments do not have enough capacity to offer such supports.
- On the other hand, FWSSMP has large-scale water supply facilities as well as human resources and capability for O&M. Therefore, WASMIP-II aimed to support WUSCs in semi-urban towns by providing training for capacity building through FWSSMPs. In this case, there was no substantial changes in performance indicators. It is essential to train at least 6 trainers from organizations including FWSSMP for training in the WUSCs.

Table 2.11 Comparison of PDM (ver. 2) and PDM (ver. 3)

Revised PDM (ver. 2)	Revised PDM (ver. 3)
Overall Goal	
Continuous support to WUSCs in semi-urban towns is provided by DWSS and NWSSTC.	Continuous support to WUSCs in semi-urban towns is provided by DWSSM and NWSSTC.
Project Purpose	

Revised PDM (ver. 2)	Revised PDM (ver. 3)
Support to the WUSCs in semi-urban towns is provided and strengthened by DWSS and NWSSTC using government and non-government organizations' personnel. (*)	Support to the WUSCs in semi-urban towns is provided and strengthened by DWSSM and NWSSTC using government and non-government organizations' personnel. (*)
Outputs	
(1) Baseline survey and capacity assessment of DWSS, NWSSTC, RMSO, WSSDO and the target WUSC are conducted, and project implementation plan is finalized. (2) Supporting capacity of DWSS regarding O&M and management for WUSCs in semi-urban towns is strengthened.	(1) Baseline survey and capacity assessment of DWSSM, NWSSTC, FWSSMP and the target WUSCs are conducted, and project implementation plan is finalized. (2) Supporting capacity of DWSSM regarding O&M and management for WUSCs in semi-urban towns is strengthened.
PDM, Objectively Verifiable Indicators	
<For Project Purpose> 1. The revision process and sections of DWSS responsible for the Management Model and Technical Support Mechanism for WUSCs in semi-urban towns are identified. 2. The sections of DWSS responsible for the training on the Management Model for WUSCs in semi-urban towns and revision process of training implementation guideline are identified. 3. More than 15 trainers, who are able to carry out the training on the Management Model for WUSCs in semi-urban towns, are developed. From this trainer batch, at least six must be employees of RMSO or WSSDO. 4. The final version of the Management Model, training implementation guideline, training plan, and training curriculums for WUSCs in semi-urban towns are officially approved/ authorized by DWSS. **<For Output 1>** 1.1 Results of the baseline survey and capacity assessment in DWSS, NWSSTC, RMSO, WSSDO and target WUSCs are shared with counterpart. **<For Output 2>** 2.2 Design manual of specifications on rehabilitation works for target WUSCs in semi-urban towns are shared in the annual progress review meeting of WSSDO. 2.3 Rehabilitation works are carried out in more than 50 target WUSCs in semi-urban towns.	**<For Project Purpose>** 1. The revision process and sections of DWSSM responsible for the Management Model and Technical Support Mechanism for WUSCs in semi-urban towns are identified. 2. The sections of DWSSM responsible for the training on the Management Model for WUSCs in semi-urban towns and revision process of training implementation guideline are identified. 3. More than 15 trainers, who are able to carry out the training on the Management Model for WUSCs in semi-urban towns, are developed. From this trainer batch, at least six must be employees of FWSSMP. 4. The final version of the Management Model, training implementation guideline, training plan, and training curriculums for WUSCs in semi-urban towns are officially approved/ authorized by DWSSM. **<For Output 1>** 1.1 Results of the baseline survey and capacity assessment in DWSSM, NWSSTC, FWSSMP and target WUSCs are shared with counterpart. **<For Output 2>** 2.2 Design manual of specifications on rehabilitation works for target WUSCs in semi-urban towns are shared in the annual progress review meeting of FWSSMP.(*5) 2.3 Rehabilitation works are carried out in more than 50 target WUSCs in semi-urban towns. (*5)
Other than above	
Other contents are amended as attached in the PDM and PO. (*5): Rehabilitation works are to provide WUSCs in semi-urban towns foe equipment in order to recovery the function of water supply facilities.	

On February 1, 2021, in consultation with MoWS, DWSSM, and JICA, it was approved to extend the WASMIP-II activities until the end of March 2022, considering that the activities were delayed due to COVID-19. The following issues were discussed for completing all the activities of WASMIP-II within the

remaining one (1) year, that is: 1) Approval process for Management Model, etc., 2) Sharing the "Design Manual of Specifications on Rehabilitation Works for the Target WUSCs in Semi-urban Towns" during the FWSSMP annual progress review meetings, 3) Further cooperation between FWSSMPs and WASMIP-II, 4) Consider unification of a contact in DWSSM for inquiries from WUSCs, 5) How to avoid water pipeline damage caused by road construction works and the solution sharing, and 6) Securing a budget for water supply facility repair.

Confirmation of the indicators and data filing (e.g. Project Purpose and the Indicators of outputs 1 to 3) were carried out based on the PDM and towards the JICA's final evaluation (which was conducted from August to October, 2021). In the JCC on October 6, 2021, where the final evaluation report was approved, recommendations were provided by the evaluation mission on the items to be implemented before the completion of the project as follows:

1) Ensure achievement of the activities and the project purpose (recommendation to DWSSM, NWSSTC and the Project)
   Conduct one Basic Training and one On-site Training in line with the PO; and
   Approve the Management Model by DWSSM as per Indicator 5 of the Project Purpose in the PDM
2) Development of a Training Plan for NWSSTC (recommendation to NWSSTC)
   Regarding the overall goal of the Project, NWSSTC has stated that it will continue to provide training to another 192 WUSCs in semi-urban towns, in addition to the 68 WUSCs covered by WASMIP-II. To achieve this, NWSSTC will develop a specific training plan, including (i) training implementation structure, (ii) the numbers of training sessions (ToT, Basic Training, On-site Training, Refresher Training, etc.) and participants in each year, (iii) trainers, and (iv) budget for training.
3) Handover of the Management Model to ISSAU (recommendation to NWSSTC and the Project)
   NWSSTC and the Project should discuss how to ensure that the deliverables of the project, such as SOPs, videos, and other training materials developed in the Project, are transferred to ISSAU.
4) Counterpart training (recommendation to the Project)
   Based on the activities outlined in PO, there is one counterpart training remaining, which should be conducted during the project period.

2.7 Review and Update of WASMIP Model (Activity 2.1, 2.12, 3.12)

Although WASMIP Models, including the Management Model, Support Model and SOPs, were established in WASMIP-I, these materials were not implemented and utilized for actual O&M work at the WUSCs. The existing SOP of O&M of water supply facilities, including Water Quality Control and Monitoring, had the following problems:

- Treatment processes described in the WASMIP Models is applicable only to the three WUSCs (Dhulabari, Gauradaha, and Mangadh) and not to the other pilot WUSCs;.
- Mechanical and electrical procedures / instructions were insufficient.
- Actual/useful procedures of O&M of water treatment facilities, including Water Quality Control and Monitoring, are inadequate.

Therefore, the existing SOPs required to be revised and updated in order to achieve the following two goals:

1) The actual condition of the pilot and target WUSCs will be considered and reflected.
2) The operators can easily understand and implement the SOPs.

The WASMIP Management Model, which was developed and introduced under WASMIP-I, has been thoroughly reviewed and updated to reflect the development of the supporting mechanism and the results of the baseline survey. The WASMIP-II team was also tasked with the selection of KPIs as appropriate monitoring/management indicators according to the current state of the WUSC (Activity 2.1). Furthermore, the Management Model and indicators were improved and updated based on the results and feedbacks from the training provided by NWSSTC (Activity 2.12 and 2.13).

2.7.1 Activities

(1) Revision and Update of SOPs

As a result of site surveys in association with the revision of existing SOPs, the treatment processes of the pilot WUSCs were categorized into five patterns as shown in Figure 2.1. Furthermore, the following critical issues were found and clarified:

- Lack of flowmeters, chlorine injection units and sluice valves for O&M, etc;
- Insufficient instruments/tools for O&M; and
- Lack of SOPs, O&M records, and as-built drawings.

Considering the problems of the existing SOPs and the critical issues at Pilot WUSCs as mentioned above, the existing SOPs were revised and updated in accordance with the following methods and steps.

a) Plan the contents
   - To focus on the five patterns of treatment processes;
   - To add mechanical and electrical contents;
   - To describe how to use each instrument (POTA TEST, etc.); and
   - To prepare the format of the daily O&M record.
b) Prepare the draft SOPs

- To describe/express simply, clearly and visually by using illustrations and photographs; and
- To prepare two versions of SOPs; a full version for managers and engineers, and a summarized version for technicians and operators

c) Use the drafts in an actual training

d) Improve and finalize the revised/updated SOP

Of the existing Management Models, the "Water Treatment Facilities and Water Quality Management SOP has been completely revised and a new record form for O&M of water treatment facilities and water quality management has been prepared and attached to the SOP. In addition, a new SOP for Water Intake Facilities has been prepared. The Water Distribution Facility SOP and the Water Meter Management SOP have been partially revised based on the existing deliverables.

SOPs version 1 (English and Nepali versions) were revised and updated as version 2 in November 2017, and were submitted and reviewed by the concerned personnel of DWSSM. In particular, the technical words and explanatory articles were clarified.

According to the suggestion from the PM (Mr. Kabindra Karki) on the revised SOPs (version 2), by adding contents on the rapid sand filter, which is adopted in one of 68 WUSCs and other comments, the revised SOPs (version 3) was finalized and distributed to trainers (Basic Trainers and On-site Trainers) in the Supplemental ToT and the Basic Training in December 2018.

The revised SOPs (version 3) were reviewed based on the results of the 1st Basic Training. The WASMIP-II team discussed with DWSSM the points to be revised for the Basic Training materials and confirmed the necessity to develop video materials (visualization on outlines of water supply systems, facility O&M, cleaning facilities, making solution with bleaching powder, how to use the water quality test kits and devices, etc.) for the WUSCs. After that, the final version of the SOP (version 4) has been developed as shown in Appendix 2.15. SOP Final Version Appendix and Record Form are shown in Appendix 2.16 and 2.17 respectively.

The video materials for the Basic Training were examined and revised based on comments from the C/Ps, and review on the comments by Japanese experts. The experts found that some parts of the materials also were needed to be revised, and instructed the editor to make further revisions and provide detailed explanations. Thereafter, the revised video materials were confirmed and finalized.

A simplified version of SOPs that had already been established was prepared. The simplified version was summarized into one (1) or two (2) pages in A4 size, by type of equipment or facility and work procedure. It was also prepared to be easily used by operators by displaying on site.

The revised SOPs and a draft of simplified version of SOPs for WUSC operators (English version 1) were distributed to DWSSM staff for review. Nepali versions of the simplified SOPs intended for WUSC operators were also prepared. The SOPs in Nepali version were translated in three stages;

a) WASMIP national staff translated the English version into Nepali version;

b) The draft Nepali documents were checked by an outsourced translator; and
c) DWSSM staff familiar with the WUSCs and their field situations provided review and comments, especially, regarding technical words and expressions.

The simplified SOPs in the Nepali version were laminated and distributed to the target WUSCs during the Basic Training and the On-site Training. The final version of simplified SOPs (Appendix 2.18) was submitted to the DWSSM along with the full version of SOPs and PowerPoint materials for ToT (English and Nepali).

(2) Selection of Key Performance Indicators (KPIs) for WUSCs

As for the existing "Business Plan Module", it was decided to revise it completely in three parts: Business Report, Financial Report and Business Plan. In addition, based on the result of analyses on the Guidelines, the Benchmarking Handbook developed by SEIU, and the annual business reports and financial statements of target WUSCs, the proposed management evaluation indicators were finalized and reflected in the module.

SEIU Benchmark Indices were selected as monitoring and management evaluation indicators for WUSCs. The indices were designed and developed for various sizes of water service providers in Nepal. SEIU conducted training for Nepal Water Supply Corporation (NWSC), Kathmandu Upatyaka Khanepani Limited (KUKL), and the Water Supply Management Board (WSMB) in November 2016 to introduce the indices. For comparison between organization, the WASMIP-II determined to harmonize the SEIU Benchmark Indices as shown in Table 2.12 with the WUSC evaluation indicators.

Table 2.12 SEIU's Evaluation Indicators

Category		SEIU Benchmark Indexes
Type of Service	Connection	Water Coverage Ratio
	Water Production	Water Production Ratio
	Water Consumption	Water Consumption Ratio
Quality of Service	Water Meter	Metered Ratio
	Length of Service Hour	Service Hours
	Water Quality	Water Quality Compliance Ratio
Finance/ Human Resource	Billing	Non-Revenue Water (NRW)
	Cost	Daily Production Cost, Operating Ratio
	Income	Collection Ratio
	Human Resource	Staff Ratio

2.7.2 Outputs/Findings

(1) Main Outputs on SOPs

a) The existing SOPs developed by WASMIP-I was revised and updated to comply with the actual conditions in the 68 target WUSCs. With regard to the water treatment process, the SOPs were updated to focus on five categories of treatment process found in the Target-A WUSCs, and the coverage of

mechanical & electrical components was added. The latest updated versions of the SOPs are shown in Appendix 2.15.

b) Maintaining functioning of water supply facilities is necessary for continuous and sustainable water supply. In other words, daily and periodic inspections for preventing failure, and efficient repair works have to be conducted adequately and efficiently. Therefore, the SOPs were updated to include more elements related to preventative maintenance and troubleshooting procedures. The trainers for the Basic Training and the On-site Training are expected to provide practical lectures and advice so as to facilitate the implementation of preventative maintenance and troubleshooting at the target WUSCs.

c) Consideration was given to the usability of the SOPs, whose primary users were the technical staff of the WUSCs, which is a community-based organization. For that purpose, the SOPs were updated to include more illustrations using photographs and an easy-to-use format for daily recording of operation. Two versions of the SOPs were prepared according to the role of the users: one was a full version for the WUSC managers and engineers, and the other was a summarised version for WUSC technicians and operators.

(2) Key Considerations on Management

a) With regard to the business component of the WASMIP Model, “Business Plan module" was developed under WASMIP-I. As part of this development, WASMIP-I proposed that WUSC introduce a management model to set a goal for sustainable water supply services and elaborate business plans to achieve the set goals. It was also proposed that WUSC business plan is managed as a “rolling” plan with an annual update. By the end of WASMIP-I, an initial business plan was developed for the three pilot WUSC and also for some semi-urban WUSCs in Morang and Jhapa Districts.

b) In WASMIP-II, it was proposed that the “Business Plan Module" should be improved and upgraded to “Management Modules". The proposed “Management Modules" consist of two parts:
   - KPIs which explain how to collect the operation data of the WUSC.
   - Business planning to identify and formulate action plans for management and O&M of the WUSC.

c) It was learnt from the baseline survey that many target WUSCs were unable to calculate the performance indicators for the latest financial year, due to lack of daily records of operation, maintenance and finance, as well as lack of knowledge of how to calculate the appropriate values.

d) Performance indicators were modified in the Second JCC held on August 26, 2019.

After the approval of the Management Model, DWSSM is planning to distribute the model throughout Nepal and will request the approval of the Ministry of Water Supply after the completion of the Project. Therefore, the model will be mainly in Nepali language version for convenience and versatility. Therefore, the Nepali version of the SOPs and PowerPoint slides were proofread, especially for technical terms.

2.8 Rehabilitation Work (Activities 2.2, 2.3, 2.4)

The main objective in conducting rehabilitation works for the target WUSCs is to provide a suitable environment to implement the revised / updated SOPs in each WUSC. The concept of rehabilitation works for the target WUSCs is as follows:

- To recover the function of each water treatment facility;
- To have an estimate, and/or proper measurement, of the quantity of water supply at each WUSC; and
- To provide safe water for consumers through proper chlorination

The WASMIP-II team assisted in identifying suitable specifications for rehabilitation works that were necessary to facilitate implementation of the Management Model at the target WUSCs (Activity 2.2, 2.3). In addition, the team supported the development of a manual for the specification and design of facilities (Activity 2.4).

2.8.1 Activities

(1) Facility Rehabilitation

The table below shows the DWSSM budget for each financial year and a summary of the facility rehabilitation activities undertaken. A description of the activities carried out in each year is also given below.

Table 2.13 DWSSM's Budget related to this Project

Financial Year	Rehabilitation Budget (NPR)	Summary of Facility Rehabilitation
2073/74 (2016/17)	15,000,000	• Target-A Procurement and installation of chlorine injection units, flowmeters, valves, pressure gauges etc. for WUSCs (13 No.). • Provision of simple water testing kits and electrical measuring equipment to the WUSC.
2074/75 (2017/18)	50,000,000 24,000,000 for 5 RMSOs	• Target-B Procurement and installation of chlorine injection units, flowmeters, valves, pressure gauges etc. to WUSCs (55 No.). • Provision of simple water quality testing kits and electrical measuring equipment to the WUSC.
2075/76 (2018/19)	10,000,000	
2076/77 (2019/20)	20,000,000	
2077/78 (2020/201)		• Provision of mobile water quality testing vehicles to seven provinces (one of which is fully equipped and is provided by WHO) • Provision of equipment sets for the above vehicles (3 of which sets are provided by UNICEF and one set provided by WHO)

1) Nepal 2073~2074 (2016~2017 AD)

In order to fully understand and comprehend the current situation of each Target A WUSC and identify the facility and/or equipment to be rehabilitated prior to the introduction of the Management Model, a site survey for Target-A WUSCs was conducted from July 2016 to March 2017. As a result of this site survey,

the list of the items to be rehabilitated, replaced, and/or newly installed is shown in Table 2.14. Furthermore, as a result of this site survey, a flow diagram indicating the location of rehabilitation works for each WUSC has been prepared and is shown in Appendix 2.19.

Table 2.14 Rehabilitation Works for Target-A WUSC

No.	WUSC	Rehabilitation Works		Remarks
		Items	Qty	
1	Gulariya	To install chlorination unit (pump injection type)	1	
		To install pressure gauge & sluice valve	2	existing well pump
2	Beljhundi	To install flowmeter	6	
		To install chlorination unit (gravity injection type)	6	
3	Pragatinagar	To replace/install flowmeter	3	
		To install chlorination unit (pump injection type)	2	
		To install pressure gauge	3	existing well pump
4	Ramgram	To install flowmeter	1	
		To install pressure gauge	1	existing well pump
5	Shankarnagar	To install chlorination unit (pump injection type)	2	except for diaphragm pump
		To install pressure gauge	4	existing well pump
		To install sluice valve	1	existing well pump
		To install check valve	2	existing well pump
6	Besisahar (Urban Area)	To install flowmeter	5	
		To install chlorination unit (pump injection type)	1	
		To install sluice valve	1	
	Besisahar (Rural Area)	To install flowmeter	5	
		To install chlorination unit (gravity injection type)	8	
7	Amlekhganj	To install flowmeter	2	
		To install chlorination unit (pump injection type)	1	
		To install sluice valve	4	inlet of reservoir
8	Karmaiya	To install flowmeter	3	
		To install chlorination unit (pump injection type)	1	
9	Manthali	To install flowmeter	6	
		To install chlorination unit (pump injection type)	2	tube well
		To install chlorination unit (gravity injection type)	2	WTP
10	Chautara	To install flowmeter	2	WTP
11	Dhulabari	To replace existing flowmeter	1	existing well pump
		To install check valve	1	existing well pump
		To replace pressure gauge	1	No.1 Wash Water Lifting Pump (WTP)
12	Gauradaha	To replace flowmeter	3	backwash and distribution pipe
13	Mangadh	To replace flowmeter	2	existing well pumps

- According to the proposed list, the specification of each item was examined and determined. A quotation for each item was collected from at least three suppliers in accordance with the determined specification and the total cost of the rehabilitation works has been estimated. The specification, quantity and cost estimation of rehabilitation works for Target-A WUSCs are summarized in Appendix 2.20.
- Based on the estimated cost, DWSSM secured NPR 15 million as budget for BS 2073/74. The WASMIP-II team assisted to compile the necessary documents for the tendering procedure including Bill of Quantities (BOQ). A bid, under the procurement rules of Nepal, was floated for a Contractor to perform the facility repair and rehabilitation for the Target-A WUSCs, and the selected Contractor implemented the rehabilitation work at each WUSC.
- A total of 60 sets of water quality test kits were procured and provided to the WSSDOs and WUSCs that did not already have such kits. Electrical equipment (clamp meter, insulation resistance meter, and earthing ground resistance meter) was also procured and provided to the Target-A WUSCs. Operation manuals for the procured simple water quality test kits and electrical equipment were prepared and orientation was conducted at the RMSO units.
- Initially, filling material for aeration tanks was planned to be procured for Gauradaha WUSC (Jhapa district), but it was decided to procure it in the following year (BS 2074/75) due to quality problems with filling material available locally. For the dosing pump attached to the chlorine injection units, the power supply specification in the Purchase Order was single phase, but the Contractor selected a mixture of single phase and three phase power supplies, so the type of power supply at the 13 WUSCs was reconfirmed and approved.
- The site of Pragatinagar WUSC (Nawalparasi District), one of the Target-A WUSCs, was inspected and it was confirmed that the procured chlorine injection units and flowmeters were properly installed. Technical guidance was also provided on how to adjust the chlorine solution (1.0 w/v %), the appropriate chlorine dosage according to the water supply amount, and the measurement method of the chlorine injection.
- From June to November 2016, the WASMIP-II team visited the water quality testing laboratories of DWSSM and NWSSTC, and conducted a field check on the implementation of water quality testing at the WUSCs. Based on the results, a draft list of water quality testing equipment (see Appendix 2.6) was prepared.

2) Nepal 2074~2075 (2017~2018 AD)

- The rehabilitation works covered the 55 Target-B WUSCs and field surveys of all 55 Target-B WUSCs were carried out between late September 2017 and mid-October 2017. Based on the results of the surveys, a schematic flow diagram for facility improvement was prepared, specifications were prepared, and procurement support was provided to DWSSM. In addition, simple water quality test kits, electrical equipment and safety protection equipment were procured and distributed.

- The needs survey was conducted for all 68 target WUSCs on additional equipment such as flowmeters, chlorine injection units, valves, water level gauges. As for the water level gauges, it was considered useful to install them in elevated water tanks, so the existing elevated water tanks and the availability of water level gauges were surveyed. In addition, national staff was sent to 48 WUSCs to check the installation status of the procured equipment, the status of operation and maintenance, and the improvements made.

3) Nepal 2075~2076 (2018~2019 AD)

- The WASMIP-II team revised and updated the schematic flow diagrams of the 68 target WUSCs based on the survey for the equipment installation condition. In addition, the list of the procured equipment and installation status for the 68 target WUSCs was prepared to obtain a clear understanding of the installation progress as of July 15, 2019. The WASMIP-II team has continuously revised and updated the flow diagram and installation list according to the newly procured equipment installation progress.
- A follow-up investigation revealed that some of the procured equipment was not delivered to the intended WUSC, but was mistakenly delivered to another WUSC or to WSSDO. In order to avoid this situation, it was decided to subsequently use one procurement package and one Contractor and to add a condition to the Contract that payment would be made on confirmed delivery (or partial installation) to the WUSC site.
- Supreme Associates Traders won the new tender for the procurement of the equipment, and by the end of the fiscal year (15 July), approximately 60% of the equipment had been procured and delivered. Partial payment was made for the procurement, with the remainder to be paid from the following year's budget (2076/2077) after delivery was completed.
- Visits to Manthali WUSC, Shivasatakshi WUSC, Beljhundi WUSC, Jhakredhunga (Amritpur) WUSC, Narayanpur WUSC, Bharatpur WUSC and Chaughera WUSC were made to conduct interviews, check the water supply system on the basis of the schematic flow diagram and check the installation of the equipment provided.

4) Nepal 2076~2077 (2019~2020 AD)

- The budget for the rehabilitation of the facilities was NPR 20 million, but the effective budget for new procurement and installation was only NPR 16 million, because NPR 4 million was needed for outstanding payment to the Contractor for BS 2075/76 (which had not been paid pending delivery of some equipment) was paid from the current year's budget.
- Finally, the fiscal budget in BS 2076/77 (2019/20) for the rehabilitation works of the water supply facilities of the WUSCs was not utilized due to COVID-19.

5) Nepal 2077~2078 (2020~2021 AD)

- The budget allocated by DWSSM for the 2077/78 fiscal year was NPR 15 million for the rehabilitation work and NPR 6 million for WASMIP-II trainings. The budget could be expended without any delay.

- A list of equipment for rehabilitation works in 2077/78 (2020/21) was prepared in collaboration with the Planning, Monitoring and Evaluation Section of DWSSM. The equipment to be procured was 1) flowmeters, 2) chlorination units, 3) pH/EC meters and 4) water quality test kits. DWSSM listed the necessary equipment for another 16 WUSCs in semi-urban towns in addition to the target 68 WUSCs. Thus, activities aimed to restore the functioning of water supply facilities have been expanded to additional WUSCs in semi-urban towns.
- Regardless of the above situation, rehabilitation works for the target WUSCs were not carried out during the fiscal year 2077/78. The budget was used for constructing new water supply facilities. The reason for this was that the WUSCs had not requested FWSSMP to procure the required equipment, even though the WUSCs had prepared their lists.
- DWSSM was provided a water quality test vehicle by WHO. In addition, DWSSM procured another 7 water quality test vehicles and provided them to 7 provinces. The vehicle from WHO was supplied with water quality test equipment. UNICEF provided 3 sets of test equipment for another 3 vehicles. Equipment for the remaining 4 vehicles was procured and installed by DWSSM. A total of 8 water quality test vehicles are now managed by the Water Quality Section of DWSSM.
- The following 16 parameters can be tested in the vehicles: 1) pH, 2) Turbidity, 3) Electrical Conductivity, 4) Total Dissolved Solids (TDS), 5) Free Residual Chlorine (FRC), 6) Ammonia, 7) Chloride, 8) Nitrate, 9) Total Hardness, 10) Calcium, 11) Iron, 12) Manganese, 13) Arsenic, 14) Fluoride, 15) E-coli, and 16) Total Coliform.
- The Water Quality Section of DWSSM secures the necessary budget for procuring reagents. The FWSSMPs procure the reagents and maintain the vehicles.

(2) Development of Design Manual of Specifications for Rehabilitation Works

"Design Manual of Specifications on Rehabilitation Works (Draft)" was prepared in coordination and collaboration with the C/Ps in order to utilize the contents of the Management Model would for water supply business management by the WUSCs. The manual shows the processes and procedures needed for setting appropriate specifications for the procurement and installation of equipment that is essential for the operation and maintenance of water supply facilities in the WUSCs.

The WASMIP-II team discussed the contents of the draft design manual with the Planning Section, in charge of budget allocation and facility planning, and the Water Quality Section, in charge of facility construction, of DWSSM. It was suggested the draft design manual should incorporate; 1) Proper valve positions in water supply systems, 2) Site survey procedure, 3) SOPs reference, and 4) DWSSM's "Design Guidelines for Community Based Gravity Flow Rural Water Supply Schemes" (especially, chlorine injection units, flowmeters and valves). The scope of the manual was to provide guidance on the minimum requirements for facility rehabilitation.

The draft design manual was revised as Version 1 based on the above comments by DWSSM. The main points of revision were; 1) the necessary information and the procedure to create a schematic flow diagram,

2) the site survey procedure for creating the flow diagram, 3) the proper installation locations of flowmeters and chlorine injection units, and 4) the procedure to design specifications for flowmeters and chlorine injection units.

After the transition to a federal government, direct support to WUSCs such as facility construction and O&M, except for large-scale construction, became an obligation of local government not DWSSM. If the water supply facilities in the WUSCs require rehabilitation, maintenance, or the installation of necessary equipment, the FWSSMPs and/or local governments have to investigate and review the details and specifications according to the request from the WUSCs. Therefore, the draft design manual was revised as Version 2 by expanding the target to DWSSM/FWSSMP and WUSCs in semi-urban towns, clarifying the objectives, and adding procedures for procurement of equipment.

The “Design Manual of Specifications on Rehabilitation Works for Target WUSCs in Semi-urban Towns” was revised and was finalized at the end of May 2021 and submitted to DWSSM. The manual was also prepared in a Nepalese version taking into consideration the expected future distribution to WUSCs.

After the review and approval by DWSSM, the outline of the design manual was explained at the " Seminar on WASMIP II-achievements and Way forward " held by DWSSM on August 24, 2021.

2.8.2 Outputs/Findings

(1) Target-A WUSC

Since it was anticipated that the rehabilitation works for the Target-A WUSCs would primarily facilitate the implementation of the WASMIP Model, priority was given to the equipment needed to efficiently perform and recover the functions of water treatment facilities; i.e. measurement equipment to collect data such as quantity of water supply and chlorin injection units for improved water quality management.

In order to share the expertise of the WASMIP-II team, the contents of rehabilitation work, construction scope, quantities, specifications and estimated cost were studied in close consultation with DWSSM. The draft "Design Manual of Specifications on Rehabilitation Works for WUSCs in Semi-urban Towns", as shown in Appendix 2.21, were prepared to provide suitable specifications for rehabilitation and implementation of rehabilitation works to be performed by DWSSM, and related institutions after the WASMIP-II completion. The flow diagram indicating the location of rehabilitation works for the Target-A WUSCs has been prepared as shown in Appendix 2.22. Also, the specification, quantity and cost estimation of rehabilitation works for the WUSCs have been summarised in the BOQ format as shown in Appendix 2.23.

Planning and implementation of the rehabilitation works for the target WUSCs is conducted by DWSSM. According to the DWSSM regulations, the "Public Procurement Act BS 2063" (tender process), if the total estimated amount is more than NPR 1 million, the bidding procedure requires publishing a public notice of the tender. The Planning Section of DWSSM secures the budget for rehabilitation works. The budget was

NPR 15 million for 13 Target-A WUSCs in BS 2073/74 (from July 16, 2016 to July 15, 2017) and NPR 55 million for 55 Target-B WUSCs in BS 2074/75 (from July 16, 2017 to July 15, 2018).

(2) Target-B WUSC

Regarding to the Target-B WUSCs, DWSSM secured NPR 53.5 million budget for the BS 2074/75 (from July 16, 2017 to July 15, 2018) for repair and rehabilitation. The WASMIP-II team collaborated with DWSSM to conduct field surveys and specification review and started a bidding procedure for the same. The specifications, quantities and cost estimates for rehabilitation works for the Target-B WUSCs have been summarised in the BOQ shown in Appendix 2.24.

Due to the large number of the Target-B WUSCs, the survey was mainly conducted by phone to comprehend the current operational situation of each Target-B WUSC and to arrive at a conclusion on the facility and/or equipment that needs to be rehabilitated. The survey focused on the water flowmeters and chlorine injection units so that every Target-B WUSC could meet the defined concept/objectives.

(3) Procurement of Water Quality Test Kits

The monitoring of water quality is one of the critically important activities for safe water supply services. The water quality parameters to be monitored and their standard values, etc. are stipulated in Nepali directives/guidelines. However, most WUSCs have not conducted any water quality monitoring, due to the lack of required instruments and/or test kits. For improvement of this situation, DWSSM and WASMIP-II decided to provide water quality test equipment for Target-A and B WUSCs using WASMIP-II counterpart budget allocated by DWSSM.

It was difficult to find general water quality test instrument in Nepal due to the small market, and it was necessary to import the instrument, for example from China, India or Japan. Even when the instrument is imported, it takes time to obtain necessary reagents and consumables for the instrument. Based on a local market survey, two types of water quality test instrument/kit are available in Nepal, which are ENPHO Water Test Kit and POTATEST.

ENPHO Water Test Kit is distributed by Eco Concern Private Ltd., which is established by the Environment & Public Health Organization (ENPHO) and is a Non-Profit Organization (http://enpho.org). The price of the kit is around NPR 10,000, which is not expensive. However, there is a small logistical issue with the procurement of reagents from the company. The company can only deliver the reagent for customers within Kathmandu and can not serve and deliver customers outside Kathmandu.

Figure 2.7 ENPHO Water Test Kit

POTATEST is a water quality test kit available from Palintest (https://www.palintest.com/en). With WHO support, the equipment is distributed to small WUSCs for implementing the water quality monitoring. The POTATEST kit is designed as user-friendly equipment, as is the ENPHO water test kit also. However, the number of monitoring parameters is limited, and the price of the equipment is around NPR 300,000, which is much more expensive than the ENPHO water test kit. The POTATEST kit uses reagents that are available in the local market, making the procurement of reagents for the equipment easier than for the ENPHO water test kit. BTC Pvt. Ltd. in Kathmandu distributes the reagents for the POTATEST test kit.

Figure 2.8 POTATEST

Table 2.15 shows the measurable parameters for each test kit. The ENPHO water test kit can measure ten parameters, whereas the POTATEST kit can measure only five parameters. The ENPHO kit is used for qualitative analysis, and its range of measurement is significantly wider than POTATEST. On the other hand, POTATEST can show figures for each of five parameters. Both water quality test kits are easy for the WUSC operators to use.

DWSSM and the WASMIP-II team decided to procure ENPHO water test kits for the 68 target WUSCs and also kits for DWSSM and NWSSTC. The kits were distributed to the target WUSCs during the On-site Training.

The procurement of reagent for the test kit is essential for the proper operation and water quality monitoring activities at each WUSC. However, the reagent vendor for ENPHO can only deliver in Kathmandu. For the time being, DWSSM will stock/store the reagents and provide them to WUSCs when the WUSC Chairperson or Manager visits DWSSM for a meeting. It is suggested that the possibility for the WUSCs to procure the reagents directly from the vendor should be investigated

(4) Procurement of Electrical Measuring Instruments

In order to continue with sustainable O&M of water supply facilities by implementing the Management Model at WUSCs in semi-urban towns, preventive maintenance measures are recommended. According to the baseline survey results for the 68 target WUSCs, most of the WUSCs have power generators, and 59 out of 68 WUSCs have a well pump. However, most of the target WUSCs do not have the appropriate and adequate instruments to conduct necessary inspections for preventive maintenance of electrical equipment, such as a generator and a well pump. To improve this situation, DWSSM and the WASMIP-II team agreed to provide the minimum required electrical testing instruments for the target WUSCs using WASMIP-II budget allocated by DWSSM.

Table 2.15 Items that can be measured by each water quality test kit

No.	Category	Parameter	Standard		POTATEST (Wagtech)	ENPO Water Test Kit	Notes
1	Physical	Turbidity	5	NTU	✓		
2		pH	6.5-8.5	-	✓	✓	
3		Color	5	TCU			
4		Taste and Odor	Non-objectionable				
5		TDS	1,000	mg/L			
6		Electrical Conductivity	1,500	mg/L			
7	Chemical	Iron	0.3	mg/L		✓	
8		Manganese	0.2	mg/L			
9		Arsenic	0.05	mg/L			
10		Cadmium	0.003	mg/L			
11		Chromium	0.05	mg/L			
12		Cyanide	0.07	mg/L			
13		Fluoride	0.5-1.5	mg/L			
14		Lead	0.01	mg/L			
15		Ammonia	1.5	mg/L		✓	
16		Chloride	250	mg/L		✓	
17		Sulphate	250	mg/L			
18		Nitrate	50	mg/L		✓	
19		Copper	1	mg/L			
20		Total Hardness (as CaCO3)	500	mg/L		✓	
21		Calcium	200	mg/L			
22		Zinc	3	mg/L			
23		Mercury	0.001	mg/L			
24		Aluminium	0.2	mg/L			
25		Residual Chlorine	0.1-0.2	mg/L	✓	✓	
26	Micro biological	*E.Coli* (MPN/100mL)	0		✓		
27		Total Coliform (MPN/100mL)	0 in 95%samples		✓	✓	
28	Others	Temperature	°C			✓	Not Included in NDWQS
29		Phosphate	mg/L			✓	Not Included in NDWQS

Note: Water quality parameters and standards are in accordance with the "National Drinking Water Quality Standards, 2005".

According to a survey of the local market, it was found to be necessary to import the general electrical testing instruments, for example from China, India or Japan. Taking instrument performance and quality into consideration, DWSSM and the WASMIP-II team procured digital clamp meters, insulation continuity testers, and earthing resistance testers that are made in Japan for the target WUSCs and FWSSMPs. Details are shown in Table 2.16.

Table 2.16 Outline of the Electrical Measurement Equipment Procured

Instrument name	Specification	Model/ Manufacturer
Digital Clamp Meter 	• Electric Current Measuring Range: 0.8 to 1,000 A Accuracy: ±1.5% (0-629.9A), ±2.0% (570-1049A) • Voltage (AC/DC) Measuring Range: 0 to 629.9 V Accuracy: ±1.2 to 1.5% (AC), ±1.2% (DC)	2007R/ KYORITSU ELECTRICAL INSTRUMENTS WORKS, LTD.
Insulation Resistance Tester 	• Insulation Resistance Measuring Range: 0 to 1,999MΩ (Nominal Voltage: 250, 500, 1,000V) Accuracy: ±1.5% (20-200MΩ), ±10% (2,000MΩ) • Continuity Measuring Range: 0 to 1,999Ω Accuracy: ±1.5%	3007A/ KYORITSU ELECTRICAL INSTRUMENTS WORKS, LTD.
Grounding Resistance Meter 	• Grounding Voltage Measuring Range: 0 to 199.9 V Accuracy: ±1.0% • Ground Resistance Measuring Range: 0 to 1,999Ω Accuracy: ±2.0%	4105A/ KYORITSU ELECTRICAL INSTRUMENTS WORKS, LTD.

(5) Development of Design Manual

After completion of WASMIP-II, DWSSM themselves will conduct necessary rehabilitation works for the other WUSCs in semi-urban towns to continue implementing of the Management Model at every WUSC. For this purpose, the "Design Manual of Specifications on Rehabilitation Works for WUSCs in Semi-urban Towns" were prepared by the WASMIP-II team.

A manual related to specifications of facility repair, rehabilitation, and maintenance was prepared so that DWSSM can disseminate the manual to related stakeholders, such as the WSSDOs and local governments, so that the repair, rehabilitation and maintenance of the facilities in the WUSCs will be carried out on a regular basis, even after the completion of the WASMIP-II. The manual also contributes to cost reduction and facilitates the procurement process using standardized specifications. The goal is that by using this manual the person in charge of facility repair and rehabilitation, or a related Section in DWSSM, will be able to prepare the documents such as quantities and specifications required for procurement (bidding) after conducting necessary survey and investigations.

(6) Inspection after rehabilitation work

site survey to confirm the result/status of rehabilitation work at Pragatinagar WUSC, one of the Target-A WUSCs, was conducted on August 26, 2017. As a result of this survey, following facts arose:

- Installation locations have changed due to misunderstanding by the WUSC.

- The newly installed chlorine injection units are suffering from problems such as: installation point of the backpressure valve was wrong; leakage at a pipe joint was found; anchor bolts were not used for fixing the equipment; and the size of the concrete base was structurally inadequate.

Figure 2.9 Rehabilitation of Facilities at Pragatinagar WUSC
(Left: New chlorine injection unit, Right: New on-site control panel)

Between June 10 and June 12, 2018, the WASMIP-II team conducted site surveys to confirm the status of rehabilitation works at Pichhra, Mangadh, Urlabari, Dhulabari, Shivasatakchi, Chandragadi I and II. As a result of this survey, the points listed in Table 2.17 were noted.

Regarding the following-up on the target WUSCs, the WASMIP-II team visited 12 WUSCs (from January to June 2019), and confirmed the status of O&M, installation of procured equipment, management and improvement points. The WUSCs were classified into 4 status groups: Level 1) NO installation of equipment, Level 2) installed equipment but NO records, Level 3) keeping records but NO analysis, Level 4) analysing data and detecting potential errors.

Table 2.17 Status of facility rehabilitation at the above WUSC

WUSC	Situation
Pichhra	・ Chlorine injection unit delivered but not installed ・ Pressure gauges have not been installed
Mangadh	・ Flowmeters at the water source have been installed ・ Flowmeters in water pipes have not been updated
Urlabari	・ Flowmeter at the water source has been updated ・ Chlorine injection unit is in the procurement process and has not been updated ・ Flowmeters in the distribution pipes have been updated
Dhulabari	・ Pressure gauges for pumps have been updated
Shivasatakchi	・ Water treatment plant damaged by landslide
Chandragadi I	・ Pressure gauges and flowmeters not installed
Chandragadi II	・ Flowmeters at the water source have not been updated ・ Chlorine injection unit not updated

Figure 2.10 Rehabilitation of facilities at Pichhra and Mangadh WUSC
(Left: Newly installed chlorine injection unit at Pichhra WUSC, Right: Newly installed water meter at Mangadh WUSC)

(7) Essential Equipment Procurement

With regard to the target WUSCs, DWSSM secured NPR 10 million as the BS 2075/76 (from 16/07/2018 to 15/07/2019) budget for rehabilitation and repair of water supply facilities. The WASMIP-II team collaborated with DWSSM to assist preparation of specification, and cost estimates based on the field and interview survey results. DWSSM procured mainly flowmeters, chlorination units and pH/ Electrical Conductivity (EC) meters for the target WUSCs. DWSSM secured NPR 20 million as the BS 2076/77 (from July 16, 2019 to July 15, 2020) budget for rehabilitation and repair of water supply facilities. As of August 2019, the procured/delivered equipment lists for the target 68 WUSCs are shown in Appendix 2.25.

During the On-site Training, DWSSM and FWSSMP instructed WUSCs to procure the essential equipment, such as flowmeters, themselves. In case that there is any difficulty to secure the budget or to procure the equipment in the market, WUSC can request such budget and/or assistance form FWSSMP, in accordance with the current procedure.

DWSSM supported the procurement/installation of the essential equipment for the target WUSCs in WASMIP-II. The essential equipment was provided to 65 WUSCs, and the basic functions of gaining knowledge of the supplied water volume, and injection levels of chlorination was recovered. The equipment and materials which DWSSM had procured was filed in a list. The system diagram of the water supply facilities and the list of the equipment and materials that had been procured were verified and were revised if there was any discrepancy. This could confirm the original situation of the facilities and the equipment that had been added.

2.9 Support activities in response to the COVID-19 emergency (Activity 2.13)

With the spread of the new COVID-19 infection in Nepal, a telephone survey was conducted to find out how COVID-19 was affecting the activities of the WUSCs. The results showed that more than 80% of the 68 target WUSCs were short of chlorine (bleaching powder). The reasons were found to be: logistics stoppages; lack of goods on the market; COVID-19 compliance with the use of chlorine powder for disinfection of public buildings; and refusal by suppliers to transport small quantities of the chemical.

The results of the telephone survey were discussed with JICA and it was decided to implement COVID-19 support activities as an emergency response.

2.9.1 First Support

Summary of the first round of support is given below.

a) Flow of the first phase of support (in chronological order)
   June 16: DWSSM sends a letter to JICA requesting support and JICA received it.
   18: Minutes signed between JICA and DWSSM
   19: Meeting between JICA and WASMIP-II team to discuss inter-item reallocation
   22: Contract signed between local chlorine supplier and WASMIP-II team
   July 2: Completion of procurement and receipt of delivery note
b) The Beneficiaries of the supply of bleaching powder during the first support phase were estimated. As of the end of June 2020, a total of approximately 108,200 people in the 11 target WUSCs in Jhapa District (Province No.1) benefited from the supply of 3.1 tons of bleaching powder, which was equivalent to an amount of 3 months consumption.
c) The status of the utilisation of bleaching powder, supplied during the first support phase, was investigated by telephone survey. It was confirmed that the bleaching powder was being utilized appropriately. Photographs were obtained from some WUSCs as evidence.

2.9.2 Second Support

Following the first round of support, a second round of support was carried out. The summary is as follows.

a) JICA and DWSSM concluded a minute of support for a second (2nd) round of COVID-19 support on July 29, 2020. Approximately 11 tons of bleaching powder, equivalent to 2 months consumption, was ordered for 54 target WUSCs. Photographs were obtained from some WUSCs as evidence.
b) The second support phase of bleaching powder supply was completed, and its beneficiaries were estimated. As of the end of July 2020, a total of approximately 607,000 people in 52 target WUSCs were the beneficiaries of the support from the supply of 11 tons of bleaching powder, which was equivalent to 2 months consumption.
c) DWSSM also procured and distributed bleaching powder to WUSCs through FWSSMPs, these were mainly Small Town WUSCs targeted by the ADB project. The supply was based on the demand and need.

2.9.3 Third Support

Following on from the second round of support, a third round of support was agreed. A summary is given below.

a) The following items were provided as the third support: 1) water quality test kits (9 kits); 2) chlorine injection units (manual type, 2 units); and 3) handwashing tanks (15 tanks); together with temporary toilets (6 units). Since the operation and maintenance of temporary toilets requires the cooperation of WUSCs, the pilot areas for item 3) were selected considering the capacity of the WUSC and the collaboration between WUSC and local governments.

b) In selecting the recipients of the hand-washing polyethylene tanks and temporary toilets, a survey was conducted on the actual situation of COVID-19 control in Nepal. Quarantine centres, isolation centres, and holding centres have been established to implement COVID-19 control measures. The definition of each facility is as follows

   Quarantine Center: a facility for people suspected of infection. Although they are normally temporary facilities located in schools, they are now being shifted from schools to community houses in some areas. According to the interview survey results, the quarantine centers near the target WUSCs still utilized schools.

   Isolation Center: a facility for isolating infected patients.

   Holding Center: a facility that accommodates people returning to Nepal from foreign countries; holding them for several hours and then sending them to their hometowns. They will be accommodated again in their local ***Quarantine centers*** for two(2) weeks. The ***Holding centers*** are placed in Kathmandu.

c) There is no legal basis to define which organization is responsible for maintaining handwashing tanks and temporary toilets. However, the local government is usually managing them. The Disaster Management Committee of each municipality manages the quarantine centers.

d) In Devchuli Municipality (Nawalparasi district, Gandaki province), the Chairman of Pragatinagar WUSC is also a board member of the Disaster Management Committee. Therefore, it was decided that the Pragatinagar WUSC was suitable as a pilot area for receiving handwashing tanks and temporary toilets. Ms. Bidhya from JICA Nepal advised that Shankarnagar WUSC (Rupandehi district, Province No.5) is also suited to being a pilot area, because of its abundant experience on management of temporary toilets.

e) Temporary toilets are connected to septic tanks. When a septic tank is full, another tank is constructed. Therefore, there is no need to treat human waste from the temporary toilets.

f) The quarantine centers and isolation centers were selected focusing on the Target-A WUSCs. After preliminary selection, information such as the number of facilities, seating capacity, and municipality, was collected and summarized. The required numbers of handwashing tanks and temporary toilets, based on this information, were determined and then the final locations of pilot areas were decided. The candidate WUSCs for the support and the scope of support are summarized in the following table.

Table 2.18 Target WUSCs for the support and the scope

No.	Target WUSC	Handwashing Tank	Temporary Toilet
1	Dhulabari	1 set	-
2	Mangadh	2 sets	2 sets
3	Rangeli	2 sets	-
4	Urlabari	1 set	2 sets
5	Simara	3 sets	-
6	Pragatinagar	3 sets	2sets
7	Shankarnagar	1 set	-
8	Nijgadh	2 set	-

g) The recipients and quantities of chlorine injection units and water quality testing kits were determined based on the results of a maintenance and ownership survey. As for the chlorine injection units, considering the limitation that DWSSM has set aside NPR 15 million budget for facility rehabilitation of in the fiscal year BS2077/78 (2020/21), two chlorine injection units (manual type) were provided to two WUSCs.

h) In addition to the third support, DWSSM has procured and distributed bleaching powder to WUSCs through the FWSSMPs. The WUSCs directly collected the bleaching powder from the FWSSMPs. The list of WUSCs supplied was not summarized.

i) The progress of the third support phase (procurement of chlorine injection units, water quality test kits, handwashing tanks and temporary toilets) was confirmed as follows;

- Chlorine injection units (delivery date: December 11, 2020), water quality test kits (delivery date: December 11, 2020) and hand-washing tanks (delivery date: December 13, 2020) were delivered. The portable temporary toilets were delivered to each site on January 22, 2021.
- 2 WUSCs used the chlorine injection units based on SOP and supplementary explanation provided by WASMIP staff. The water quality test kits were also utilized according to the manual (Nepali), the SOP, and supplementary explanations from the WASMIP staff.
- Two (2) sets of temporary toilets were delivered to each of 3 WUSCs on January 22, 2021. Use of the portable temporary toilets in the WUSCs is shared by men and women. The following was the situation as of February 28, 2021:
  - Mangadh WUSC planned to install a portable toilet on the side of the road near the WUSC office, and another on public land near the elevated tank.
  - Pragatinagar WUSC, in consultation with Local Government, installed the toilet in the Ward 13 office which had a shortage of toilets, on February 19, 2021. The other will be installed in the Ward 11 office. The installation status of the portable toilet is shown in the photograph below.

- Regarding temporary toilets, Pragatinagar and Mangadh WUSC had installed two toilets and started using them. Urlabari WUSC had received requests to install two toilets from various related organizations and was coordinating with those organizations.

Figure 2.11 Installation of the temporary toilet

Figure 2.12 Chlorine Injection Unit and Bleaching Powder

Figure 2.13 Handwashing Tank

Figure 2.14 Water Quality Test Kit

2.10 Planning and Implementation of Training of Trainers (Activity 2.6, 3.3, 3.4, 3.5)

Prior to implementation of training activities for the WUSCs, ToT was provided to trainer candidates so as to familiarize them with the Management Model, as well as to improve their training skills. ToT can be categorized into 1) ToT for Basic Training (3 subject of SOP training, management training and trainer's capacity building) and 2) ToT for On-site Training.

2.10.1 Preparation of Training

(1) Trial ToT

A lecture on "Improving Training Skills" was conducted on April 3, 2017. Analysis of NWSSTC's training performance revealed that the concept of action plans was missing. Therefore, it was decided to add a topic on how to construct an action plan to the curriculum for the ToT and Training in Japan.

(2) Selection of Trainers

Firstly, it was necessary to appoint appropriate trainers to set up the technical support mechanism. The WASMIP-II team requested DWSSM/NWSSTC to select and propose appropriate personnel from DWSSM/NWSSTC, as well as from other government and non-government organizations. The list of potential trainers was presented by DWSSM on June 11, 2017 and the WASMIP-II selection of trainer candidates started in August 2017. After several revisions, 50 trainer candidates were shortlisted as of November 7, 2017. The first and second ToT on for SOP training were conducted in November and December 2017, and the first ToT for management training was conducted in January 2018.

The candidates were required to have adequate work experience and knowledge of water supply management. Based on the key requirements, NWSSTC made a final selection of 9 trainer candidates for the Basic Training and 14 for the On-site Training. These selected trainers were from MoWS, DWSSM, NWSSTC, FWSSMP, WSSDOs, WUSCs.

The knowledge of the NWSSTC, which has been conducting the training, was thus crucial in the selection of potential lecturers, and the NWSSTC's assessment and accreditation were added to the selection process.

2.10.2 Implementation of Training

(1) 1st ToT (for the Basic Training)

Table 2.19 shows the program of the 1st ToT (regarding SOP training) in 2017. The duration of the training was five days starting from November 11, 2017. The trainer for each subject was from the WASMIP-II team. The training covered: O&M of water intake facility; O&M of water distribution facilities; water meter reading and meter calibration control; O&M of WTP (Water Treatment Plant); and water quality monitoring and control. Management training was not covered in this session. In total, 27 trainer candidates from MoWS, DWSSM, NWSSTC, WSSDO, WUSC, KUKL, etc. attended the ToT.

Table 2.19 Program of 1st ToT (regarding SOP training)

Date, Time		Contents	Trainer
11th November (Sat.), 2017	11:00-11:30	Orientation	• Mr. Tejraj Bhatt, Director General, DWSSM • Mr. Kabindra Bikram Karki, Project Manager, Chief of NWSSTC • Mr. Arun Kumar Simkhada, Project Coordinator, Chief of Planning Section, DWSSM
	11:30-13:00	O&M of Water Intake Facility	Japanese Expert
	14:00-16:00	O&M of Water Intake Facility	
12th November (Sun.)	10:00-13:00	O&M of Water Distribution Facility	Japanese Expert
	14:00-16:00	O&M of Water Distribution Facility	
13th November (Mon.)	10:00-13:00	O&M of Water Meter	Japanese Expert
	14:00-16:00	O&M of Water Meter	
14th November (Tue.)	10:30-12:30	O&M of WTP	Japanese Expert
	13:00-14:30	O&M of WTP	
15th November (Wed.)	10:00-13:00	Water quality monitoring and control	Japanese Expert
	14:00-15:30	Water quality monitoring and control	
	15:30-16:00	Closing Ceremony	• Mr. Sunil Kumar Das, Deputy Director General, DWSSM • Mr. Kabindra Bikram Karki, Project Manager, Chief of NWSSTC • Mr. Arun Kumar Simkhada, Project Coordinator, Chief of Planning Section, DWSS

(2) 2nd ToT (for the Basic Training)

The 2nd ToT was conducted in three subjects: regarding SOP training, management training, and trainer's capacity building.

1) ToT regarding SOP Training

Table 2.20 shows the program of the 2nd ToT on SOP training. The duration of the training was three days from December 19 to 21, 2017 and the trainer of each subject was from the WASMIP-II team. The training covered: O&M of intake facility; O&M of water distribution facilities; Water meter reading and meter calibration control; O&M of WTP; and Water quality monitoring and control. In total, 19 trainer candidates from MoWS, DWSSM, NWSSTC, and WSSDO attended the training.

Table 2.20 Program of 2nd ToT (regarding SOP training)

Date, Time		Contents	Trainer
19th December (Tue.)	12:00-12:30	Orientation	• Mr. Kabindra Bikram Karki, Project Manager, Chief of NWSSTC • Japanese Expert
	12:30-14:00	O&M of Intake Facility	Japanese Expert
	14:00-16:30	O&M of Distribution Facility	Japanese Expert
20th December (Wed.)	10:30-12:30	O&M of WTP	Japanese Expert
	13:00-14:30	Water meter reading and meter calibration control	Japanese Expert

Date, Time		Contents	Trainer
	15:00-16:30	Practical training for preparing a training material	Japanese Expert
21st December (Thu.)	10:30-12:30	Water Quality Monitoring and Control	Japanese Expert
	13:00-14:30	Practical training of electrical measuring instruments	Japanese Expert
	15:00-16:30	Practical training for preparing a training material (interim report)	Japanese Expert

During the training session, there were some questions, requests and comments from the candidates as mentioned in below bullet points. These comments were taken into consideration and reflected in the revised SOPs, the training implementation guideline, the plan for training on the Management Model for WUSCs, and the design manual of specifications on rehabilitation work for the target WUSCs.

- It is essential to provide the workers with lectures on safety, as it is not a normal practice to wear safety accessories like gloves, helmets, and safety boots.
- High turbidity in the water of deep tube wells is the major problem in Terai Region.
- The cleaning of horizontal flow typed roughing filter cannot be performed effectively due to either the lack of drain valve or its improper location. The root cause of this problem is that the DWSSM standard drawing does not show the proper installation point for the drain valve. To clean the filter, operation of the filter has to be stopped temporarily and the filtration material (gravel) is removed and cleaned manually.
- Training for making earthing connections for submersible pumps is necessary.
- An effective solution for the pipe blockage due to calcium compound is not available. Consequently, a bypass pipeline is installed as a temporary solution.
- WUSCs cannot procure good quality water meters and valves from the market in Nepal. The available poor quality Chinese water meters frequently malfunction. The situation is similar for valves.
- A forum/meeting should be held by DWSSM to discuss the problems faced by WUSCs, so that WUSCs can solve the issues by interchange of ideas and countermeasures.
- Due to the personnel transfer and turnover of employees who took the DWSSM training course, technical knowledge transfer within WUSC does not work effectively.

2) ToT for Trainer's Capacity Building

ToT for trainer's capacity building was conducted at NWSSTC, Nagarkot, for 2 days from December 22 to 23, 2017 according to the program specified in Table 2.21. Twenty-three (23) trainer candidates participated.

The WASMIP-II team prepared the syllabus and contents of the ToT for trainer skills: including management by Action Plan (A/P); team building; useful tips on delivery of lectures; and development of training materials. On commencing the trainers' skill session, the lecture on management by A/P is introduced as a tool for managing any improvement. Useful Tips on inducing group dynamics, preparing and implementing a lecture (pedagogy), and teaching materials were introduced.

The trainer candidates were divided into four teams based on candidates' areas of specialization, which were: water treatment management; water quality monitoring; water distribution management; and water meter management, and training materials were prepared by which the trainers can conduct the trainings on each area. Each team was given the contents of SOP, and discussion on each area was held within the teams. The result of the discussion was then used to prepare a 5-minute presentation. The presentation was revised during the ToT session, and the final presentation was made on the 2nd day of ToT.

Table 2.21 ToT for Trainer Skills

Day 1	
10:50	The bell for starting
10:55-11:00	Opening remarks by Mr. Kabindra Bikram Karki
11:00-11:45	ToT Lecture (1): Management by Action Plan
11:45-12:40 13:00-14:50	Group activity: scope and elaborate the trial training materials previously produced (considering quantitative targets and 4W1H)
15:20-16:00	Presentations of works by the 4 groups
Day 2	
9:00-10:00	Lecture on key points in preparing slides by Mr. Kabindra Karki (in regard to spelling mistakes in Nepali)
10:00-10:15	Explanation of WASMIP by national staff of the WASMIP-II team
10:40-11:30	ToT Lecture (2): Group Synergy Creation ToT Lecture (3): Preparing a Lecture
11:30-12:40	Group activity: scope and elaborate the trial training materials produced on the previous day (reflecting the tips on producing materials)
13:10-14:10	Presentation of works by 4 groups
14:20-14:45	Closing session

3) ToT regarding Management Training

ToT for Management Modules took place on January 16 and 17, 2018. There were 14 participants, and 13 of them completed the two-day course. There were three candidates from WSSDO, one from MoWS, two from WUSC, and eight from DWSSM. The Japanese expert in charge of Management (Organizational, Financial, Business Planning) has showcased the contents consisting of six modules: orientation; preparation of business report; financial statement; analysis and management plan; preparation for training; and question/conclusion.

Table 2.22 ToT Program for Management

Date, Time		Contents	Trainer
16th January (Tue.), 2018	10:30-12:10	Orientation	Japanese Expert
	12:25-14:05	Preparation of Report	
	14:20-16:00	Financial Statement	
17th January (Wed.), 2018	10:30-12:10	Analysis and Management Plan	Japanese Expert
	12:25-14:05	Preparation for the Training	Japanese Expert
	14:20-16:00	Questions and Conclusion	

In order to implement the training for WUSCs in a limited time, the contents of Management Modules had been simplified and tailored for semi-urban WUSCs. For example, the calculation of KPIs was based on "The Water Service Providers Benchmarking Data Calculation Handouts" produced by SEIU of MoWS. The handout was prepared primarily for larger water supply providers such as KUKL and NWSC, and some formulae are too complicated for semi-urban WUSCs to collect the raw data.

Almost half of training time was allocated for the practices and group work, such as calculation of KPIs, compilation of balance sheet and income statements, SWOT analysis and cross SWOT analysis. The idea behind this was that the trainees required not only lecture by trainers but also a lot of practice examples in order to have deep understanding of these topics. Therefore, the Japanese expert prepared some scenarios to simulate the operational and financial performance of WUSC.

(3) Supplemental ToT

1) 1st Supplemental ToT

The 1st supplemental ToT was held at NWSSTC Nagarkot on December 27 and 28, 2018. There are 13 trainers after the supplemental ToT. The trainers for the Basic Training belong to DWSSM (6), NWSSTC (2), WSSDO (2), MoWS (1), MoPID (1), and to other organization (1). The intention of the supplemental ToT was to provide training to trainers on how to conduct and teach Basic Training. Trainer candidates for On-site Training were also invited, resulting in 5 trainers in the field of management and 8 trainers in the field of SOPs. However, after that, due to transition to Federal System, however, some trainers were transferred to province provincial or local governments. ToT was held continuously to address the decrease in the number of trainers due to transfers and retirements.

In order to conduct the supplementary ToT, a supplementary ToT document (PowerPoint) was prepared, with the main points of the trainings and instructions presented on each slide. When working as trainers for WASMIP-II, the notes on conducting trainings were compiled into the Basic Training materials and used as guidelines for trainers.

2) 2nd Supplemental ToT

The 2nd supplemental ToT was held in the DWSSM conference room on June 16th, 2019. Twelve (12) trainers for the Basic Training from DWSSM (5), NWSSTC (5), and MoWS (2) participated the training. In this ToT, the participants were trained on the main problems faced by WUSCs and how to teach and solve them. The participating trainers had also attended the JPCM held in the morning, which helped them to understand the significance of the training by reacquainting them with WASMIP's activities.

The ToT on June 16 covered the following topics: (1) Analysis of the current situation and methods for planning improvements against targets; (2) Relationship between measurement data/records and KPIs (review); and (3) Major problems occurring at WUSCs (water pipe breakage due to road construction, scale caused by calcium in water pipes, blockage of filtration ponds due to high water turbidity, and water shortage due to increase in water demand) were the topics of the workshop in the form of exercises. In the past, ToT was based on management and SOPs, but this time, the problems faced by WUSCs were included.

(4) 3rd ToT (for the Basic Training)

In order to increase the number of trainers, with the help of C/P (the PM Mr. Kabindra Karki) candidates from MoWS (1), DWSSM (10), NWSSTC (4), FWSSMP (8), TSTSSSP (3) and WUSC (1) were selected and invited to attend the 3rd ToT conducted on August 27th and 28th, 2019. The total number of participants was 27 persons. Of the participants, there were 11 trainers who had participated in the 2nd training in Japan.

The training materials that had been used for the 2nd ToT for Basic Training were reorganized into 8 modules (subjects). Trainer candidates were asked to select subjects in which they had confidence and interest, and this was used as a reference in selecting trainers.

(5) 4th ToT (for the On-site Training)

The baseline survey (refer to Activity 1.1) of local governments revealed a lack of human resources, and of knowledge on the design, construction and O&M of water treatment facilities. The expert team assessed that it is necessary for the local governments to understand not only O&M but also the main equipment installed in water supply facilities. Therefore, the WASMIP-II team decided to request participation of MoPID, WSSDO, and local governments, in addition to FWSSMP personnel, in the ToT for the On-site Training. The request letter was issued by the Deputy Director General (DDG) of DWSSM (Ms. Meena Shrestha).

ToT for the On-site Training was conducted in February 2020. For this training, the WASMIP-II team went to the field and conducted training at 7 FWSSMPs, instead of conducting the training at NWSSTC in Kathmandu. The main reasons for conducting the training at each FWSSMP, instead of at NWSSTC, were: (1) expected higher participation rate from NPs, GPs and WSSDOs; (2) to create contacts between FWSSMPs and NPs/GPs; and (3) to provide an environment for detailed guidance in small groups.

The following is an outline of the on-site training instructor training. The training material for the ToT for the On-site Training is shown in Appendix 2.26.

a) The objectives of the training were as follows:
   - Understanding of the role of the central and local governments;
   - ToT for the On-site Training (follow-up of Basic Training, understanding of checking O&M records, checking water distribution system diagrams, checking data for KPI calculation, etc.);
   - Understanding how to analyse the current status of WUSCs (check management checklist); and
   - Understanding of the appropriate specifications and locations of key equipment (flowmeters, chlorine injection units, water quality measurement equipment).

b) The participation rate was about 70%, with 72 actual participants from 103 invitees.

c) The results of this training are as follows;
   - FWSSMPs, WSSDOs and NPs/GPs have never had an opportunity to meet each other, and this training provided a good platform for the exchange of information and opinions among the three parties.

- As the training was held in the field (at each FWSSMP), the number of participants was high. Especially participation by the NPs/GPs who were not able to attend the NWSSTC in Kathmandu due to their busy schedules.
- Some of the FWSSMP engineers are also responsible for teaching the Basic Training. However, it is difficult to call them to Kathmandu frequently to participate as trainers during the Basic Training due to their responsibility for projects under investigation, planning and construction. In this respect, holding the training at each FWSSMP made it easier for them to participate.
- The small number of participants allowed for detailed discussion and guidance on exercises.
- With the assistance of the Basic Training trainers and the FWSSMP engineers who participated in the 2nd Training in Japan, the knowledge and experience gained from each training could be shared.
- Detailed discussions between the participants and the Japanese trainers and his assistant, national staff, enabled the participants to reflect their opinions and questions regarding the On-site Training materials.
- The training was a good opportunity for the NPs/GPs to learn about the situation at the WUSCs, as many NPs/GPs had never visited WUSCs before and had no information about them. The difficulty level of the material was also suitable for the participants.
- NPs/GPs were made aware of the importance of liaising and advising the FWSSMP in support of WUSC O&M.
- The chief of FWSSMP, the C/P from WASMIP-I, participated in the training and explained the experience and importance of WASMIP to the participants and this encouraged their understanding.
- During the training, opinions, problems and areas for improvement were identified, which could be considered and reflected in each subsequent training.
- As the result of the implementation of the ToT for the On-site Training and the On-site Training, the draft training implementation guidelines were revised to reflect the actual situation of WUSCs.

d) The problems and issues identified during the training were as follows;

- The WUSC does not know which organization to ask for construction support and O&M support.
- Lack of coordination between water works and road construction departments (at federal, provincial and local levels) on the issue of frequent water pipeline damage caused by road works.
- NPs/GPs had little knowledge of their intended role in assisting the WUSCs with water supply infrastructure maintenance and repair (as described in the draft WaSH Bill).
- NP/GP top management do not value safe water supply and have a small budget allocation for water supply services. Therefore, it is necessary to educate the top management on the importance of water supply service.
- There is no platform for exchange of information and opinions among FWSSMP, MoPID, WSSDO, NP/GP and WUSCs.

- NPs/GPs rarely visit the WUSCs and are not aware of their current situation. There is also a need for training on O&M.
- Consumers tend to prefer the continued use of shallow wells. Consumers are unwilling to pay water charge because they believe the safety of water supplied is not ensured. Therefore, there is a need to educate people about water safety.

Issues identified during the on-site training of trainers as having a high degree of commonality were proposed as agenda items at the 4th Refresher Training. However, due to the effects of the COVID-19 pandemic throughout Nepal, the 4th Refresher Training was cancelled.

(6) 5th ToT (for the Basic Training)

The 5th ToT (for the Basic Training) was conducted as online training on November 12 and 13, 2021. Online training was necessary due to the COVID-19 pandemic. The syllabus of the online training was prepared and shared with Chief of NWSSTC.

Prior to the 5th ToT, 1) monitoring of the online training conducted by NWSSTC and 2) rehearsal of the 5th ToT were conducted, because this would be the first attempt at online training by WASMIP-II.

1) Monitoring of the Online Training by NWSSTC

National staff of WASMIP-II participated in the annual training conducted by NWSSTC, which was held online in September 2021 and monitored the results. This experience was used as guidance for the 5th ToT. The outline of the training was summarized as follows.

- Lecturers were PM and other NWSSTC engineers.
- The trainees were 25 engineers of FWSSMP.
- The location of the trainees during training was their offices and homes in online communication.
- The training was conducted using the Zoom application. The appropriate number of the participants was set as fifty (50) persons taking the line speed of the network into account (while the maximum number could be estimated as much as 100).
- Major problems experienced in the above training were as follows:
  - Short power cuts occurred many times.
  - Internet communication was not smooth due to slow line speed.
  - Most trainees were unfamiliar with using Zoom.
  - Monitoring of the training was difficult.
  - In the case of using a smart phone, the internet communication was interrupted by phone calls.

2) Implementation of rehearsal of the 5th ToT

A rehearsal of the 5th ToT was conducted on October 21, 2020, with proper measures taken against the problems encountered during the annual training of NWSSTC held in September 2020.

Twenty-two (22) engineers of DWSSM participated in the rehearsal as trainer candidates, and seven (7) of the engineers were participating in the WASMIP training for the first time. The main topics of the rehearsal were as follows:

a) Introduction
b) Objectives of the rehearsal
c) Schedule and syllabus of ToT
d) Trial operation of PowerPoint and video material
e) Points to be noted (using the mute mode during lecture, Q&A session after each lecture etc.)

3) Implementation of the 5th ToT

The 5th ToT (for the Basic Training) was conducted on November 12 and 13, 2020 online and using the Zoom application. Although the ToT was planned for just before the Tihar holiday, trainer candidates could participate in the ToT because the training was conducted online. The outline of the ToT was as follows:

a) Content of the lectures: Management and key points of SOPs
b) Participants: Ten (10) engineers from DWSSM, NWSSTC and FWSSMP
c) Output: Presentation of visualized key points by using video training materials and realization of shortening the training period by eliminating presentations using PowerPoint slides as much as possible.
d) Problems and challenges:
   - Some discrepancies between the narration of the video (in Nepalese) and its subtitles had to be reviewed by DWSSM/NWSSTC staff and revision of the narration was required.
   - Some problems were experienced in playing the videos (no playback and/or no sound. It was found that several rehearsals were necessary to confirm how to play the video materials properly at the next basic training session.
   - Practical training for using water quality test kits and electrical measuring devices cannot be varied out by online training. In case that face-to-face type training cannot be conducted for a long time, then individual training and following up by On-site Training with small scale is expected to be important.

Figure 2.15 Training of Trainers (ToT)

Figure 2.16 Practice for Water Quality Measuring

A list of developed trainers is shown in Appendix 2.27.

2.11 Planning of Basic Training (Activity 2.7, 3.6, 3.7)

The Basic Training aims at enhancing the technical and managerial knowledge of water supply services that are required for semi-urban WUSCs based on the Management Model, which consists of Management and SOP modules. The national trainers hired by NWSSTC, and trained by the WASMIP-II team through the trainers training programme, provided six days of classroom-style training courses at NWSSTC. The participants from the WUSC were chairpersons, managers, technicians and internal audit committees. Also, some FWSSMP engineers who were expected to attend the On-site Training were participated in the Basic Training.

2.11.1 Preparation of Training

(1) Preparation of Training Materials

In order to conduct the 1st Basic Training, the WASMIP-II team prepared training materials (PowerPoint) that covered the key points of the Management Manual and the draft revised SOPs (version 3). The team requested DWSSM to review the content of the training materials and then revised them to reflect DWSSM's comments. In addition, training procedures and key points were added to the materials to enable instructors to conduct the training smoothly and effectively.

It was proposed that, before ToT, the training materials (presentation) for the Basic Training should be prepared by national trainers to facilitate capacity development on compilation of training materials as well as to enhance their interest and motivation. As mentioned above, the plan has been changed and the WASMIP-II team developed the training materials both in English and Nepali and shared with the national trainers.

The Basic Training consists of a management component and an O&M component. In the development of the syllabus, the objectives of each component were made clear as below:

Table 2.23 Objectives of Training of Management Model

Course	Objectives of the Course
Management of WTP and O&M	➢ To understand flow of the water treatment process。 ➢ To learn methods of O&M ➢ To learn record keeping system for O&M
Monitoring and Quality Control	➢ To understand water quality parameters that are measurable using simplified water test kits ➢ To carry out management and inspection of water quality using simplified water test kit ➢ To learn the record keeping system for water quality
Distribution Facility and O&M	➢ To understand water distribution facilities ➢ To learn how to prepare and update distribution network map ➢ To learn how to inspect and maintain water distribution facilities ➢ To learn how to store spare parts necessary for water distribution facilities
Water Meter	➢ To learn the basic knowledge of the water meter. ➢ To learn how to install a service connection pipe and water meter. ➢ To learn how to calibrate the existing water meter ➢ To learn information management methods which are necessary for

Course	Objectives of the Course
	management of existing and new water meters ➢ To learn how to store spare parts
Management	➢ To understand the aims and roles of annual reports and business plans as PDCA tools ➢ To understand the standard style of annual reports for the WUSCs in semi-urban towns ➢ To understand key factors in preparing annual reports (calculation and recording of management performance indicators, etc.)

(2) Revision of Training Materials

1) Overview

Based on the evaluation of the results of the 1st Basic Training, the WASMIP-II team analysed the comments on management training and SOPs training, and also checked for duplication of contents among the training modules. The training materials were revised and improved so that they could be easily implemented at each WUSC site.

In preparation for the second basic training, the structure of the training material on SOPs was re-examined and the basic training, including the syllabus, was re-structured with the introduction of video material to shorten for the lecture duration. As a result, the number of modules was reduced by two (2) sets and became a total of eight (8) sets That is, for management modules:1) business management analysis and 2) formulation of business management improvement plan, and for SOP modules: 1) water supply system introduction; 2) O&M outlines; 3) daily inspection of water supply facilities; 4) periodic inspection and troubleshooting; 5) water quality management; and 6) distribution facilities and water meters. At the same time, the training period was shortened by one day to a total of five (5) days; two (2) days for management training, three (3) days for SOPs training, including group activities. The English version of the basic training material was translated into Nepali. An engineer from DWSSM joined in the preparation of the training materials and in revising and finalising the PowerPoint materials.

2) Preparation of Video Materials

a) Purpose

The use of the video training materials was expected to give the following advantages: (1) facilitate understanding of the O&M and management; (2) lectures can be given at "anytime", "anywhere" and for "anyone"; and (3) standardization of lecture quality (no superiority/inferiority between trainer performance).

b) Preparation Procedure and Contents

Dhulabari WUSC and Pragatinagar WUSC were selected as models for the video materials, and the procedures and contents of the inspection, maintenance and cleaning of the facilities were prepared on video recording, in cooperation with the WUSCs.

The video material consisted of the outline of the water supply system (from the water intake to the hydrant), how to operate the system (valves, water quality monitoring using ENPHO kits, electrical panels and testing

equipment, chlorine dosing equipment, etc.) and how to clean the facilities (sedimentation basin, roughing filter, slow sand filter, etc.).

The video materials for the 2nd Basic Training course were prepared. Due to time constraints, the subtitles were written in both English and Nepali, but the narration was in English. The video materials were developed for each module and were improved based on feedback from the participants.

Subsequently, the video materials for the Basic Training were edited and revised into 51 video sets, according to the subject matter. The narration was changed to Nepali and the subtitles were in English. The key points of the revisions were: "wide range", "easy to understand", "friendly and easy to use". Some of the content of the PowerPoint material was transferred to the video material to make the material of the Basic Training simpler and shorten the duration of the lectures.

Utilization of the video materials as much as possible in the lectures became a basic policy for enhancing the versatility of the lectures. The videos were shared with the C/Ps and it was agreed to use them in future training. Video was confirmed as an effective training tool to introduce the WUSCs and its facilities during the Basic Training and the Refresher Training (Observation and Interaction Workshop). A prototype video was prepared during the refresher training (for the mainly two (2) WUSCs that were visited during the Observation and Interaction Workshop). The training materials for the Basic Training are shown in Appendix 2.28.

2.11.2 Implementation of Training

(1) 1st Basic Training

The 1st Basic Training was held at NWSSTC for six (6) days from December 30, 2018 to January 4, 2019 using the materials prepared by the team. The outline of the training is as follows:

a) Key points: water utility management and water supply facility O&M

b) Trainers: 13 trainers (DWSS: 5, NWSSTC: 3, WSSDO: 2, MoWS: 1, MoPID: 1 and freelance: 1), who had attended the supplemental ToT.

c) Trainees: 27 trainees.
From the 13 Target-A WUSCs, 10 WUSCs (27 members) participated in the training, while 3 WUSCs were absent due to their concurrent participation in other events or work commitments. The main participants from each WUSC were Board Members, Managers and Key Technicians.

d) he Basic Training was carried out using: 1) the training material and PowerPoint slides developed by the Experts; 2) supplemental slides added by Nepali trainers; 3) video materials presented by Nepali trainers; and 4) introduction of WUSC's activities by the attending WUSCs.

e) The syllabus of the 1st Basic Training is given as follows. Management training has 5 modules: 1) management model; 2) operational performance; 3) financial performance; 4) business analysis; and 5) business planning. SOP training consisted of 8 modules, namely: 1) standard operating procedures; 2) water intake facility; 3) water treatment plant (facility); 4) water treatment plant (M&E equipment);

5) water quality management; 6) water distribution facility; 7) water meter; and 8) repair work and inspection reports.

Findings were as follows:

- The managers were generally highly competent and understood the training content quickly. On the other hand, for the directors, many of the topics were related to water supply technology and were difficult to understand, especially regarding the SOPs. In addition, the lectures seemed to be difficult for the key technicians as a whole to understand (Findings of PM).
- It was confirmed that the trainers (13 trainers in total) generally possessed a good level of knowledge in lecturing ability and facilitation skills. However, some of them had little experience of field works. This was learnt when visiting the WUSCs. Therefore, teaching how to apply the training knowledge to the practical use of the WUSCs in the field was expected to become a challenge for the future. Improving the training materials (PowerPoint slides, etc.) was also necessary.
- Although the contents of the training materials were prepared by the WASMIP-II team, some of the Nepali trainers prepared additional slides and videos. WUSC managers introduced presentations on their own WUSC activities, which was well received by the other participants. The WASMIP-II team noted the possibility of using WUSC staff as trainers in the future.
- The first day of the Basic Training started around noon (although scheduled for 10:30 am) due to the availability of the participants. However, the planned training was completed within a reasonable time. DWSSM/NWSSTC were responsible for overall management of the training program. DWSSM/NWSSTC had a lot of experience in conducting training and no particular problems were encountered.
- The results of the questionnaire survey to the trainees at the end of the Basic Training showed that over 90% of participants “agreed” or and “strongly agreed” about the suitability of the training contents, training procedure, training team and training materials.
- After the training, a video recording of the lectures was distributed to the participants from the WUSCs, with the aim of having them use it as a reminder.

The following comments were received from the trainers who conducted the SOP training regarding the training materials.

(1) Correction of Nepali wording
(2) Request for additional content on maintenance of raw water pipelines
(3) Request for additional content on protection and cleaning of water intake facilities
(4) Request for details for the proper layout of well pump equipment
(5) Request for additional information on how to read pressure gauges.

The PM also pointed out contents of the training materials where supplementary explanation was required.

- After the 1st Basic Training, the WASMIP-II team visited the Pragatinagar WUSC to verify O&M records and any suggested improvements measures for the O&M procedures in their water supply system. In addition, the team also collected the feedback to the SOPs.
- Linkage of the water distribution pipeline maps with the customer complaints data could easily identify the issue, occurrence places and underlying causes of such incidents.
- Suggestions for the improvement from the measures in facility / equipment viewpoints were: 1) to procure additional water quality test kits (ENPHO kits) for the water treatment plants. The reason is that the ENPHO test kit is absolutely necessary for monitoring water quality at a large number of points, such as at the water intake facility and at consumer taps; 2) rehabilitation of the weir at the grit chamber of the water intake facility, because of leakage and damage at the weir; 3) inflow volume equalization from the grit chamber at the sedimentation tank; and 4) weir level equalization in the slow sand filter.
- NWSSTC conducted the training for the WUSCs using their remaining annual budget for training. As observed from discussions with the WUSCs, the WASMIP-II team coordinated with NWSSTC to conduct training with contents on the most highly desired subjects, such as water quality management, pump operation and water meter reading.

(2) 2nd Basic Training

The 2nd Basic Training was held for 5 days from September 24 through 28, 2019. Its outline is as follows:

1) Trainers: A total of 11 trainers, including participants in the 3rd ToT on August 27th and 28th, 2019, and also trainees who participated in the 2nd training in Japan, gave the training.
2) Participants: There were 35 participants from 29 WUSCs. One manager was invited from each WUSC. For WUSCs that did not have a manager, two (2) Board members and a key technician were invited.
3) The trainers introduced and explained to the participants the concepts of forest conservation at water sources and the additional chlorine in water supply facilities, which they had learnt in the 2nd Training in Japan.
4) The current water supply and distribution system diagrams of the WUSCs were distributed to all the participants to enable them to understand the current situation and to check if there were any mistakes in the diagrams. Eight (8) of the WUSCs requested to update their drawings. The participants also understood the required equipment.
5) The trainers introduced their videos. One was from Far Western Region (Province No.7) and it explained the difficulties in constructing water supply facilities, accessibility to consumers residing at a far distance, lack of human resources, inconvenience of transportation and distance of water sources. The second video was a presentation on the importation of expensive bottled water from India and the waste of precious water due to leakage.

6) At the beginning of the third day of the training, three participants gave their comments in a mid-term review. They requested that more time should be spent on lectures on pumps and electricity, as the majority of the WUSCs participating rely on groundwater for their water supply source.
7) In response to this, the PM gave an additional lecture (after the scheduled lecture of the day). The lecture topics were "electric power & safety measures", "safe water concept of water safety plan" and "action plan formulation in the basic training".
8) The exercises were led by all trainers. Listening to the lectures given by other trainers also led to improvement in trainer skills.
9) The manager of Urlabari WUSC presented the business plan developed during WASMIP-I. They had continued revising their business plan independently since WASMIP-I.
10) The majority of the WUSCs participating had experienced incidents of pipeline breakage due to road construction works. During the training, one WUSC presented a case study on pipeline damage by road construction and the participants discussed how to prevent recurrence.

(3) 3rd Basic Training

The 3rd Basic Training was held online for three (3) days from December 10 through 12, 2020, using the Zoom application. The content of the training is shown in Appendix 2.29. The outline of the training is as follows:

1) Lecture Distributing Method: Online by using Zoom application, presentation by using PowerPoint slides and video materials.
2) Participants: 49 engineers from 26 WUSCs and 13 persons from other organizations.
3) ToT was conducted in November 2020 and DWSSM prepared for the 3rd Basic training independently.
4) For the 3rd Basic training, all 68 WUSCs were requested to attend, regardless of past attendance.
5) The WASMIP team interviewed the target 68 WUSCs to confirm whether they could attend online training or not. As a result, 25 WUSCs were found to be in an environment (possessing internet line and PCs) where they could attend the online lectures.
6) Since PowerPoint and video operations had performed well during rehearsals and ToT, the online Basic training was able to proceed smoothly.
7) The on-line lectures were given in Nepalese, and Q & A sessions were held after the finishing of each lecture. The training was completed on schedule without any delay.
8) Some of the participants from the WUSC side were unfamiliar with the operation of Zoom, and during the lecture left their microphone on. This disturbed the lecture delivery. It was found that it is necessary to provide detailed explanation to trainees about how to operate the Zoom application tools (microphone/camera on/off, etc.) in the draft training implementation guideline, and to explain these tools at the beginning of future training sessions.

9) Due to the online training, practical training such as how to use clamp meters, insulation resistance meters and water quality test kits (ENPHO kits), could not be performed, so it will be necessary to follow up with such practical training during future On-site training.
10) Some comments were received on the need to correct the figures and Nepali translation in the video materials. After confirming the relevance of the comments, the necessary revisions were made.

(4) 4th Basic Training

The 4th Basic Training was conducted by NWSSTC for 5 days from February 25 through March 1, 2021. The content of the training is also shown in Appendix 2.30. The outline of the training is as follows:

1) Since NWSSTC invited the WUSCs that were located near the training venue, a total of 15 WUSCs (12 target WUSCs and 3 non-target WUSCs) participated in the training, with a total of 53 participants.
2) The method of the training was face-to-face on location (not online), and the venue was Dalla Community Homestay (community hall) in Bardiya District, Province Lumbini No.5.
3) The number of trainers was kept to a minimum due to restricted regional travel under the COVID-19 pandemic. Three DWSSM/NWSSTC staff members conducted the training.
4) The main points of the instruction in the 4th Basic Training were as follows.
   - ✓ The obligation of local governments to support water supply projects under the Local Government Operation Act 2074.
   - ✓ Appropriate method for injection of chlorine (utilization of SOPs) and disclosure of water quality test results in response to chlorine odour complaints.
   - ✓ Regular practice of record keeping for O&M (utilization of SOP record format)
   - ✓ If E-coli is detected, it is necessary to check for possibility of inadequate chlorine injection, chlorine chemical deterioration or injection leakage.
   - ✓ There is a problem of calcium scale build-up on the inside surfaces of the distribution pipes, causing a decrease in water distribution capacity. The current water treatment system is unable to cope with this problem. Therefore, a practical solution to adopt larger diameter pipes, during the planning stage, or to replace pipes which have build-up of scale should be considered.
   - ✓ Where slow sand filtration is adopted in the water treatment system, it is necessary to periodically scrape or replace the filter sand. Checking of the specifications of the filter sand before purchasing is essential.
   - ✓ The "Design Manual of Specifications on Rehabilitation Works for the Target WUSCs in Semi-urban Towns", developed by WASMIP-II, explains how the WUSCs may themselves develop the schematic flow diagram.

(5) 5th Basic Training

The 5th Basic Training was conducted for 5 days from April 7 through 11, 2021. The content of the training is also shown in Appendix 2.31. The outline of the training is as follows:

1) The training was conducted face-to-face on location at the Amaltari Community Homestay in Nawalparasi East District.
2) The total number of participants for the 5th Basic Training was 46 persons from 13 target WUSCs and from one adjacent WUSC.
3) Three engineers of DWSSM/NWSSTC conducted the training, as trainers.
4) The main contents of the training were the same as those of the 4th Basic Training.
5) The following points were discussed in the training:
   - ✓ Communication between local government and the department of roads (provincial and central governments) is important, so as to prevent destruction of distribution pipelines caused by road construction works.
   - ✓ Recommendation on purchase of filtration sand that meets the standard specification of DWSSM for Slow Sand Filters (Effective diameter: 0.2 to 0.3 mm).
   - ✓ Appropriate updates of distribution network maps.
   - ✓ Data acquisition for calculation of KPIs and their evaluation.

(6) 6th Basic Training

The 6th Basic Training was conducted for 5 days from January 5 thorough 9, 2022 at Letang WUSC, Morang district, Province No. 1. A total of 42 persons from 14 WUSCs in semi-urban town (new) and 2 target WUSCs participated. The content of the training is also shown in Appendix 2.32. The main outcomes of the training were as follows.

1) Four engineers served as trainers (NWSSTC: 2, FWSSMP: 1, STWSSSP: 1).
2) With this training, all 68 WUSCs covered by WASMIP have participated in the Basic Training. In addition, 14 new WUSCs participated and learned proper O&M and management according to the Management Model.
3) Once the draft Wash Bill is approved, the local government will be responsible for management and O&M of WUSCs. Therefore, cooperation with local government will be more important.
4) NWSSTC/FWSSMP explain to WUSCs that their consumers complain about chlorine smell in tap water but it means the water is safe. Proper chlorination (how to make proper concentration solution) should be in accordance with SOPs.
5) n order to confirm the effectiveness of chlorination, the residual chlorine and E. coli must be regularly measured and monitored. If the effectiveness of chlorine disinfection is inadequate, inappropriate solution concentration or solution leakage should be suspected.
6) Fourteen (14) WUSCs did not have any water quality testing kit, so the trainer recommended purchasing one. The price is NRP 20,000 NRP. Alternatively, a nearby water testing laboratory should be used to test water samples.
7) The trainer explained that if there is no bulk meter to accurately measure the amount of water distributed, it can be estimated from the pump capacity and operating hours.
8) Data and calculation methods required for KPIs and setting targets for water service operations.

9) Recommendations on water disinfection and hand washing as a response to waterborne diseases and COVID-19.
10) Explanation and necessity of NWASH (database of water services).

2.11.3 NWSSTC's Annual Training Program

NWSSTC conducts the training to WUSC engineers for O&M of water supply systems as per the NWSSTC's annual training program. In the training, NWSSTC uses SOPs as the training materials. After the trainings, a part of trainees from WUSCs would report to board members on the training received and would also share the knowledge gained and training materials with other WUSC staff.

The WASMIP-II team coordinated with NWSSTC to conduct training for priority training contents, such as water quality management, pump operation and water meter reading, which the WASMIP-II team had been advised about during visits to the WUSCs.

2.12 Planning of On-site Training (Activity 2.8, 3.8, 3.9)

The goal of the On-site Training is for the WUSCs to be able to practically apply the knowledge acquired from the Basic Training. Therefore, the On-site Training is expected to be conducted for WUSCs who have already taken the Basic Training. Monitoring and evaluation activities are conducted to measure and verify whether WUSCs are applying the knowledge obtained from the Basic Training. A one-day On-site Training session at each WUSCs is conducted by the national trainers hired by NWSSTC and trained by the WASMIP-II team.

2.12.1 Preparation for On-site Training

The framework of the training (syllabus, target group and number of participants, etc.) was reviewed and proposed, and agreed by DWSSM and NWSSTC.

As shown in the analysis of the impact of the transition to the federal system (see Activity 1.3), the administrative bodies and human resources related to regional water supply is divided between the federal and provincial governments. This made it difficult to secure trainers for the On-site Training.
Considering this situation, the WASMIP-II team discussed with the PM about the On-site Training and the following points were agreed:

- The original plan for regular visits to the WUSCs by WSSDO engineers needed to be revised due to the fact that WSSDOs has shifted to the jurisdiction of MoPID and the number of FWSSMP engineers is insufficient for them to visit the WUSCs regularly (the engineers are already responsible for an average of about 53 projects per engineer).
- Therefore, WASMIP-II should: a) provide training to FWSSMP engineers to monitor and check the WUSCs; and b) evaluate and provide guidance to FWSSMP engineers on their on-site checklist.
- The FWSSMP Engineer should monitor the WUSCs on an ad hoc basis using the opportunities of water supply facility planning, monitoring and construction supervision at the construction project sites (WUSC sites).
- The results of the FWSSMP engineers monitoring should be communicated the Planning, Monitoring and Evaluation Section of DWSSM.
- The WASMIP-II team should consolidate actual implementation methods of the WASMIP-II activities through analysing these contents in parallel to preparing a checklist in the team.

The training materials used for the On-site Training was a checklist summarizing the points of inspections at the WUSCs, such as the operational status of all facilities, daily recoding of water production and distribution volume, flowmeters, inventory management, water quality test records, network maps, KPI, etc. The materials were developed by the WASMIP-II team.

2.12.2 Implementation of On-site Training

(1) 1st On-site Training

The 1st On-site Training was conducted for the WUSCs which had completed the Basic Training, as shown in the table below. The On-site training was carried out firstly by the FWSSMP engineers under instruction by the WASMIP-II team and with national staff hired by the WASMIP-II team. MoPID, WSSDO and NP/GP were convened for the On-site Training. Although not under the jurisdiction of DWSSM, the request letter for their participation has been issued by the DDG. In this training, (1) the Schematic Flow Diagram was checked and updated, (2) major equipment was installed, (3) KPI data (basic information) was obtained and checked, (4) management checklist, and (5) other advices were provided. A national staff hired by WASMIP-II team accompanied the On-site Training and monitored it.

Date of Implementation	Target WUSC	District/Province	Trainer
March 3rd	Dhalkebar	Dhanusha/No.2	FWSSMP-1
March 4th	Ishworpur	Sarlahi/No.2	FWSSMP-1
March 5th	Hariwon	Sarlahi/No.2	FWSSMP-1
March 6th	Barahathawa	Sarlahi/No.2	FWSSMP-1
March 9th	Karmaiya	Sarlahi/No.2	FWSSMP-1、LG-1
March 11th	Nijgadh	Bara/No.2	FWSSMP-1
March 12th	Dumarwana	Bara/No.2	FWSSMP-1
March 13th	Simara	Bara/No.2	FWSSMP-1

(2) 2nd On-site Training

The 2nd On-site Training was conducted from December 31, 2020 through January 9, 2021. The target sites were 10 WUSCs (Pichhra, Mangadh, Jhorahat, Katahari, Karsiya, Rangeli, Bayarban, Pathri-Sanischare, Madhumalla, Urlabari) in Morang district in Province No. 1. The training was conducted by FWSSMP engineers, NP/GP engineers and WASMIP-II staff. The outline of the training is as follows.

- The contents of the training were: a) confirmation/update of the Schematic Flow Diagram; b) the confirmation of O&M records; c) management checks (50 items, 147 questions); d) the identification of any other problems; e) advice to water supply management; and f) and the influence of COVID-19.
- The schematic diagram was verified and updated from the viewpoint of: 1) new construction of water supply facilities; 2) identification of defects, such as malfunction of equipment; 3) necessary equipment and new water source.
- Regarding the WUSCs' O&M activities such as 1) existence of records, 2) existence of water quality data and 3) understanding of KPIs calculation method, etc., these were reviewed and verified, and necessary instructions were given to the WUSC staff.
- Regarding management checks, the FWSSMP engineers instructed the WUSC chairperson and managers to obtain an understanding of the actual situation and confirm the improvement points for water supply management.

- The main problems found during the On-site Training were 1) less water supply than the expected demand, 2) low water tariff collection rate, 3) supply of rusty coloured water, 4) lack of O&M personnel, and 5) low awareness of water quality management requirements (water quality testing data not recorded), etc.
- In the water supply management, the following were advised and instructed to the WUSCs according to SOPs and manuals: 1) Importance of data recording, 2) How to use water quality test kits, 3) Recommendation for official release of water quality data to public, 4) Recommendation of data management using PC, 5) How to use chlorination units (appropriate injection amount), 6) Update of water distribution map, 7) Recommendation to hold discussions among relevant authorities to avoid damage to water pipes, 8) Recording of complaints information, etc.
- The influence of COVID-19 on WUSCs was also confirmed. Some of the staff had been infected and had recovered. There was little influence by COVID-19 on the water supply activities in the ten (10) WUSCs. However, tariff collection counters were closed during the lockdown.

(3) 3rd On-site Training

The 3rd On-site Training was conducted by DWSSM/FWSSMP from February 4 through 19, 2021. The target sites were 4 WUSCs (Besisahar, Bhoteodar, Lasunekhola, Sundarbazaar) in Lamjung district, Gandaki (Province No.4) and 4 WUSCs (Agyauli, Gaidakot, Pragatinagar, Rajahar) in Nawalparasi East district, Gandaki Province. The On-site Training was originally intended to be conducted for the WUSCs which had taken the Basic Training, because the training aimed to follow up and establish the content learned during the Basic Training. However, considering their geographical proximity, the training also included Sundarbazaar WUSC and Rajahar WUSC, who had not attended the Basic Training. The trainer confirmed the status of the water supply facilities, and provided guidance based upon the actual situation

The PM joined the training for 4 days from February 4 to 7, 2021 and directly instructed the WUSCs. The main points of the instruction were as follows:

1) The new facility was not equipped with a flowmeter and a chlorine injection unit, and the FWSSMP engineer was instructed to add them to the future new construction works;
2) The WUSCs were instructed to replace malfunctioning flowmeters (dia.140 mm);
3) It was instructed to set low water tariffs for the low-income households. Setting of low water tariffs is commonly adopted in Nepal; and
4) The PM also visited those WUSCs that had not attended the Basic Training and gave advice after confirming their situation on water supply service (management and O&M).

The engineers of local governments participated in the On-site Training at Lasunekhola WUSC and Gainakot WUSC. Pragatinagar WUSC had calculated and analysed all 11 KPIs, using the collected data.

(4) 4th On-site Training

The 4th On-site Training was conducted at the following 15 WUSCs from February 23 through March 16, 2021.

1) 4 WUSCs (Bhurigan, Kusumba, Rajapur, Guleriya-I) were in Bardiya district, Lumbini (No.5) province.
2) 5 WUSCs (Beljhundi, Narayanpur, Jhakredhunga, Chaughera, Bharatpur) were in Dang district, Lumbini (No.5) province.
3) 5 WUSCs (Shankarnagar, Anandaban, Sainamaina, Sauraha Farsatikar, Devdaha) were in Rupandehi district, Lumbini (No.5) province.
4) Ramgram WUSC is in Parasi-West district, Lumbini (No.5) province.

The main instructions given were: 1) Regular practice of recording of O & M data, 2) Disclosure of water quality test results to consumers and 3) Calculation method of KPIs

After that, WASMIP-II team planned to conduct the On-site Training for Bhoteodar WUSC and Sundarbazar WUSC in Lamjung District. Since Sundarbazar WUSC requested participation of the WASMIP-II team, the team planned to conduct monitoring of the On-site Training and instruction during the training. However, the declaration of lockdown measures on April 20, 2021 was not relaxed during the team's stay in Nepal (beginning of June, 2021) and the On-site training had to be cancelled.

(5) 5th On-site Training

The 5th On-site Training was conducted from October 24 through November 12, 2021. The site was Province No. 1, Jhapa District with 11 WUSCs (Dhulabari, Juropani, Gauradaha, Shanischare, Shivasatachi, Topgachi-I, Topgachi-II, Topgachi-III, Topgachi-I, Topgachi-II, Topgachi-III, Chandragadhi-I, Chandragadhi-II, Prithvinagar (Gaurishankar)), and also 3 WUSCs (Jamungachi, Tankisinuwari, Itahara) in Morang District, making a total of 14 WUSCs.

(6) 6th On-site Training

The 6th On-site Trainings was conducted on November 28 and November 30, 2021. The sites were Rajahar WUSC in Lumbini Province, Nawalparasi District, and Sundarbazar WUSC in Gandaki Province, Lamjung District, a total of 2 WUSCs.

(7) 7th On-site Training

The 7th On-site Training was conducted from December 10, 2021 through December 13, 2021. The sites were 4 WUSCs (Manthali, Ramechaap, Pakarbas-I, and Pakarbas-II) in Province No. 3, Ramechaap District. At that time, the PM, two members from NWSSTC and three members from FWSSMP participated in the trainings.

(8) 8th on-site Training

The 8th On-site Training was conducted from January 19 through 21, 2022. The sites were Chautara WUSC, Melamchi WUSC and Barhabise WUSC in Bagmati Province, Sindhupalchok District.

2.12.3 Outcome of Training

An outline of the On-site Training is shown in Appendix 2.33 and the summary of the results is as follows:.

- The training was conducted by FWSSMP engineers and supported by WASMIP staff.
- A simplified version of the SOP was distributed, and its usage was explained.
- Water source development and construction of elevated tanks are being carried out to meet water demand.
- Water quality is regularly measured, data is recorded, and KPIs are regularly calculated. WUSCs were advised to develop targets and plans using the KPIs.
- Some WUSCs could not understand how to calculate KPIs or what KPIs mean. Also, WUSCs explained that they are unable to calculate KPIs due to staff shortage. It was recommended that more time be spent on the importance of KPIs and KPI calculation in the future Basic Training.
- O&M is being performed appropriately according to the SOPs.
- Some WUSC staff had been infected with COVID-19, but water supply was carried out as usual.
- FWSSMP trainers instructed the WUSCs to repair flowmeters and chlorine injection units that are not working, or procure new one. This is the same instruction that NWSSTC had given to WUSCs to repair or replace defective equipment themselves. In some cases, spare parts were not available in the local market and FWSSMP engineers provided the supplier information.
- It was instructed that the residual chlorine concentration should be maintained at the proper level by chlorine injection and that the nozzles should be maintained to prevent clogging.
- There were WUSCs where daily water quality testing was not conducted, and water quality control was inadequate. These WUSCs were instructed on how to use simple water quality test kits, evaluate the results, and disclose information. Although some WUSCs focus on water quantity, the importance of water quality management was explained.
- Some WUSCs regularly outsourced water quality testing.
- It was instructed to periodically conduct filter cleaning where underground water sources have high iron concentration.
- In addition, it was instructed to update the water distribution network map simultaneously with the construction of new water distribution pipes.
- In order to improve the fee collection rate and to promote connection, it was suggested to consider setting tariffs for the poverty level.
- In response to a request for training on mechanical and electrical equipment, WUSCs were instructed on how to use the provided current measuring equipment and were advised to monitor it regularly.
- A sand washing machine for slow filtration (made in India) was procured with WUSC funds, and the filter sand is being maintained.
- A landslide at the water treatment plant (WTP) at Rajahar WUSC caused a leak in the slow sand filter. FWSSMP engineers reported this situation to FWSSMP management.

- The filter at the WTP is old and no longer in use. In response to this, FWSSMP proposed to construct a new WTP through Co-Financing project. Also, the area near the WTP is at risk of landslide and some protection measures are needed. FWSSMP reported the need for support to DWSSM.
- NWSSTC engineers instructed the WUSCs on how to connect the ground (earth) from the electrical panel. Simultaneously, the WUSCs were instructed on how to measure voltage and current. As a result, it was found that there was a high need for training in electrical panel operation and maintenance management, and it was decided to provide training through NWSSTC.
- By participating in the On-site Training, NWSSTC was able to understand the situation at the WUSC sites, identified training needs, and was able to provide more practical training.
- A management checklist was developed based on WUSC's field survey, with 50 items (147 questions) in seven areas (governance, human resources, facilities, O&M, information, finance, and communication). It is in the form of questions and is a self-assessment by WUSC.
- A visualization of the results of the management check (50 items, 147 questions) that had been performed during the training up to that time was made by using radar charts. The radar charts are shown in Appendix 2.34. The results of the management check are shown in Appendix 2.35.

Figure 2.17 On-site Training (1)

Figure 2.18 On-site Training (2)

2.13 Planning of Refresher Training (Activity 2.9, 3.10, 3.11)

The Refresher Training served several purposes: 1) introduction of new subjects which were not covered in the Basic Training; 2) collection of feedback on the Basic and On-site Trainings; 3) sharing good work practices and key issues of the target WUSCs; 4) introduction of policy and technology related to water sector; and 5) interaction among the target WUSCs.

The planning and preparation of the Refresher Training commenced after completion of the Basic Training of Target-A WUSC, so that the outputs and lessons learnt from the Basic Training activities could be incorporated into the planning of the Refresher Training.

2.13.1 Preparation of Training

In response to a proposal by NWSSTC, the WASMIP-II team agreed with NWSSTC to conduct the Refresher Training as an Observation Tour. The content of the Refresher Training plan in the form of an Observation Tour was as follows: 1) target trainees: Board members and managers of WUSC; 2) Selection of a model WUSC; 3) visit and inspect the model WUSC and learn good practices regarding water supply business operation and management at field level; and 4) WUSCs in the vicinity of the model WUSC are to be invited to visit and inspect the model WUSC.

It was confirmed that there were no problems with the DWSSM budgetary measures in implementing the Refresher Training. As expected, the training required much time and effort for logistical preparation. The WASMIP national staff provided their support for making contact with the participants and arranging their accommodation.

2.13.2 Implementation of Refresher Training

Three (3) Refresher Trainings (Observation and Interaction Workshop) were conducted at the three (3) WUSCs of Pragatinagar (Province No.4), Dhulabari (Province No.1) and Amlekhgunj (Province No.2) in April, May and June, 2019, respectively.

The Observation and Interaction Workshop objectives were: 1) to observe water supply facility in the model WUSC as an example of good practice; 2) to learn O&M, record keeping, water quality tests and sharing test results etc. for water supply facilities; 3) to facilitate interaction among DWSSM, NWSSTC and WUSC members and discuss issues, challenges and countermeasures related to water supply system/management; 4) to recognize the gaps between the model WUSC and attending WUSCs; and 5) to facilitate presentations from DWSSM/NWSSTC to the WUSCs.

(1) 1st Refresher Training

The 1st Refresher Training was held on April 25, 2019 at Pragatinagar WUSC for the 9 WUSCs that had participated in the Basic Training. Initially, the training was scheduled to be held at Pragatinagar WUSC and Mangadh WUSC, as model WUSCs. However, it was decided to hold the training conference jointly

by the two WUSCs, but only at Pragatinagar WUSC. This decision was due to declaration of a nationwide strike on April 18. The following summarizes the outline of the Refresher Training:

- A total of 13 WUSCs, with 83 participants (Board members and/or managers.
- Presentations by the Chairpersons of Pragatinagar WUSC and Mangadh WUSC, comments by each WUSC, and an inspection tour of the Pragatinagar WUSC facilities were conducted.
- In addition, as per the recommendation of NWSSTC, Simara WUSC was added as a model WUSC. A presentation was given by Simara WUSC, and opinion exchange and site inspection of the facilities were carried out.
- In the presentation by Pragatinagar WUSC, the following activities were introduced: 1) Regular testing of water quality in storage tanks and of tap water supplied to residents; 2) Regular water quality testing and release of their results to the public; 3) Operation and maintenance records, equipment repair records; 4) Evaluation of KPIs; 5) Publicity of WUSC activities through Facebook and radio; 6) Payment of water bills through cellular phones; 7) Monitoring of facilities through CCTV; and 8) Education to schoolchildren, at schools, on safe water supply .
- There were some points for reflection and improvement, of the Refresher Training, such as: 1) Time management (allocation and management of time for the presentations, exchange of opinions and facility inspection tours); 2) Means of making explanations during facility inspection tours (explanation using loudspeakers, etc. was necessary); and 3) Time consuming transportation (long distance and travel time consumed due to the scattered locations of WUSCs). At that time, NWSSTC provided a pick-up bus for the tour.

(2) 2nd Refresher Training

The 2nd Refresher Training was conducted on May 18 and 19, 2019, at Dhulabari WUSC, showcasing Dhulabari WUSC as a model WUSC. Twenty-five (25) WUSCs from Jhapa and Morang Districts were invited and a total 24 WUSCs with 77 participants of Board members and/or managers attending. The outline of the 2nd Refresher Training is described below:

- The program consisted of: 1) a presentation by the Chairperson of Dhulabari WUSC: 2) a presentation by NWSSTC; and 3) an observation tour of the facilities (sharing good practices in facility maintenance).
- Dhulabari WUSC gave a presentation regarding{ 1) Basic information; 2) Issues and challenges on O&M before implementation of WASMIP-I; 3) Acquisition of new technical and management concepts from WASMIP-I; 4) Good practices for O&M; and 5) Acquisition of technical skills through the Basic Training.
- The Chief of NWSSTC gave the following presentations for WUSCs:
  - Water supply and sanitation quality improvement, water supply schemes pattern categorization, duties and responsibility of the authorities concerned;
  - Governance of WUSCs, including policy and financial aspects (transparent accounts & audit, balance sheet, financial performance, PDCA cycle, SWOT analysis, KPIs, etc.);

- Safe water and improved sanitation;
- Concept of Water Safety Plan and its implementation procedures;
- Knowledge and information management of WUSCs; importance, problems, past working methods and future work model based on the KPIs and the Management Model; and
- Service, proper operation, and sustainability of water supply system;

- In the observation tour, the outlines, functions and O&M activities of each facility were explained by technicians, engineers and Chief of NWSSTC to understand the procedures followed for O&M. Especially, the importance of maintaining accurate and regular records, such as water production volume, water quality and customer complaints, etc. were emphasized to the attendees. Since there were many types of water treatment processes corresponding to the variety of water sources at the model WUSCs, all attending WUSCs sought to acquire new knowledge through the Workshops.
- Grouping and the use of megaphones allowed the participants to receive the explanations efficiently during site inspections.
- In terms of the points to be improved, most of the participants made comments that: 1) the content of NWSSTC's presentation (sanitation quality improvement, management topics, analysis methods, etc.) was too technical for the participants (the content was aimed at trainers); and 2) more time was needed for the participating WUSCs to exchange opinions.

(3) 3rd Refresher Training

The 3rd Refresher Training was organized by NWSSTC and held on June 27 and 28, 2019. The location was Amlekhgunj WUSC in Bara district, Province No.2. Site visits were made to both Simara WUSC (source: groundwater) and Amlekhgunj WUSC (source: surface water). The number of participants was 73 from 20 WUSCs (of which 16 were target WUSCs). The outline of the 3rd Refresher Training is described below:

- The contents included: 1) presentation by the Chairperson of Simara WUSC; 2) introduction of WASMIP and activity report by NWSSTC; 3) management of the WUSC; 4) improvement of water supply and sanitation; 5) site visit; 6) presentation by participants from each participating WUSC (5 minutes each); 7) KPI and points to be improved; 8) good practices in providing water supply services; and 9) business plan of the WUSC.
- A questionnaire was distributed to the participants during the orientation at the beginning of the training, and they were requested to fill in the information and good practices of each WUSC. Based on this, they gave speeches, based on the format of speeches given by participants at the Network Conference in Dang district (Province No.5). This permitted an effective exchange of views and information among the participants.
- Sixteen (16) good practices were introduced by the participants from the WUSCs: 1) regular meter reading; 2) quick repairing of pipelines; 3) setting water tariffs for consumers with economic difficulties to pay; 4) storing spare parts; 5) installing a generator; 6) daily chlorine dosing; 7) regular inspection and monitoring of facilities; 8) regular water quality testing; 9) management of customer

complaints; 10) holding regular Board Meetings; 11) preparing annual audit reports; 12) regular communication with consumers; 13) public awareness programs; 14) establishing a cooperative finance system by Karmaiya WUSC; 15) utilizing local FM radio to disseminate information and public awareness to consumers; and 16) considering suggestions from intellectuals, school teachers, journalists, etc. regarding water supply O&M, and management.

- The key challenges the WUSCs faced were: 1) pipe damage/destruction by road construction contractors; 2) importance of a secure fiscal budget for construction and O&M; 3) control for increasing water supply volume; 4) suitable water treatment process for raw water with high turbidity; 5) water leakage from aged pipes; 6) high electricity bill; 7) scaling inside pipes; and 8) alternative water resource mapping and development.
- The good practices and challenges noted above were discussed between the participating WUSCs.

(4) Refresher Training after FY 2020

Because the Nepal government prohibited holding meetings of over 25 people, as a COVID-19 precaution, The PM and the WASMIP-II Team decided that it would not be possible to hold planned Refresher Training after FY 2020.

2.13.3 Outcome of Training

Based on the comments of the PM on each Refresher Training session, the outcomes are summarized as follows:

<For DWSSM/NWSSTC>

- Improvement of the lecture and facilitation skills of trainers
- Increase in the number of trainers whose performance had been enhanced in the field of O&M and management.
- Establishment of systematic training on O&M of water supply facilities and management.
- Increase of the opportunities for site visits and lectures on site, and enabling visualization of the status O&M.

<For WUSC>

- Increased opportunities for lectures by DWSSM and awareness of WUSCs problems and solutions.
- Understanding of the importance of O&M, financial records and calculation of KPIs.
- Obtaining the opportunity to learn good practices in O&M observed in the field.
- Acquisition of the knowledge of the important equipment (chlorine injectors, flowmeters, water quality testing equipment, etc.) for operating water facilities and the supply of necessary equipment by DWSSM.

Figure 2.19 Lecture by NWSSTC

Figure 2.20 Observation Tour

2.14 Evaluation of Training Activities (Activity 2.10)

2.14.1 Evaluation based on KPIs

(1) Outline of Activities

KPIs have been set as indicators to measure the outcomes of the training activities in the target WUSCs under the WASMIP-II. The following indicators, adopted referring the benchmark handbook prepared by SEIU, were selected as KPIs to monitor and evaluate the status of water supply management in the target WUSCs.

Table 2.24 KPIs for the target WUSCs (Table 2.12 written again)

Category		SEIU Benchmark Indexes
Type of Service	Connection	Water Coverage Ratio
	Water Production	Water Production Ratio
	Water Consumption	Water Consumption Ratio
Quality of Service	Water Meter	Metered Ratio
	Length of Service Hour	Service Hours
	Water Quality	Water Quality Compliance Ratio
Finance/ Human Resource	Billing	Non-Revenue Water (NRW)
	Cost	Daily Production Cost, Operating Ratio
	Income	Collection Ratio
	Human Resource	Staff Ratio

The KPI values at the beginning of the project were calculated based on the results of the baseline survey of the target WUSCs conducted between 2016 and 2017. The KPIs were calculated for all 13 Target-A WUSCs and 55 Target-B WUSCs, for a total of 68 WUSCs.

In order to check the improvement after the implementation of the training, basic information on the target WUSCs in 2019/20 was collected by telephone survey and KPIs were calculated. The results of KPI calculation were reported to DWSSM and ISSAU in March 2021 by online presentation. In addition, a KPI verification sheet was prepared and distributed to the 68 WUSCs to promote understanding of KPIs.

Subsequently, the PM requested the WASMIP-II team to calculate KPIs based on the latest data (2020/21) in the final year of the WASMIP-II. According to the request, the WASMIP-II team collected the relevant data and calculated the KPIs by the end of January 2022.

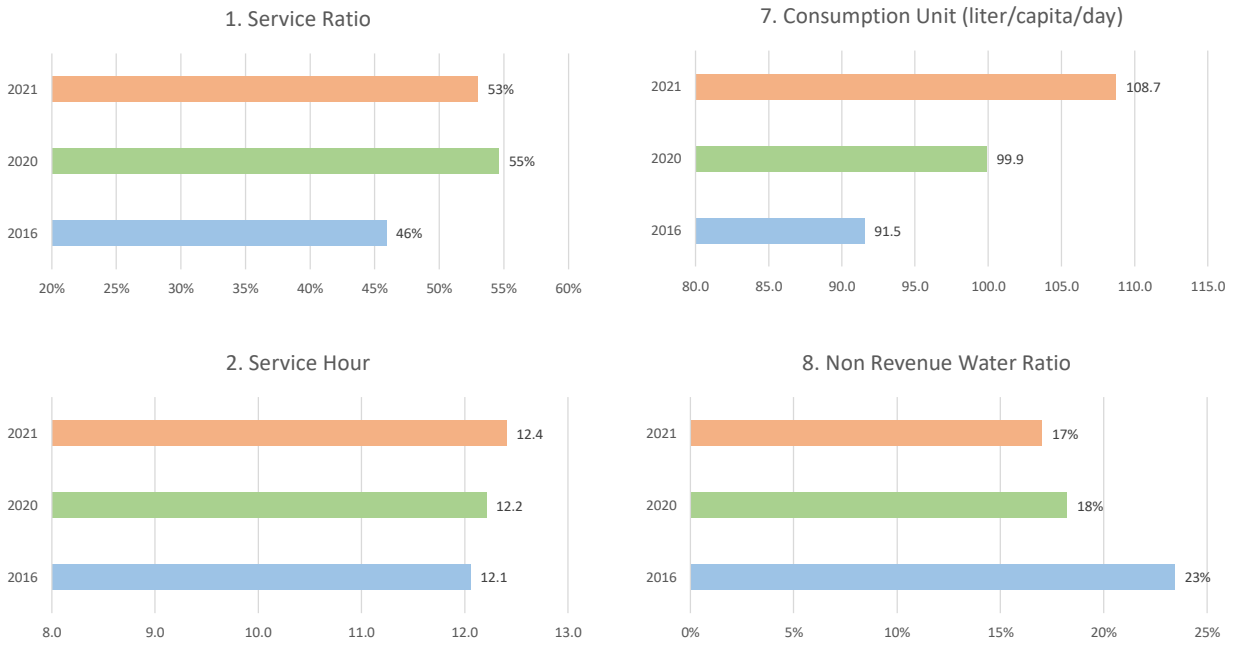
(2) Evaluation Results

Of the 68 WUSCs covered, KPIs were calculated and analysed for 64 target WUSCs for which data were finally available. For the remaining 4 WUSCs, no information was available because water services had not been started at the time of the 2021 survey.

The changes in the average values of each KPI for the 64 target WUSCs are shown in Figure. Summary of the results is described below:

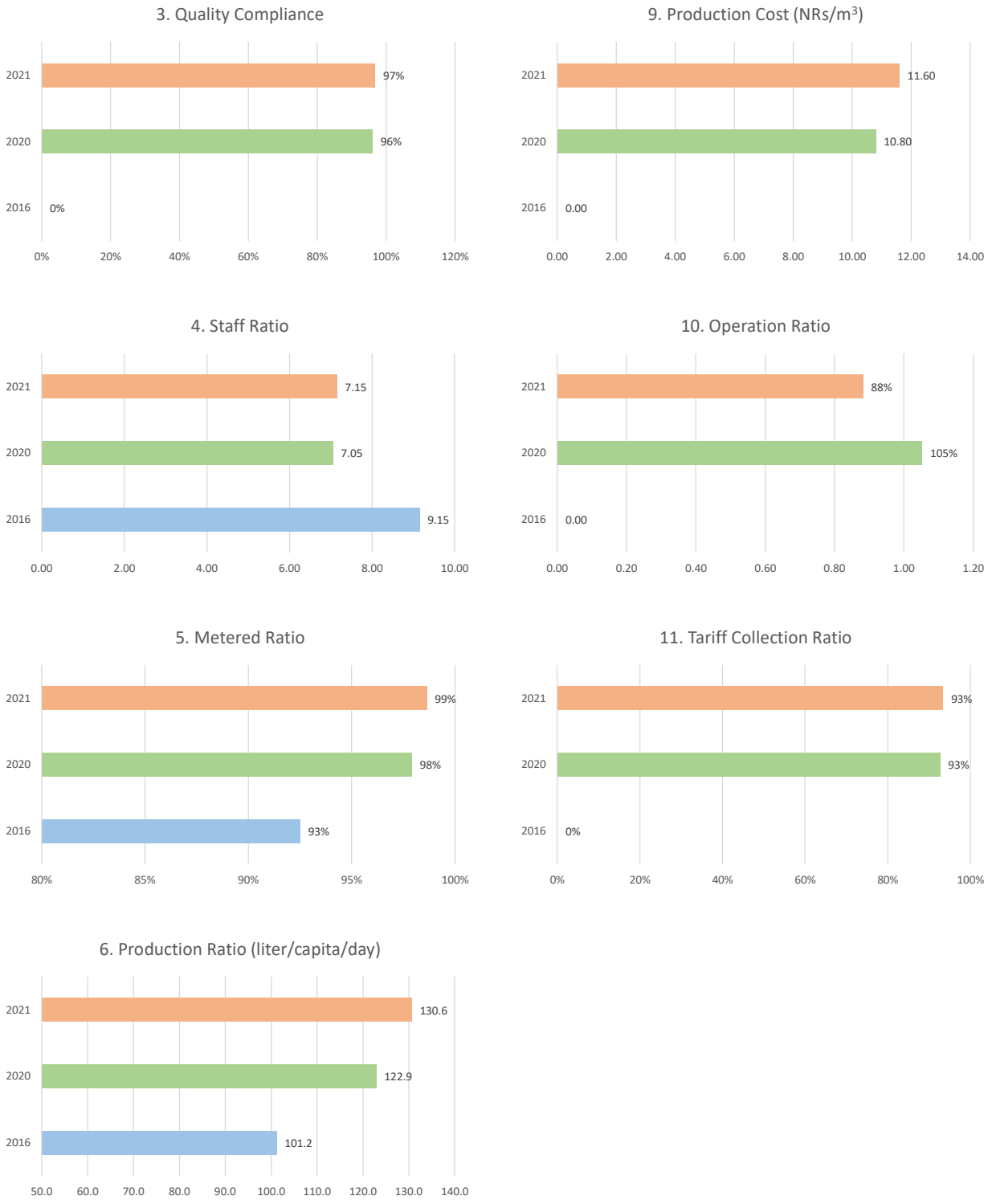
- Water coverage ratio improved by 7% from the point in 2016 to 53% in 2021.
- Service hours improved slightly from 12.1 hours/day as of 2016 to 12.4 hours/day as of 2021.

- Water quality compliance ratio were not measured at any WUSCs in 2016. However, water quality is now being measured and the water quality compliance ratio reaches 97% in 2021, satisfying with drinking water quality standards.
- Staff ratio (number of staff per 1,000 customer taps) changed from 9.15 in 2016 to 7.15 in 2021.
- Metered ratio improved by 7% from the point in 2016 to 99% in 2021.
- Water production ratio improved significantly from 101.2 L/person/day in 2016 to 130.6 L/person/day in 2021.
- Water consumption ratio increased significantly from 91.5 L/person/day in 2016 to 108.7 L/person/day in 2021 due to improved water production and reduced NRW.
- NRW has been reduced by 6% from 23% in 2016 to 17% in 2021.
- Daily production cost of water was not available for any WUSCs as of 2016. However, it could be calculated for all WUCSs as of 2021.
- Operating ratio (operation cost/tariff income) was not available for any WUSCs in 2016. However, it could be calculated for all WUCSs, and has improved from a deficit situation of 105% (2020) to a surplus of 88% (2021).
- Collection ratio of water tariff was not available for any WUSCs in 2016. However, in 2021 it could be calculated for all WUCSs and was as high as 93% in 2021.



*) The above figures are averages for the 64 target WUSCs for which information was available in 2021, out of the 68 WUSCs surveyed.

Figure 2.21 Comparison of Average KPIs of the 64 Target WUSCs



*) The above figures are averages for the 64 target WUSCs for which information was available in 2021, out of the 68 WUSCs surveyed.

Figure 2.21 Comparison of Average KPIs of the 64 Target WUSCs (Continue)

(3) Outputs/Findings

The missing data rate has significantly improved, compared to that at during the baseline survey conducted at the beginning of the WASMIP-II. That can be said to be one of the outcomes of the training activities of WASMIP-II. Specifically, the rate improved from 62% in 2016, to 10% in 2020 and to 1% in 2021. In particular, data to calculate KPIs of water quality compliance ratio, water production ratio, operating ratio (cost/revenue), and collection ratio was not recorded in 2016, but all WUSCs have received the necessary training and by 2021 all WUSCs have been recording the data. The main factors contributing to the reduction in the missing data rate are considered as follows:

- Restoration of functioning through facility rehabilitation (installation of flowmeters, and provision of chlorine injection units and water quality testing kits). In particular, the major factors were; 1) installation of flowmeters to measure water production and water distribution amount, and 2) provision of water quality testing kits to test water quality.
- Techniques and practices of record keeping have taken root. Through the various WASMIP-II trainings, it was a great achievement that the WUSCs learned the importance and the way of record keeping, and became accustomed to it.
- Through the training, the WUSCs understood the importance of visualizing the status of waterworks operations through KPIs and KPIs calculation method. The data required for the KPI calculation came to be recorded regularly.

In addition, by learning and practicing proper O&M of water supply facilities thorough the WASMIP-II trainings, the following improvements were observed, such as: 1) significant improvements in water coverage ratio and service hours; 2) compliance with water quality standards; 3) increase in water production and consumption; 4) improvement in NRW rate; and 5) improvement in collection ratio of water tariff.

The KPIs applied in the WASMIP-II are expected to be incorporated into the targets of future annual plans and they can help in identifying weaknesses and developing policies for improvement.

2.14.2 WASMIP Seminar

DWSSM held an online seminar titled “Seminar on WASMIP-II Achievements and Way Forward” on August 24th, 2021. The number of the participants was 23 persons (DWSSM/FWSSMP:12, ISSAC:3, JICA:2, and WASMIP:6). The purpose of the seminar was to explain to the participants the activities and achievements of WASMIP-II and the facility rehabilitation manual.

The speakers at the seminar were three persons, WASMIP Chief Advisor (Overview of WASMIP-II), NWSSTC Chief/PM (Capacity Development and Operational Management of WUSCs under WASMIP-II), and DWSSM Planning Section Chief (Support programs provided by the Department to improve the operational management of WUSCs under WASMIP-II). (the texts inside the parenthesis are the presentation titles)

The handouts of the presentation at the seminar titled "Design Manual of Specifications on Rehabilitation Works for Target WUSCs in Semi-urban Towns" and its PowerPoint slides were distributed to the participants to share them. The manual was explained briefly by presentation at the Seminar.

The PM made the following statements;

a) DWSSM requested that the FWSSMP engineers should participate in the Basic and On-site trainings, and followed-up by the issuance of its request letter issued by the DWSSM DDG to FWSSMP.
b) The training of the WUSCs in semi-urban towns will be carried out continuously, even after the completion of WASMIP-II. The training will be conducted targeting at the 68 WUSCs, out of the total 260 semi-urban town WUSCs and will be followed by training for the remaining 192 semi-urban town WUSCs. The WASMIP-II team should collect the basic data on the balance of semi-urban town WUSCs, such as location, scale and facility components.
c) Capacity building of local government is an important issue for WUSC support. It is possible to invite the local governments to training conducted by NWSSTC. However, the official procedures for invitation takes time.
d) The management model will be approved by DWSSM for its distribution.

2.15 Budget Allocation for Training Activities (Activity 2.11)

DWSSM's budget allocation for WASMIP-II for each fiscal year of the Project is shown in Table 2.25.

Table 2.25 DWSSM Budget for WASMIP-II

Unit: NPR

Fiscal Year	Rehabilitation Works (Support by Equipment Supply)	Training (Support by Soft Component)
2073/74 (2016/17)	15 million	2.5 million
2074/75 (2017/18)	50 million 24 million (5 RMSOs)	2.5 million
2075/76 (2018/19)	10 million	2.5 million
2076/77 (2019/20)	20 million	4.0 million
2077/78 (2020/21)	15 million	6.0 million
2078/79 (2021/22)	NA	6.0 million

2.15.1 Nepal 2073~2074 (2016~2017 AD)

As budget for the FY 2073/74 (2016/17), 15 million NPR for facility rehabilitation and 2.5 million NPR for the trainings were allocated.

2.15.2 Nepal 2074~2075 (2017~2018 AD)

The total amount of the budget for the facility rehabilitation for the FY 2074/75 (53.5 million NPR) had been disbursed as at the end of May 2018, therefore, it was confirmed that another amount of 5 million NPR had been diverted from other sections within DWSSM and added to the budget for WUSC facility rehabilitation. The cost of ToT was expected to be disbursed from the budget of NWSSTC (2.5 million NPR).

In addition, NWSSTC conducted its own training for engineers of the target WUSCs.

2.15.3 Nepal 2075~2076 (2018~2019 AD)

It was also confirmed that the budget plan for the FY 2075/76 allocated approximately 10 million NPR for facility rehabilitation and 2.5 million NPR for NWSSTC training. There was no budget allocation for the RMSO.

The release of NWSSTC Budget was delayed (actual official release was expected around the end of November 2018) because of the organizational restructuring of DWSSM. MoWS approved DWSSM's new structure and budget. The supplemental ToT and the Basic Training were performed after the release of the agreed budget.

NWSSTC conducted training to WUSC engineers on O&M of water supply systems in the fiscal year 2075/76, as per the NWSSTC annual training program.

2.15.4 Nepal 2076~2077 (2019~2020 AD)

As the budget of the FY 2076/77 (2019/20), 20 million NPR for facility rehabilitation and 4 million NPR for training were allocated.

The budget for the facility rehabilitation was 20 million NPR, but the effective budget for new works was 16 million NPR, as 4 million NPR was allocated for outstanding payment to the contractor for work in 2075/76 (which had not been paid due to non-procurement of some equipment) was to be paid from the 2076/77 budget. Finally, the fiscal year budget for 2076/77 (2019/20) for rehabilitation works on the water supply facilities of WUSC was not used due to COVID-19.

The initial budget allocation for WASMIP-II training activities was 1 million NPR, but the allocation was increased to 4 million NPR by negotiation between DWSSM and MoWS. This was a significant increase from the 2075/76 FY's training budget of 2.5 million.

2.15.5 Nepal 2077~2078 (2020~2021 AD)

NWSSTC executed only around half of the NPR 4 million training budget in the fiscal year 2077/78, because mainly online training was conducted due to COVID-19.

2.15.6 Nepal 2078~2079 (2021~2022 AD)

NWSSTC’s budget for WASMIP-II training activity in the fiscal year 2078/79 (2021/2022) totalled 6 million NPR, being 4 million NPR plus 2 million NPR undisbursed budget from fiscal year 2077/78.

2.16 Situation Analysis of Training Mechanism (Activity 2.5, 3.1)

As mentioned above, prior to the transition to federal government in 2017, the DWSS and its subsidiary RMSOs and WSSDOs provided technical support and training to WUSC staff on the construction and rehabilitation of water supply facilities. After the transition to federal government, DWSS was renamed DWSSM and reorganized from 18 sections of DWSS to 8 sections of DWSSM. In line with this, an analysis of the training mechanism was carried out.

DWSSM regulation was issued stating that the Planning, Monitoring and Evaluation Section, and NWSSTC, would be responsible for the WASMIP Management Model and that NWSSTC would be responsible for implementing the training. (The original of the regulation was in Nepali and WASMIP had it translated into English). The draft Job Description of the NWSSTC is shown in Appendix 2.12.

The "Training Implementation Guideline" includes training mechanisms and management procedures for training. NWSSTC plans and conducts training for WUSCs according to the guideline.

The training mechanism consists of Basic Training, On-site Training and Refresher Training and the selection of trainers for each training is carried out by NWSSTC. The ToT conducted by WASMIP-II has contributed to securing a number of trainer candidates and to selection of trainers by NWSSTC.

It is important to enhancing the credibility of the training mechanism that the training is properly conducted according to the annual training plan. NWSSTC has the required skills to manage training according to the training mechanism established by WASMIP-II. However, the On-site training methodology will need to be revised based on the time-wise changed situation, such as number of FWSSMP engineers and projects. NWSSTC will be required to continually review and improve training management in response to changing circumstances.

2.17 Training Implementation Guideline and Training Plan (Activity 3.2)

2.17.1 Training Implementation Guideline

The "Training Implementation Guideline" was prepared to specify the administrative procedures for training activities to be conducted under WASMIP-II. The guideline was modified as necessary to incorporate the lessons learnt during the Project.

The first version of the proposed guideline was prepared and submitted to the DWSS in June 2018. NWSSTC, already had a “NORM” that regulated roles, responsibilities, fees and so on. NWSSTC had historically conducted their training in accordance with the NORM. Therefore, it was agreed to combine the proposed guideline and the NORM into the “Training Implementation Guideline" to set-out the procedures and key points of training implementation.

The proposed guideline describes only the specific conditions for the training of WUSCs in semi-urban towns by DWSSM and NWSSTC. It covers planning, preparation works, including selection criteria for trainers and trainees, implementation, and evaluation procedures of training activities for WUSCs as well as necessary ToT. The common procedures and conditions for NWSSTC training are not detailed in the proposed guideline, as they may be referred to in the existing rules and regulations adopted by DWSSM/NWSSTC. The proposed guideline was discussed and finalized in close consultation with the C/Ps to incorporate the lessons learnt from the WASMIP project.

The approval process, such as management models and training implementation guidelines for DWSSM, was examined by the PM. As a result, approval by the MoWS was considered to not be required and the documents would be approved within DWSSM. Previous approval inside DWSSM for the WHO's SOP guided the PM’s decision that the guidelines only needed approval by DWSSM. However, it was expected that later approval by MoWS would be necessary for DWSSM to distribute the management model nationwide. The approval procedure is expected to be conducted by 1) approval by DWSSM, followed by 2) approval by MoWS for nationwide distribution.

The "Training Implementation Guideline" is shown in Appendix 2.36.

2.17.2 Training Plan

ToT to conduct training, Basic Training and On-site Training for the WUSCs and also Refresher Training were planned, incorporated in the PDM and approved by the 1st JCC.

For the year of July 16th 2019 to July 15th 2020, two (2) Basic Training sessions, two (2) On-site Training sessions and two (2) Refresher Training sessions were planned. A training budget of NPR 4 million was reserved for WASMIP-II.

Regarding the training schedule for WASMIP-II, the trainees first attended a Basic Training course, followed by an On-site Training course, to ensure knowledge and skills have been established in the trainees.

After some time, opinion exchange and information sharing among WUSCs, lectures by NWSSTC, and introduction of good practices (including site visits) were conducted.

(1) Basic Training

Basic training should be targeted at 20-40 WUSCs (assuming 1-2 participants per WUSC) due to the lecture room capacity at NWSSTC, but a maximum of 40 participants per training is appropriate, due to the number of trainers and maintaining the quality of training.

In some cases, it was difficult to convene the trainers at the NWSSTC training centre due to COVID-19, so the NWSSTC and the trainers went to the field and convened the target WUSCs around the venue to conduct Basic Training. This type of training has the advantage of limiting the number of people travelling, thereby reducing the risk of COVID-19 infection and the cost of training. On the other hand, the challenge is that the number of WUSCs to be trained is limited to those nearby where the training is conducted.

When it was not possible to convene trainees to the NWSSTC training centre, due to COVID-19, and when it was not possible to send instructors to the site, Basic Training was conducted online. The main advantage of this method is that it minimises the risk of infection. The challenges are that only WUSCs with online access (PC & internet) can be targeted, there is no practical training, and participants tend to be passive.

(2) On-site Training

On-site training is basically conducted for WUSCs who have attended the Basic Training. The trainers will be engineers from the nearest FWSSMP to consolidate the Basic Training. Previous on-site trainings have been attended by engineers from WSSDO and local government.

During the on-site training, a management checklist is used to ask 150 questions to Chairpersons and Managers for self-assessment. The appropriateness of the facility O&M is also checked by means of a record sheet.

Since there are often only one or two trainers and training is conducted on-site at the WUSC, the impact of COVID-19 is small and training can be done as appropriate. In WASMIP-II, On-site Training was done at 63 WUSCs.

(3) Refresher Training

After attending the Basic Training and On-site Training, WUSC will be convened at district level to conduct the Refresher Training. The duration of the training is about 2 days, mainly for manager class, with training by NWSSTC, site visits and exchange of opinions. In particular, the effectiveness of the WUSC Network Conference in Dang District will be incorporated and opinions will be collected from each WUSC.

Since COVID-19, large scale meetings have been restricted and refresher training has not been possible. It will be resumed in the future when there is a return to normalcy.

(4) Development of Training Plan for post-WASMIP-II

Information on contact phone numbers and contact persons were collected in order to develop a training plan for another 192 WUSCs in semi-urban towns in order to develop a training plan for implementation post-WASMIP-II. Information on WUSCs was confirmed through the NWSSTC, FWSSMP, WSSDO, WUSC of the same district, local government and SNS/FB, as DWSSM had limited information available. As a result, information on 176 WUSCs was obtained, and the training plan was developed based on this information. Of 176 WUSCs, 14 WUSCs of Province No. 1 participated in the 6th Basic Training from January 5th through 9th, 2022 at Letang WUSC, Morang district, Province No. 1.

2.18 Training in Japan

2.18.1 1st Training in Japan (Training for Top Management)

(1) Concept

The main objective of the Training in Japan for top management was to obtain a good understanding of the ideal state of legal and/or organisational framework required to establish a supporting mechanism, including Management Model and Technical Support Model, for the improvement of water supply works in semi-urban towns in Nepal. The following are some of the key points related to the training to be conducted.

- The framework for implementing waterworks in Japan can serve as a role model to the Nepali side for establishing a capacity enhancement framework through a cascaded ToT mechanism. The concept of the framework in Japanese practice is that the national government regulates the national legal framework and the local governments, or a united local government, operates the water utility, while the Japan Water Works Association (JWWA), established by multiple water utilities, sets the technical standards and assists the local water utilities. Consequently, the participants were expected to obtain an understanding of the development of a framework to promote the human resource development and the method of knowledge transfer to the end-user organisations, as well as the sound management and financial planning of water supply entities. Yokohama Waterworks Bureau (YWWB), the oldest waterworks entity in Japan. was established in 1887. YWWB was scheduled to provide lectures to the trainees based on its long history of operation.
- Regarding the content of the training to be given in Japan, the PM requested that sufficient time be given for a course on the detection of water leakage. In response to this request, the time allocation was adjusted to include both lectures and practical training on leak detection
- Coordination was made with Japanese municipalities (Yokohama City, Hakone Town, Zama City and Doshi Village) to request site visits. Doshi Village is situated in Yamanashi Prefecture. However, the water source located there is owned by the Yokohama Waterworks Bureau, and not by Doshi Village, and most of its water resource is supplied to Yokohama city.

(2) Term and Program of Training

The first training in Japan was conducted for five (5) days (from September 4 to 8, 2017) at the JICA Yokohama office and at other planned locations and institutions. Table 2.26 shows the training program and Table 2.27 shows the aim of each subject. The duration of the training was scheduled for five (5) days commencing on 4th September 2017. The training covered i) introduction to waterworks in Japan; ii) policies and legal frameworks relating to water supply in Japan; iii) establishing and maintaining the standards that should be commonly applied nationwide; iv) strategy for sound management; and v) strategy for HR development.

A special time-slot was set aside on the final day to discuss the support approach proposed by WASMIP-II, based on activities of the NWSSTC.

Table 2.26 Program of the 1st Training in Japan

Date	Time	Subjects	Trainer		Venue
			Name	Affiliation	
4-Sep	11:30 ～ 12:00	Program Orientation	Mr.Kozo Hayashishita	Yokohama Water Company	JICA Yokohama
	13:45 ～ 15:00	Introduction of waterworks in Yokohama	Ms.Ko Nakamura	International Operations Division, Yokohama Waterworks Bureau (YWWB)	JICA Yokohama
	15:30 ～ 16:30	Discussion	Mr. Satoru Oniki	NJS Consultants	JICA Yokohama
5-Sep	9:30 ～ 11:40	The role of national government and water supply in Japan	Mr.Takeshi Sasaki	Water Supply Division, Ministry of Health,Labor and Welfare	NJSC, Tokyo
	13:00 ～ 15:00	The role of organization as a center for maintaining nation-wide technical standard	Mr.Yuto Niwa	International Division, Japan Water Works Association (JWWA)	JWWA, Tokyo
6-Sep	10:30 ～ 12:00	Operation and maintenance of small/medium sized water utility	Mr.Yushi Fukui	Hakone Water Partners Corporation	Hakone Water Center
	13:00 ～ 15:00				
7-Sep	9:30 ～ 10:45	Sound management of water supply business	Mr.Tadashi Yamamoto	Management Planning Division,YWWB	JICA Yokohama
	11:00 ～ 12:00	Financial planning of water supply business	Ms.Sakiko Yoda	Management Planning Division,YWWB	
	13:00 ～ 14:00	Securing human resources	Mr.Kenji Kondo	Personel Affairs Division, YWWB	
	14:10 ～ 15:00	Human rsource development vision	Mr.Kaeki Yoshizawa	Human Resource Development Division, YWWB	
	15:10 ～ 16:00	Technology and knowledge succesion	Mr.Tetsuo Fukushi	Human Resource Development Division, YWWB	
8-Sep	10:00 ～ 11:00	Wrap-up Meeting	Mr. Satoru Oniki	NJS Consultants	JICA Yokohama
	11:40 ～ 11:50	Closing Ceremony			

Table 2.27 Aim of each Subject

No.	Subject	Aim
1	Introduction of the waterworks in Yokohama	To learn the history and background of YWWB before attending the lectures on individual subjects.
2	The role of national government and water supply in Japan	To learn legal/administrative basis of Japanese system and demarcation of stakeholders and the role of national government to regulate the legal framework and the national standard.
3	The role of organization as a centre for maintaining nation-wide technical standard	To learn the function of JWWA which, starting as a voluntary organization established by multiple water utilities for mutual assistance, has grown to the de facto headquarters of each utility to manage the national standard.
4	Operation and maintenance of small/medium sized water utility	To learn the practice of operation and maintenance and the performance monitoring, visiting a small/medium-sized water utility located in a mountainous area.
5	Sound management of water supply business	To learn good practices in managing water supply business and financial planning.
6	Financial planning of water supply business	
7	Securing HR (human resources)	To learn the concept of HR development under the circumstance where staff members need to acquire much more skills than ever before, due to the downsizing of the organization and the mass retirement of veteran engineers.
8	HR development vision	
9	Technology and knowledge succession	

The training materials for the 1st training in Japan are shown in Appendix 2.37.

(3) Participant

Four (4) participants from MoWS, DWSSM, and NWSSTC attended the training. The number of participants was initially planned to be six from MoWS and DWSS. Two (2) officers could not participate in the training due to the Nepal National Election as shown in Table 2.28. In view of the national elections scheduled for November-December 2017, the Election Commission took the view that this trip fell under the Code of Conduct issued at the end of August, that public servants subject to the Code of Conduct should refrain from traveling abroad. Finally, MoWS decided that the Joint Secretary (JS) of MoWS and the Director General (DG) of DWSSM should not participate in this training.

Table 2.28 List of Participants

No.	Name	Position / Affiliation	Remarks
1	Mr. Ghimire Ashish	Joint Secretary, Water Supply Section, MoWS	Cancelled
2	Mr. Subedi Shankar Prasad	Joint Secretary, Administration Section, MoWS	Attended
3	Mr. Bhatt Tejraj	Director General, DWSSM, MoWS	Cancelled
4	Mr. Das Sunil Kumar	Deputy Director General, DWSSM, MoWS	Attended
5	Mr. Simkhada Arun Kumar	Section Chief, Foreign Assistance Coordination & Planning Section, DWSSM, MoWS	Attended
6	Mr. Karki Kabindra Bikram	Senior Divisional Engineer, DWSSM, MoWS	Attended

(4) Outcomes of the Trainings

Questions/interests of the participants and the responses from the trainers are summarized in Table 2.29.

Table 2.29 Questions and Answers during the Training

No.	Subject	Questions/interests of the participants	Responses from trainers
1	Introduction of the waterworks in Yokohama	-	-
2	The role of national government and water supply in Japan	Do you have the English-version of the Water Supply Act in Japan?	Not available
		Demarcation among national government, prefectures and municipalities (water supply utilities)	Practices of on-site inspection regarding legal compliance of municipalities were introduced.
		Cooperation of 5 national ministries involved in water supply	-
3	The role of organization as a centre for maintaining nation-wide technical standard	Introduction of the standard that is commonly applied in nationwide	Every public utility accepts JWWA's specification despite its legal status as self-specification.
		Inspection system to maintain quality	-
4	Operation and maintenance of small/medium sized water utility	O&M of Hakone is an appropriate reference for Nepal WUSCs because of its mountainous location and the scale of the facility.	-
		Outsourcing under PPP scheme	Ideas to motivate outsourced operator.

No.	Subject	Questions/interests of the participants	Responses from trainers
5	Sound management of water supply business	Customer handling in case of tariff revision	Since water tariff is a matter for decision of the city council, it is necessary to explain the matter to stakeholders in advance.
6	Financial planning of water supply business	-	-
7	Securing HR (human resources)	Formulation of a system to keep skilled engineers in the organization	Persistent persuasion to the authority of power of personal issues
		Promotion system of engineers	Every engineer can be promoted to assistant manager if he/she passes the annual examination.
		How to measure the degree of customer satisfaction	-
8	HR development vision	The gap between the ideals and the realities regarding the HR development vision	The result is not necessarily same because of individual capacity, but creating a vision is important to providing direction to all employees.
9	Technology and knowledge succession	Is it difficult for mid-level managers to make a fair evaluation.	Evaluation of employees is considered from two (2) viewpoints; technological knowledge acquirement and motivation to transfer it.
		There may be less opportunity to raise employees' skill when outsourcing technical matters to external private consultants.	Some of works are kept under the operation of water works bureau to maintain a certain level of expertise and to pass it on to the next generation.

The most impressive aspects/interests of the participants are shown below;

- High coverage rate of water supply in Japan.
- Forest preservation for water resource reservation.
- PFI/PPP scheme of Hakone introducing private-sector funds to outsource construction and/or operation.
- Management system to develop future vision and to incorporate it in a long-term management plan.
- Hakone was good choice in terms of facility scale and geographical (mountainous) features and the measures against common challenges, such as high leakage could be shared.
- Issues to handover technology and practices to the next generation is important.
- Introducing legal systems regarding water supply works is essential.
- Empowering municipalities' capacity to manage water works is vital.

(5) Request toward the 2nd training in Japan for Working-Level Class

The participants requested the WASMIP-II team to include the following points for the 2nd training in Japan for engineers.

- Increase fieldwork experience opportunities.
- Support introduction of nationwide standards for water supply equipment.
- Support to establish a scheme of water supply works at provincial level.
- Support a human resources development system through practical training such as is practiced by YWWB.

2.18.2 2nd Training in Japan (Training for Working-level Class)

(1) Concept

The aim of this program was to provide the participants with the opportunity to obtain the knowledge that is currently only available in Japan, and which can help the trainees to guide improvements in the performance of the WUSCs. After finishing this training program, participants were expected to be trainers for the future training of WUSC personnel. Hence, this program introduced the practical expertise of water supply utilities (large and small, urban and rural) in Japan. Subjects were selected considering the needs and requirements that may be applied to the WUSCs.

(2) Term and Program of Training

The 2nd Training in Japan was conducted for two (2) weeks (from September 1 to 14, 2017) at the JICA Yokohama Training Centre. Table 2.30 shows the training program.

Table 2.30 Program of the 2nd Training in Japan

		Subject	Venue	Content	Aim
Day 1	9/1 (Sun)	Arrival in Japan			
Day 2	9/2 (Mon)	Program Orientation	YHM*	Introduction to the syllabus and the aims	
		Observation of Tokyo Waterworks Historical Museum	Tokyo (obs.)	Observing the PR facility of water works displaying the technology and equipment from 17th century to present day	Learn the contents and the layout of display to attract the interest of customers
Day 3	9/3 (Tue)	Introduction to water work in Japan / Yokohama	YHM (lec.)	Lecture on legal / administrative basis and general condition of water supply in Japan/YHM	Acquire the background knowledge to easily understand the following lectures
		NRW Management	YHM (lec.)	Lecture on definition, cause analysis and countermeasures for NRW	Understand the significance of NRW reduction and prepare for the following practice
Day 4	9/4 (Wed)	Water Safety Plan	YHM (lec. / prac.)	Lecture and practice on Water Safety Plan (WSP) developed by World Health Organization (WHO)	Understand the basic knowledge of WSP to ensure safe water supply from water source to tap and identify viewpoints of monitoring and supporting WUSCs
Day 5	9/5 (Thu)	Water resource management and preservation	Doshi Village (lec. / obs.)	Observation of the actual state of maintenance of water resource forest which YWWB purchased more than a century ago	Understand the necessity of water resource preservation and the significance of maintenance
		Surface water intake	Sagamihara (obs.)	Observation of surface water intake facilities	Learn the actual practice of O/M of surface water intake facilities
Day 6	9/6 (Fri)	Water quality management	YHM (lec. / obs.)	Lecture on legal basis of water quality management and observation of the actual practice	Understand the legal basis of water quality management and the actual practices
		Pipe replacement	YHM (lec.)	Replacement plan for aged pipes and quake-proofing	Learn the scheme to implement replacement work and quake-proofing work under budgetary constraints

		Subject	Venue	Content	Aim
		Action Plan Formation (1)	YHM (prac.)	Practicing the formation of "Action Plan" to support WUSCs to improve their performance	Refine the skill to formulate "Action Plan Practice" focusing on NRW reduction
Day 7	9/7 (Sat)	OFF			
Day 8	9/8 (Sun)	OFF			
Day 9	9/9 (Mon)	Water tariff	YHM (lec.)	Lecture on water tariff system and rate collection	Understand the concept of water tariff and effective way of rate collecting
		Customer service	YHM (lec.)	Lecture on customer satisfaction activity	Understand the significance of building confidence between customers and water supply utilities
		Enlightening education program for school children	YHM (lec.)	Introduction to the activity targeted at school children who are future customers	Learn the activity to install the importance of securing safe water supply into the school children
Day 10	9/10 (Tue)	Operation and maintenance of small/medium-sized water utility	Hakone Town (obs.)	Observation of the small/medium-sized water utility located in the mountainous area	Learn the actual practice and procedure of the water utility of similar size and environment as Nepal
Day 11	9/11 (Wed)	Operation and maintenance of water utility using ground water	Zama City lec./ obs.)	Lecture and observation on operation and maintenance of water utility using groundwater in the suburb of Yokohama	Learn the actual practice of operation and management of water utility using ground water and surface water
		Observation of Kawai Water Treatment Plant	YHM (obs.)		Understand easy and reliable way of logging and processing data to raise data collecting rate and to improve their accuracy
Day 12	9/12 (Thu)	Action Plan Formation (2)	YHM (prac.)	Practicing the formation of "Action Plan" to support WUSC to improve their performance	Guidance before finalization of plan
		Water meter	YHM (lec. / prac.)	Lecture and practice on water meter structure and maintenance	Understand water meter structure and maintenance for effective tariff collection
		Leakage detection	YHM (prac.)	Practice of detecting water leakage using various devices	Understand the actual way of leakage detection and the devices (including primitive one)
Day 13	9/13 (Fri)	Wrap-up	YHM (discussion)	Each participant expresses opinions regarding the findings which they may utilize for giving support to WUSCs and discusses on the program as a whole	
		Prepare for returning home			
Day 14	9/14 (Sat)	Departure from Japan			

* YHM: Yokohama

The training materials for the 2nd training in Japan are shown in Appendix 2.38.

(3) Prospective Participants

Participants in the 2nd Training in Japan were intended to be the trainers who would conduct future training for WUSC personnel and improve their performance, such as the personnel of DWSSM, NWSSTC and the FWSSMPs. Twelve (12) trainees from Nepal were to participate in the training course.

The draft GI (General Information) and proposed training contents/schedule for the training were submitted to the JICA Head Office on May 21st and the GI and target organizations were described and submitted to the JICA Nepal Office on June 3rd.

The Japanese experts recommended 12 candidates, who had collaborated in the WASMIP-II activities, to the DWSSM at the end of May. Subsequently, the Nepalese side submitted a list of 14 candidates (of which 2 were reserves). However, most of the candidates recommended by Japanese experts were replaced during the selection process conducted by the MoWS. In a meeting with the JS of the MoWS, the WASMIP team learnt that the selection of trainees was to be conducted by a committee within the MoWS. In order to make the training more meaningful by linking it to the measures implemented in WASMIP-II, it is desirable to have a large number of WASMIP-II collaborators among the trainees, and two reserve candidates, who were collaborators in WASMIP-II, were added as trainees with assistance of JICA.

(4) Outcomes of Training

One of the key points in the water supply management is reduction of NRW. The NRW rate had been included as one of the KPIs for the WUSCs. However, the components of NRW were not well understood by the trainees from DWSSM and FWSSMP. Therefore, as part of the lectures and exercises of this training program, the NRW issues facing WUSCs were turned out by focusing on the components of NRW. The trainees came to understand the importance of data collection to solve the issue of NRW reduction and that became one of the important outcomes of the training.

Although technology of the membrane filtration is not immediately applicable to Nepal, trainees could acquire advanced expertise in water treatment by understanding this modern technology. At the Kawai Water Treatment Plant, where membrane filtration is applied, data collection using a tablet computer was introduced. Smartphones are rapidly becoming common in Nepal and the trainees understood the usefulness of having a platform that can be used to collect data without special knowledge or skill.

(5) Utilization Method of Outcomes

The Basic Training was implemented immediately after the trainees returned to Nepal. Ten (10) of the trainees who participated in the 2nd Training in Japan were scheduled to attend the Basic Training as trainers. In the Basic Training, the outcomes of the Training Program in Japan were introduced to participating WUSCs. It was expected that the skills and viewpoints acquired from the Training in Japan will be utilized for guidance and support to WUSCs in the future.

One of the training participants, a staff member of the NWSSTC, requested the supply of experimental apparatus to promote understanding of the water retention function of the water catchment forest. This apparatus was provided, with support from Yokohama Waterworks Bureau, for use in the training in Nepal.

2.18.3 3rd Training (Online Training)

(1) Concept

In September 2021 the COVID-19 pandemic was not under control and it was not possible to invite the trainees to Japan for training. JICA and the WASMIP-II team decided to conduct the 3rd training remotely.

The target for this training was national government officials who are in a position to lead WUSC. The expert team expected that the trainees would be able to recognize the importance of issues that they will eventually face, such as conservation of water source forests, NRW reduction, and renewal of pipelines, and would reflect these issues in their future policy making.

(2) Term and Program of Training

The 3rd training was held for 5 days (from November 15 to 19, 2021) online.

The training program was designed referring to the opinions of the trainees who had attended the 1st and 2nd Trainings in Japan. The trainees of the training were trainer candidates and trainees for ToT conducted by NWSSTC. A questionnaire survey was conducted for the 16 former trainees and five (5) trainees responded to the questionnaire. The contents of the questionnaire were: 1) the lectures with meaningful contents; 2)subjects that should be adopted in the training; and 3) free opinion. The results of the response to the questionnaire are summarized below;

For 1): Water resources management, water security plan/ program, water quality management, NRW reduction plan / program, SCADA system (through onsite visit to Hakone waterworks) to be covered.

For 2): Lectures to be added on operation and maintenance in regional / local water supply facilities, preparation of business plan, practical training on detection of water leakage, operation management of pumps, and water security plan.

For 3): While the trainees were satisfied with the training contents, they considered that the duration of the training was too short and another one week should be added. Also, more sessions for practical training and onsite visits should be added.

Considering the opinions of the former trainees, the training program was designed as shown in the table below.

Table 2.31 Program of the 3rd Training in Japan (Online Training)

	Program	Trainer
Nov.15	Orientation. Overview of water supply in Yokohama City. Reduction of non-revenue water	YWC, Yokohama Waterworks Bureau
Nov.16	Information management for water pipelines	Yokohama Waterworks Bureau
Nov.17	Water source forest conservation. On-site waterworks class (public awareness)	Yokohama Waterworks Bureau
Nov.18	Renewal of water pipelines	Yokohama Waterworks Bureau
Nov.19	Customer service and Public Relations	Yokohama Waterworks Bureau

The training materials for the 3rd training in Japan (Online training) are shown in Appendix 2.39.

(3) Participants

Twelve (12) trainees participated in the training. The MoWS had selected 15 trainees, but only 12 actually participated. The participating trainees are listed in Table 2.32.

Table 2.32 Participants of the 3rd Training in Japan (Online Training)

SN	Organization	Designation	Name
1	DWSSM	Engineer	Mr. Madhusudhan Khanal
2	DWSSM	Engineer	Mr. Sunil Tiwari
3	Federal – Nepalgunj	Engineer	Mr. Ramesh Thapa
4	Federal – Janakpur	Engineer	Mr. Puspa Raj Singh
5	Federal – Bhaktapur	Engineer	Mr. Arun Kumar Kharel
6	Federal – Rammechap	Engineer	Mrs Sharmila Maharjan
7	Federal – Lamjung	Engineer	Mr. Naresh Regmi
8	Federal – Chitawan	Engineer	Mr. Pradeep Regmi
9	Federal – Pokhara	Engineer	Mr. Jitendra Bahadur Kunwar
10	Federal – Butwal	Engineer	Mr. Utsav Pokharel
11	Federal – Butwal	Chemist	Mr. Rabi Kiran Acharya
12	DWSSM-NWSSTC	Engineer	Mr. Binod Prasad Gajurel

(4) Outcomes of the Trainings

- The PM was concerned that conducting online training instead of conducting training in Japan would reduce the focus and motivation of the trainees. How to ensure the effectiveness of the online training was discussed between JICA and WASMIP-II team on August 12th, 2021. Some of the ideas brought up in the meeting are listed below and these were suggested to the PM;
  a) The C/P members who attend the online training should be given priority for later training in Japan, post corona.
  b) The historical experience of online training should be evaluated by the HR Department of DWSSM.
  c) DDG of DWSSM should conduct the greeting of participants at the opening ceremony on the first day of the online training.
  d) The training should be conducted in live streaming to enhance the trainees' attitude toward the lectures.
  e) The training materials should be prepared in a way to be easily understood by the trainees.
  f) The training should be conducted in an interactive way to include free discussion and exchange of information and ideas.
  g) Completion Certificates of having participated in the training should be handed to the trainees by DWSSM.

h) The training should minimize the burden on the trainees, by limiting the requirements for homework and exercises.

- There were concerns about whether the motivation of the trainees could be sustained during online training. Consequently, the WASMIP-II team decided to conduct short-duration intensive training and to focus on a limited number of training subjects. The training subjects were selected from those that had not been covered in previous training, and subjects that are essential to water supply management.
- On the first day of the training, the response from the trainees was seen to be sluggish and there were few questions. The Yokohama Waterworks Bureau staff who were commissioned to deliver most of the lectures suggested to revise the way of conducting the training and to hold group discussions using the functions of the Zoom meeting application. The trainees were divided into small groups and group discussions were held for a short time on each training subject. As a result, the trainees' awareness of participation was improved and the training itself was revitalized through interactive communication.
- The group discussion brought about another benefit that the trainers had not intended. The trainees are employees of the MoWS or its regional branches nationwide. They commented that it was a valuable experience for them to have the opportunity to exchange opinions through group discussions.
- The time difference between Nepal and Japan is only 3 hours and 15 minutes, as a result the lectures were given live (with an interpreter present and providing concurrent/real-time interpretation of lectures given in Japanese). It was possible to respond immediately to any questions arising about the lecture. This, together with increased awareness of participation through group discussions, increased the sense of satisfaction for the trainees. Nonetheless, there remained an opinion that it would have been more effective if the participants could have visited Japan to observe the actual situation of water supply in Japan.
- Other trainee comments on the training are listed below:
  - Many of the trainees commented that it was refreshing to learn about new perspectives, such as NRW reduction and water source forest conservation.
  - In particular, the concept of NRW reduction is essential for improving the management of waterworks, and many participants said that this was the first time they had learned about this matter.
  - The trainees recognized that the conservation of water source forests is an important issue. They commented that Nepal is already practicing water source forest conservation, although on a different scale.
  - Pipeline information management (drawing management) is an urgent issue for the WUSCs. There was a lot of interest in supporting WUSC pipeline mapping in the future.

  The trainees were asked to recognize the issues of water source forest conservation and pipeline renewal from the perspective of future policy making.

- As for the post-training questionnaires, the WASMIP-II team could not obtain written answers from all participants by the deadline, and urged all trainees to respond to the questionnaire by phone. The WASMIP-II national staff made a very important contribution to this effort.

2.19 Joint Coordinating Committee (JCC) and Joint Project Coordination Meeting (JPCM)

2.19.1 JCC

(1) 1st JCC (February 28, 2018)

The 1st JCC regarding the revised PDM and PO was held on February 28, 2018 with the objective of reaching agreement among the authorities concerned (MoWSS, DWSSM and JICA) about the revised PDM and PO.

In the 1st JCC, the following points were explained by the WASMIP-II team:

- The revised PDM covered the overall goal, project purpose, three outputs, and activities to achieve each output.
- In the first 2 years of the project, the baseline survey and information collection regarding DWSS, NWSSTC, RMSOs, WSSDOs, and WUSCs were conducted. Based on the results of the survey, the WASMIP team proposed the Technical Support Mechanism targeted at WUSCs in semi-urban towns.
- After completion of the Project in 2021, the main counterpart, DWSSM, is expected to continue to achieve the overall goal.
- Indicators in the PDM were set to evaluate the Project outputs.
- The concept of the DWSS model consists of Management Model, Support Model, and Smart Water Management Model, as described below:
    1) **Management Model:** Various kinds of manuals and SOPs that are to be established for proper management of the WUSCs in semi-urban towns under this project.
    2) **Support Model:** Consisting of Technical Support Mechanism; rehabilitation works and other financial support. Technical Support Mechanism for WUSCs in semi-urban towns are covered by this project.
    3) **Smart Water Management Model:** DWSS's proposal to upgrade the well managed WUSCs that are expected to be achieved through the WASMIP-II Management Model and Support Model.
- DWSS allocated enough budget and human resources to implement the training component of Technical Support Mechanism.
- NWSSTC conducted the ToT, On-site Training, and Refresher Training. Despite a shortage of human resources in DWSS, they have selected candidates from the RMSOs, WSSDOs, and DWSS for the role of trainers.
- JICA and the WASMIP-II team put a high value for DWSS's allocation of budget and human resources to support WUSCs in both hardware and soft components which are very important to achieving the sound management and maintenance of the WUSCs.

In the 1st JCC, the following feedback was reflected by the counterpart side (MoWSS and DWSS):

- NWSSTC will support the training component of the Technical Support Mechanism. However, if there is any change in DWSS's organization structure in future, the supporting unit of NWSSTC will be rebuilt/established according to DWSS's restructured situation.

- NWSSTC will facilitate conducting the Basic Training, the On-site Training, and the Refresher Training in the future.
- DWSS has completed the rehabilitation works for the 13 Target-A WUSCs and the rehabilitation works for the 55 Target-B WUSCs are expected to be finished in the current fiscal year.
- DWSS considers that the purpose of the Project coincides with the United Nations' Sustainable Development Goals (SDGs) and DWSS has high expectations that the Project will provide valuable support in achieving the SDGs.

The Minutes of Meeting on Amendment of R/D is shown in Appendix 2.40. The expert's PowerPoint presentation is shown in Appendix 2.41.

(2) 2nd JCC (August 26, 2019)

The 2nd JCC was held on August 26, 2019 with the objective of reaching agreement with the relevant authorities (MoWS, DWSSM and JICA) about the revised PDM and PO. The PowerPoint slides presented in the JCC are shown in Appendix 2.42.

The issues considered by the C/P (PM) are availability of trainers, monitoring personnel for WUSC activities (FWSSMP engineers), impact of restructuring, rehabilitation of WUSC water supply facilities (procurement, distribution, installation, and use), training implementation and securing budget for these items. The PowerPoint presentation of the C/P is shown in Appendix 2.43 and that of the experts in Appendix 2.44.

In the second JCC, the following results of activities were explained;

1) Change of Technical Support Mechanism in DWSSM
   - The change of technical support mechanism within DWSSM after the transition to the federal system in 2017.
   - DWSSM is responsible for providing essential equipment (hardware support) and training programs to the target WUSCs in semi-urban towns during implementation of the Project. The essential equipment includes flowmeters, valves, chlorination equipment and water quality test kits. The training programs consist of training for O&M of facilities and water supply management.

2) Supports on Construction and O&M for Water Supply and Sanitation by each level of government:
   - The decision on the responsible entities for construction projects for water supply and sanitation.
   - Each construction project for water supply and sanitation is classified into either federal, provincial, or local government, according to the defined design population.
   - After the transition to the federal system, the responsibilities for O&M of water supply and sanitation are delegated to the provincial and local governments. In this regard, the Project will conduct a survey of the pilot areas to analyse the support mechanism to WUSCs that needs to be provided from the provincial and local governments and will examine the necessity for capacity development on technical support at provincial and local level.

3) WASMIP-II Training Implementation Plan
   - The proposed schedule and target entities for training to be conducted in the Project.
   - The duration of the Project is five-years from June 2016. By August 21, 2019, the Project had implemented some training programs, including ToT, the Basic Training, and the Refresher Training. The major recipients of ToT are operational staff from DWSSM, NWSSTC and the FWSSMPs, while other training programs target the WUSCs in semi-urban towns.

4) Effective Utilization of Trainers
   - Active involvement of the trainers will be essential toward sustainable implementation of the training in the future. DWSSM and NWSSTC collected information on the profile of trainer candidates through the implementation of ToT.
   - The JCC meeting reached agreement that it was necessary to collect/analyse such information sophisticatedly; to recognize/certify the trainers officially; and to ensure the active participation of the trainers according to the training plan. DWSSM will create a roster/database of trainers and will coordinate with provincial and local governments as needed.

5) Clarification of Administrative Authority of DWSSM
   - The draft version of the administrative authority of DWSSM prescribes that "DWSSM takes necessary action for the maintenance-repair and ensure the sustainability of water supply and sanitation systems" as its essential administrative responsibility. It is necessary to clarify how such actions can be taken at the local level. The JCC meeting agreed that this issue needs to be clarified, so the competent Section can perform its function and obtain approval for the responsibility within the fiscal year BS 2076/77.
   - The DWSSM Electromechanical and Hydrological Section will provide technical advice to the WUSCs in semi-urban towns for maintenance and repair works, while the WUSCs will procure the equipment necessary for maintenance and small-scale repair works from budget sources other than DWSSM; for example from provincial or local governments, or from the WUSC's own budget.

6) Involvement of FWSSMP for Capacity Development of WUSCs in Semi-urban Towns
   - The draft WaSH Bill stipulates that "monitoring of water supply and sanitation projects" is one of the key roles of the Federal Government. In this regard, FWSSMPs have an obligation to visit WUSCs in semi-urban towns in order to monitor the construction works of water supply and sanitation projects.
   - The visits to WUSCs are not only for the supervision of construction projects but are also opportunities for the capacity development on O&M of facilities and water supply management. It is recommended to prepare a timeline for such regular FWSSMP visits on annual basis.

- DWSSM plans to employ inspectors at FWSSMPs. The JCC meeting agreed to elaborate a plan to continue utilizing the inspectors for capacity development of WUSCs in semi-urban towns after completion of the WASMIP-II

7) Budget Support to WUSCs in the Future

- After completion of the Project, the WUSCs should request budget support from the provincial and local governments for the purchase of O&M equipment. DWSSM will continue to provide the necessary budget for capacity development of the WUSCs in semi-urban towns after Project completion.

(3) 3rd JCC (October 6, 2021)

A Joint Terminal Evaluation was conducted from September 13 to October 7, 2021. In the Terminal Evaluation survey, the degree of achievement of the project purpose, achievements and issues were analyzed jointly with Nepalese counterparts, because the project is to be terminated in March 2022. It was also conducted in order to confirm the status to be attained at the end of the project and to agree on the Joint Terminal Evaluation report.

The Joint Terminal Evaluation provided an assessment and recommendations for the project. The details are described in detail in Chapter 3. The report also recommended four issues to be implemented within the project period and six issues to be implemented after the completion of the project. The status of these recommendations was reported at the 4th JCC.

The results of the Joint Terminal Evaluation were reported at the 3rd JCC held on October 6, 2021 and agreed with the C/Ps, including recommendations. The minutes of Meeting is shown in Appendix 2.45.

(4) 4th JCC (February 15, 2022)

The 4th JCC, which is the concluding meeting of the project, was held on February 15, 2022. The status of achievement of the Terminal Evaluation reported in the 3rd JCC was explained according to the indicators of the project purpose and overall goal.

In the JCC, the recommendations to be implemented during the project period were reported and the recommendations to be made to the C/Ps after the completion of the project were explained.

1) Recommendation within the Period of the Project

a) Ensuring achievement of Activities, Outputs, and the Project Purpose

Two recommendations were made: the Basic Training and On-site Training shall be conducted once each. Secondly, the DWSSM approval of the Management Model shall be carried out by the end of the project.

- The 6th Basic Training was conducted in Letang area (Morang district, Province No.1) for 5 days from January 5, 2022. 16 WUSCs participated, of 14 which were WUSCs in semi-urban towns that were not targeted by WASMIP-II. Basic training has already started for the WUSCs that were not targeted by WASMIP-II.

- The On-site training was conducted at 23 WUSCs from October 2021 to January 2022. This meant that training for 67 WUSCs was implemented (98.5%) out of 68 WUSCs.
- The Management Model and training implementation guidelines have not yet been approved (as of February 23, 2022). Therefore, the DWSSM was again requested to approve the Management Model.

b) Development of training plan for NWSSTC

It was recommended that NWSSTC formulate a specific training plan for 192 WUSCs semi-urban towns.

- Information (contact details, names of chairpersons) was collected for 176 out of 192 WUSCs, and it is now possible to invite the WUSCs to the Basic Training.
- Considering the training budget of the NWSSTC, a training plan for the Basic, On-site and Refresher Trainings was developed to be implemented over a six-year period from 2022 to 2027.

c) Handover to ISSAU

It was recommended that NWSSTC and the Japanese side hold a discussion in order to ensure that the results of this project are passed on to ISSAU, such as the use of SOPs, videos, and other teaching materials.

- The Chief of NWSSTC and the Japanese experts discussed and agreed that the Management Model will be used in ISSAU activities.
- Once Management Model is approved and handed over via DWSSM, ISSAU will use the Management Model.

d) Counterpart Training

The Japanese side was recommended to conduct a counterpart training within the project period. Due to the influence of COVID-19, it was decided not to invite trainees to Japan for the training, but to conduct online training instead. The third remote training in Japan was conducted for five days from November 15 to 19, 2021, with 12 trainees participating.

2) Recommendation after the Terminal of the Project

In the Terminal Evaluation, the following issues were recommended after the completion of the project. MoWS and DWSSM were informed of the recommendations again at the 4th JCC. The recommendations made in the Terminal Evaluation are described in detail in Chapter 3.

i) Authorization of Management Model and other documents by MoWS
ii) Continuation of ToT
iii) Cooperation and strengthening of FWSSMP
iv) Linkage with ISSAU's service and support center
v) Encouraging WSSDO and local government engineers to participate in training
vi) Further contribution to operation and maintenance of WUSCs

The minutes of meeting of the 4th JCC are shown in Appendix 2.46.

(5) Dissemination Workshop to introduce WASMIP-II activities and deliverables (February 15, 2022)

Following the 4th JCC, the activities and deliverables of WASMIP-II were presented in the workshop. The seven organizations that participated in the workshop were MoWS, DWSSM/NWSSTC, ISAU/ISAC, Kathmandu Valley Water Supply Management Board, and other donors such as Water Aid, WHO, and ADB. In the workshop, the achievements of the project activities were illustrated with photos, data, KPIs, COVID-19 emergency preparedness support, and WUSC awards.

SOPs, simplified SOPs, video materials, management check sheets for the On-site Training, Training Implementation Guidelines, and Design Manuals on rehabilitation works developed in WASMIP-II were introduced using photographs and actual items. During the waiting time, videos of training materials were shown for the participants to watch.

From the C/P, the former NWSSTC Chief introduced the results of the training at WASMIP-II, future training plans, and the Management Model, which will be posted on the DWSSM website after approval.

WHO, ADB and Water Aid showed high interest and expressed their appreciation for the activities of WASMIP-II. There were valuable comments, and we received constructive suggestions such as (1) why not incorporate risk management in O&M, and (2) whether the deliverables could be used.

The expert's PowerPoint presentation is shown in Appendix 2.47, the C/P's PowerPoint presentation is shown in Appendix 2.48.

2.19.2 JPCM

(1) 1st JPCM（September 18, 2016）

The 1st JPCM was held on September 18, 2016, and the outputs of the Japanese experts' activities were reported, especially on the current situation, problems encountered and proposals for improvement. In addition, DWSS explained the activities for solving the problems which DWSS, RMSOs, WSSDOs and WUSCs faced. NWSSTC also spoke about their current situation and their future training plan.

In the 1st JPCM the results of analysis on major issues, such as parameters of water quality testing, NRW amount and total income and expenditure, were reported. The KPI data that were collected after the field survey in the 13 Target-A WUSCs was utilized for the analysis. The outline of the 1st JPCM is shown below:

- Objectives of field survey: 1) Explanation of the WASMIP-II; 2) Dissemination of the WASMIP Model; 3) Confirmation on applicability of water supply systems to 13 Target-A WUSCs; and 4) Issues/Problems encountered and their resolution and/or mitigation
- Problems detected by the field survey: 1) Problem recognition; 2) Unknown field conditions; and 3) Unrecognizable problems
- Importance of data recording: 1) Awareness of the demand and necessity of water supply; 2) Formulation of plans for pipeline extension and construction of facilities; and 3) Sound and smooth water business management

- Preventive maintenance: 1) Increase the life span of equipment/facilities; 2) Maintain or improve the facility function; 3) Reduce the maintenance costs; and 4) Provide continuous and better service to consumers
- Performance Indicators (PIs): 1) Service provider's accountability; 2) Management of service achievements; and 3) Improve and promote efficiency of O&M
- Study of cascade system: 1) Existing system (conference/meeting); and 2) Optional conference i.e. forum in Dang district
- Revision of the WASMIP Model: 1) Water treatment plant O&M; 2) Mechanical and electrical SOP; and 3) Water quality management

The expert's PowerPoint presentation is shown in Appendix 2.49.

(2) 2nd JPCM (December 19, 2016)

The 2nd JPCM was held on December 19, 2016 and progress of WASMIP-II was reported to the main C/P such as the DG, who was newly assigned in December. The new PM (Mr. Kabindra Karki) of C/P had been assigned after 4 months of vacancy. The WASMIP-II team shared information on the Project outline, progress and problems of WASMIP-II with the new PM.

Outline of the 2nd JPCM is shown below;

- Workshop for 56 target WUSCs: Introduction of five good practices and one challenge
- Collection of the responses to a questionnaire sent to the target WUSCs: WUSC capacity and WSSDO support
- Key points of support mechanism/cascade system: Staff numbers in the WSSDOs
- Improved quality of documentation: Importance of records/check sheets
- Water quality testing: Possession of portable test kits

The expert's PowerPoint presentation is shown in Appendix 2.50.

(3) 3rd JPCM (April 22, 2017)

The 3rd JPCM was held on April 22, 2017, and the progress and issues of the WASMIP-II were reported to the main members of the C/Ps. The expert's PowerPoint presentation is shown in Appendix 2.51, the C/P's PowerPoint presentation is shown in Appendix 2.52.

(4) 4th JPCM (September 14, 2018)

The 4th JPCM was held on September 14, 2018. The PM explained the WASMIP activities and achievements, and the Chief Advisor explained the training plan of WASMIP-II. The expert's PowerPoint presentation is shown in Appendix 2.53, the C/P's PowerPoint presentation is shown in Appendix 2.54.

(5) 5th JPCM (June 16, 2019)

The 5th JPCM was held on June 16, 2019 in the DWSSM conference room. The PM explained the WASMIP activities, achievements and challenges (from October 2018 to May 2019) about the Basic Training and three Observation & Interaction Workshops. The Chief Advisor explained the activity analysis and issues.

The WASMIP team explained the analysis of activities, challenges, future plans, appropriate O&M, measurement of KPIs, the effective use of SOPs, flowmeters, chlorine injectors and water quality test kits. That the results of WASMIP activities could not be effective without measuring equipment and chlorine injection in the water supply facilities, was explained and shared among the authorities concerned for their understanding of this important issue.

The expert's PowerPoint presentation is shown in Appendix 2.55.

2.19.3 Discussion with DWSSM/FWSSMP/WUSC and Related Organizations

The memorandums of discussions with DWSSM/FWSSMP/WUSC and other relevant authorities are shown in Appendix 2.56.

Chapter 3 Achievement of Project Purpose

3.1 Development and Discussion on the Work Plan

This report presents the summary and results of the end-of-term evaluation study of WASMIP-II, as cited in the "Joint Terminal Evaluation Report on Capacity Development Project for the Improvement of Water Supply Management in Semi-Urban Areas in Nepal" (hereinafter referred to as the "Terminal Evaluation Report").

The Termination Evaluation mission was conducted jointly with the Nepalese counterparts in view of the fact that WASMIP-II will be terminated in March 2022. The purpose was to analyze the degree of achievement of the project's purpose, achievements and issues, and to confirm the status to be attained at the end of the project, and to compile and agree on the joint termination evaluation report.

3.1.1 Objectives of the Terminal Evaluation Survey

The objectives of the joint terminal evaluation are as follows:

(1) To review and confirm the progress and performance of project activities, implementation process, and achievement of goals and outputs to date based on the PO, in order to verify whether the project is being implemented smoothly and effectively,

(2) To evaluate the project from the perspective of the five Development Assistance Committee (DAC) evaluation criteria (Relevance, Effectiveness, Efficiency, Impact, and Sustainability) based on the comparison of the initial plan and actual results of inputs, activities and goals as well as the implementing structure, and

(3) To make recommendations for the remaining period of the project and post-project period, and draw lessons learned for implementing similar projects.

3.1.2 Outline of the Survey

(1) Schedule of the Joint Terminal Evaluation

The terminal evaluation survey was conducted from 13 September to 7 October 2021.

(2) Members of the Joint Terminal Evaluation Team

The members of the joint terminal evaluation team are shown in the following tables.

<Japanese side>

Name	Title	Assigned task
Dr. Ryuji Ogata	Senior Advisor for Water Supply, JICA	Team Leader
Ms. Miha Matsubayashi	Water Resources Team 1, Water Resources Group, Global Environment Dept, JICA	Cooperation Planning
Ms. Ayako Nomoto	International Development Center of Japan Inc.	Evaluation Analysis

<Nepalese side>

Name	Title
Dr. Rajit Ojha	Section Chief, National Management of Information Project/ISSAU, DWSSM

3.2 Summary of the Results of the Joint Terminal Evaluation

Below, from the "Terminal Evaluation Report", we describe 1) the evaluation of the achievement of each outcome of the PDM, 2) the evaluation of the achievement of the project goals, and 3) the expected achievement of the higher-level goals.

3.2.1 Evaluation of the Achievement of Each Output by PDM

The achievement of each outcome at the time of the terminal evaluation (October 2021) is shown below.

Output 1： Baseline survey and capacity assessment of DWSSM, NWSSTC, FWSSMP, and the target WUSCs are conducted, and project implementation plan is finalized.	
Indicators	Achievement level
1.1 Results of the baseline survey and capacity assessment in DWSSM, NWSSTC, FWSSMP, and target WUSCs are shared with counterparts.	1.1 Achieved - Baseline surveys were conducted for DWSSM, NWSSTC, and Target-A WUSCs (13) in April 2017 and for Target-B WUSCs (55) in December 2017. - Baseline surveys were conducted for 49 local governments, 5 Ministry of Physical Infrastructure Development (MoPIDs), 10 WSSDOs, and 7 FWSSMPs (total 71 institutions/organizations) - Basic data to calculate KPIs were collected from 61 WUSCs. 5 WUSCs have no data, as they do not operate water supply facilities. Collecting information of remaining 2 WUSCs through telephone interviews have been impossible so far.
1.2 Project Design Matrix (PDM) and Plan of Operation (PO) are finalized.	1.2 Achieved The latest versions were approved in M/M 18 June, 2020 (Supports for COVID-19 measures were added)

Source: Joint Terminal Evaluation Report, JICA, 2021

Output 2：Supporting capacity of DWSSM regarding O&M and management for WUSCs in semi-urban towns is strengthened.	
Indicators	Achievement level
2.1 The Management Model/Support Model for WUSCs in semi-urban towns formulated during phase-I project is revised in the context of the actual situation of WUSCs in semi-urban towns.	2.1 Achieved Management Model/Support Model has been continuously re-updated receiving feedback from Output-3. <Deliverables and Materials> - Video materials (51 videos) for the Basic training - Handy-type Standard Operation Procedures (SOPs) were finalized (April 2021) - Finalized SOPs were submitted to DWSSM (May 2021) - Nepalese versions of SOPs and PowerPoint slides were being revised.
2.2 Design manual of specifications on rehabilitation works for	2.2 Partially achieved - Design manual was finalized and submitted to DWSSM. - Due to the COVID-19 pandemic situation, the duration of annual progress

target WUSCs in semi-urban towns are shared in annual progress review meeting of FWSSMP. 2.3 Rehabilitation works are carried out in more than 50 target WUSCs in semi-urban towns.	review was shortened from 3 days to a single day. Though short information was given in the NWSSTC progress presentation on the 'Design manual of specifications on rehabilitation works, a copy of the manual along with the SOPs will be shared with FWSSMPs shortly. Also, these documents are being prepared for submission to departmental approval. Achieved. Rehabilitation works (Procuring and installing equipment necessary to recover the basic function of WUSCs) for 68 target WUSCs were completed. As a result, WUSCs have recovered their basic functions of grasping the water production volume and chlorination. <Items> Flowmeter, Chlorination unit, Pressure gauge, Water quality test kit, Electric Devices (digital clamp meter, insulation continuity tester, earth tester), Safety tools (mask, glove, goggles), Aeration filter media

Source: Joint Terminal Evaluation Report, JICA, 2021

Output 3: Implementing capacity of NWSSTC regarding the training for WUSCs in semi-urban towns is strengthened.	
Indicators	Achievement Level
3.1 Training implementation guideline, training plan, training curriculums and training materials for WUSCs in semi-urban towns are formulated.	3.1 Achieved The documents were formulated. The final version of 1) Management Model, 2) Training Implementation Guideline, 3) Training Plan, 4) Training Curriculums for WUSCs in semiurban towns are to be officially approved/authorized by DWSSM.
3.2 The Management Model for WUSCs in semi-urban towns is utilized in trainings in NWSSTC.	3.2 Achieved After the Management Model was revised in 2017/18, the Model was utilized in Training of Trainers (ToT) (January 2018), revised based on the ToT (in2018/19), and utilized in supplementally ToT and Basic Training (December 2018).
3.3 More than 80% of target WUSCs attend the Basic Training on the Management Model.	3.3 Achieved 63 WUSCs participated in the Basic Training Outline of the training conducted under the Project including the Basic Training is as follows: - ToT: 5 times (70 individuals) - Basic training: 5 times (among them 1 training course was online training. 63 WUSCs participated. - Onsite training (41 WUSC) - Refresher training (3 times, 59 WUSC) A total of 1,751 individuals took part in the training at the time of terminal evaluation.
3.4 Monitoring and Evaluation of more than 80% of target WUSCs are carried out.	3.4 Achieved Key Performance Indicators (KPI) were collected in 2020 to compare the status with the baseline. The data will be collected in 2021 again. <Changes in KPI> Data deficiency rate improved 63% before the project to 8% in 2020. Before the project, WUSCs did not have measuring devices and had no awareness about data collection. As a result of onsite training/refresher training, they have kept the record. KPI will be taken over by Institutional Support and Service Advisory Unit (ISSAU) under DWSSM

Source: Joint Terminal Evaluation Report, JICA, 2021

3.2.2 Project Purpose

The achievement of the Project Purpose at the time of the terminal evaluation (October 2021) is shown below.

Project Purpose: Support to the WUSCs in semi-urban towns is provided and strengthened by DWSSM and NWSSTC using government and non-government organizations' personnel.	
Indicators	Achievement level
1. The revision process and sections of DWSSM responsible for the Management Model and Technical Support Mechanism for WUSCs in semi-urban towns are identified.	Achieved 1. DWSSM confirmed that mainly the Planning, Monitoring, and Evaluation Section and NWSSTC will be responsible for the revision. • Part of it goes to ISSAU. ISSAU in consultation with NWSSTC is working on developing a support and management model to backstopping the WUSCs. The work is close to each other and joint planning is needed. The Management Model is expected to be revised/integrated under the framework in the future. Department is changing the name of the sections and TOR as well in coming future. • 2. Though the job description of DWSSM has been a draft since 2018, the job description of those sections are as follows: • <NWSSTC> • Job description NWSSTC including "Work for the capacity development, promotion of innovation, and technological development of stakeholders and service providers of water supply and sanitation sector, and "Develop necessary manuals, online courses and information management system for training" among others is relevant to the Project. • <Planning Monitoring and Evaluation Section> • Provide necessary technical assistance to concerned parties or bodies to collect and update data related to drinking water and sanitation.
2. The sections of DWSSM responsible for the training on the Management Model for WUSCs in semi-urban towns and revision process of training implementation guideline are identified.	Achieved - Though the job description of DWSSM including NWSSTC has been still a draft since 2018, job description NWSSTC includes "Work for the capacity development, promotion of innovation, and technological development of stakeholders and service providers of water supply and sanitation sector", "Develop necessary manuals, online courses and information management system for training" among others are relevant to the Project. - DWSSM and NWSSTC confirmed that NWSSTC has been and will be responsible. And Business plan of NWSSTC is being prepared by ISSAU.
3. More than 15 trainers, who can carry out the training on the Management Model for WUSCs in semi-urban towns, are developed. From this trainer batch, at least six must be employees of FWSSMP.	Achieved - 70 trainers were trained. Among them,17 persons are from DWSSM/NWSSTC/MoWS, 19 are from FWSSMP.
4. Capacity assessment results of trainers on the Management Model for target WUSCs in semi-urban towns are improved compared to the baseline	Achieved The results of the capacity assessment (self-assessment) on General skills (self-management, communication, achievement, process, logic, information) and Specific skills (water supply system, O&M of water treatment plant, construction and O&M of network, financial

<table>
<tr><td></td><td>management, and public relation) were improved

Average of 70 trainers<table><tr><td></td><td>Pre</td><td>Post</td></tr><tr><td>General skills</td><td>3.54</td><td>3.94</td></tr><tr><td>Specific skills</td><td>3.16</td><td>3.50</td></tr></table>• *5 point scale</td></tr>
<tr><td>5. The final version of the Management Model, training implementation guideline, training plan, and training curriculums for WUSCs in semi-urban towns are officially approved/authorized by DWSSM.</td><td>Likely to be achieved
According to DWSSM and NWSSTC, the final version of 1) Management Model, 2)Training Implementation Guideline, 3)Training Plan and 4)Training Curriculums for WUSCs in semiurban towns are to be officially approved/authorized by DWSSM.

They will be approved after a due process such as review by other sections and inputs from the ISSAU team. After the approval from DWSSM, they will seek approval from MoWS, and those documents will be distributed nationally (Provincial governments and local governments).</td></tr>
</table>

Source: Joint Terminal Evaluation Report, JICA, 2021

3.2.3 Overall Goal

At the time of the terminal evaluation (October 2021), the achievement of the Overall Goal is as follows.

Continuous support to WUSCs in semi-urban towns is provided by DWSSM and NWSSTC.	
Indicators	Prospects for achievement
1. The trainings are continuously implemented by NWSSTC on the Management Model for WUSCs in semi-urban towns.	At the time of terminal evaluation, it is expected that the indicator is achieved after the completion of the project. 70 trainers were trained under the ToT of the project. However, the number of trainers who actually can serve as trainers for the Basic Training is limited (around 34-36 individuals from DWSSM/NWSSTC/MoWS/FWSSMP), as many are retired/promoted/transferred. So, whether or not securing a sufficient number of trainers is an issue. As for the onsite training, 19 individuals of FWSSMPs are expected to continue facilitating, however, considering the limited number of staff and the volume of their duties, it might be difficult for them to conduct onsite training.
2. The contents of the Management Model are utilized for the management of the water supply of WUSCs in semi-urban towns.	Although some improvement in performance (KPI) of the target WUSCs has been observed, there are differences among the WUSCs. Average of Production Ratio increased. However, other KPI, where external benchmarks are available, averages did not reach the benchmarks and variances are big among WUSCs. Comparing to the status of 2013-14, Non-Revenue Water (NRW) improved and performance of Production Ratio is good. On the other hand, Water Supply Ratio, Operation Ratio and Collection Ratio worsened. Continuous support (taking part in Basic Training/On-site Training) might be needed. Nonetheless, grasping the figures and keeping records show the progress of WUSCs. As mentioned above, data deficiency rate significantly improved, as a result of Onsite training/Refresher training.

Source: Joint Terminal Evaluation Report, JICA, 2021

3.3 Results of the Evaluation

3.3.1 Framework of the Terminal Evaluation

The project is evaluated from the perspective of DAC five evaluation criteria as follows:

Table 3.1 DAC Five Evaluation Criteria

	Perspective of Evaluation
Relevance	Was the project objective/purpose consistent with: - development policies of Nepal? - development needs of target group/beneficiaries? - Japan's ODA policy for the recipient country (at ex-ante)
Effectiveness	- Will the project purpose be achieved? - What are the major factors influencing achievement or non-achievement of the project purpose? - Will the outputs produced by the Project contribute to the achievement of the project purpose?
Efficiency	- Were the outputs produced by using inputs/resources efficient?
Impact	- Will the Overall Goal be achieved? - What are the positive and negative changes as a result of the project (expected and unexpected effects)?
Sustainability	Are the effects of the project likely to continue in terms of the following aspects? - Are there any policies to endorse activities to sustain project effects? - Are there necessary organizational arrangements? - Do/will the staff have adequate skills/knowledge? - The budgets allocated for activities to sustain project effectively are sufficient?

Source: Joint Terminal Evaluation Report, JICA, 2021

3.3.2 Evaluation According to Five Evaluation Criteria

The following is the result of the evaluation of the five evaluation items from the "Terminal Evaluation Report, JICA, 2021".

(1) Relevance

The relevance of the Project is high, as the Project was consistent with the development policies and development needs of Nepal, as well as Japan's ODA policy at the time of ex-ante evaluation.

1) Consistency with the development policies of the Government of Nepal

The Project was consistent with the development policies of Nepal at the time of ex-ante evaluation, "improvement of quality of water supply service" was one of the priority areas under the *Envision Nepal 2030* and the *14th 3-year National development plan* (2016/2017-2018/2019).

2) Consistency with the development needs of Nepal and target group

The responsibility for O&M of water supply facilities in the rural areas lied with WUSCs. WUSCs were mandated to provide a sufficient quantity of water supply to users, control water quality, collect water tariff, and manage human and financial resources to keep the water supply facilities in good condition. On the other hand, until 2010, DWSS (then, currently DWSSM) was mainly focused on the construction of facilities and was not able to engage in activities related to strengthening the capacity of WUSCs for O&M. Supporting WUSCs in building their capacity to run the services, rehabilitation, and reconstruction of water infrastructures was the responsibility of DWSSM. And NWSSTC was responsible for the capacity building part. Thus, strengthening the capacity of DWSSM and NWSSTC suited their needs.

3) Consistency with Japan's ODA policy

Under the Country Development Cooperation Policy for Federal Democratic Republic of Nepal (September 2016), one of the priority areas is "social and economic infrastructure and mechanism development which directly lead to economic growth and the national livelihoods improvement", which include supports in "building of social infrastructure and mechanisms related to transportation, electricity, urban environment, etc. which directly connects to economic growth, private sector development, and the improvement of the living standard of people", responding to different issues such as "deteriorating supplies of electricity and water". Thus, the Project is fully consistent with Japan's ODA policy targeting at improving water supply.

(2) Effectiveness

The effectiveness of the project is relatively high.

1) Prospects for achieving the Project Purpose

All Outputs have been achieved (except one indicator which has been partially achieved), and the indicators for the Project Purpose are mostly achieved, or likely to be achieved by the end of the project. One remaining indicator which has not been achieved at the time of terminal evaluation is indicator 5, "The final version of the Management Model, training implementation guideline, training plan, and training curriculums for WUSCs in semi-urban towns are officially approved/authorized by DWSSM." DWSSM confirmed that they will be approved after due process by the end of the project, and it is expected to be approved by MoWS for distributing them nationally.

2) Contributing factors for achieving the Project Purpose

<u>Appropriateness of the counterpart agencies/appropriate change in the project design</u>

Organizational restructuring following the transition to federalism during the project period forced the Project to change the mechanism for training. Initially, the Project planned cascade training through RMSO and WSSDO". However, how RMSO and WSSDO are to be reorganized was not clear and NWSSTC, that was expected to continue, was selected to be the responsible body for the training under the Project. NWSSTC is very much committed to the Project activities as an agency responsible for capacity building of the sector and is willing to continue the training for WUSCs, although the regulatory framework for the post-construction status of WUSCs' facilities has been vague.

Communication and ownership of the counterparts

Strong commitment and ownership of the counterparts have been observed. DWSSM and NWSSTC allocated budgets for rehabilitation works of WUSC's facilities and training respectively. Regular reporting to DDG and DG of DWSSM through JPCM has made it possible to recognize the importance of allocating those necessary budgets. Also, regular and close communication between the counterparts and the project team contributed to the achievement.

3) Hindering factors to achieving the Project Purpose

Restructuring of organizations following the transition to federalism caused the suspension of the activities under the Project, and the Project needed to change the Project design. Besides, a weak regulatory framework for WUSCs made it difficult to effectively approach to WUSCs. DWSSM/NWSSTC do not have legal authority over WUSCs to be accountable. Local governments are responsible for WUSCs by Constitution, Local Government Act as well as the draft WaSH Bill; however, WUSCs and local governments rarely interact in general.

(3) Efficiency

The efficiency of the Project is evaluated to be relatively high.

The project period was extended for 10 months, mainly due to external factors. The organizational structure of counterpart agencies changed following the transition to federalism, which caused the revision of PDM, and the activities under the Project were suspended (From May to August 2017). Also, the travel bans due to the COVID-19 pandemic affected the project period. Though extended, the activities under the Project have been mostly conducted and completed at the time of the terminal evaluation.

Inputs by Japan to implement the Project and produce the Outputs have been appropriate in terms of (i) number of experts, (ii) expertise, (iii) the timing of dispatch, and (iv) duration of the dispatch. However, dispatch of Japanese experts was hindered during the last one year due to the COVID-19 pandemic.

As for the Inputs by Nepal, allocation of staff has been appropriate for project implementation and decision-making. Equipment and operational cost by the Nepalese side were also appropriately provided. Necessary equipment for strengthening the water supply function of WUSCs has been procured and installed by DWSSM (Planning, Monitoring and Evaluation Section), and NWSSTC has allocated budget to the training under the Project.

(4) Impact

The impact is evaluated to be relatively high, considering the prospect for achieving the Overall Goal and other impacts.

1) Prospect for achieving the Overall Goal

The prospect to achieve the Overall Goal is moderate.

To achieve the Overall Goal, securing the trainers is necessary (Indicator 1). As for the actual practice of the Management Model at the target WUSCs (Indicator 2), although some progress has been observed,

continuous support or monitoring of WUSC's practice might be required. However, as mentioned above, possible initiatives by ISSAU may contribute to the continuation of support/monitoring to WUSCs.

2) Other impacts

Following positive impacts have been observed.

i) Possible impacts on the policy documents: Initiatives under the Project such as KPI analysis and benchmarking of WUSC performance, SOPs, Training curriculums, and training materials for WUSCs are expected to be reflected in the policy documents under development.
ii) Performance improvement of WUSCs resulting in better service delivery.
iii) Induction training to other nearby WUSCs and awareness building.

(5) Sustainability

The sustainability of the Project is evaluated to be relatively high.

1) Policy aspect

There is policy support for the continuation of the project effects. The goal of the "Drinking Water and Sanitation" sector under the 15th National Plan (Fiscal Year 2019/20 – 2023/24) is "To enhance quality services by ensuring basic drinking-water and sanitation services to all.", and one of the objectives under the goal is "To bolster the capabilities of the federal, provincial, and local levels by increasing their roles in sustainable drinking-water and sanitation service delivery."

2) Institutional/Organizational aspect

According to the Constitution, draft WaSH Bill and Local Government Act (hereinafter referred to as "LGA" (2017), local governments are expected to be responsible for O&M of the water supply facilities of WUSCs, however, relationship between WUSCs and the local governments is ambiguous, partly because WUSCs also operate based on the Water Resource Act (1992), an act before federalization. However, the number of engineers at the local governments is limited and they face difficulties in supporting WUSCs. Several piloting being done to institutionalize WaSH services to local governments such as WaSH plan preparation. However, they need to be mainstreamed.

Meanwhile, supporting WUSCs in building their capacity to run the services, rehabilitation, and reconstruction of water infrastructures is the responsibility of DWSSM. And NWSSTC is responsible for the capacity building part. So, DWSSM and NWSSTC are expected to continue their supports for the O&M of WUSCs.

As for the trainers under the Project, securing the current trainers in the future might be a problem, due to the turnover/transfer of the personnel. FWSSMP under DWSSM is understaffed and it would be difficult to provide support to WUSCs for O&M. DWSSM is currently thinking about establishing a section dedicated to O&M in each FWSSMP.

3) Technical aspect

During the project period, NWSSTC has gained sufficient technical capacity to facilitate training as trainers, as well as capacity for planning and implementing the training courses under the Project. However, continuous ToT would be necessary to secure a sufficient number of trainers.

DWSSM has also gained sufficient technical skills for estimating and procuring the necessary capacity for the rehabilitation of the WUSCs.

4) Financial aspect

DWSSM and NWSSTC allocated the budget for procuring equipment and implementation of the training during the project period. Thus, the future cost for application of the Management Model and conducting training to WUSCs could be borne by DWSSM and NWSSTC, as DWSSM has given high priority.

3.3.3 Conclusion

The Project is likely to achieve the Project Purpose as a support mechanism and the capacity of DWSSM and NWSSTC to WUSCs in semi-urban towns has been strengthened. Thus, the effectiveness of the Project is relatively high. The impact is evaluated to be relatively high. Securing and strengthening the capacity of personnel who support WUSCs is crucial to achieving the Overall Goal. However, as a result of the coordination with ISSAU, a unit under the ADB financed project, there are prospects that the effects of the Project continue. The relevance is evaluated to be high and the efficiency of the Project is evaluated to be relatively high. The sustainability of the Project is evaluated to be relatively high. If a system to continuously ToT continues, the sustainability would be improved. Thus, considering the degree of progress and achievement of the Project, and the prospects of the Project's attaining the Overall Goal, the Project would be concluded in March 2022 as scheduled.

3.4 Recommendations

3.4.1 Recommendations within the Current Period of the Project

The following are the four activities to be carried out during the project period as recommended by the "Terminal Evaluation Report, JICA, 2021".

(1) Ensuring achievement of the Activities, Outputs, and the Project Purpose (Recommendation to DWSSM, NWSSTC, and the Japanese side)

(a) Based on the PO, Basic training and On-site training shall be conducted once each.

(b) DWSSM approval of Project Purpose/Indicator 5 shall be done by the end of the project.

(2) Development of training plan for NWSSTC (Recommendation to NWSSTC)

Concerning the Overall Goal of the project (Indicator 1: The trainings are continuously implemented by NWSSTC on the Management Model for WUSCs in semi-urban towns.), NWSSTC has stated that it will provide training to 192 WUSCs in semi-urban towns other than the 68 covered by the Project. To realize this, it is recommended that NWSSTC formulate a specific training plan, including i) training

implementation structure, ii) number of training courses each year (ToT, Basic training, On-site training, Refresher training, etc.) and participants, iii) potential trainers, and iv) budget formulation.

(3) Handover to ISSAU (Recommendation to NWSSTC and Japanese side)

The SOPs, videos, and other teaching materials of the Project have been highly appreciated, and it is recommended that NWSSTC and the Japanese side hold discussions to ensure that the results of this Project are passed on to ISSAU, such as the use of SOPs, videos, and other teaching materials.

(4) Counterpart training (recommendation to Japanese side)

One counterpart training is remaining based on the activities indicated in the PO. Therefore, Japanese side is recommended to conduct a counterpart training within the project period. The modality of the counterpart training should be determined taking the factors into account including the influence of COVID-19.

3.4.2 Activities in response to Recommendations in the Terminal Evaluation

With regard to the four recommendations made in the aforementioned exit evaluation, the following actions were taken to complete the recommendations.

(1) Ensuring achievement of the Activities, Outputs, and the Project Purpose

a) Basic training was conducted for 5 days from 5 to 9 January 2022 at Province No.1, Morang District, Letang. A total of 20 WUSCs participated: 2 from the target WUSCs and 18 from 192 WUSCs. See Chapter 2. p.67 for details of the activities.
b) On-site training was conducted at a total of 23 WUSCs between October 2021 and January 2022. The WUSCs where the training was conducted are listed below.
   - Province No.1, Morang District, Jhapa District: 14 WUSCs
   - Lumbini Province, Nawalparasi East District: 1 WUSC
   - Gandaki Province, Lamjung District: 1 WUSC
   - Province No.3, Ramechaap District: 4 WUSCs
   - Bagmati Province, Sindhupalchok District: 3 WUSCs
c) The Management Model has not been approved internally by the DWSSM as of 28 February 2022. Two versions, one in English and the other in Nepali, have already been used in the WUSC field. After approval by the DWSSM and the MoWS, the model will be distributed to all WUSCs and relevant institutions across the country.

(2) Development of training plan for NWSSTC

a) Of the 192 WUSCs in the regional cities (excluding WASMIP), information (contact details, names of Chairpersons) was collected for 176 WUSCs and a training plan was developed.
b) The number of training sessions was established based on the cost per session of basic, on-site and refresher training and the budget to date, and a training plan was developed over a period of 6 years

(2022 - 2027). Table 3.2 shows the target WUSC and each training. In addition, trainers will be trained through training of trainers and each training, and the current list of trainers is shown in Appendix 2.27.

(3) Handover to ISSAU

a) Discussions were held with the NWSSTC Chief on site and it was agreed that the Management Model would be used by ISSAU. The Management Model was handed over via DWSSM (NWSSTC) and it was agreed that ISSAU will use the Management Model at the JCC on 15 February 2022.

b) The ISSAU Chief has a good understanding of the content of the Management Model as he has been a trainer at the WASMIP-II Basic Training.

(4) Counterpart training

A remote training course (alternative to the third training course in Japan) was conducted from 15 to 19 November 2021 (5 days).

Table 3.2 Draft Training Plan for WUSC semi-urban towns

(a) 2022

SN	WUSCs	Province	District	Basic training	Onsite Training	Refresher Training	Fiscal Year
1	Gachhia	1	Morang	January	May	September	Fiscal Year 2022
2	Keraun	1	Morang				
3	Rajighat	1	Morang				
4	Inaruwa	1	Sunsari				
5	Ramdhuni-Bhasi/Jhumka	1	Sunsari				
6	Haripur/Bhantabari	1	Sunsari				
7	Pakhribas	1	Dhankuta				
8	Shadananda	1	Bhojpur				
9	Siddhicharan	1	Okhaldhunga				
10	Beltar-Bashaha	1	Udaypur				
11	Taplejung	1	Taplejung				
12	Bhojpur	1	Bhojpur	March	July	November	
13	Dhankuta	1	Dhankuta				
14	Tikkal/Suryodaya	1	Ilam				
15	Ilam	1	Ilam				
16	Birtamod	1	Jhapa				
17	Budhabare/Kankai	1	Jhapa				
18	Surunga	1	Jhapa				
19	Kakadvitta	1	Jhapa				
20	Damak	1	Jhapa				
21	Charali	1	Jhapa				
22	Diktel	1	Khotang				
23	Belbari	1	Morang				
24	Letang	1	Morang				
25	Indrapur	1	Morang				
26	Phidim	1	Panchthar				
27	Khandbari	1	Sankhuwasabha				
28	Itahari	1	Sunsari				
29	Duhabi	1	Sunsari				

(b) 2023

SN	WUSCs	Province	District	Basic training	Onsite Training	Refresher Training	Fiscal Year
30	Mahehdranagar/Chakragatti	1	Sunsari	January	May	September	Fiscal Year 2023
31	Triyuga	1	Udayapur				
32	Katari	1	Udayapur				
33	Dewanaganj	1	Sunsari				
34	Harinagara	1	Sunsari				
35	Laukahi	1	Sunsari				
36	Kaptanganj/Sankarpur	1	Sunsari				
37	Deumai	1	Ilam				
38	Pashupatinagar	1	Ilam				
39	Myanglung	1	Terathum				
40	Chainpur	1	Sankhuwasabha				
41	Madi	1	Sankhuwasabha				
42	Dudhkunda	1	Solukhumbu				
43	Kanchan Rup	Madhesh	Saptari				
44	Sambhunath	Madhesh	Saptari				
45	Saptakoshi	Madhesh	Saptari				
46	Kalyanpur	Madhesh	Saptari				
47	Hanuman Nagar	Madhesh	Saptari				
48	Chhinnamasta	Madhesh	Saptari	March	July	November	
49	Golbazar	Madhesh	Siraha				
50	Dhangadhi	Madhesh	Siraha				
51	Bishnupur	Madhesh	Siraha				
52	Sukhipur	Madhesh	Siraha				
53	Inarwa / Bhagwanpur	Madhesh	Siraha				
54	Dhanusadham	Madhesh	Dhanusa				
55	Chereshwornath	Madhesh	Dhanusa				
56	Ganeshman Charnath	Madhesh	Dhanusa				
57	Mithila	Madhesh	Dhanusa				
58	Sabaila	Madhesh	Dhanusa				
59	Fulgama	Madhesh	Dhanusa				
60	Bardibas	Madhesh	Mahottari				
61	Kathariya	Madhesh	Rautahat				
62	Lalbandi	Madhesh	Sarlahi				
63	Mirchaiya	Madhesh	Siraha				
64	Sakhuwa Mahendranagar	Madhesh	Dhanusa				
65	Gaushala	Madhesh	Mahottari				

(c) 2024

SN	WUSCs	Province	District	Basic training	Onsite Training	Refresher Training	Fiscal Year
66	Khyar Mara	Madhesh	Mahottari	January	May	September	Fiscal Year 2024
67	Matihani	Madhesh	Mahottari				
68	Murtiya	Madhesh	Sarlahi				
69	Garuda	Madhesh	Rautahat				
70	Bariyarpur	Madhesh	Rautahat				
71	Samanpur	Madhesh	Rautahat				
72	Rajpur Farhadawa	Madhesh	Rautahat				
73	Auraiya	Madhesh	Rautahat				
74	Simraungadh	Madhesh	Bara				
75	Pokhariya	Madhesh	Parsa				
76	Jeetpur	Madhesh	Parsa				
77	Bhisawa	Madhesh	Parsa				
78	Gadi/Rangapur	Madhesh	Parsa				
79	Chitraban	Bagmati	Chitwan				
80	Parsa/Khariahani	Bagmati	Chitwan				
81	Ratnanagar	Bagmati	Chitwan				
82	Meghauli	Bagmati	Chitwan				
83	Birandranagar	Bagmati	Chitwan				
84	Charikot	Bagmati	Dolakha	March	July	November	
85	Bidur	Bagmati	Nuwakot				
86	Kamalamai	Bagmati	Sindhuli				
87	Madhi	Bagmati	Chitwan				
88	Darechok/Mugling	Bagmati	Chitwan				
89	Dudhauli	Bagmati	Sindhuli				
90	Kapilakot	Bagmati	Sindhuli				
91	Kuseswor Dumja	Bagmati	Sindhuli				
92	Panchkhal	Bagmati	Kavre				
93	Kashikhanda	Bagmati	Kavre				
94	Ugrachandi Nala	Bagmati	Kavre				
95	Nilkhanta	Bagmati	Dhading				
96	Naubise	Bagmati	Dhading				
97	Gajuri	Bagmati	Dhading				
98	Thaha	Bagmati	Makwanpur				
99	Bhimphedi	Bagmati	Makwanpur				
100	Bhimeshwor	Bagmati	Dolakha				
101	Jiri	Bagmati	Dolakha				

(d) 2025

SN	WUSCs	Province	District	Basic training	Onsite Training	Refresher Training	Fiscal Year
102	Pafungtar	Gandaki	Gorkha	January	May	September	Fiscal Year 2025
103	Aarupokhari/Arughat	Gandaki	Gorkha				
104	Bhanu	Gandaki	Tanahu				
105	Bhimad	Gandaki	Tanahu				
106	Putalibazar	Gandaki	Syangja				
107	Chapakot	Gandaki	Syangja				
108	Jagatradevi/Galyang	Gandaki	Syangja				
109	Bharatpokhari	Gandaki	Kaski				
110	Tansen	Gandaki	Palpa				
111	Falebas Devisthan	Gandaki	Parbat				
112	Hawas	Gandaki	Parbat				
113	Majhphant Mallaj	Gandaki	Parbat				
114	Tilahar	Gandaki	Parbat				
115	Bihunkot/Rampur	Gandaki	Baglung				
116	Baglung	Gandaki	Baglung				
117	Prithvinarayan/Gorkha	Gandaki	Gorkha				
118	Beni	Gandaki	Myagdi				
119	Kawasoti	Gandaki	Nawalparasi				
120	Mukundapur	Gandaki	Nawalparasi	March	July	November	
121	Tamasariya	Gandaki	Nawalparasi				
122	Kusma	Gandaki	Parbat				
123	Waling	Gandaki	Syangja				
124	Khairenitar-Suklagandaki	Gandaki	Tanahu				
125	Bandipur	Gandaki	Tanahu				
126	Vyas	Gandaki	Tanahu				
127	Dumre	Gandaki	Tanahu				
128	Abukhaireni	Gandaki	Tanahu				
129	Resunga	Lumbini	Gulmi				
130	Shivangadi	Lumbini	Kapilbastu				
131	Buddhabatika	Lumbini	Kapilbastu				
132	Maharajgunj	Lumbini	Kapilbastu				
133	Bhahadurgunj	Lumbini	Kapilbastu				
134	Lalmatiya/Brihat	Lumbini	Dang				
135	Khajura	Lumbini	Banke				
136	Bageshwori	Lumbini	Banke				
137	Manpur Mainapokar	Lumbini	Bardiya				

(e) 2026

SN	WUSCs	Province	District	Basic training	Onsite Training	Refresher Training	Fiscal Year
138	Bhaigri/Mandavi	Lumbini	Pyuthan	January	May	September	Fiscal Year 2026
139	Mijhing/Sulichour	Lumbini	Rolpa				
140	Bijayaswori/Chaurjahari	Lumbini	Rukum				
141	Sandhikharka	Lumbini	Arghakhachi				
142	Kohalpur	Lumbini	Banke				
143	Tulsipur	Lumbini	Dang				
144	Ghorahi	Lumbini	Dang				
145	Lamahi	Lumbini	Dang				
146	Chandrauta	Lumbini	Kapilbastu				
147	Lekhnath	Lumbini	Kaski				
148	Nimal Pokhari	Lumbini	Kaski				
149	Bardghat	Lumbini	Nawalparasi				
150	Sunuwal	Lumbini	Nawalparasi				
151	Rampur	Lumbini	Palpa				
152	Bijuwar/Pyuthan	Lumbini	Pyuthan				
153	Liwang	Lumbini	Rolpa				
154	Karahiya-Makrahar/Tilottama	Lumbini	Rupandehi				
155	Sarada	Karnali	Salyan				
156	Narayan	Karnali	Dailekh	March	July	November	
157	Musikot	Karnali	Rukum				
158	Sitalpati Khalanga	Karnali	Salyan				
159	Birendranagar	Karnali	Surkhet				
160	Babiyachaur	Karnali	Surkhet				
161	Bheriganga	Karnali	Surkhet				
162	Gumi	Karnali	Surkhet				
163	Dullu	Karnali	Dilekh				
164	Khalanga	Karnali	Jajarkot				
165	Chandannath	Karnali	Jumla				
166	Myanma	Karnali	Kalikot				
167	Bhajani-Trishakti	Sudurpaschim	Kailali				
168	Shantipur	Sudurpaschim	Kailali				
169	Joshipur	Sudurpaschim	Kailali				
170	Punarbas	Sudurpaschim	Kanchanpur				
171	Dodhara-Chadani	Sudurpaschim	Kanchanpur				
172	Jhalaripipaladi	Sudurpaschim	Kanchanpur				
173	Parasuram	Sudurpaschim	Dadeldhura				

(f) 2027

SN	WUSCs	Province	District	Basic training	Onsite Training	Refresher Training	Fiscal Year
174	Brindaban	Sudurpaschim	Baitadi	January	May	September	Fiscal Year 2027
175	Mangalsen	Sudurpaschim	Achham				
176	Sanphebagar	Sudurpaschim	Achham				
177	Dipayal Silgadhi	Sudurpaschim	Doti				
178	Jayaprithivi	Sudurpaschim	Bajhang				
179	Badhimalika	Sudurpaschim	Bajura				
180	Kolti	Sudurpaschim	Bajura				
181	Baitadi	Sudurpaschim	Baitadi				
182	Chainpur	Sudurpaschim	Bajhang				
183	Amargadhi	Sudurpaschim	Dadeldhura				
184	Attariya	Sudurpaschim	Kailali				
185	Lamki Chuha	Sudurpaschim	Kailali				
186	Darakh-Sukhad	Sudurpaschim	Kailali				
187	Shivanagar	Sudurpaschim	Kailali				
188	Tikapur	Sudurpaschim	Kailali				
189	Mahendranagar Bhimdatta	Sudurpaschim	Kanchanpur				
190	Bhasi	Sudurpaschim	Kanchanpur				
191	Suda	Sudurpaschim	Kanchanpur				
192	Appi	Sudurpaschim	Darchaula				

3.4.3 Recommendations toward Achievement of the Overall Goal

The following is a description of the "Recommendation after the Termination of the Project" from the "Joint Terminal Evaluation Report".

(1) Authorization of Management Model and other documents by MoWS (Recommendation to MoWS)

Once DWSSM approves the Management Model, training implementation guideline, training plan, and training curriculums (Indicator 5-Project Purpose), MoWS is recommended to authorize them in order to disseminate nationally.

(2) Continuation of ToT (Recommendation to NWSSTC)

Of the 70 trainers trained, 15 are from DWSSM/NWSSTC and 19 are from FWSSMP, and the rest have been transferred or retired, making it difficult for them to continue as trainers for the training (Basic training, On-site training, and Refresher training). In addition, it is impossible for FWSSMP, in particular, to serve as trainers during their busy work periods. Considering the limited number of available trainers, it is necessary for NWSSTC to continue ToT and ensure the availability of trainers, as transfers are expected in the future. Also, ToT should ensure to include current trainers to brush up their skills.

(3) Cooperation and strengthening of FWSSMP (Recommendation to DWSSM)

The active involvement of FWSSMP is necessary to achieve the Overall Goal. To achieve Indicator 1 (continuation of training), it is required to dispatch FWSSMP engineers who are close to the field as trainers, especially for On-site training. Also, for Indicator 2 (contents of the Management Model are utilized in the water supply business operation of WUSCs), it is considered necessary to follow up on the target 68 WUSCs of the Project, and the cooperation of FWSSMP is necessary for this purpose. For this purpose, the DWSSM issued a letter to FWSSMP requesting cooperation in dispatching trainers during the implementation of the Project, and DWSSM should continue to encourage FWSSMP to continue dispatching trainers (and participating in ToT). At the same time, DWSSM is requested to consider the establishment of a unit and increase in the number of staff to specialize in capacity building, and O&M at FWSSMP, which is currently under discussion.

(4) Linkage with ISSAU's service and support center (Recommendation to NWSSTC)

ISSAU is currently considering the concept of a WUSC service support center, where one service support center is established at the Provincial or District level to support neighboring WUSCs. They plan to establish pilot service support centers (one or two centers) within two to three years. It is recommended that NWSSTC encourage the service support centers to utilize the Management Model of the Project. It is also recommended that NWSSTC continue to consider collaborating with ISSAU in its efforts to revise and update the Management Model as part of the Service Support Center initiative.

(5) Encouraging WSSDO and local government engineers to participate in training (Recommendation to NWSSTC and MoWS)

Initially, the Project targeted WSSDOs at the District level for capacity building; however, due to reorganization following the transition to federalism, WSSDOs are now under the jurisdiction of the Ministry of Physical Infrastructure Development (MoPID) (Provincial governments). Therefore, support from DWSSM to WUSCs below a certain size is no longer covered. However, it is recommended to consider including WSSDOs in the future training by NWSSTC to improve water supply services by these WUSCs below a certain size. At the same time, it is recommended that NWSSTC continue encouraging local government engineers to participate in the training, as O&M of WUSC facilities will be the role of local governments once the draft WaSH Bill is approved. MoWS is recommended to support the procedure to include WSSDO and local government engineers to the training.

(6) Further contribution to operation and maintenance of WUSCs (Recommendation to Japanese side)

The Japanese side is recommended to consider further contribution to the capacity development of WUSCs through feasible methods such as water operator partnership (WOP) or thematic trainings in Japan etc.

3.5 Lessons Learned

Coordination with other donors and effective use of support projects by other donors

In this Project, MOU was signed with the unit under the project financed by ADB at the time of project planning to avoid duplication of assistance projects and to implement projects in a more coordinated manner. In addition, coordination with other donors was included in the PO. While avoiding duplication of support with ADB, the Project has had a cooperative relationship with the ADB-supported project by providing WUSC data collected under this Project for the preparation of ADB-supported data books. As mentioned above, the Management Model (SOPs and teaching materials) developed by this Project may be utilized in the service support center being planned by ISSAU.

Thus, it can be said that concluding MOUs with other donors and holding frequent consultations with other donors, as in this Project, will lead to a concrete increase in aid effectiveness.

Chapter 4 Challenges and Lessons Learned, Deliverables

4.1 Challenges and Responses in the Project, and Lessons Learned

During the six (6) years of WASMIP-II implementation, there have been various challenges regarding project management. In this chapter these challenges are summarized, and the responses taken and lessons learned are presented. It is hoped that these experiences will serve as a reference for improving support capacity for WUSCs after the completion of WASMIP-II.

(1) Review of the WUSC Support System with the Transition to the Federal Government

Challenge:

The transition of the Nepalese government to the federal system led to changes in the project target organizations (e.g., WSSDO's transfer to being under the provincial government) and their personnel changes due to decentralization, which required a review of the WUSC support system.

Response:

The roles of each organization related to WUSC support were confirmed based on the legal basis. Since information became complicated during the government transition period, the status and schedule of transition were confirmed through DWSSM in order to obtain highly reliable information. Then, based on this information, the draft revised PDM was prepared, which includes changes of project goals, outcomes and activities, and the WASMIP-II team explained in detail to the C/P in order to obtain their understanding.

(2) Information Sharing and Collaboration with Counterparts

Challenge:

Information sharing and collaboration with the C/Ps on the project planning and progress, assignments of DWSSM's C/Ps, and on-site problems and issues of WUSCs (equipment shortage at water supply facilities, transportation and daily allowance for participants for workshop and training participations, and support for procurement of necessary equipment) were required.

Response:

The JPCM was held for information sharing and discussion on the issues with the Director, Deputy Director and related department of DWSSM. The JPCM was held when the Japanese experts had achieved a certain level of outcomes and when the issues needed to be addressed.

(3) Ownership Transfer to Counterparts

Challenge:

The challenge was to encourage the busy C/Ps to participate in the trainings and workshops held by the Project and then to transfer ownership of the project activities to the C/Ps.

Response:

The project objectives, activities, and expected outcomes were explained at the first JPCM to deepen DWSSM's understanding of the Project. The WASMIP-II team put effort into making it easier for C/Ps

to participate in the training by arranging for transportation and daily allowances for participants, and providing a greeting by the Director of DWSSM on the first day of the ToT. In order to strengthen the FWSSMP's involvement in the Project, DWSSM issued a letter to the FWSSMP requesting its participation in the trainings. In addition, the C/Ps took ownership of the activities by reporting the project activities and outcomes themselves at the JCC and JPCM. As a result, in the latter part of the Project, the Basic Trainings and the On-site Trainings were conducted by the C/P even in the absence of Japanese experts.

(4) Installation of Necessary Equipment to WUSC's Water Supply Facilities

Challenge:

The results of the baseline survey revealed that equipment such as flowmeters, chlorination units, and water quality testing equipment had not been installed, or malfunctioned in the majority of WUSCs. There was the possibility that the trainings were not effective for the water supply service and the O&M for water supply facilities at WUSCs, without the necessary equipment, and thus installation was required.

Response:

The WASMIP-II team briefed DWSSM on the current status of the WUSCs and the need for equipment installation. The supporting budget for equipment procurement to WUSCs was secured by DWSSM. The WASMIP-II team prepared a list of necessary equipment, specifications for the equipment, and supported DWSSM in the procurement. With the procurement of the necessary equipment, WUSCs were able to restore the function of their own water supply facilities, and this led to the creation of an environment where the knowledge and skills acquired from the trainings could be applied in the field. The evaluation results based on the KPIs show that WUSC's water supply service and the O&M capacity of water supply facilities have been improved significantly.

(5) Project Operation under the COVID-19 Pandemic Situation

Challenge:

Project activities have been stagnant for a while due to travel restrictions to Nepal for Japanese experts and movement restrictions within Nepal caused by COVID-19. Although Japanese experts had conducted their activities in Nepal up until February 2020, they were then unable to travel to Nepal again until March 2021. Therefore, there were challenges on how to manage and operate the Project under such COVID-19 pandemic situation.

Response:

Fortunately, the C/Ps and local staff were able to conduct the necessary trainings on their own during the time of the travel restrictions, because they had previously conducted several field surveys, the Basic Trainings, the On-site Trainings, the Refresher Trainings, and workshops, with the Japanese experts prior to the occurrence of the travel restrictions. Local staff supported the preparation of the training materials and the monitoring of the trainings, and the NWSSTC provided ToT and the Basic Trainings to available

C/Ps and WUSCs by using online methods. Further, the Japanese experts provided advice to the C/Ps as needed through the provision of reports from the field surveys and monitoring of the training.

In addition, due to the COVID-19 pandemic, bleaching powder was not available in the market at the WUSC sites. Based on this situation, bleaching powder and other necessary materials and equipment, such as chlorine injection units, handwashing tanks, temporary toilets, and water quality testing kits, were procured for 68 WUSCs in the Project in order to contribute towards safe water supply and improved sanitation.

(6) Dealing with Personnel Changes of C/Ps

Challenge:

During the six years of WASMIP-II implementation, there were transfers and retirements of the key staff in the C/Ps. In particular, the position of Project Manager (PM) of the C/P has been vacant for about three months, which could lead to delays in decision making. In addition, about half of the 70 trainers trained through the ToT were transferred to other organizations. In order to avoid the negative effects of these C/P personnel changes on the Project, flexible actions were required.

Response:

When the key C/P staff had been changed, the Japanese expert explained the outline and progress of the Project to the C/P staff successor, as required. Although the PM position was vacant for three months, it was only a short period of time in terms of the overall project duration. Thankfully, with the prompt response of the C/Ps, the position was assigned a replacement quickly. As the Project was able to proceed in consultation with the project coordinator of the C/P, the vacant position was not problematic.

On the other hand, since the transfer / retirement of trainers were inevitable, DWSSM selected additional trainer candidates and requested them to participate in the ToT in order to increase the number of trainers. Since similar situations might occur in the future, it is important to continuously implement ToT and increase the number of trainers. In addition, to maintain and improve the capacity of trainers, it is necessary to provide them opportunities to lecture as a trainer in each training program as much as possible. Meanwhile, the transferred trainers are expected to utilize the knowledge and skills obtained from the Project in a different way in their new department.

(7) Capacity Development of the Local Government Engineers

Challenge:

Once the draft WaSH bill will be enacted, local government engineers will be required to take more responsibility for managing the WUSC than currently. However, the number of engineers in local governments is limited regardless of their large workload, and the majority of them lack knowledge and skills for water supply. Therefore, it is essential to improve the capacity of local government engineers.

Response:

The capacity of local government engineers should be developed by inviting them to participate in the Basic Training conducted by NWSSTC. On the other hand, although it is possible to invite local

government engineers to trainings, there is a problem in that the invitation process is time-consuming. Therefore, as the first step, it is recommended that the training materials developed in WASMIP-II be distributed to local governments. These materials are expected to be utilized by the engineers in the field.

(8) Lessons Learned

The first step of collaboration with the C/Ps in a project is to build a relationship of mutual trust. To do so, it is important to provide opportunities for information sharing and discussion with the C/Ps as much as possible. Specifically, it is necessary not only to request activities to achieve the project goals, but also to share issues, activity results, and achievements.

In technical cooperation projects, it is important to transfer technology through trainings and workshops. In particular, it was essential to obtain the understanding and cooperation of the C/Ps who support the procurement of materials and equipment for WUSCs, because the training outcomes of this Project can only be realized with the proper equipment. In addition, the visualization of the improvements in WUSC's water supply service through the provision of equipment and materials by KPIs and through feedback to the C/Ps to demonstrate the effectiveness of the equipment and materials procurement support, led to the strengthening of support for WUSCs.

4.2 Technical Deliverables of WASMIP-II

The training materials shown in Table 4.1 were developed in WASMIP-II. These materials can be used in future trainings.

Table 4.1 Training Material List

No.	Training Material	Purpose/ Usage
1	Management Model	
1.1	SOP (English / Nepali)	・Reference for O&M procedures of water supply facilities ・Training material for the Basic Training and the On-site Training
1.2	Lecture Material (PowerPoint, English / Nepali)	・Training material for ToT and the Basic Training
1.3	Video Material (Nepali narration and English capture)	・Reference for O&M of water supply facilities consisting of 51 videos ・Training material for ToT and the Basic Training
1.4	Simplified SOP (English / Nepali)	・Simplified version of SOP consisting of 31 parts ・To display near equipment and facilities at the WUSC site ・A4 size and laminated
2	Training Implementation Guideline (English)	・Guideline for training implementation by NWSSTC engineers ・Outline of training planning, lecture contents and curriculum
3	Design Manual of Specifications on Rehabilitation Works for Target WUSCs in Semi-urban Towns (English / Nepali)	・Manual for WUSCs to request necessary materials and equipment for facility rehabilitation ・Manual for DWSSM / NWSSTC / FWSSMP to support procurement of materials and equipment to WUSCs according to the above request ・Understanding of WUSC's water supply system, development of a schematic flow diagram, and design of specification for materials and equipment

No.	Training Material	Purpose/ Usage
4	ToT Material for On-site Trainings (PowerPoint, English / Nepali)	・ Training material for ToT of the On-site Training ・ Aim, contents and implementation procedures of the On-site Training
5	Management Checklist	・ Checklist for interviewing WUSCs during the On-site Training

(1) Standard Operation Procedures (SOPs)

The training materials of SOPs for ToT and the Basic Training are shown in Table 4.2.

Table 4.2 List of the Training Materials of SOPs

No.	SOP/ Lecture subjects
1	Module 1 Introduction
2	Module 2 Management of Water Supply Facilities (1) - Outline -
3	Module 3 Management of Water Supply Facilities (2) - Daily Inspection and Keeping Records -
4	Module 4 Management of Water Supply Facilities (3) - Periodic Inspection -
5	Module 5 Water Quality Management
6	Module 6-1 Water Distribution Facility
7	Module 6-2 Household Connections and Water Meters
8	Module 7 Analysis of Water Supply Management
9	Module 8 Planning of Water Supply Management

(2) Video Materials

Table 4.3 shows the list of the 51 video materials developed in the Project. The three main advantages of using Video Materials are as follows;

a) Videos can be watched "anytime, anywhere, repeatedly"
b) Lectures of same quality can be provided
c) Necessary information is readily available

As for a), WUSC staff and trainers can learn from the Video Materials about water supply facilities even if they do not have the opportunity to participate in training. As for b), lectures of same quality can always be provided. As for 3), the video materials consist of 51 short videos categorized by facilities and functions, so that necessary information can be picked up easily from the videos. In addition, the videos were used as the training materials for the Basic Training, and the trainers provided supplementary explanations during the session, which had the effect of promoting the participants' understanding.

Table 4.3 List of Video Materials

No.	Video Title	No.	Video Title
1	Water Users and Sanitation Committee 1	28	ENPHO Test Kit
2	Water Users and Sanitation Committee 2	29	Coliform Presence/Absence
3	Objectives of Water Supply Management	30	Free Residual Chlorine
4	Water Supply Facilities	31	pH
5	Objectives of Operations and Maintenance	32	Ammonia
6	Surface Water Facilities	33	Iron
7	Groundwater Facilities	34	Nitrate
8	Chlorination and Reservoir	35	Hardness
10	Mechanical & Electrical Equipment	36.1	Distribution Network 1
11	Objectives of Daily Operation and Maintenance	36.2	Distribution Network 2
12	Daily Operation and Maintenance: Surface Water Facilities 1	37	Valve and Fire Hydrant
13	Daily Operation and Maintenance: Surface Water Facilities 2	38	Water Meter
14	Daily Operation and Maintenance: Groundwater Facilities	39	Key Performance Indicator
15	Daily Operation and Maintenance: Chlorination Unit & Reservoir	40	Water Supply Ratio
16	Periodic Inspection and Maintenance: Intake Facilities	41	Service Hours
17	Periodic Inspection and Maintenance: Sedimentation Tank	42	Water Quality Compliance
18	Periodic Inspection and Maintenance: Roughing Filter	43	Staff Ratio
19	Periodic Inspection and Maintenance: Slow Sand Filter	44	Metered Ratio
20	Clamp Meter	45	Production Ratio
21	Insulation Tester	46	Consumption Ratio
22	Periodic Inspection and Maintenance: Pumps	47	Non-Revenue Water
23	Periodic Inspection and Maintenance: Electrical Panel	48	Unit Production Cost
24	Periodic Inspection and Maintenance: Generator	49	Operation Ratio
25	Water Quality Management	50	Collection Ratio
26	Sampling Point of Water	51	Check List
27	Turbidity Tube and Visual Inspection		

(3) Simplified SOPs

The simplified SOPs, which are organized into two A4-size pages (duplex printing), consist of 31 types for usage at the WUSC sites. These simplified SOPs were laminated and distributed to each facility and equipment at the WUSC site, and display them for easy check of the procedures. The full versions of SOPs are kept at the WUSC offices so that detailed procedures and methods can be confirmed as necessary.

Figure 4.1 Display of Simplified SOP

Figure 4.2 Procedure check based on Simplified SOP

Table 4.4 List of Simplified SOPs

SN	Title	SN	Title
1	Intake Flow Management	17	Daily & Periodic Inspection of Standby Generator
2	Daily & Periodic Inspection of Intake Structure	18	Daily & Periodic Inspection of Aeration Facility
3	Operation Procedure of Well Pump	19	Daily & Periodic Inspection of Pressure Filter
4	Daily & Periodic Inspection of Well Pump	20	Procedure for Distribution Flow Management
5	Daily & Periodic Inspection of Sedimentation Tank	21	Maintenance for Service Reservoir
6	Cleaning of Sedimentation Tank	22	Maintenance for Distribution Pipeline
7	Daily & Periodic Inspection of Roughing Filter	23	Procedure for Household Connection Facility Management
8	Cleaning of Roughing Filter	24	Procedure for Use Tolerance Test
9	Daily & Periodic Inspection of Slow Sand Filter	25	Sampling Point for Surface Water
10	Scraping Sand of Slow Sand Filter	26	Sampling Point for Well Water
11	Daily & Periodic Inspection of Clear Water Reservoir	27	Repair Work for Civil Structure
12	Daily & Periodic Inspection of Chlorination Unit	28	Repair Work for Pipelines
13	Preparation of Chlorine Solution	29	Repair Work for Mechanical and Electrical Equipment
14	Operation Procedure of Volute Pump	30	Report of Inspection Result
15	Daily & Periodic Inspection of Volute Pump	31	Analysis of Water Supply Amount
16	Periodic Inspection of Electrical Panel		

(4) ToT Materials for the On-site Training

The purpose of the On-site Training is to confirm that the knowledge and skills acquired from the Basic Training are being used in the WUSC site. WASMIP-II team developed teaching materials for ToT for the On-site Training. The materials included the purpose and the outline of the On-site Training, and how to use the "Design Manual of Specifications on Rehabilitation Works".

In addition, the Management Checklist was developed as shown in Table 4.5. The management checklist was developed based on WUSC's field survey. The checklist consists of 50 items (147 questions) in seven areas (Governance, Human Resources, Facilities, O&M, Information, Finance, and Communication). Based on the checklist, the WUSC chairperson and managers were interviewed on 50 items, with 147 questions in 7 fields, aiming to improve water supply service operations based on self-assessment.

Table 4.5 Management Checklist

Category	No	Item	Category	No	Item
Governance	1	Annual General Meeting	O&M Operation and Maintenance	27	Security and Safety
	2	Election		28	Utilization of Facilities
	3	Management Board		29	Manuals
	4	Sub Committees		30	Water Quality
	5	Internal Audit		31	Water Leakage
	6	Social Considerations		32	Periodical Operations
	7	Goal Management		33	Troubleshooting
	8	Mid-Term Plan		34	Inventory Management
	9	Annual Report		35	Office
Human Resources	10	Code of Conduct	Information	36	Operation Record
	11	Job Descriptions		37	ICT
	12	Staff Communications		38	Document Management
	13	Staff Appraisals	Finance	39	Water Tariff
	14	Motivation		40	Cost Management
	15	Knowledge and Skills		41	Tariff Collection
	16	Training		42	Accounting
Facility	17	Water Source		43	Procurement
	18	Facility for Water Volume		44	Financial Analysis
	19	Facility for Water Quality	Communications	45	Customers Management
	20	Measurement Equipment		46	Information Disclosure
	21	Maintenance Equipment		47	Public Awareness
	22	Distribution Network		48	Online Services
	23	Disaster management		49	Government
	24	Power Supply		50	WUSC Network
	25	Lifetime of Facility			
	26	Office			