Kathmandu Upatyaka
Khanepani Limited (KUKL)
Nepal

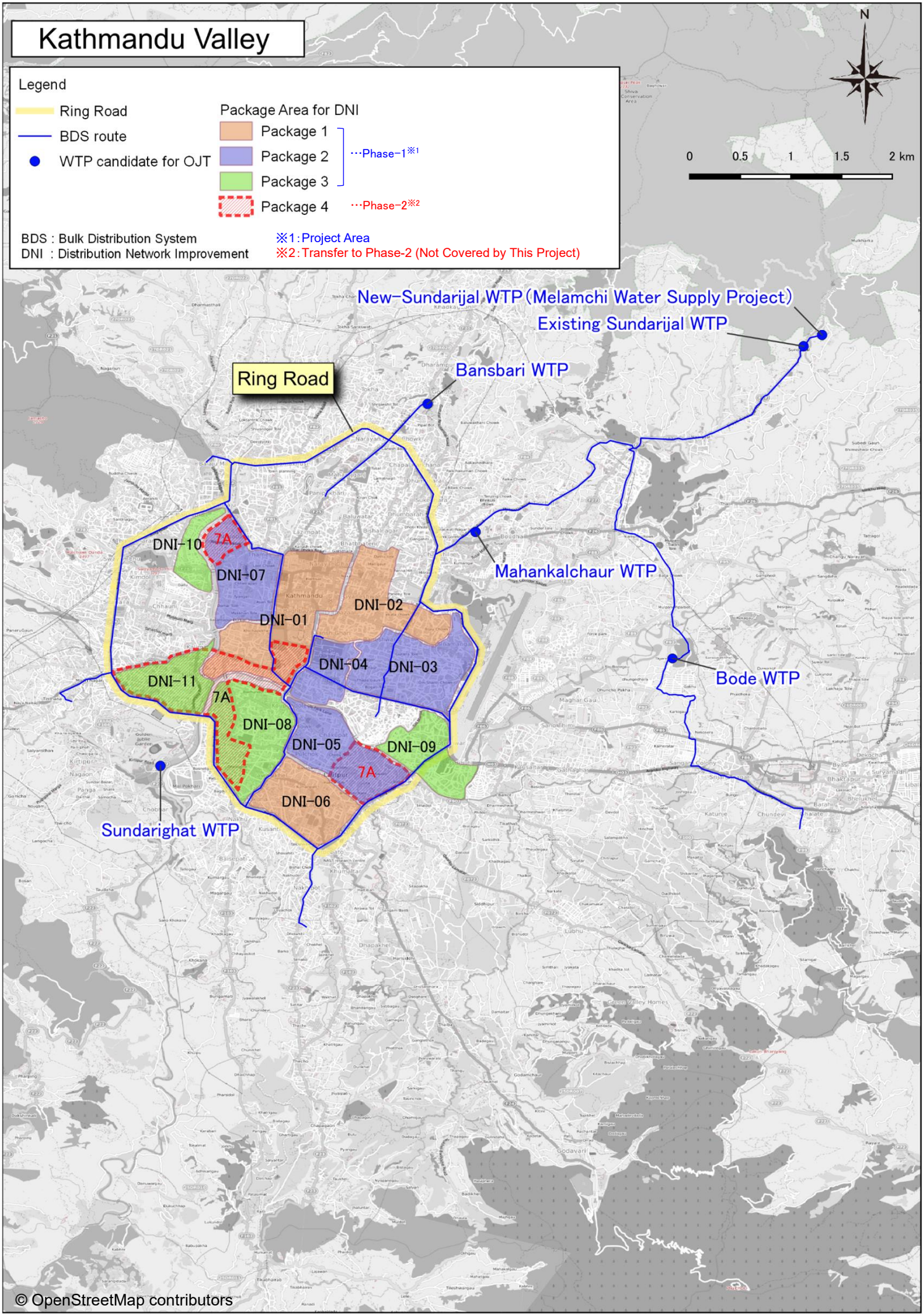
The Project on Capacity Development of KUKL to Improve Overall Water Supply Service in Kathmandu Valley

Work Plan
(Term-3)

April 2024

CTI Engineering International Co., Ltd.
TEC International Co., Ltd.
Nihon Suido Consultants Co., Ltd.
Tokyo Water Co., Ltd.

Contents



Location of the Project Site

Abbreviaciones and Acronyms

ADB	Asian Development Bank
BCP	Business Continuity Plan
BDS	Bulk Distribution System
C/P	Counterpart
CBAAS	Computerized Billing and Accounting System
CEO	Chief Executive Officer
CTII	CTI Engineering International Co. Ltd.
DMA	District Metered Area
DNI	Distribution Network Improvement
DWSSM	Department of Water Supply and Sewerage Management
GIS	Geographic Information System
GPS	Global Positioning System
JCC	Joint Coordination Committee
JET	Japanese Expert Team
JICA	Japan International Cooperation Agency
JV	Joint Venture
KUKL	Kathmandu Upatyaka Khanepani Limited
KVWSMB	Kathmandu Valley Water Supply Management Board
MLD	Million Liters per Day
MoWS	Ministry of Water Supply
MWSDB	Melamchi Water Supply Development Board
NRW	Non-Revenue Water
NSC	Nihon Suido Consultants Co., Ltd.
NWSC	Nepal Water Supply Corporation
NWSDB	National Water Supply and Drainage Board
O&M	Operation and Maintenance
OJT	On the Job Training
PC	Personal Computer
PDCA	Plan-Do-Check-Act
PDM	Project Design Matrix
PID	Project Implementation Directorate
PMU	Project Management Unit
PO	Plan of Operation
R/D	Record of Discussion
SATREPS	Science and Technology Research Partnership for Sustainable Development
SCADA	Supervisory Control And Data Acquisition
SDGs	Sustainable Development Goals
SOP	Standard Operating Procedure
TECI	TEC International Co., Ltd.
TFC	Tariff Fixation Committee
TOT	Training of Trainers
TW	Tokyo Water Co., Ltd.
UPS	Uninterruptible Power Supply
WASMIP	Water Supply Management Improvement Project
WTP	Water Treatment Plant

Chapter 1: Outline of the Project

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1.1 Background of the Project

In the Kathmandu Valley of Nepal, Kathmandu Valley Water Supply Management Board (KVWSMB) owns the water supply facility and Kathmandu Upatyaka Khanepani Limited (KUKL) operates and maintains the water supply service under the lease agreement with the granted license.

Against an estimated water demand of 470 MLD for 2.7 million of population in the Kathmandu Valley, the drinking water provided by KUKL is only 126 MLD on average per year (source: KUKL Annual Report 2080), and taking into account an estimated 26% leakage rate, the effective water supply is estimated to be 81 MLD. As a result, water services are unevenly provided, and many customers do not get water, or are forced to have a service every few days or under limited water supply hours despite having a contract with KUKL.

Under these circumstances, customers are forced to use alternative water sources, such as using water tankers for additional payment or using groundwater of poor quality, which does not ensure fairness in water service.

KUKL is not fully fulfilling its role as a water utility in terms of water quality management, operation and maintenance of water treatment plants, water supply pressure control, non-revenue water management, and customer service, and is lagging behind in establishing an internal human resource development system.

Until now, water quality management has not been given a high priority in improving water quality, as the top priority for KUKL has been to alleviate absolute water shortages. However, after the completion of the Melamchi Water Supply Project, which is described below, it is expected that the level of water quality requirements of customers will increase, and it will be necessary to enhance technical capabilities for appropriate water quality management and to establish appropriate operation and maintenance techniques for the water treatment plants.

In addition, equitable distribution of drinking water with well-controlled water quality within the valley is essential to improve customer service, and proper water distribution management must be realized. For this purpose, water distribution management utilizing GIS data of the water distribution network currently under construction will be important, but neither the specific method of utilizing GIS data nor its organizational structure has been determined.

Regarding non-revenue water management, as part of KUKL's organizational reform, a Non-Revenue Water Section has been established under the Planning and Monitoring Division. However, its personnel and organizational structure are weak, and it is necessary to enhance the system and improve technical capabilities to maintain a low non-revenue water ratio.

In addition to these, a system of continuous development of internal human resources is considered necessary to transform KUKL's business operations into a more sustainable form in the future.

In order to improve the situation, the Melamchi Water Supply Project with a water supply capacity of 170 MLD is underway (Japanese ODA Loan, co-financed with the Asian Development Bank (hereinafter referred to as "ADB")). After the completion of this Melamchi project, the water supply volume of KUKL will be approximately doubled by the water conducted from the Melamchi River, and the water supply infrastructure in the Kathmandu Valley is expected to be drastically improved through synergy effects with the ADB-supported Distribution Network Improvement (DNI) project, etc.

In the above DNI project, the water distribution network including installation of distribution pipes and meters is being implemented in three phases. The water distribution network inside the ring road surrounding Kathmandu and Lalitpur will be developed through DNI Phase 1 and Phase 2.

Meanwhile, KUKL's new organizational structure was announced in July 2016, and implementation

systems within KUKL has been developed, with the hiring of new staff beginning thereafter.

Following these trends, the framework for cooperation and implementation policies for the present Project were agreed upon during two detailed planning studies conducted by JICA in May and August 2017, and a Record of Discussions (R/D) was signed in February 2018; however, the start of this Project was also delayed significantly due to the suspension of the water conduction following the accident at the Melamchi Diversion Tunnel.

Subsequently, after the repair of the water diversion tunnel was completed and the trial operation using the New Sundarijal Water Treatment Plant was resumed in March 2021, JICA decided to start this technical cooperation project in March 2021.

1.2 Outline of the Project

1.2.1 Project Period

The project period is from March 2021 to March 2026 (approximately 61 months), and the contract between JICA and the JICA Expert Team (hereinafter referred to as "JET") will be divided into three terms. The project activities were officially launched with a kick-off meeting (April 21, 2021) between JET and KUKL.

Table 1.2.1 Project Term Division

Term	Period	Months	Remarks
Term-1	From March 2021 to March 2022	13	Considering the impact of Covid-19 pandemic, the period from March to August 2021 was designated as a remote work period from Japan, and local activities began in September 2022.
Term-2	From April 2022 to January 2024	22	The work was carried out in accordance with the "Draft Activity Plan for the Term-2" prepared in the end of Term-1 activities and the work instructions by JICA Headquarters.
Term-3	From February 2024 to March 2026	26	This Work Plan targets activities in Term-3. The work will be carried out in accordance with the "Draft Activity Plan for the Term-3" that will be prepared by the end of Term-2 activities and the work instructions by JICA Headquarters.

1.2.2 Outline of the Project

The outline of the Project is shown below. This is based on the content agreed by the Joint Coordinating Committee (JCC) on 14 February 2022 (PDM Ver. 2.0).

Table 1.2.2 Outline of the Project

Item	Contents	
Overall Goal	The quality of KUKL's water supply services is improved	
	[Indicator 1]	Water pressure is properly maintained above 0.05MPa during the water supply time in the areas within the ring road where the water distribution networks will be improved by DNI project.
	[Indicator 2]	Water supply hours are fair in the areas within the ring road where the water distribution networks will be improved by DNI project.
	[Indicator 3]	The water quality (Turbidity and Residual Chlorine) at the taps in the water supply areas by the target WTPs[*1] is improved.
	[Indicator 4]	Customer satisfaction of KUKL's water supply service is improved.
Project Purpose	The KUKL's capacity of operation and maintenance of water supply is improved.	
	[Indicator 1]	Water pressure is properly maintained above 0.05MPa during the water supply time in the areas within the ring road where the DNI project has been completed.
	[Indicator 2]	Water supply hours are fair in the areas within the ring road where the DNI project has been completed.

Item	Contents	
	[Indicator 3]	The rate of turbidity value which satisfies 5 NTU at the clear water reservoirs of the target WTPs[*1] reaches more than 95%.
	[Indicator 4]	The rate of residual chlorine value which satisfies the required value specified in the SOPs at the clear water reservoir of the target WTPs[*1] reaches more than 95%.
	[Indicator 5]	The result of customer satisfaction survey is reported in the KUKL's annual reports.
Expected Outputs	[Output 1]	The capacity of water distribution management utilizing GIS is enhanced.
	[Output 2]	The capacity of NRW reduction is enhanced.
	[Output 3]	The capacity of operation and maintenance of WTPs and water quality control is enhanced.
	[Output 4]	The capacity of customer service management is enhanced.
	[Output 5]	The capacity of managing KUKL's internal training is improved.
Project Site	Kathmandu Valley	
Target areas for project activities	[Output 1]	Water service areas covered by DNI Project Phase 1
	[Output 2]	Water service areas covered by DNI Project Phase 1
	[Output 3]	Mahankalchaur WTP, Bode WTP, Bansbari WTP and New Sundarijal WTP
	[Output 4]	Water service areas covered by DNI Project Phase 1
	[Output 5]	Kathmandu Valley
Concerned organizations	Ministry in charge	Ministry of Water Supply (MoWS)
	Implementation agency	Kathmandu Upatyaka Khanepani Limited (KUKL) ・Head Office ・Mahankalchaur Branch ・Maharajgunj Branch ・Baneshwor Branch (*2) ・Chhetrpati Branch (In the future, Chjhetrapati will be merged into Maharajgunj and Tripureshwor branches.) ・Tripureshwor Branch ・Lalitpur Branch

*1: Target WTPs are Mahankalchaur, Bode, Bansbari and New Sundarijal.

1.3 Concept and Scope of the Project

1.3.1 Challenges of Water Supply Service in the Kathmandu Valley

To overcome above mentioned challenges faced by KUKL, JET and KUKL staff will collaborate to carry out the activities indicated in R/D.

As a consequence, the Project aims to realize continuous improvement of the water supply business through improvement of water supply service level and enhancement of the KUKL's internal training.

The concept of this project is to establish a virtuous circle in which each phase of "improvement of water service by KUKL," "improvement of tariff collection," "improvement of financial capacity," "improvement of water supply facilities," and "further improvement of water service" continues like a spiral through continuous implementation of activities to improve each issue facing KUKL.

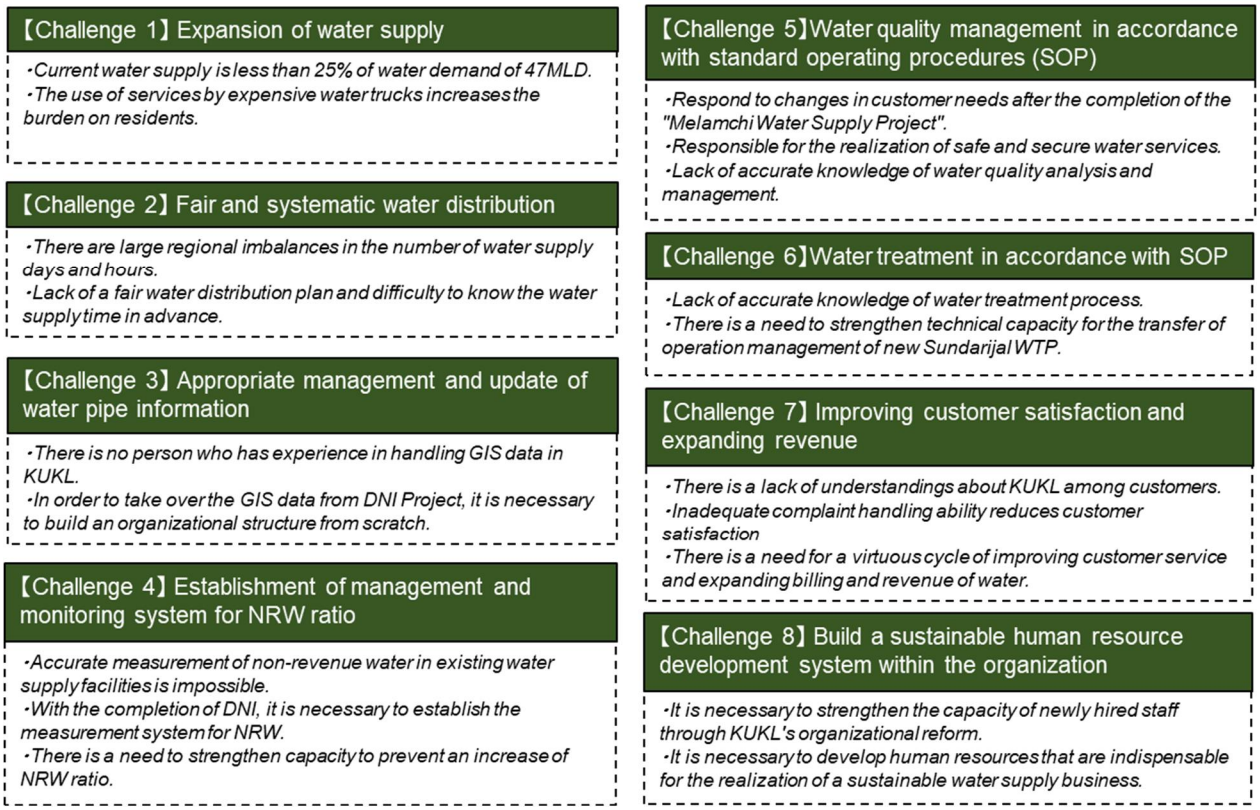

Figure 1.3.1 Challenges faced by KUKL and related supports for solution

1.3.2 Concept of the Project

To overcome above mentioned challenges faced by KUKL, JET and KUKL staff will collaborate to carry out the activities indicated in R/D. As a consequence, the Project aims to realize continuous improvement of the water supply business through improvement of water supply service level and enhancement of the KUKL's internal training.

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Table 1.3.1 Approach for overcoming challenges

Challenges	Approach
Challenge 1	After the completion of Phase 1 of the Melamchi Water Supply Project, it will be possible to supply 170MLD of water, and the water supply situation is expected to improve significantly. This project will support the realization of appropriate water distribution management by effectively utilizing the increasing amount of treated water.
Challenge 2 / Challenge 3	It is necessary to formulate a water distribution plan by utilizing GIS data and analyzing the water distribution network considering the actual water usage situation. These are carried out through the activities of Output 1. In order to overcome these challenges, it is premised that the facilities shall be constructed by the Melamchi Water Supply Project, BDS and DNI projects, which are implemented with the support of ADB and JICA.
Challenge 4	It is important to create an organizational system promoting competitive atmosphere among different branches, raising motivation for non-revenue water reduction measures, and clarifying the roles and responsibilities among head office and branches. These are carried out through the activities of Output 2.
Challenge 5 / Challenge 6	It is necessary for KUKL to clarify the roles and responsibilities among the head office, branches and laboratories in order to utilize limited water resources effectively and supply safe water. In addition, it is necessary to operate and update the SOP by KUKL itself. These are carried out through the activities of Output 3.
Challenge 7	It is important for KUKL to recognize customer satisfaction and importance of customer service by analyzing the content of complaints, and to spread KUKL's improved service for the customers through public relations and enlightenment activities. These are carried out through the activities of Output 4.
Challenge 8	It is important to establish an internal training system so that the training can be done continuously without being affected by the retirement, transfer of staff. These are carried out through the activities of Output 5.

The basic concept of the Project is to aim for a virtuous spiral cycle in the water supply business by continuing to implement activities to improve each of the issues faced by KUKL: "Improvement of water service", "Increase of Billing water", "Financial Improvement" "Improvement of water supply facilities", "Further Improvement of water service".

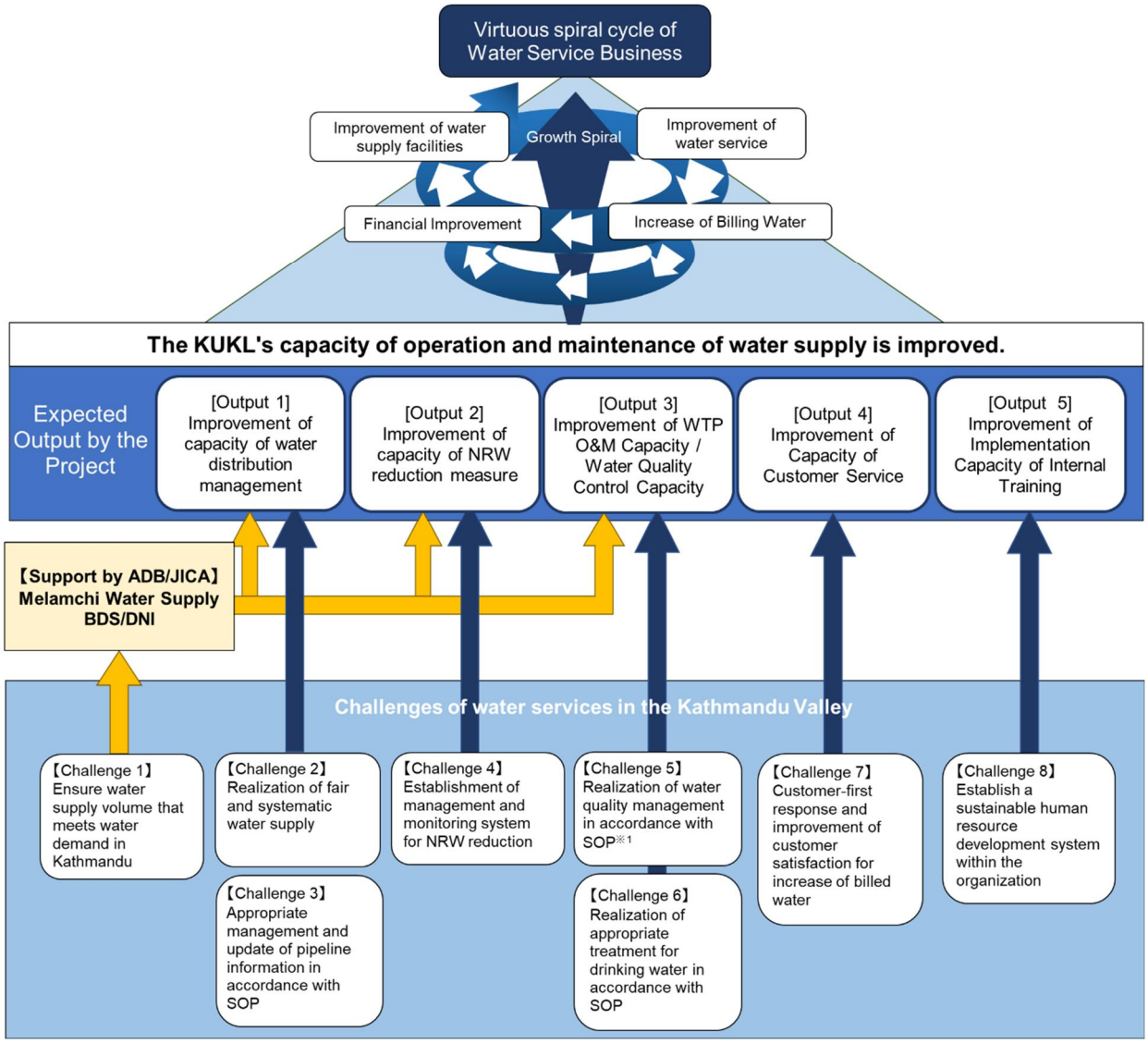


Figure 1.3.2 Overview and concept of the Project

1.3.3 Expected Impact of the Project

Through this project, planned water distribution management will be realized and non-revenue water reduction activities will be continuously implemented, which will promote effective use of water resources and increase water supply volume and hours.

In addition, improved water treatment plant operations and water quality management capacity will result in a safe water supply. These will contribute significantly to SDG Target 6 and Nepal's development policies. The relation between Target 6 of the SDGs and Nepal's national development goals is shown below:

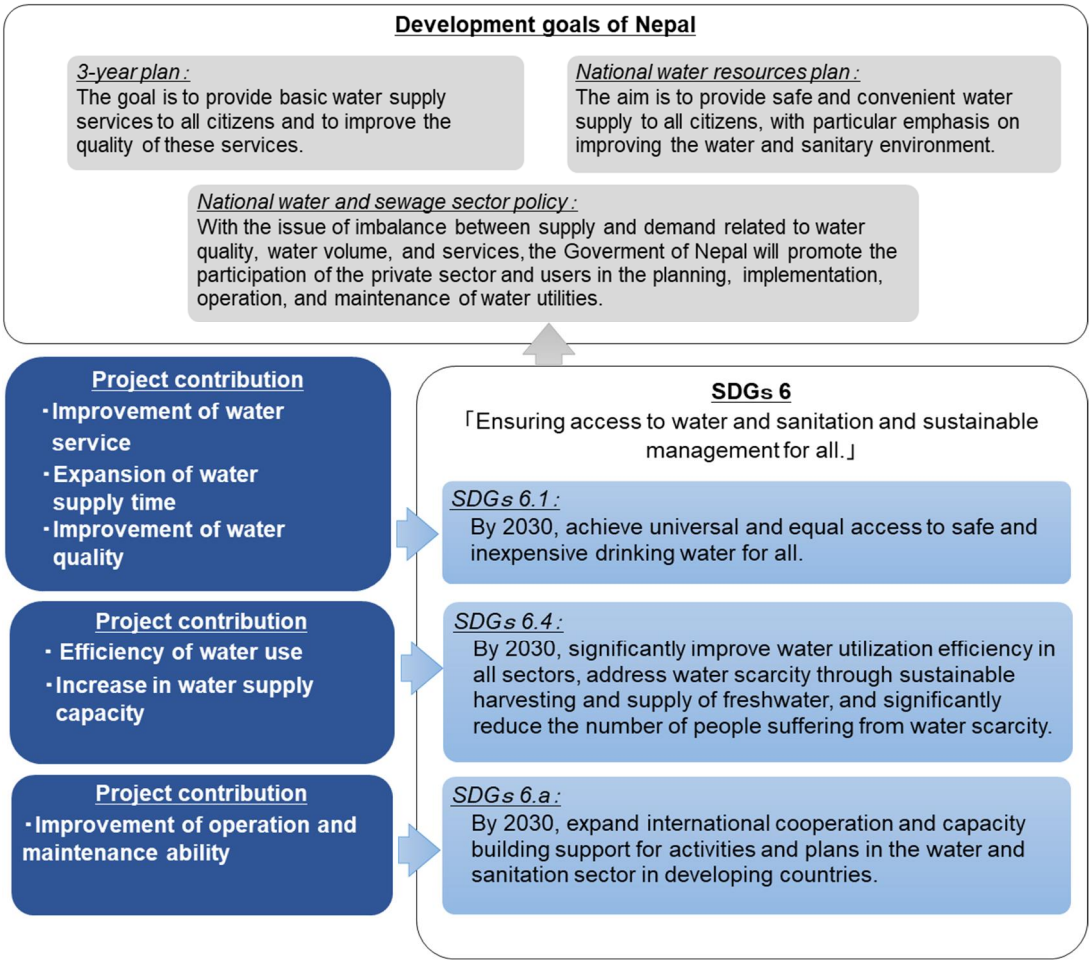


Figure 1.3.3 Project contribution to the SDGs and Nepal's development goals

1.3.4 Project Design Matrix (PDM)

(1) Use of PDM

The Project Design Matrix (PDM) is a simple, compact, and visual representation of a project in the form of a square matrix, and it will be revised and updated, with appropriate monitoring of future project progress, achievements, and prospects of the project purpose.

The original PDM ver.1 attached to the R/D is a project design based on a hypothesis or a survey before the start of the project, so it was revised through a baseline study and capacity assessment after the start of this project. In this revision, each activity and output indicator were reconfirmed and the evaluation indicators were quantified, and PDM Ver. 2 was agreed upon at the 2nd Joint Coordinating Committee (JCC-2) meeting on February 14, 2022.

The advantages of using PDM are shown below.

- Project purpose, activity details, and risks are clarified, and it is easy to set specific evaluation questions and survey items.
- Quantitative target values are set, so the validity of target achievement can be judged.
- Since the method of obtaining the indicators is specified, there is no misunderstanding of the evaluation method.
- The range of available monitoring information is specified.
- Useful for verifying whether the plan is logically constructed or not.

In the technical cooperation project utilizing the capacity development method, it is necessary to flexibly review the project activities according to the performance of the target group (KUKL staff) and changes in the environment surrounding the project.

(2) Objectively Verifiable Indicator of Each Output

The indicators and their baseline values for each outcome are as follows:

Table 1.3.2 Objectively verifiable indicators for each output

No	Objectively verifiable indicators	Baseline status
[Output 1] The capacity of water distribution management utilizing GIS is enhanced		
1-1	GIS data is updated according to SOP in the areas within the ring road where the DNI project has been completed.	There are no SOPs for GIS at the start of the project.
1-2	GIS data is shared between Head Office and Branches according to SOP in the areas within the ring road where the DNI project has been completed.	There are no SOPs for GIS at the start of the project.
1-3	The water distribution plan for maintaining proper water pressure is prepared for the areas within the ring road where the DNI project has been completed.	At the start of the project, there is no water distribution plan to ensure adequate water pressure.
[Output 2] The capacity of NRW reduction is enhanced.		
2-1	The data of water inflow and water consumption in the areas within the ring road where the DNI project has been completed is monthly reported from Branches to Head Office.	At the start of the project, the precise data required for the calculation of the non-revenue water rate was not reported.
2-2	The NRW ratio in the areas within the ring road where the DNI project has been completed is monthly calculated at Head Office.	At the start of the project, non-revenue water rates were not calculated on monthly basis.
2-3	The number of training participants on NRW reduction measures (Basic training, TOT and Internal Training by KUKL) is more than 120 persons.	At the start of the project, the number of participants is zero.
2-4	The NRW ratio in the areas within the ring road where the DNI project has been completed does not exceed 15 %.	The baseline value cannot be calculated at the start of the project due to delay of handing over of DNI completed area.

No	Objectively verifiable indicators	Baseline status
[Output 3] The capacity of operation and maintenance of WTPs and water quality control is enhanced.		
3-1	Water is treated according to the SOPs in the target WTPs.	There are no SOPs for water treatment plants.
3-2	The water quality is measured according to SOPs.	SOPs for water quality analysis exist but are incomplete and do not match the actual equipment or environment.
3-3	The monitoring activities are carried out at all target WTPs*1 according to the water quality control plan.	Water quality monitoring is carried out at three water treatment plants, Mahankalchaur, Bode and Bansbari, but water quality management plans are not fully developed
3-4	The water quality is regularly measured at the taps.	Water quality at the tap has not been measured regularly.
[Output 4] The capacity of customer service management is enhanced.		
4-1	The future plan of customer services management is prepared.	There are no relevant plans at the start of the project.
4-2	Customer satisfaction about KUKL's customer care is improved.	Satisfaction with customer care as identified by the first customer satisfaction survey. Percentage of customers who said they were "A little satisfied" or "Much satisfied" (%) "Telephone support": 30.1% "Face-to-face support in KUKL office": 54.8%
4-3	The results of customer complaints' analysis and how KUKL responds to their complaints are regularly reported to KUKL's management.	At the start of the project there was no analysis of complaint information.
4-4	Public awareness activities are planned and developed by KUKL and implemented annually from 2022.	At the start of the project, KUKL has no plan for public awareness activities.
[Output 5] The capacity of managing KUKL's internal training is improved.		
5-1	An overall structure of training (rough structure) for KUKL staff is developed.	At the start of the project, it has not been created.
5-2	The number of training programs that KUKL plans and implement by itself (without JET's support) is more than 10 courses. *2	At the start of the project, there are no training courses.
5-3	The number of trainers in each area is more than target value. *3	At the start of the project, there are no trainers for internal training.

*1: Target WTPs are Mahankalchaur, Bode, Bansbari and New Sundarijal.
*2: The training programs refer to those which are conducted in collaboration between Human Resource Development Section and trainers of other relevant sections.
*3: The target value of trainer is shown in Table 1.3.3.

Table 1.3.3 Target number of internal training courses and trainers

No	Technical Field	Training Course	Number of trainers to be created (Minimum)	Number of candidate trainer as of the end of Term-2
1	Water Distribution Management	GIS Operation & Management	2	3
		GIS Field Data Collection *1	-	3
		Hydraulic Analysis	2	2
		Water Distribution Management	1	2
2	NRW Management	Anti-illegal connections	1	6
		Meter accuracy control	2	3
		Commercial Losses (Basics of NRW)	2	5
		Customer data input/check *1	-	4
3	Water Quality Management	Water Quality Control	3	2
		Water Treatment	3	6
4	Customer Management	Customer Care	1	3
		Meter Reading	2	3
		Total	19	42

*1: Added in Term-2

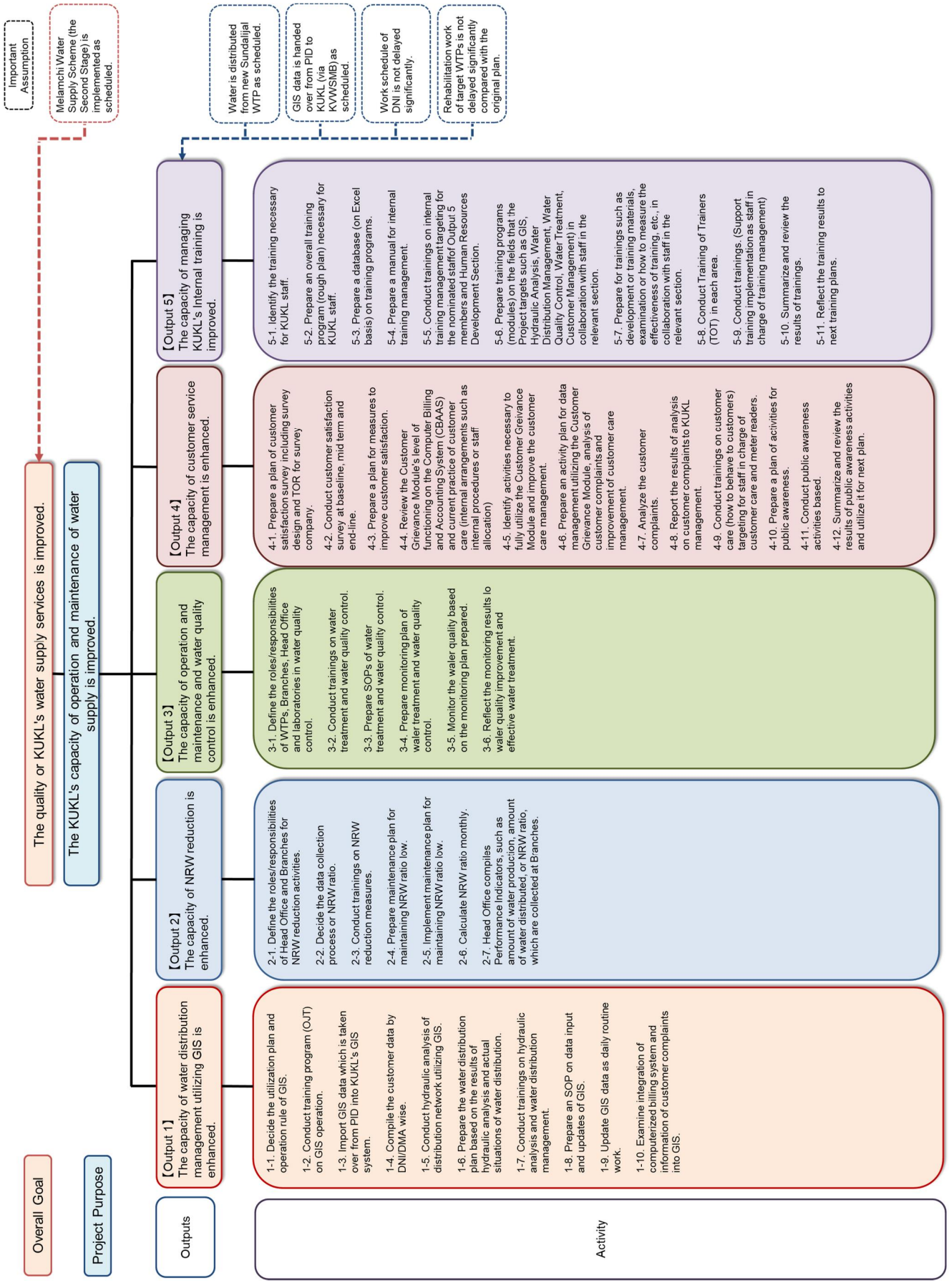


Figure 1.3.4 Work Breakdown Structure of PDM

Table 1.3.4 Work Breakdown Structure of PDM

PDM: Project Design Matrix

Version: 2.0
Date: February 14, 2022

Project Name: The Project on Capacity Development of KUKL to Improve Overall Water Supply Service of Kathmandu Valley
Implementing Agency: Kathmandu Upatyaka Khanepani Limited (KUKL)
Target Group: All the staff members of KUKL
Period: Five years from initial assignment of JICA expert(s)
Project site: Water service areas covered by DNI's first stage; OJT sites for Output 1, 2. and 4 are Mahankalchaur branch office, Maharajgunj branch office, Baneshwor branch office, Chhetrapati branch office, Tripureshwor branch office and Lalitpur branch office; OJT sites for Output 3 will be determined after the commencement of project.

Project Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal			
The quality or KUKL's water supply services is improved.	1. Water pressure is properly maintained above 0.05MPa (*1) during the water supply time in the areas within the ring road where the water distribution networks will be improved by DNI project. 2. Water supply hours are fair in the areas within the ring road where the water distribution networks will be improved by DNI project. 3. The waler quality (Turbidity and Residual Chlorine) (*1) at the taps in the water supply areas by the target WTPs (*5) is improved. 4. Customer satisfaction (*1) of KUKL's water supply service is improved.	1. Records of water pressure monitoring by KUKL 2. Records of water supply hour monitoring record by KUKL 3. Records of water quality monitoring by KUKL 4. Results of customer satisfaction survey conducted by KUKL	
Project Purpose			
The KUKL's capacity of operation and maintenance of water supply is improved.	1. Water pressure (*1) is properly maintained above 0.05MPa during the water supply time in the areas within the ring road where the DNI project has been completed. 2. Water supply hours are fair in the areas within the ring road where the DNI project has been completed. 3. The rate of turbidity value which satisfies 5NTU at the treated water reservoirs of the target WTPs reaches more than 95 % (*1). 4. The rate of residual chlorine value which satisfies the required value specified in the SOPs at the treated water reservoirs of the target WTPs reaches more than 95 % (*1). 5. The result of customer satisfaction survey is reported in the KUKL's annual reports.	1. Records of water pressure test made by KUKL 2. Records of water supply hour controlled by KUKL 3. Record of water quality analysis by KUKL 4. Record of water quality analysis by KUKL 5. KUKL's annual reports	1.Melamchi Water Supply Scheme (the Second Stage) is implemented as scheduled.

PDM 1/5

Outputs			
1. The capacity of water distribution management utilizing GIS is enhanced.	1-1. GIS data is updated according to SOP in the areas within the ring road where the DNI project has been completed. 1-2. GIS data is shared between Head Office and Branches according to SOP in the areas within the ring road where the DNI project has been completed. 1-3 The water distribution plan for maintaining proper water pressure (*1) is prepared for the areas within the ring road where the DNI project has been completed.	1-1. Status of GIS data updates and Project progress reports 1-2. Project progress reports 1-3. Prepared distribution map of water pressure	
2. The capacity of NRW reduction is enhanced.	2-1. The data of water inflow and water consumption in the areas within the ring road where the DNI project has been completed is monthly reported from Branches to Head Office. 2-2. The NRW ratio in the areas within the ring road where the DNI project has been completed is monthly calculated at Head Office. 2-3. The number of training participants on NRW reduction measures (Basic training, TOT and Internal Training by KUKL) is more than 120 persons. (*1) 2-4. The NRW ratio in the areas within the ring road where the DNI project has been completed does not exceed 15%. (*1)	2-1. Records of KUKL and Project progress reports 2-2. Records of KUKL and Project progress reports 2-3. Records of training conducted 2-4. Records of KUKL and Project progress reports	
3. The capacity of operation and maintenance of WTPs and water quality control is enhanced.	3.1. The water is treated according to SOPs in the target WTPs. (*5) 3-2. The water quality is measured according to SOPs. 3-3. The monitoring activities are carried out at all target WTPs (*5) according to the water quality control plan 3-4. The water quality is regularly measured at the taps in the water supply areas by the target WTPs (*5).	3.1 Records of operation made by KUKL 3-2. Records of water quality analysis made by KUKL 3-3. Monitoring records of water quality control plan by KUKL 3-4. Records of water quality analysis by KUKL	
4. The capacity of customer service management is enhanced.	4-1. The future plan of customer services management is prepared. 4-2. Customer satisfaction about KUKL's customer care is improved. (*1) 4-3. The results of customer complaints analysis and how KUKL responds to their complaints are regularly reported to KUKL's management. 4-4. Public awareness activities are planned and developed by KUKL and implemented annually from 2022.	4-1. Prepared plan and Project progress reports 4-2. Customer satisfaction survey conducted by the project 4-3. Records of meetings 4-4. Activity records and Project progress reports	

5. The capacity of managing KUKL's internal training is improved.	5-1. An overall structure of training (rough structure) for KUKL staff is developed. 5-2. The number of training programs that KUKL plans and implement by itself (without JICA experts support) is more than 10 courses. (*2) 5-3. The number of trainers in each area is more than target values. (*3)	5-1. Training programs developed 5-2. Project progress reports and records of trainings conducted 5-3. Project progress reports, Records of TOT	
Activities	**Inputs**		**Important Assumptions**
	Japanese side	**Nepal side**	
<Output 1: Water Distribution Management Utilizing GIS> 1-1. Decide the utilization plan and operation rule of GIS. 1-2. Conduct training program (OJT) on GIS operation. (*4) 1-3. Import GIS data which is taken over from PID into KUKL's GIS system. 1-4. Compile the customer data by DNI/DMA wise. 1-5. Conduct hydraulic analysis of distribution network utilizing GIS. 1-6. Prepare the water distribution plan based on the results of hydraulic analysis and actual situations of water distribution. 1-7. Conduct trainings on hydraulic analysis and water distribution management (*4) 1-8. Prepare an SOP on data input and updates of GIS. 1-9. Update GIS data as daily routine work. 1-10. Examine integration of computerized billing system and information of customer complaints into GIS. <Output 2: NRW Reduction> 2-1. Define the roles/responsibilities of Head Office and Branches for NRW reduction activities. 2-2. Decide the data collection process of NRW ratio. 2-3. Conduct trainings on NRW reduction measures (*4) 2-4. Prepare maintenance plan for maintaining NRW ratio low. 2-5. Implement maintenance plan (prepared by Activity 2-4) for maintaining NRW ratio low. 2-6. Calculate NRW ratio monthly.	Experts 1. Project Manager/Water Distribution Management 2. Hydraulic Analysis 1 3. Hydraulic Analysis 2 4. GIS 5. NRW Reduction Measures 1 6. Project Coordinator/NRW Reduction Measures 2 7. Operation and Maintenance of WTPs 8. Water Quality Control 1 9. Water Quality Control 2 10. Customer Service 1/Awareness Activity 11. Internal Training System 12. Customer Service 2	Counterparts 1. Project Director 2. Project Manager 3. Counterparts Facilities - Office Space for JICA Experts Others - Operation Costs (travel expense for counterparts, etc.)	1.Water is distributed from new Sundalijal WTP as scheduled. 2.GIS data is handed over from PID to KUKL (via KVWSMB) as scheduled. 3.Work schedule of DNI is not delayed significantly. 4.Rehabilitation work of target WTPs is not delayed significantly compared with the original plan. Pre-conditions 1.Project counterparts are assigned by the commencement of respective activities.

2-7. Head Office compiles Performance Indicators, such as amount of water production, amount of water distributed, or NRW ratio, which are collected at Branches. <Output 3: O&M of WTPs and Water Quality Control> 3-1. Define the roles/responsibilities of WTPs, Branches, Head Office and laboratories in water quality control. 3-2. Conduct trainings on water treatment and water quality control. (*4) 3-3. Prepare SOPs of water treatment and water quality control. 3-4. Prepare monitoring plan of waler treatment and water quality control. 3-5. Monitor the water quality based on the monitoring plan prepared in Activity 3-4. 3-6. Reflect the monitoring results to waler quality improvement and effective water treatment. <Output 4: Customer Service> <Customer Satisfaction Survey> 4-1. Prepare a plan of customer satisfaction survey including survey design and TOR for survey company. 4-2. Conduct customer satisfaction survey at baseline, mid-term and end-line. 4-3. Prepare a plan for measures to improve customer satisfaction. <Analysis of Customer Complaints and Customer Management> 4-4. Review the Customer Grievance Module's level of functioning on the Computer Billing and Accounting System (CBAAS) and current practice of customer care (internal arrangements such as internal procedures or staff allocation) 4-5. Identify activities necessary to fully utilize the Customer Grievance Module and improve the customer care management. 4-6. Prepare an activity plan for data management utilizing the Customer Grievance Module, analysis of customer complaints and improvement of customer care management. 4-7. Analyze the customer complaints. 4-8. Report the results of analysis on customer complaints to KUKL management. <Training on Customer Services> 4-9. Conduct trainings on customer care (how to behave to customers) targeting for staff in charge or customer care and meter readers. (*4) <Public Awareness>	Overseas Trainings: - Training in Japan: 6 persons/year x 5 times (Totally 30 persons) - Third Country Training: as necessary Equipment 1. GIS equipment - GIS server: 1 unit for head office - PC for GIS operation: 6 units - RTK-GNSS receiver: 6 units 2. Inspection Device of Customer Meter - Portable test meter: 9 units - Electronic water meter: 1 unit - Portable pulse logger: 1 unit 3. Equipment for rehabilitation of WTP - Portable ultrasonic flow meter: 1 set 4. Water Quality Measurement - Potable Residual Chlorine Meter: 9 units - Portable Turbidity Meter: 9 units - Multi Pocket Meter: 4 units 5. Equipment for the activities of public awareness - Laptop PC: 1 set - Video Camera: 1 set - Projector: 1 set 6. Equipment for Customer Care Section in the head office and target branch offices - Desktop PC: 7 sets 7. Others for project activities - Multi-function color photocopy machine: 1 unit - Radio Handset Guiding System: 1 set - Sound set for small scale lecture: 1 set - Sound set for middle scale lecture: 1 set 8. Supporting device for remote management work - Smartphone: 3 sets - Laptop PC: 3 sets - Speakerphone for small scale meeting: 1 set - Speakerphone for middle scale meeting: 1 set - Action camera (GoPro): 1 set 9. Other additional equipment approved by JICA during the Project		<Problems and Measures>

4-10. Prepare a plan of activities for public awareness. 4-11. Conduct public awareness activities based on Activity 4-10 4-12. Summarize and review the results of public awareness activities and utilize it for next plan. <Output 5: Internal Training System> ＜Overall Training Plan＞ 5-1. Identify the training necessary for KUKL staff. 5-2. Prepare an overall training program (rough plan) necessary for KUKL staff. 5-3. Prepare a database (on Excel basis) on training programs. <Trainings in the areas that this Project targets> (*4) 5-4. Prepare a manual for internal training management. 5-5. Conduct trainings on internal training management targeting for the nominated staffs of Output 5 members and Human Resources Development Section. 5-6. Prepare training programs (modules) on the fields that the Project targets such as GIS, Hydraulic Analysis, Water Distribution Management, Water Quality Control, Water Treatment, Customer Management) in collaboration with staff in the relevant section. 5-7. Prepare for trainings such as development of training materials, examination of how to measure the effectiveness of training, etc., in collaboration with staff in the relevant section. 5-8. Conduct training of trainers (TOT) in each area. 5-9. Conduct trainings. (Support training implementation as staff in charge of training management) 5-10. Summarize and review the results of trainings. 5-11. Reflect the training results to next training plans.			

(*1) These values were determined by the end of Term-1 after the Project begins through discussion with C/Ps.
(*2) The training programs refer to those which are conducted in collaboration between Human Resources Development Section and trainers of other relevant sections.
(*3) The basic target fields are as follows:
Output 1: Water Distribution Management (2 trainers for GIS operation, 2 trainers for hydraulic analysis, 1 trainer for distribution management),
Output 2: NRW Management (1 trainer for anti-illegal connection, 2 trainers for customer meter accuracy control, 2 trainers for commercial losses)
Output 3: Waler Quality Management (3 trainers for water quality control, 3 trainers for water treatment)
Output 4: Customer Management (1 trainer for customer care, 2 trainers for meter reading)
(*4) The activities on the trainings under Output 1, 2, 3 and 4 will include development of training modules and training materials, examination of measuring the effectiveness of trainings and feedback of the training results to the next plans in respective fields. The timing of conducting training programs is described in Activity 1-2, 1-7, 2-3, 3-2 and 4-9.
(*5) The target WTPs are limited to Mahankalchaur, Bode, Bansbari and New Sundarijal.
DNI: Distribution Network Improvement (Project supported by ADB)
PID: Project Implementation Directorate
WTP: Water Treatment Plant
TOT: Training of Trainers
CBAAS: Computerized Billing and Accounting System

1.4 Relation among the ongoing projects and this technical cooperation

To improve the water supply in the Kathmandu Valley, the following three projects are underway, ranging from water source development to construction of water transmission and distribution networks and installation of water meters for each household, utilizing co-financing from Japan and the ADB.

- Melamchi Water Supply Project

  Construction of diversion tunnel and water treatment plant

  - Facilities supported by JICA: WTP1
  - Facilities supported by ADB: WTP2
- Construction of Bulk Distribution System (BDS)
- Distribution Network Improvement (DNI)

1.4.1 Melamchi Water Supply Project

(1) Water Diversion Tunnel

The construction of the Melamchi Water Diversion Tunnel and intake gate, originally expected to be completed by the end of 2018, had to be suspended due to contractor issues.

The water diversion tunnel was then completed in July 2020 after re-contracting with the contractor, but its operation was suspended due to a major accident during a water conduit test from the Melamchi River, requiring repair work in the tunnel.

Water conduction testing resumed on February 22, 2021, and operational testing of the tunnel proceeded with a gradual increase in water flow, which was completed by mid-March 2021.

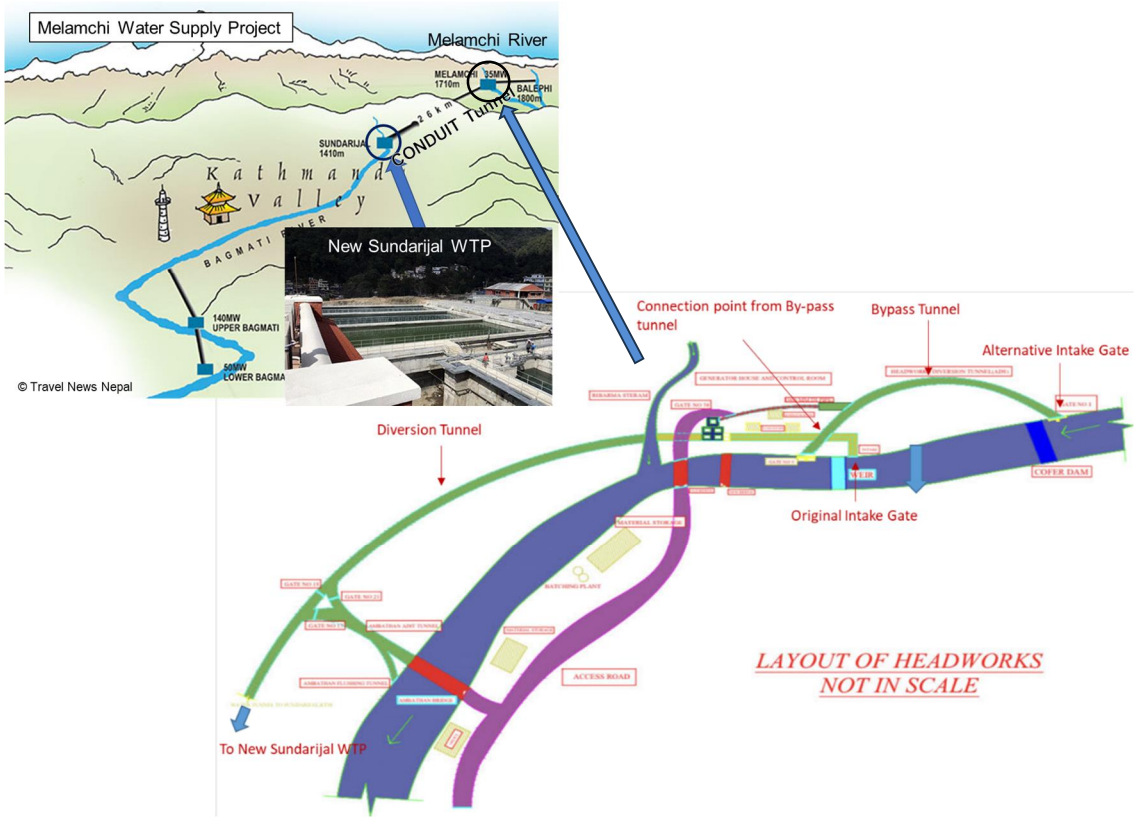


Figure 1.4.1 Overview of the Melamchi Diversion Tunnel

Although the BDS and DNI projects have not yet been completed, the high demand for early improvement of the water supply situation in the Kathmandu Valley has led to the start of test water distribution using the partially completed pipelines and service reservoirs constructed by BDS project, as well as existing reservoirs and distribution pipe networks.

However, the full operation of the water diversion tunnel was further delayed when the intake facilities were covered by mudslides caused by flooding on June 15, 2021.

Subsequently, as a result of emergency restoration works around the intake facility, water supply to the tunnel was resumed through a bypass route several hundred meters upstream from the original intake point about one and a half years after the flooding. After the contractor provided guidance on facility operation from late January 2023, responsibility for operation and management of the water treatment plant was handed over to KUKL on March 7 of the same year.

The water diversion tunnel continues to be operated by Melamchi Water Supply Development Board (MWSDB). Water intake facilities remain difficult to rehabilitate, and the intake points along the current bypass route are likely to again be subject to flooding and mudslides during the rainy season.

It has been decided to stop water conduction from the Melamchi River for a certain period of time during the rainy season because the inflow of raw water with high turbidity and sediment into the tunnel would cause significant damage to the facilities.

Under these circumstances, ADB is considering new support for long-term solutions, one of which is a proposed dam approximately 1 km upstream from the current bypass intake point to mitigate flood damage during the rainy season.

In addition, a plan to abandon the restoration of the original intake facility and build a new intake facility upstream of the Melamchi River has been proposed, and the Nepalese government is currently considering the pros and cons of this plan.

(2) New Sundarijal Water Treatment Plant

An agreement was signed by four Nepalese government agencies for the transfer of the operation and management of the water treatment plant to KUKL. The signing date was March 7, 2023, and the agreement became effective on March 10, 2023.

Table 1.4.1 Agreement for the handover of the New Sundarijal Water Treatment Plant

Organization	Roles and Responsibilities
Ministry of Water Supply (MoWS)	a. MoWS will provide overall guidance with regard to water and wastewater management in Kathmandu valley including policy decision. b. MoWS will lead sectorial and cross-sectoral coordination for resolving issues related to functionality and sustainable operation of WTP. c. MoWS will monitor and supervise the performance of stakeholders engaged for sustainable service delivery.
Kathmandu Valley Water Supply Management Board (KVWSMB)	a. KVWSMB will take over the WTP for operation with immediate effect. b. KVWSMB will supervise and audit the performance of the operator. c. KVWSMB will cause the operator to maintain the physical, hydraulic and treated water quality. d. KVWSMB will cause the operator to maintain the effluent quality of water to permissible to be discharged to the Bagmati River after backwashing. e. KVWSMB will cause the operator to manage safely the sludge deposited in the lagoons in coordination with the concerned authorities.
Kathmandu Upatyaka Khanepani Limited (KUKL)	a. Provide uninterrupted operation and necessary maintenance of the plant. b. Adopt and comply with the operating manuals and operating procedures and practices for operation of WTP. c. Management of necessary power, operating fuels, chemicals and required manpower for the O&M of WTP. d. Maintain security and safety in the premises. e. Provide access to MWSDB, its consultants and the contractor in commissioning of Mini-hydro units, closure of the contracts WTP/01 and WTP/02 and further future expansion of the plant.

Organization	Roles and Responsibilities
Melamchi Water Supply Development Board (MWSDB)	a. MWSDB will cause the WTP/01 contractor to successful commissioning of the Mini-hydro units and closure of the contracts. b. Facilitate rectification of defects, if any (identified during functionality assessment by KVWSMB within 2 months) during operation. c. Following information/documents/materials, spare parts have been handed over along with this MOA and shall form integral part of this handover. i. Operation and maintenance manual (both WTP/01 and WTP/02) ii. List of spare parts and fittings (both WTP/01 and WTP/02) iii. Inventory of chemicals iv. Taking Over Certificate (both WTP/01 and WTP/02) A. As Built Drawings B. Test Certificates

When the water conduction from the Melamchi River is stopped during the rainy season, the planned 170 MLD of water cannot be obtained, and the operation rate of the water treatment plant will drop significantly. In such a case, the only source of water for the water treatment plant would be the adjacent Bagmati River, from which water intake would be available for about 2 to 3 months starting in late June, with a possible intake of 40 MLD. As of September 2023, emergency water intake is possible with the two existing water pipelines, but KUKL is planning to install a third pipeline in order to secure as much water production as possible for the water treatment plant.

An Initial Environmental Assessment (IEA) is required for the installation of conduction pipe. On March 26, 2024 one consultant was selected but the submission deadline is mid-July, so the pipe installation is expected to be delayed beyond the originally planned schedule.

[Photograph] Conduction pipe from the Bagmati River

		
Existing pipelines	Intake (Dry season)	Intake (Rainy season)

(3) Bulk Distribution System (BDS)

The BDS project is one of the components of the Melamchi Water Supply Project, which is the construction of water transmission pipes and service reservoirs to supply water to the Kathmandu Valley from the New Sundarijal WTP. The package has been added and modified in stages since the project started in 2014.

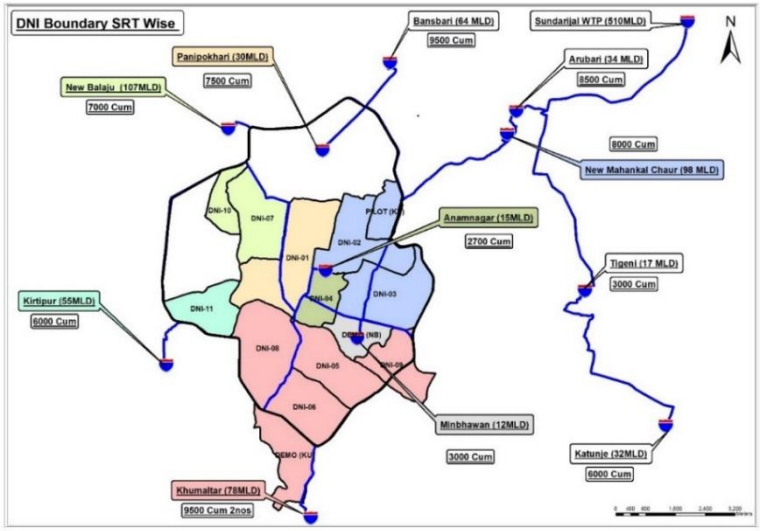


Figure 1.4.2 Overview of BDS project

An agreement by the four Nepalese government agencies was also signed as of January 31, 2023 for some of the facilities constructed under the BDS project. The agreement became effective on February 1, 2023.

[Handed over facilities (Package 1 to 4)]

- Transmission pipeline from the New Sundarijal WTP to several service reservoirs
- Service reservoirs at 9 sites (Arubari, Mahankalchaur, Bansbari, Panipokhari, Balaju, Kirtipur, Khumaltar, Tigeni, Katunje)

Table 1.4.2 Agreement for the handover of BDS facilities

Organization	Roles and Responsibilities
Ministry of Water Supply (MoWS)	a. MoWS will provide overall guidance with regard to water and wastewater management in Kathmandu Valley including policy decisions. b. MoWS will lead sectoral and cross-sectoral coordination for resolving issues related to functionality and sustainable operation of Bulk Distribution System. c. MoWS will monitor and supervise the performance of stakeholders engaged for sustainable service delivery.
Kathmandu Valley Water Supply Management Board (KVWSMB)	a. KVWSMB will subsequently hand over the BDS including SRTs for operation with immediate effect. b. KVWSMB will supervise and audit the performance of the operator. c. KVWSMB will cause the operator to maintain the physical hydraulic and water quality integrity of the BDS.
Kathmandu Upatyaka Khanepani Limited (KUKL)	a. Provide uninterrupted access to construction sites for installation of supervisory control and data acquisition (SCADA) system components (Reservoir Management Unit - RMU, Outlet Management Unit - OMU and Air Management Unit - AMU) at various locations along BDS and SRTs currently under construction by PID. b. Provide construction sites for connecting BDS 5 (currently under constructions) with BDS 1 as scheduled by PID. c. Provide adequate quantity of water to DNIs (during testing and commissioning process) free of cost on mutually agreed scheduled to PID. d. Ensure uninterrupted operation of BDS for continuous supply of water to SRTs and downstream DNIs, e. Carry out routine, recurrent and periodic maintenance of BDS lines, various valves, water flow meters, valve chambers, thrust blocks, SRTs including their reservoir management units and outlet management units from the date of taking over, for the cases other than constructional defects.

Organization	Roles and Responsibilities
	f. Notify PID in case of constructional defects for rectification within the Defect Notification Period (DNP). Upon expiry of the DNO for respective BDS packages, PID shall officially notify KVWSMB/KUKL. g. Adopt and comply with the operating manuals and operating procedure and practices for operation of BDS and SRT.
Project Implementation Directorate (KUKL-PID)	a. PID will cause the contractor to rectify any constructional defects, if any till the Defect Notification Period (DNP). b. PID will timely inform KVWSMB/KUKL for site access (SCADA, BDS-5 etc.) and schedule of testing that requires water supply through the handed over BDS and SRTs. c. Undertake rectification of defects, if any as identified and verified by KVWSMB through a functional study within 2 months. d. Following information/documents/materials, spare parts have been handed over along with this MOA and shall form integral part of this handover. i. Bulk Distribution System Operational Guideline ii. List of spare parts and fittings iii. Two vehicles will be handed over exclusively for BDS operation iv. Taking Over Certificate A. As Built Drawings B. GIS shape files of the network C. Operation Manual D. Test Certificates

When water is conducted from the Melamchi River, 170 MLD can be supplied, but only about 40 MLD can be supplied from the Bagmati River during the rainy season. Since the Support Division is responsible for the operation and management of the BDS and the Operation Division is responsible for water distribution management downstream from the service reservoirs, both divisions cooperate in planning and implementing water operations under the restricted water production.

The scheme diagram of the BDS is shown below. The reservoirs are divided into two groups, with Group 1 receiving water from the New Sundarijal WTP for three consecutive days, and then switching to Group 2 for the following three days.

For service reservoirs that are not in this group, the water may not be delivered or may be supplied from an existing water source.

Table 1.4.3 Water distribution plan for each group

Group 1		Group 2	
SRTs	Distribution (m^3/h)	SRTs	Distribution (m^3/h)
New Khumaltar	700	New Mahankalchaur	400
New Mahankalchaur	300	New Balaju	300
Anamnagar	250	Existing Balaju	700
Minbhawan	300	Kirtipur	300
Katunje	150	-	-
Total	1,700	Total	1,700
	(40,800 m^3/day approx.)		(40,800 m^3/day approx.)

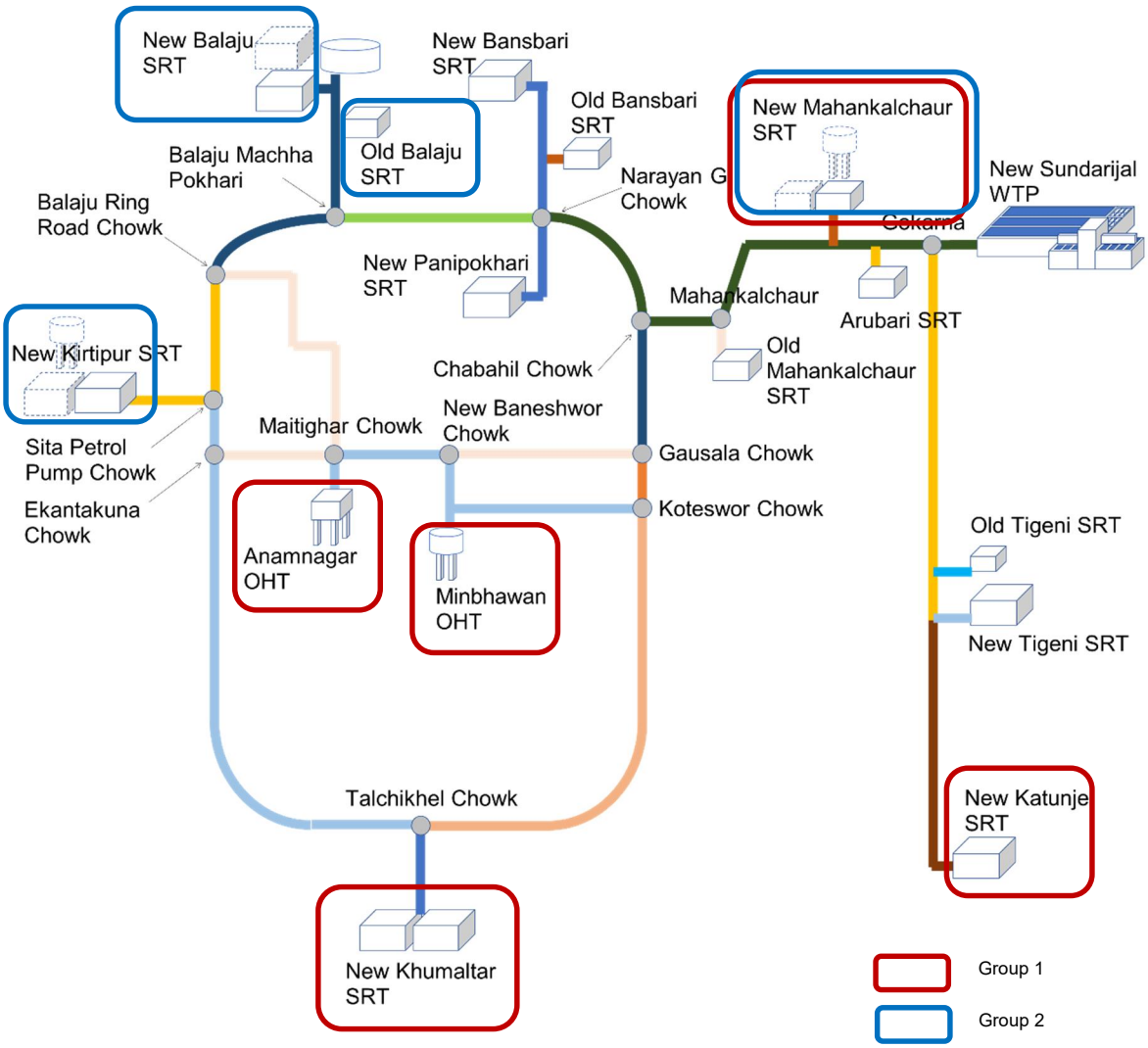
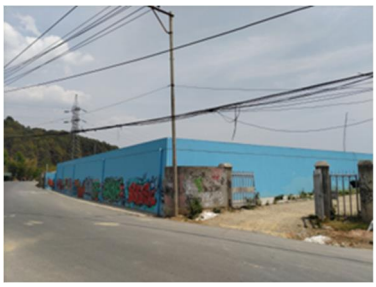


Figure 1.4.3 Scheme Diagram of BDS Network

[Photograph] Service Reservoirs constructed by BDS Project

		
Bansbari SRT	Khumaltar SRT	Balaju SRT
		
Mahankalchaur SRT	Arubari SRT	Panipokhari SRT
		
Kirtipur SRT	Tigeni SRT	Katunje SRT

(4) Distribution Network Improvement (DNI)

DNI's component is the construction of a distribution network aimed at efficiently supplying water from the existing water treatment plant after renovation and the New Sundarijal WTP constructed under the Melamchi Water Supply Project (Sub-Project 1).

- Rehabilitation and replacement of primary and secondary distribution pipelines,
- Rehabilitation and replacement of tertiary distribution networks,
- Replacement of cluster property connections with new metered connections,
- Installation of new tertiary distribution pipes in areas currently not served, and
- Installation of a service saddle in the tertiary distribution pipes, and water meters at every service connection.

The water supply area within the ring road is divided by reservoirs wise, and water is supplied to each house connection by gravity flow starting from each reservoir.

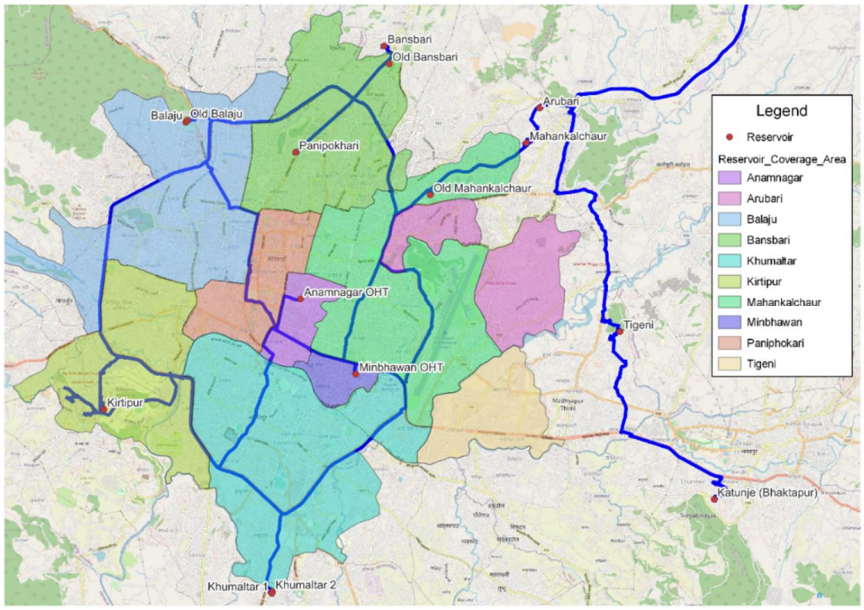


Figure 1.4.4 Water distribution area starting from the BDS service reservoir

Each distribution area is divided into hydrologically independent District Metered Areas (DMAs), and each DMA is further divided into Sub-DMAs. The amount of water entering the Sub-DMA can be measured with a bulk meter, and by measuring the amount of water consumption in the Sub-DMA, the non-revenue water rate can be calculated.

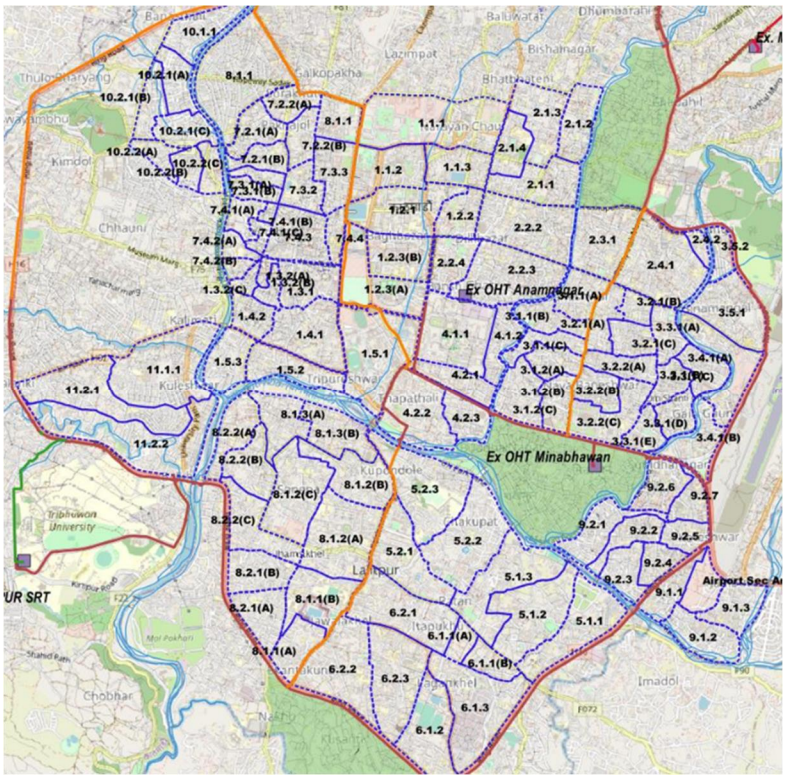


Figure 1.4.5 Classification of Sub-DMA

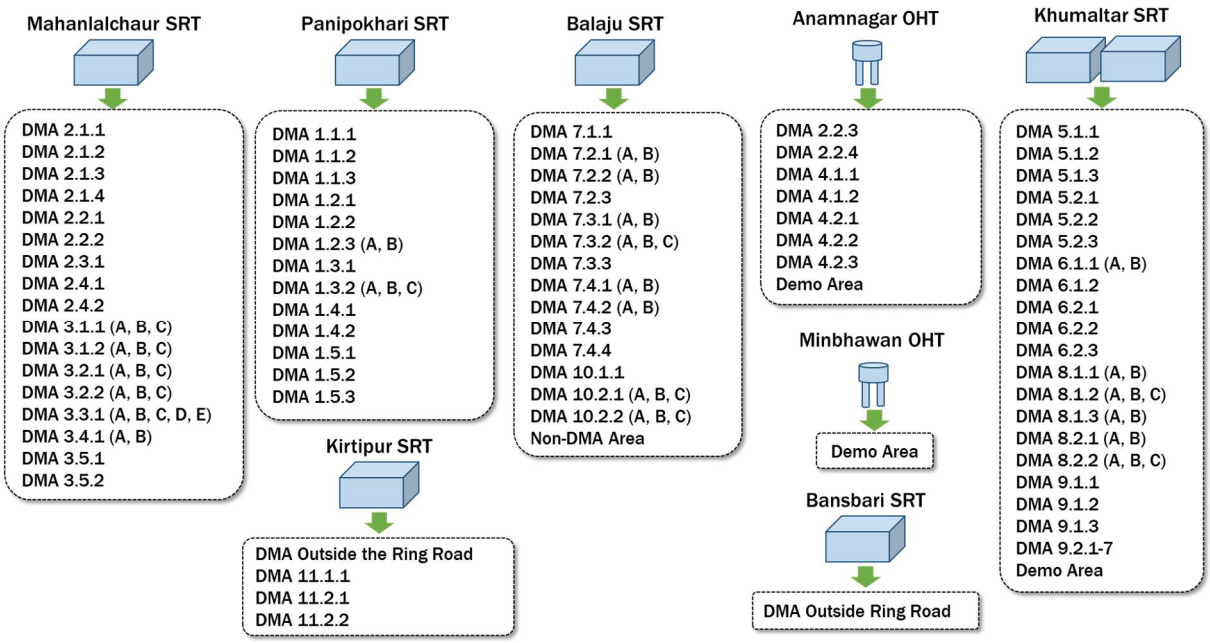


Figure 1.4.6 Relation between service reservoir and sub-DMA

As of April 2024, the following 13 DMAs within the ring road were completed and handed over to KUKL.

Table 1.4.4 Handed-over DMAs and its current situation

DMA	Sub-DMA	Use of old pipe network	Use of new pipe network	Remarks
1.5	1.5.1 1.5.2 1.5.3	In use	In use	Both old and new water distribution pipe network in use.
2.1	2.1.1 2.1.2 2.1.3 2.1.4	In use	In use	Both old and new water distribution pipe network in use.
2.3	2.3.1	In use	In use	Both old and new water distribution pipe network in use.
2.4	2.4.1 2.4.2	In use	In use	Both old and new water distribution pipe network in use.
3.2	3.2.1 3.2.2	In use	In use	Both old and new water distribution pipe network in use.
3.3	3.3.1	In use	In use	Both old and new water distribution pipe network in use.
3.4	3.4.1	In use	In use	Baneshwor branch office is carrying out activities to shut down the old distribution pipe
3.5	3.5.1	Out of service	In use	Switchover to new distribution pipe was completed.
	3.5.2	In use	Partially in use	Switchover to the new distribution pipe is completed only in the Baneshwor branch administrative area. Old pipe is still in use in the Mahankalchaur branch administrative area.
7.1	7.1.1	In use	In use	Both old and new water distribution pipe network in use.
8.2	8.2.1 8.2.2	In use	In use	Both old and new water distribution pipe network in use. Lalitpur branch office is carrying out activities to shut down the old distribution pipe.
9.1	9.1.1	Out of service	In use	Switchover to new distribution pipe was

DMA	Sub-DMA	Use of old pipe network	Use of new pipe network	Remarks
	9.1.2 9.1.3			completed.
9.2	9.2.1 9.2.2 9.2.3 9.2.4 9.2.5 9.2.6 9.2.7	In use	In use	Both old and new water distribution pipe network in use. Baneshwor branch office is carrying out activities to shut down the old distribution pipe.
10.1	10.1.1	In use	In use	Both old and new water distribution pipe network in use.

Most of above DMAs have only been handed over on paperwork and water has not yet been supplied from the new water distribution pipes for the following reasons:

- Due to the shutdown of water conduction from the Melamchi River during the rainy season, the service reservoirs cannot receive enough water.
- Contractors are laying service pipes to houses that are not registered as customers with KUKL.
- Water meters cannot be installed until KUKL's customer registration is completed.

Along with the handover of the DMA, GIS data containing water supply facilities and customer information was provided by PID. However, several errors have been identified in the GIS data created by the contractor, which need to be corrected.

1.4.2 Management system for facilities handed over to KUKL

KUKL must be responsible for the operation and maintenance of facilities constructed under the BDS project, but the documented handover has been carried out without preparing a sufficient organizational structure in KUKL.

As for the DNI project, the department or division responsible for the management of the constructed DMA has not been clarified within KUKL, and its management methods and protocols have not been determined.

In addition, the boundaries of some of the DMAs do not match the current management areas of the branches, which poses a major problem for future implementation of post-handover maintenance and non-revenue water management.

Since ADB has similar concerns about the appropriate management system for BDS and DMA, JET compiled a proposal on matters necessary to resolve the issues and submitted it to KUKL at the end of May 2023.

In preparing this proposal, the following stakeholder meetings were held to confirm the need for the reorganization and to agree on the concept proposed by JET. The results were also presented at the 4th JCC and are included in the Minute as an agreed upon item.

Table 1.4.5 Stakeholder meeting about management system of BDS facilities

Date	Confirmed Items
16/May/2023	➢ Discussion with ADB representative at JICA office (Mr. Saugata Dasgupta : Senior Project Management Specialist, Nepal Resident Mission)
18/May/2023	➢ Confirmation of policy at KVWSMB with CEO of KUKL, Production Division Chief of KUKL, and Operations Division Chief of KUKL
22/May/2023	➢ Confirmation of policy at KVWSMB with CEO of KUKL、Production Division Chief of KUKL, Operation Division Chief of KUKL and Project Director of PID ➢ JET will submit a proposal for the reorganization of the branch offices by the end of May. Also, by the end of June, KUKL will secure its implementation structure and confirm that it will be put into action starting in the new fiscal year.
31/May/2023	➢ Joint meeting with Secretary of MoWS, CEO of KUKL, Production Division Chief of KUKL, JICA Nepal Office, JET, and ADB (Mr. Saugata Dasgupta) to review roles and obligations of all parties for handover of the Melamchi Water Supply Project.

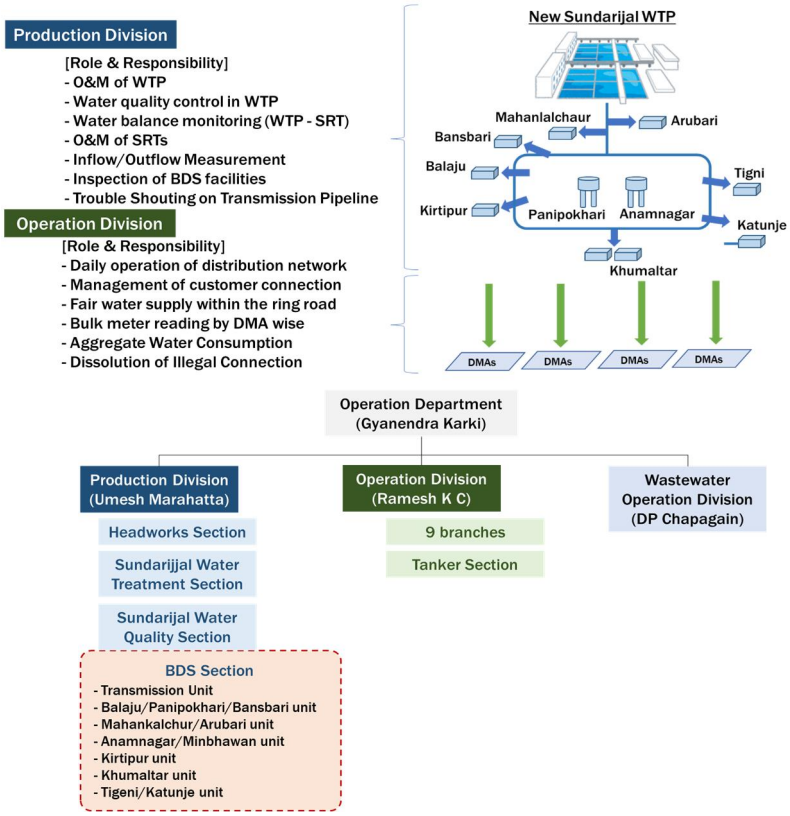
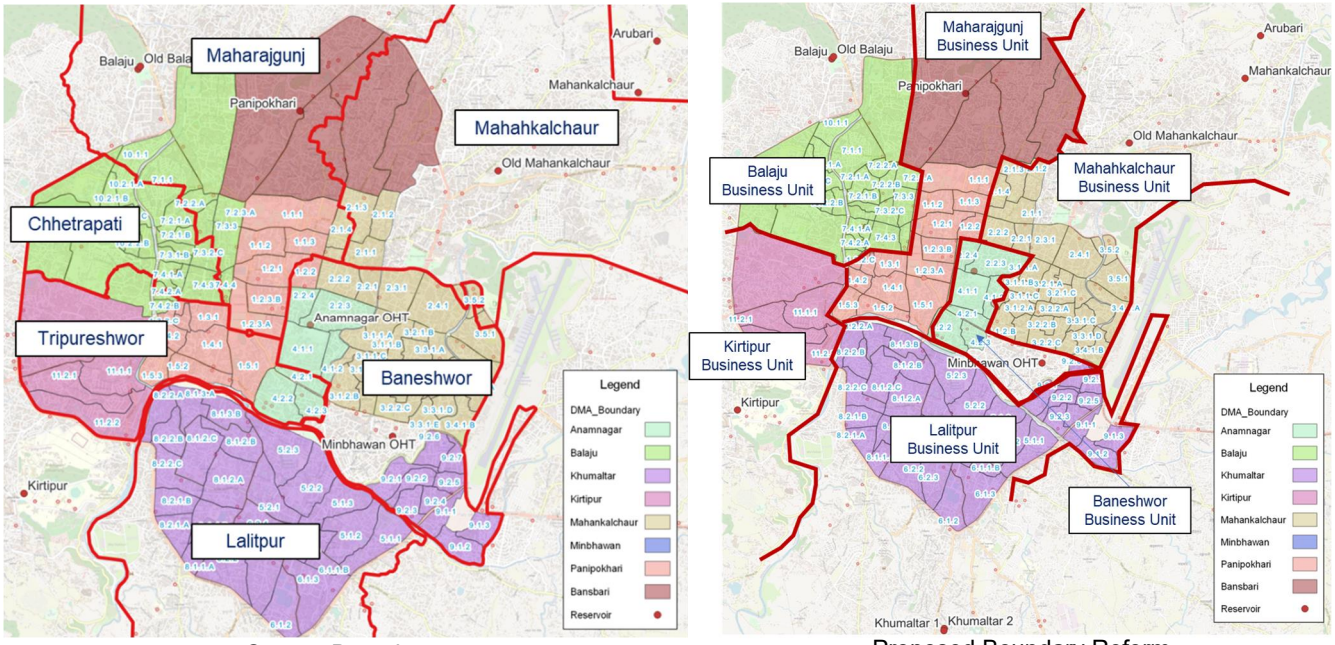


Figure 1.4.7 Draft assignment of role and responsibility for management of BDS/DNI facilities to be handed over



Current Boundary

Proposed Boundary Reform

Figure 1.4.8 Proposed realignment of branch boundaries based on the extent of water supply for distribution reservoirs

Mahankalchaur Branch

DMA 2.1.1*1
DMA 2.1.2
DMA 2.1.3
DMA 2.4.2
DMA 3.5.1*1
DMA 3.5.2*1
Non-DMA Area

Tripureshwor Branch

DMA 1.3.1
DMA 1.3.2 (A, B, C)
DMA 1.4.1
DMA 1.4.2
DMA 1.5.1
DMA 1.5.2
DMA 1.5.3
DMA 4.2.1
DMA 4.2.2
DMA 4.2.3
DMA 7.4.2 (A*1)
DMA 11.1.1
DMA 11.2.1
DMA 11.2.2

Maharajgunj Branch

DMA 1.1.1
DMA 1.1.2
DMA 1.1.3
DMA 1.2.1
DMA 1.2.3 (A, B)
DMA 2.1.1*1
DMA 2.1.4
DMA 7.1.1*1
DMA 7.2.2 (A, B)
DMA 7.2.3
DMA 7.3.3
DMA 7.4.3*1
DMA 7.4.4
DMA 10.1.1
Non-DMA Area

Kirtipur Branch

Non-DMA Area

Chhetrapati Branch

DMA 7.1.1*1
DMA 7.2.1 (A, B)
DMA 7.3.1 (A, B)
DMA 7.3.2 (A, B, C)
DMA 7.4.1 (A, B)
DMA 7.4.2 (A*1, B)
DMA 7.4.3*1
DMA 10.2.1 (A, B, C)
DMA 10.2.2 (A, B, C)
Non-DMA Area

Bhaktapur Branch

Non-DMA Area

Madhyapur - Thimi Branch

Non-DMA Area

Baneshwor Branch

DMA 1.2.2
DMA 2.2.1
DMA 2.2.2
DMA 2.2.3
DMA 2.2.4
DMA 2.3.1
DMA 2.4.1
DMA 3.1.1 (A, B, C)
DMA 3.1.2 (A, B, C)
DMA 3.2.1 (A, B, C)
DMA 3.2.2 (A, B, C)
DMA 3.3.1 (A, B.C. D. E)
DMA 3.4.1 (A, B)
DMA 3.5.1*1
DMA 3.5.2*1
DMA 4.1.1
DMA 4.1.2
DMA 9.1.1
DMA 9.1.2
DMA 9.1.3
DMA 9.2.1-7
Demo

Lalitpur Branch

DMA 5.1.1
DMA 5.1.2
DMA 5.1.3
DMA 5.2.1
DMA 5.2.2
DMA 5.2.3
DMA 6.1.1 (A, B)
DMA 6.1.2
DMA 6.2.1
DMA 6.2.2
DMA 6.2.3
DMA 8.1.1 (A, B)
DMA 8.1.2 (A, B, C)
DMA 8.1.3 (A, B)
DMA 8.2.1 (A, B)
DMA 8.2.2 (A, B, C)
Demo
Non-DMA Area

*1: DMAs belonging to the administrative areas of multiple branches

Figure 1.4.9 Current branch administrative area and sub-DMAs

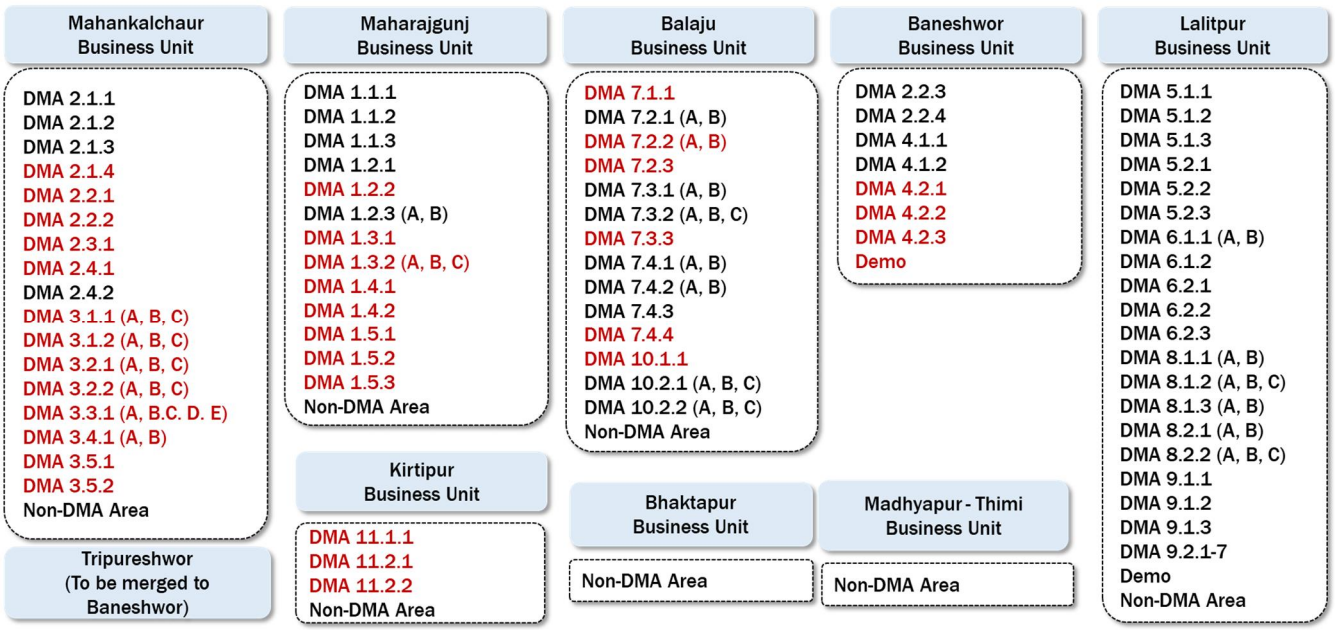


Figure 1.4.10 Sub-DMAs to be managed by branch offices based on the proposed reform plan of branch administrative area

Chapter 2: Implementation Policies

Chapter 2: Implementation Policies

2.1 Capacity Development

Capacity development is "the process by which individuals, organizations, institutions and societies, individually or collectively, fulfill their roles to solve problems or set goals and develop the capacity to achieve them". In this context, the Japanese Expert Team (hereinafter referred to as "JET") will play the role of facilitators, recognizing the specific knowledge and skills needed by the implementing agencies themselves, and utilizing their practical experience and knowledge in the field to produce locally adapted results by integrating external knowledge while justifiably evaluating existing knowledge.

On the other hand, the Nepalese side must be aware of their own initiative and ownership, work to improve the capacity they need, and be able to continue to improve capacity after the project is completed.

This project will be implemented using this process of Capacity Development, and KUKL's own self-initiated development of activities toward the project purpose and overall goal is essential to the success of the project.

Therefore, it is essential that JET and KUKL cooperate in the implementation of this project. At the end of the project, KUKL staff will play a leading role in the actual activities of the project, aiming for a system in which each can work independently and actively.

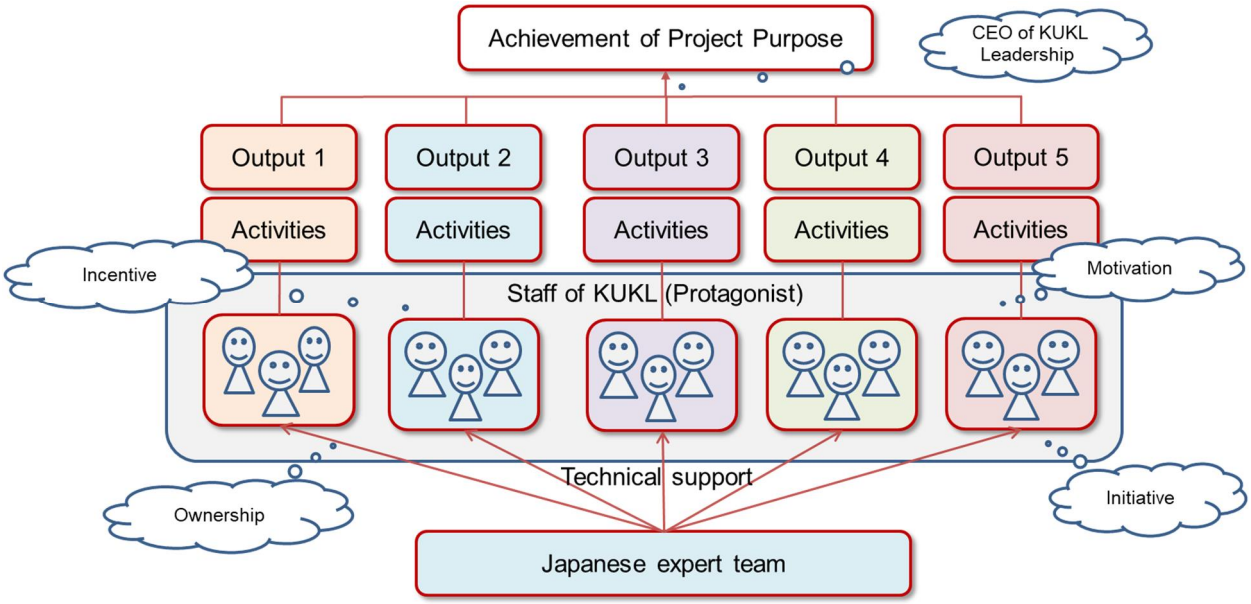


Figure 2.1.1 Capacity Development Process

Project activities as capacity development will be implemented in accordance with the PDM and the Programme of Activities (PO), and their achievement will be qualitatively and quantitatively checked based on the indicators set for each output and the project purpose.

2.2 Overall Implementation Policy of the Project

The project aims to improve the operation and maintenance of water supply facilities by KUKL and to enhance complaint handling and public awareness activities, thereby improving water supply services and achieving recognition of service improvements by customers.

Furthermore, as indicated in "1.3.2 Concept of the Project ", it is expected that KUKL's internal training will be enhanced to continuously improve the water supply business, thereby transforming it into a virtuous cycle of water supply business operation.

The realization of a "Spiral Growth" is the ultimate goal as well as the basic policy for project implementation, and the "establishment of the PDCA (Plan-Do-Check-Action) cycle" is an indispensable tool for achieving this goal.

The training to be conducted in relation to the activities related to each output will enhance the capacity of each individual and organization to continue the PDCA cycle.

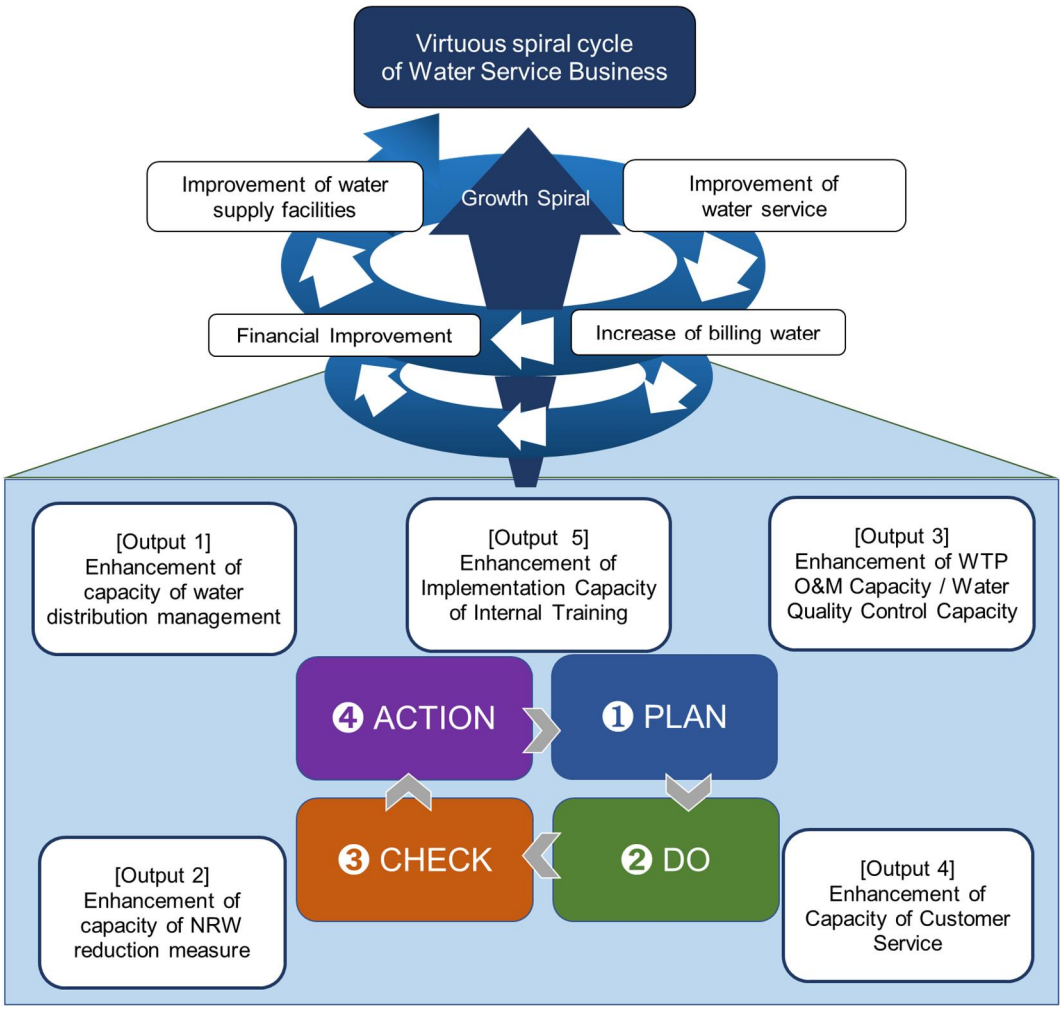


Figure 2.2.1 Virtuous cycle of water supply business

The duration of the project is approximately 60 months, from March 2021 to March 2026.

	Term1 (Mar/2021 - Mar/2022)	Term2 (Apr/2022 - Jan/2024)	Term3 (Feb/2024 - Mar/2026)
	Baseline Survey・Building a project implementation system	**Planning and Implementation of OJT and TOT**	**Implementation of internal training・Establishment of skills**
General	•Collection of basic information •Relationship-building with C/P	•Improvement of the capacity of KUKL staff through training	•Establishment of PDCA cycle and KUKL's organizational system after the project completion
Output1	•Activity: 1-1 •Implementation of basic training •Preparation of SOPs of GIS	•Activity: from 1-2 to 1-10 •Implementation of OJT and TOT •Preparation/utilizing of SOPs of GIS	•Activity: from 1-5 to 1-9 •Implementation of internal training •Utilization and update of GIS data
Output2	•Activity: 2-1 & 2-2 •Clarification of roles and data collection about NRW	•Activity: from 2-2 to 2-7 •Formulation of maintenance plan for NRW reduction •Implementation of training	•Activity: from 2-3 to 2-7 •Implementation of maintenance plan for NRW reduction •Implementation of training
Output3	•Activity: 3-1, 3-2 & 3-3 •Implementation of basic training •Prepare SOPs related to water treatment and water quality control	•Activity: from 3-2 to 3-5 •Implementation of OJT and TOT •Formulation and implementation of monitoring plan	•Activity: 3-2, from 3-4 to 3-6 •Implementation of internal training •Implementation of monitoring
Output4	•Activity: 4-1, 4-2, 4-4 & 4-5 •Conducting customer satisfaction •Review of complaint handling module	•Activity: 4-2, 4-3, from 4-6 to 4-12 •Making an action plan for improving customer service •Prepare a plan of activities for public awareness and implementation of TOT	•Activity: 4-2, 4-3, from 4-6 to 4-9, 4-11, 4-12 •Revised action plan for improving customer service •Review the results of public awareness activities, Implementation of internal training
Output5	•Activity: from 5-1 to 5-7 •Identify the training necessary for KUKL staff / Prepare an overall training program, Prepare a manual for internal training management	•Activity: from 5-8 to 5-11 •Implementation of TOT •Analysis and feedback of training	•Activity: from 5-8 to 5-11 •Implementation of internal training •Analysis and feedback of training

Figure 2.2.2 Main activities in each term

Term-1 corresponded to the project's start-up phase, and laid the foundation for efficient capacity building for each of different outputs scheduled in Term-2. JET identified the direction and training needs of the project through the baseline survey and capacity assessment of KUKL staff.

On the other hand, the KUKL side deepened its understanding of the relationship between project purpose and the expected outputs of each activity and various evaluation indicators through action team meetings for each output, and worked to acquire the basic knowledge necessary to start OJT.

In Term-2, in collaboration with KUKL staff, activities were developed in accordance with the technical themes addressed by each output, and training was effectively promoted to enhance the capacity of KUKL staff.

The training programs planned and implemented by JET have all met the expectations of the KUKL side, and have contributed to the enhancement of staff motivation.

In addition, awareness has been fostered within the counter parts (C/P) to achieve the project purpose of translating the increased water supply by the Melamchi Water Supply Project into improved customer service and improving KUKL's own operations and maintenance capacity.

Meanwhile, the DNI project, a sub-project of the Melamchi Water Supply Project, has been delayed significantly from its original schedule due to flood damage to the Melamchi River and the closure of the diversion tunnel in rainy season.

At the end of Term-2 only three District Metered Areas (DMAs) have been handed over to KUKL for operation and maintenance after the completion of the construction of the new distribution network.

Even in the DMAs that have been handed over to KUKL, the switchover to the new distribution network has not progressed, and most of the water produced at the New Sundarijal WTP is supplied through the old distribution network.

Under these circumstances, for Indicators 1 and 2 of the project purpose, progress in switching to the new distribution network will largely determine the extent to which the indicators are achieved.

Table 2.2.1 Prospect for achievement of the project purpose

No	Objectively Verifiable Indicators	Prospect
[Project Purpose] The KUKL's capacity of operation and maintenance of water supply is improved.		
Indicator 1	Water pressure is properly maintained above 0.05MPa during the water supply time in the areas within the ring road where the DNI project has been completed.	Only 3 DMAs have been handed over to KUKL by the end of Term-2, but several more DMAs are planned to be completed and handed over by early 2024. A significant increase in water supply is assured during the dry season when the Melamchi water diversion tunnel can be operated. This indicator will be achievable, although the timing and areas where water supply stabilizes will be limited.
Indicator 2	Water supply hours are fair in the areas within the ring road where the DNI project has been completed.	Only 3 DMAs have been handed over to KUKL by the end of Term-2, but several more DMAs are planned to be completed and handed over by early 2024. A significant increase in water supply is assured during the dry season when the Melamchi water diversion tunnel will resume. This indicator will be achievable, although the timing and areas where water supply stabilizes will be limited.
Indicator 3	The rate of turbidity value which satisfies 5NTU at the treated water reservoirs of the target WTPs reaches more than 95 % .	Through the activities up to Term-2, turbidity control at each water treatment plant has improved more than before, and the turbidity value is generally below 5 NTU except during sudden increases in raw water turbidity. The amount of PAC injected was determined through jar tests, control targets were indicated in the prepared SOPs, and installation of the PAC injection volume measurement equipment (Rotameter) has completed in Mahankalchaur WTP. If improvements to the chemical dosing facilities at each WTP are completed and the capacity enhancement of C/P continues through Term-3, this indicator will be achieved.
Indicator 4	The rate of residual chlorine value which satisfies the required value specified in the SOPs at the treated water reservoirs of the target WTPs reaches more than 95 %.	Through the activities up to Term-2, items to be improved in residual chlorine control have been identified, and facilities for measuring chlorine dosage have been installed in Mahankalchaur WTP. In Term-3, the required value to be specified in the SOP will be determined in consideration of the retention time at the clear water reservoirs and service reservoirs. After the chemical dosing measurement facilities (Rotameter) are installed and function at the remaining existing WTPs, and the capacity enhancement of C/P continues through Term-3, this indicator will be achieved.
Indicator 5	The result of customer satisfaction survey is reported in the KUKL's annual reports.	The results of the second customer satisfaction survey were analyzed and evaluated by KUKL staff throughout the activities in Term-2. The result was reported in the KUKL Annual Report 2080 published in the first half of 2024. The results of the third survey to be conducted in Term-3 will be analyzed and evaluated by KUKL staff in the same way. This indicator is achievable by the end of the project.

2.3 Degree of improvement of KUKL organization during project implementation

Although there is no responsible department or division within KUKL that collects and monitors the Performance Indicators, the following information is shown in the Annual Report that is published in Falgun of every year, the time of KUKL's anniversary.

- Shareholders structure of KUKL
- List of directors of KUKL Board and CEO
- Organizational structure of human resource status
- KUKL service area for water supply
- Water production and distribution details
- Activities of service improvement (Maintenance and pipeline works)
- Pipeline installation for distribution improvement
- Consumer water connections
- Annual new connections
- Other activities (JICA Project Information, Water quality sampling etc.)

In technical cooperation projects, it is desirable to evaluate the results of implemented activities not only by using indicators shown in PDM, but also by linking capacity development activities to KUKL's Key Performance Indicators (KPIs).

While not all output activities will directly contribute to the improvement of KPIs, changes in indicators that can contribute to improvement through the project are shown below.

Table 2.3.1 Comparation between the outputs and KPIs

KPI	Baseline (2020/2021)	Actual (2023)	Source
General information			
Number of staff	Total: 977 Permanent: 750 Non-permanent: 227 (Feb/Mar 2021)	Total: 933 Permanent: 648 Non-permanent: 285 (Feb/Mar 2023)	KUKL Annual Report
Served population	2,300,000	2,300,000	JICA Institutional Capacity Assessment of KUKL (Feb 2016)
Number of staff per 1000 connections	4.3	3.9	
[Output 1] The capacity of water distribution management utilizing GIS is enhanced.			
Total number of connection	228,808	239,396	
Number of stand post	652	600	
Number of metered connection	220,659	230,160	
Metered connection ratio	96.4%	96.1%	
Number of new connection	7,719/year	10,275/year	
[Output 2] The capacity of NRW reduction is enhanced.			
Total operating cost (Annual expenses for O&M only) *1	NRs 804,250,957	NRs 799,713,043	KUKL Financial Statement
Annual total billing (Net Billing Amount)	NRs 858,146,648	NRs 936,975,412	KUKL Financial Statement
Toal operating income*2	NRs 1,005,119,402	NRs 1,135,095,863	KUKL Financial Statement
Operating ratio*3	0.94	0.85	Total operating cost /Annual total billing
Operating balance ratio*4	1.25	1.42	Total operating income /Total operating cost
Collection ratio (Collected amount / Billing	0.96	0.98	Historical Average

KPI	Baseline (2020/2021)	Actual (2023)	Source
amount)			
Average monthly billing	NRs 313/con・month	NRs,327/con・month	
Production cost	NRs.19.3/m^3	NRs.17.3/m^3	
Average daily production	114,000 m^3/day	126,550 m^3/day	KUKL Annual Report
Average daily production per capita	49.6 L/day・capita (Target 2,300,000)	55.0 L/day・capita (Target: 2,300,000)	
Percentage exceeding standard values 5 NTU of turbidity in water samples of treated water at WTPs	Mahankalchaur: 32.4% Bode: 2.7% Bansbari: 0.5%	Mahankalchaur: 11.2% Bode: 0.1% Bansbari: 0.1% New Sundarijal: 4.1%	Data provided by the central laboratory
[Output 4] The capacity of customer service management is enhanced.			
Customers satisfied with overall service of KUKL (%)	388/1000 = 38.8% A little satisfied: 335 Very satisfied: 53	691/1000 = 69.1% A little satisfied: 443 Very satisfied: 248	Customer Satisfaction Survey Report
Customers satisfied with telephone attention by KUKL (%)	34/113 = 30.0% A little satisfied: 31 Very satisfied: 3	33/48 = 68.8% A little satisfied: 21 Very satisfied: 12	Customer Satisfaction Survey Report
Customers satisfied with on-site attention by KUKL (%)	17/37 = 45.9% A little satisfied: 15 Very satisfied: 2	144/172 = 83.7% A little satisfied: 81 Very satisfied: 63	Customer Satisfaction Survey Report
Customers whose domestic demand is fully covered by KUKL water supply (%)	[100% of Sufficiency] 141/1000 = 14.1%	[100% of Sufficiency] 385/992 = 38.8%	Customer Satisfaction Survey Report

*1: Annual operating expenses excluding license and lease fee and TFC payment
*2: Total operating income = Revenue + Other income
*3: Operating ratio = Annual O&M cost / Annual billing
*4: Operating balance ratio = Total operating income / Total operating cost

[Operating Ratio]

The operating ratio was previously used in the MoWS's WATER SERVICE PROVIDERS Capacity Assessment and Benchmarking 2071-72 (2014-15) and is defined as follows:

Annual operational cost / Annual sales revenue (Billing)

O&M expenses decreased 0.5%, while billings increased 9%, and the ratio of O&M expenses to billing decreased from 0.94 to 0.85. These O&M expenses do not include license/lease fees to KVWSMB nor contributions to TFC, but are calculated as pure operating expenses.

[Operating Balance Ratio]

The operation balance ratio (operating income / operating cost) is an indicator of the percentage of operating expenses covered by operating revenues. The higher this ratio is, the better the operating profit is, and less than 100% means an operating loss. The operation balance ratio increased from 1.25 at the baseline to 1.42, indicating an improvement in the operating income/expenses ratio.

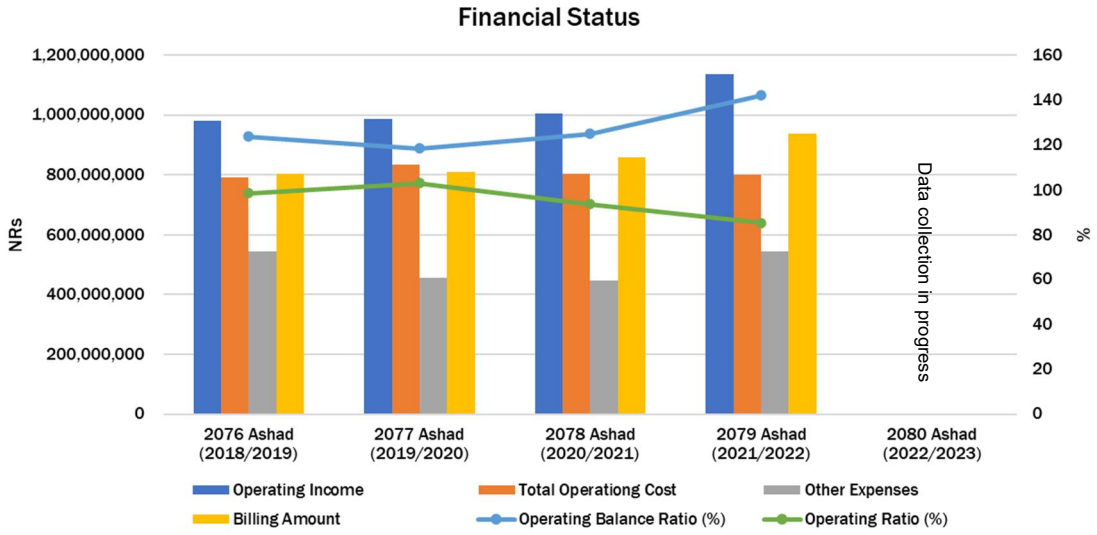


Figure 2.3.1 Operating Ratio and Operating Balance Ratio

[Collection Ratio]

The ratio of the collected amount to the billing amount, which shows improvement from previous years.

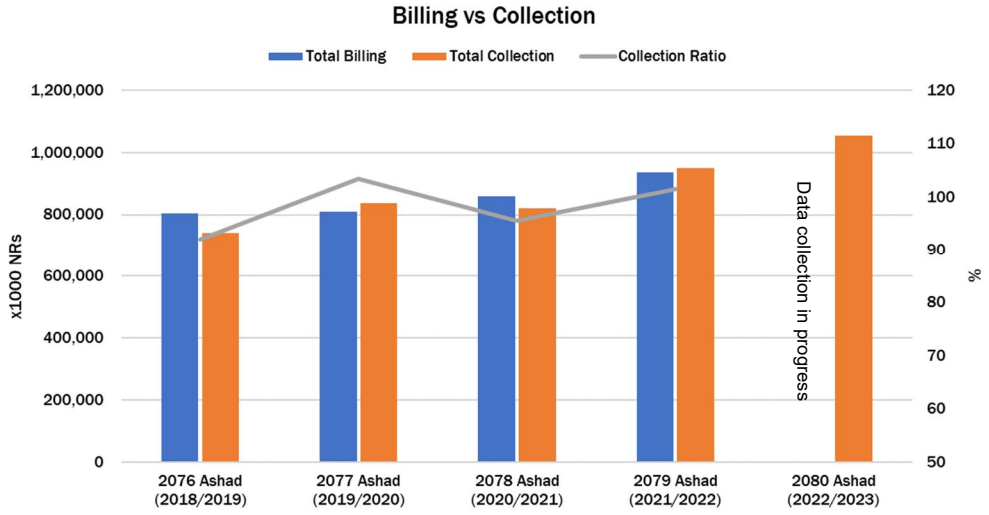


Figure 2.3.2 Billing and Collection

[Percentage of samples exceeding standard values 5 NTU of turbidity in treated water at WTPs]

Control of treated water turbidity at the water treatment plant is improving. In the Mahankalchaur WTP, there is still room for improvement in treatment and turbidity management when raw water turbidity suddenly increases.

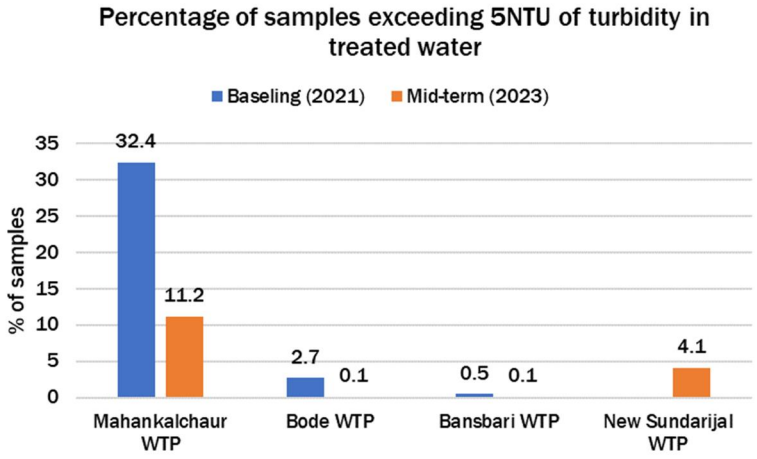


Figure 2.3.3 Change of turbidity control status in WTPs

2.4 Implementation Policy for each Output Activities

2.4.1 Implementation Policy for Output 1 Activities

(1) Direction of activities

In the Kathmandu Valley, GIS data for the new water distribution network will be provided to KUKL as part of the handover documents in the areas covered by the BDS and DNI projects.

This project will provide the training necessary to effectively utilize this GIS data for water distribution management, and develop human resources to operate and update GIS data at the KUKL Head Office and the branch offices.

The project will also enhance the capacity for water distribution management, including hydraulic analysis techniques and water pressure control techniques necessary for equitable distribution of drinking water supplied from the New Sundarijal WTP and the existing water treatment plant within the Kathmandu Valley.

When these efforts are developed on the PDCA cycle, the growth spiral shown below will be realized, and equitable water distribution will lead to increased customer confidence. To achieve Output 1, the JET will assist KUKL in making this PDCA cycle work as part of its daily operations.

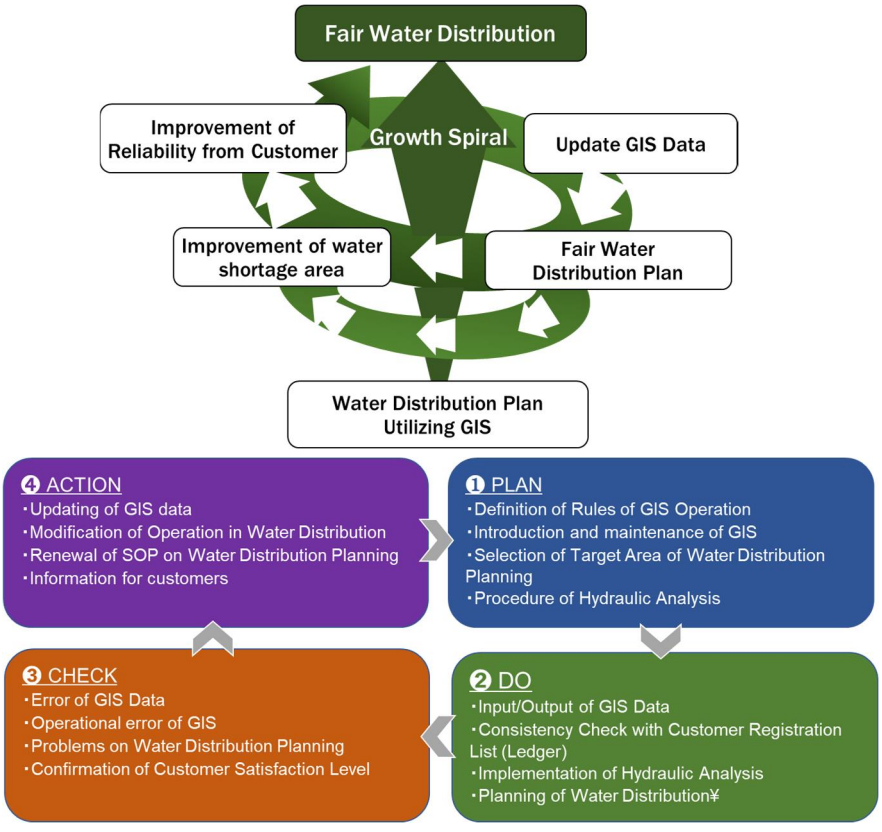


Figure 2.4.1 PDCA Cycle for Sustainable Water Distribution Management

(2) Challenges and measures to achieve Output 1

Based on the results of the activities to date, the outlook for the achievement of the performance indicators planned in the PDM is shown below.

1) Indicator 1-1

GIS data is updated according to SOP in the areas within the ring road where the DNI project has been completed.

By the end of Term-2, practical training for engineers and supervisors at each branch office and head office was planned and implemented, ensuring that technical skills were enhanced and firmly established.

Although KUKL has not been able to begin practical work with GIS data on new water distribution networks, during this period the staff of the several branches has routinely collected and managed GIS data on water supply facilities, customer locations, and other information in existing water distribution networks that are not included in the DMA construction.

After a certain number of DMAs are completed by early stage of Term-3 and their GIS data are officially handed over to KUKL, practical GIS management can proceed under the guidance of JET.

The following is a list of issues to be addressed to achieve Indicator 1-1.

Table 2.4.1 Issues to achieve the indicator 1-1

Issues	Contents and measure
Proficiency in GIS data updating practices	Regarding GIS data updating, an environment for data updating work was developed, including data management by a GIS server, acquisition of local customer information using tablet devices, and preparation of customer registration using GIS maps. The handover of the official GIS data of several DMAs is expected to be done in Term-3. The challenge is to address this schedule delay and complete the practical training of operation and management using the official GIS data at all the branches. To this end, the training should be provided in an efficient and effective manner to enhance and proficient GIS data updating capabilities.
Establishment of a quality inspection system for GIS data	Regarding the quality inspection system, in order to avoid concentrating only on those in charge at the head office, JET instructed data quality inspection and correction methods at group training sessions for GIS personnel at the head office and at each branch office. In previous activities, as part of GIS data quality control, data quality inspections have been conducted using informally provided GIS data, but several errors in graphic and attribute information have been identified because contractors are not complying with requirements by PID. In the future, when official data is provided by PID to KUKL, KUKL itself must immediately conduct a quality check of the data. Especially for serious errors or more than a certain number of errors, it would be difficult for KUKL's GIS staff to solve them alone. Therefore, it is necessary to take measures such as clearly indicating the error location and requesting the contractor to correct it through PID. Considering this situation, JET will create an environment that facilitates the transfer of technology by developing a quality inspection manual. JET will also encourage KUKL to establish a quality inspection office or take other organizational corrective actions.
Thorough management of personal information in GIS data collection operations	The issue is to add a lecture on information security measures as part of GIS training to raise awareness of personal information management among those in charge. Measures to reduce information security risks will be practiced in daily operations, such as restricting mobile device logins, deleting applications deemed unnecessary, restricting the use of specific applications (restricting the use of Internet browsers and application search and installation that may lead to information leakage), and setting access rights to folders/files on the GIS server.

2) Indicator 1-2

GIS data is shared between Head Office and Branches according to SOP in the areas within the ring road where the DNI project has been completed.

Through the activities up to Term-2, "GIS utilization plans and operation methods" were generally agreed upon, and activities to finalize the SOP are planned in Term-3. In addition, the installation of IT equipment and server settings necessary for data sharing between the branch offices and the head office have been completed, so the infrastructure in terms of both software and hardware is now in place.

After the GIS data is officially provided to KUKL, each branch office will work on adding and updating GIS data, and these data will be shared between the head office and the branch offices by utilizing the already established system.

The following are issues to be addressed to achieve Indicator 1-2.

Table 2.4.2 Issues to achieve the indicator 1-2

Issues	Contents and measure
Operation of GIS data server	Since official GIS data is not yet available, the system that has been built has not been actually utilized to share data. Operational guidelines for GIS technology describing how to utilize and operate GIS are being prepared, and SOPs integrated with equipment operating procedures will be compiled in Term-3. Future training will further increase the level of mastery of GIS server data access authority settings and data management methods, and encourage each person in charge to understand appropriate data sharing and management methods.

3) Indicator 1-3

The water distribution plan for maintaining proper water pressure is prepared for the areas within the ring road where the DNI project has been completed.

The completion of the DNI project has been delayed and only a limited number of areas have started to be supplied with water through the new distribution pipes; based on the situation in the second half of 2023, it is necessary to develop activities to achieve this indicator in the plan of activities in Term-3.

Table 2.4.3 Issues to achieve the indicator 1-3

Issues	Contents and measure
Ensure water supply necessary to develop and implement water distribution plans	The New Sundarijal WTP began full-scale operation in March 2023, and by May 2023, the water production volume reached approximately 170 MLD, equivalent to the design value. On the other hand, the conditions for planning water distribution are not yet in place, as new distribution pipes have only been put into service in a limited number of areas, and water intake has had to be restricted since June in order to prevent damages to the tunnel by high turbidity of raw water. The completion and handover of several DMAs is expected to be done between the end of 2023 and April 2024, allowing the necessary activities to be deployed upon its completion. However, it is assumed that the achievement of this indicator will not extend to the entire area within the ring road, as the completion of the DMA for the entire area within the ring road will still take some time.

Issues	Contents and measure
Hydraulic analysis modeling in the completed DMAs	Completion and handover of several DMAs is expected to be done between the end of 2023 and April 2024, but completion of all the DMA throughout the ring road will still take time. It is assumed that the achievement of this indicator will not extend to the entire area within the ring road. However, at a minimum, the activities required in Term-3 will be to identify a few DMAs within the commercial management area by each branch, build a hydraulic analysis model using GIS data, and implement the analysis practices through on-the-job training.

2.4.2 Implementation Policy of Output 2 Activities

(1) Direction of activities

The project will provide the skills training necessary to acquire knowledge on preventative measures, focusing mainly on commercial losses, with the aim of keeping the non-revenue water ratio low for long time after handover of DMA to KUKL. To achieve Output 2, JET will assist KUKL in ensuring that the PDCA cycle outlined below functions as part of KUKL's daily operations.

Along with the provision of the new distribution network, maintaining a low non-revenue water ratio in the initial phase is expected to improve the performance indicators of the water utility in the medium and long term.

Furthermore, proper evaluation of the improvement of revenue in each branch office by the head office will also elicit higher staff motivation to reduce non-revenue water.

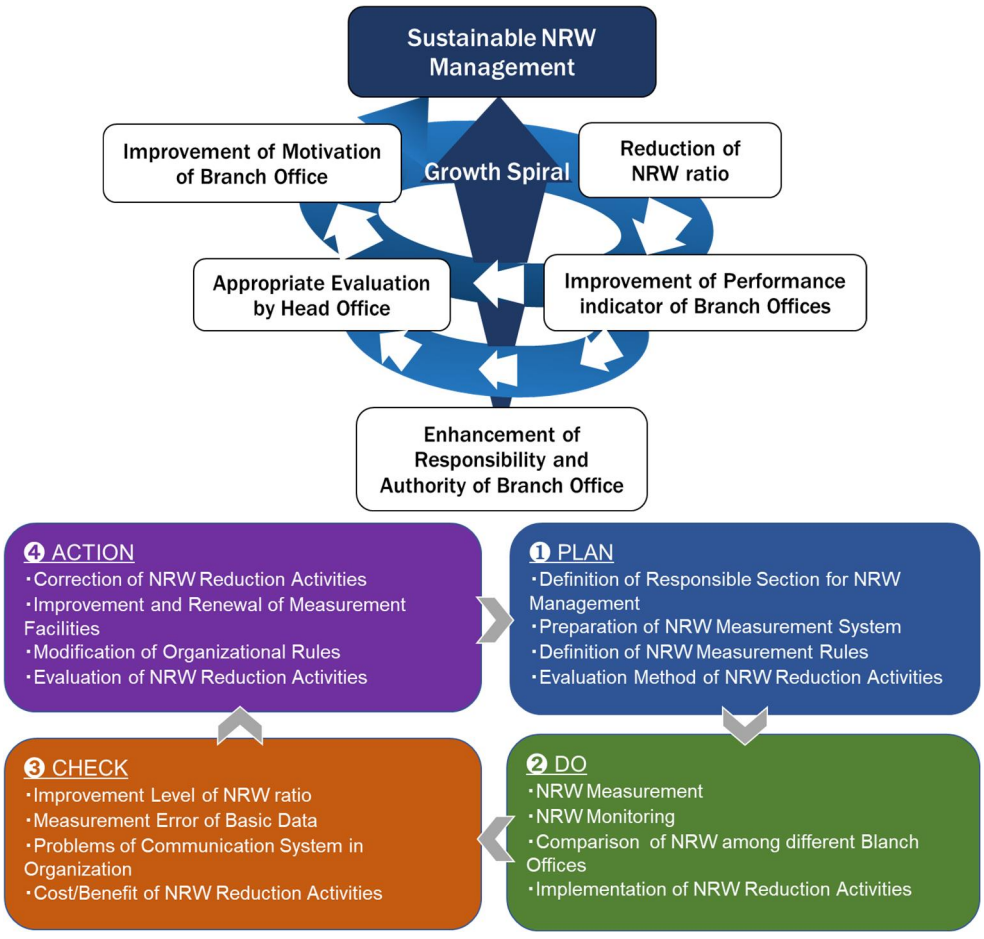


Figure 2.4.2 PDCA Cycle for sustainable NRW Management

(2) Challenges and measures to achieve Output 2

Based on the results of the activities to date, the outlook for the achievement of the performance indicators planned in the PDM is shown below.

1) Indicator 2-1

The data of water inflow and water consumption in the areas within the ring road where the DNI project has been completed is monthly reported from Branches to Head Office.

Achievement within the project period is possible. However, the timing of achievement of the indicators will depend on the progress of the completion and handover of the DMAs. It is anticipated that the timeframe for starting the calculation of non-revenue water in the ring road will be after 2024. However, in DMA 4.1.2, of which the new pipeline is already in service, water inflow and water consumption data collection was initiated in Term-2 on a trial basis.

The following is a list of issues to be addressed to achieve Indicators 2-1.

Table 2.4.4 Issues to achieve the indicator 2-1

Issues	Contents and measure
The timing of handover of DMA to KUKL will affect the achievement of this indicator, since the progress of DMA construction work by the DNI project varies from area to area. Although the calculation of the non-revenue water ratio can be started in the order of DMAs that have been completed and handed-over, the challenge is to secure a certain number of DMAs at each branch office that can be deployed for OJT in Term-3.	Hold regular consultations with KUKL and PID to review the progress of DNI project from time to time. Efficiently deploy the non-revenue water ratio calculation and data sharing findings in DMA 4.1.2 to other areas and branches.
Water consumption data is unreliable because the meter reading rate is not 100%. The challenge is to properly estimate the water consumption of unmetered customers.	The work to calculate the amount of water billed in DMA 4.1.2 will be discussed with the members of Output 2 Action Team. Strongly request for an increase in the meter reading rate conducted by the branch offices, and expand the method of calculating water consumption obtained here to other areas and branch offices.

(2) Indicator 2-2

The NRW ratio in the areas within the ring road where the DNI project has been completed is monthly calculated at Head Office.

Achievement within the project period is possible. However, the timing of achievement of the indicators will depend on the progress of the completion and handover of the DMAs. It is anticipated that the timeframe for starting the calculation of non-revenue water in the ring road will be after 2024. However, in DMA 4.1.2, which is already in service, water inflow and water consumption data collection was initiated in Term-2 on a trial basis.

The following is a list of issues to be addressed to achieve Indicators 2-2.

Table 2.4.5 Issues to achieve the indicator 2-2

Issues	Contents and measure
As the understaffing of KUKL is chronic, the challenge is to secure staff to collect and calculate data on non-revenue water rates at the branch offices and the head office.	In order to broaden the scope of technical transfer, the project will ask as many staff members as possible from each branch to be involved in project activities.

(3) Indicator 2-3

The number of training participants on NRW reduction measures (Basic training, TOT and Internal Training by KUKL) is more than 120 persons.

Achievement within the project period is possible. The trainings conducted to date and the number of participants is 114 in total.

Table 2.4.6 Number of trainees for training on NRW measure

Training Module	Participants in TOT	Participants in Internal Training
Basics of Non-revenue Water (Commercial Losses)	17	19
Meter accuracy testing skill	14	18
Meter reading skill	20	Before commencement
Billing data input/check skill:	8	Before commencement
Illegal connection measures:	18	Before commencement
Total	77	37

Three internal training sessions are scheduled in Term-3. The following is a list of issues to be addressed in order to achieve Indicator 2-3.

Table 2.4.7 Issues to achieve the indicator 2-3

Issues	Contents and measure
The challenge is to plan and manage the internal training by KUKL itself according to the training modules that have been established so far.	Deepen communication with the Training & Research Section, the department responsible for internal training, and secure a stable training budget with the understanding and support of KUKL's upper management. As in the past, the training plan will be explained and discussed in advance at regular meetings with the Output 2 Action Team members.

(4) Indicator 2-4

The NRW ratio in the areas within the ring road where the DNI project has been completed does not exceed 15%

Prospects for achievement within the project period will depend on post-delivery activities of the DMA, but may also be affected by the non-revenue water ratio at the time of handover.

The baseline non-revenue water ratio of DMA constructed by DNI project is not yet known and cannot be determined at this time.

The following is a list of issues that need to be addressed in order to achieve Indicator 2-4.

Table 2.4.8 Issues to achieve the indicator 2-4

Issues	Contents and measure
The completed and handed-over DMAs are not yet operational. The challenge is to determine the baseline value of the non-revenue water ratio as soon as possible after the water supply from Melamchi resumes.	The communication and coordination with KUKL and PID should be fully coordinated and, if necessary, re-set to feasible targets after baseline values are known.
There are a certain number of customers who do not have meters installed or who have meters but cannot be read. The challenge is to properly assess the water consumption of these customers and reflect it in the calculation of the non-revenue water ratio.	A policy on how to estimate water usage for unmetered customers should be fully discussed with the Action Team members for Outcome 2. The assumptions on which the calculations are based should be described in detail in the monthly report, etc., and any changes that may be necessary should be well discussed and recorded in the meeting memo.

2.4.3 Implementation Policy of Output 3 Activities

(1) Direction of activities

When the water supply to the residents of the Kathmandu Valley is increased by the water conduction from the Melamchi River, the reliability of KUKL's water service will improve by eliminating the main cause of customer dissatisfaction: insufficient water supply.

On the other hand, as such improvements in water supply conditions subside over time, customer requirements are expected to shift from increased water supply volume to improved water quality. Therefore, KUKL is required to enhance its internal water quality management system before customer requirements change.

The PDCA cycle for water quality control, including the division of roles among KUKL related departments, head office, branch offices, and water quality laboratories, and water treatment plants, is shown below. JET will support KUKL to ensure that such PDCA cycle functions as a daily operation of KUKL in order to achieve Output 3.

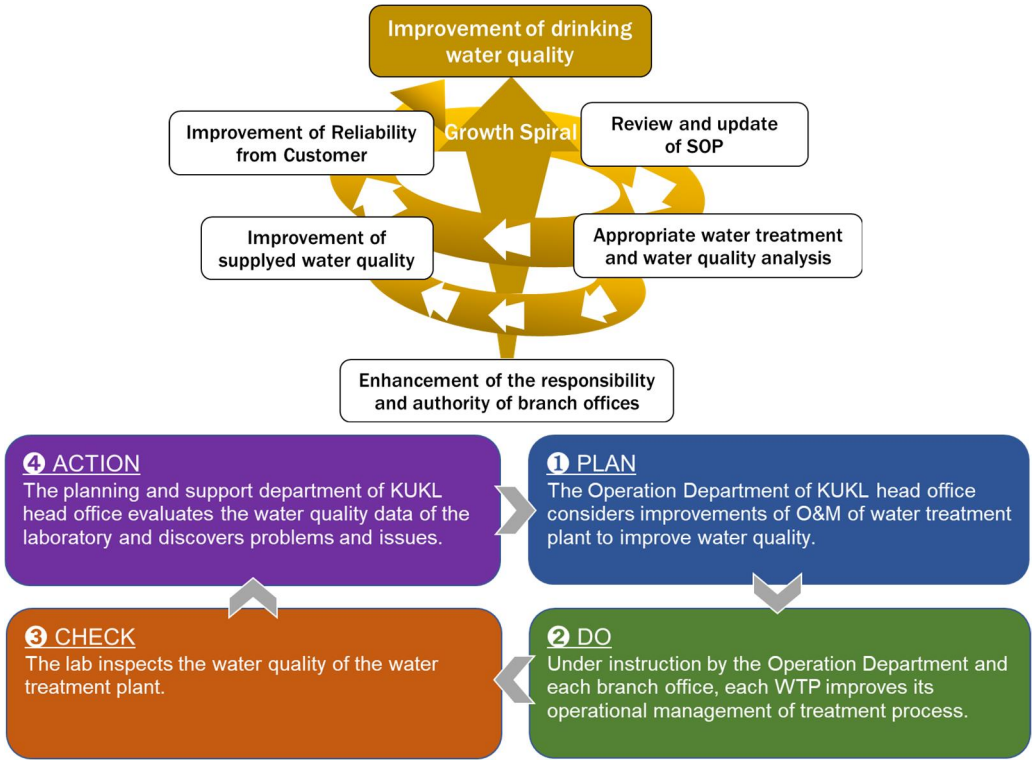


Figure 2.4.3 PDCA Cycle for Sustainable Water Quality Control

(2) Challenges and measures to achieve Output 3

1) Indicator 3-1

The water is treated according to SOPs in the target WTPs.

This indicator can be achieved within the project period. OJT and TOT are underway using the prepared SOPs, and the following capacity improvements have been observed with respect to water treatment.

① The staff deeply understood the importance of turbidity removal and residual chlorine as part of operating techniques of water treatment plant.

② The PAC dosing facilities and the chloring dosing facilities have been gradually upgraded, and operators have become accustomed to using these facilities.

③ Using a conversion table prepared by JET, the operators began calculating the inflow of water from the water level at the weir and confirming the required chemical dosing rate.

④ When operational results are not favorable, consultations are voluntarily held to remedy the situation.

The following is a list of issues to be addressed in order to achieve Indicator 3-1.

Table 2.4.9 Issues to achieve the indicator 3-1

Issues	Contents and measure
Determination of water treatment operation at the time of inflow of high turbidity raw water	Operators are not able to cope with fluctuations in raw water turbidity during the rainy season and high turbidity water inflow at night. Utilize the automatic raw water quality monitoring device currently being installed by the Electromechanical Department. Assign water treatment plant operators to work at night so that pH and turbidity measurements can be made at night as well, and provide necessary technical guidance. Instruct KUKL to prepare a conversion chart between "Raw water turbidity" and "PAC dosing rate" at each WTP and instruct operators to adjust the chemical dosing volume.
Improvement of chemical dosing facilities and operational capacity	The coagulant and chlorination facilities at Bansbari and Bode WTPs are aging, and the replacement of these facilities has not been completed. JET follows up with KUKL to promote the renewal of equipment and provide operational guidance after maintenance.
Establishment of residual chlorine control standard values for each water treatment plant	Target residual chlorine concentration value (at the outlet of the water treatment plant) is not determined for each WTP. After the chlorine dosage can be adjusted at WTP, the residual chlorine data of the distribution system is analyzed to set the residual chlorine control standard value at the outlet of WTP. Provide guidance on how to operate to comply with the determined residual chlorine standard value.

2) Indicator 3-2

The water quality is measured according to SOPs.

By the end of Term-2, SOPs for each measurement parameter were prepared and distributed to the water quality labs at each water treatment plant. In addition, the necessary SOPs have been prepared and distributed for water quality measurement personnel at KUKL branches.

Water quality measurements according to SOPs have been initiated in the water quality labs at the water treatment plants, but there are still many issues for improvement at the branch level. The

following issues need to be addressed to achieve Indicator 3-2.

Table 2.4.10 Issues to achieve the indicator 3-2

Issues	Contents and measure
Thorough SOP referencing in KUKL branches	The required SOPs have already been distributed to the water quality lab at the water treatment plant and to the water quality measurement personnel at each branch office. In the water quality labs in WTPs, SOPs are bound in files and kept in desk-top holders, ready to be used at any time. On the other hand, water quality measurement staff at branch offices do not refer to SOPs as well as manuals for measuring instruments, so it is necessary to ensure that SOPs and manuals are utilized at monthly seminars and on-site guidance.
Establishment of SOP documents management rules (assignment of text numbers, storage and management of text data)	By the end of Term-2, the first version of the SOP was prepared. In the future, it will be necessary to revise the SOPs based on improvements in measurement methods, changes in measuring equipment materials, etc., but this must be done in accordance with the management rules for SOP documents, and the latest version must always be available in the laboratories. JET and KUKL will prepare a Master SOP that defines the rules for the management of SOPs. The expert will also designate a person in charge of SOP management and provide guidance to ensure smooth management of SOP documents and its revision.

3) Indicator 3-3

The monitoring activities are carried out at all target WTPs according to the water quality control plan.

Water quality monitoring is being conducted at the target water treatment plants (Mahankalchaur, Bansbari, Bode, and New Sundarijal) according to a schedule.

However, the development of a water quality management plan is an issue that needs to be addressed in Term-3. The water quality management plan should include both the implementation of water quality monitoring and the operation and management of WTPs reflecting the monitoring results, but the project has not yet reached the stage of proper operation and management, especially since the maintenance and improvement of chemical dosing facilities at existing WTPs (Mahankalchaur, Bansbari, and Bode) are still in progress.

A Water Quality Management Plan should be developed integrating the Water Quality Monitoring Plan and the Water Treatment Plant Operation and Management Plan, while taking into account the progress in the development of chemical dosing facilities and training of operators at existing water treatment plants.

It is assumed that the water quality management plan will include basic policies regarding the following items, and that detailed items such as facility operation and monitoring plans will be cited from individual plans, SOPs, etc. to be developed separately.

Table 2.4.11 Contents of Water Quality Management Plan (Draft)

Items	Contents	Remarks
Water quality monitoring at WTPs	Parameter, Sampling point, Frequency	To be referred to a separately established monitoring plan.
WTP operation plan	Appropriate method of WTP operation	To be descript the operation method for each water treatment plant facility.
Experiment of water quality at WTPs	Chloring demand test, Frequency of implementation of jar test	To be referred to a separately established monitoring plan.
Emergency attention at WTPs	Response to abnormal water quality (assuming high turbidity or low pH)	Describe the basic response policy. For individual facility operations, refer to

Items	Contents	Remarks
	: Water quality monitoring system when high turbidity is expected, Method of controlling coagulant dosing rate and chlorine dosing rate	separately defined SOPs, etc.
Maintenance plan of distribution facilities	Maintenance method of reservoirs: to be referred to SOP of BDS reservoirs	Describe the basic maintenance policy. For individual facility operations, refer to separately defined SOPs, etc.
Water quality monitoring plan at reservoirs and taps in the city	Water quality monitoring being conducted by KUKL branches: Parameter, Sampling point, Frequency	To be referred to a separately established monitoring plan.
Organizational system for water quality control	To ensure smooth implementation of the above activities, the duties of each of the departments concerned and the system for coordination among them are clearly stated.	To be mentioned in the water quality management plan

The following issues need to be addressed in order to develop the water quality management plan described above (see also the issues in Indicator 3-1)

Table 2.4.12 Issues to achieve the indicator 3-3

Issues	Contents and measure
Establish operational procedures for water treatment plants	JET will continue to provide guidance to ensure that the chemical dosing facilities are in place and that coagulant and chlorine dosing rates are controlled based on water quality data.
Establish additional operating procedures for water treatment plants	Establish a response method for abnormal water quality and develop necessary SOPs.
Establish a monitoring plan for reservoirs and taps in the city.	Based on the start of operation of The New Sundarijal WTP, the city's water quality monitoring points should be reviewed and a water distribution basin monitoring plan should be developed. Build coordination with relevant departments, as the monitoring schedule will be greatly influenced by the water transmission and distribution plan at that time.

[Attention]

It should be noted that the policy of the Government of Nepal requires water utilities to adopt a Water Safety Plan (WSP) to monitor water quality and services, and that a Water Safety Plan Handbook (WSP) was developed in 2013 by the Department of Water Supply and Sewerage (DWSS) of the Ministry of Urban Development (UDM) in collaboration with WHO, but KUKL has not initiated the preparation of this plan.

Considering this situation, the project decided to incorporate the following basic elements of the WSP in developing the water quality management plan (See Table 4.3.3).

- Develop a water quality testing plan at critical points for water quality control (raw water, water treatment process, and critical points on the water distribution route)
- Establish a rational maintenance management method for water treatment plants and distribution facilities to enable the results of water quality measurements to be reflected in operational management on a daily basis.
- Assume possible water quality incidents and develop an emergency response plan (emergency monitoring, water treatment process management, etc.) for such incidents.

The water quality management plan to be developed under this project will cover the requirements of the WSP. Once that plan is developed, it is expected to be further developed into a WSP that incorporates disaster countermeasures (restoration of water supply facility functions, securing water supply, and ensuring water quality safety), clarification of cooperation with higher level organizations, and functions for evaluation and improvement of countermeasures.

4) Indicator 3-4

The water quality is regularly measured at the taps in the water supply areas by the target WTPs.

Water quality analysis at the taps through collaboration with KUKL's nine branches began in the second half of Term-1 and has continued since then.

This indicator has been generally achieved, but the following issues need to be addressed.

Table 2.4.13 Issues to achieve the indicator 3-4

Issues	Contents and measure
Lack of staff in charge of water quality monitoring	The shortage of water quality analysis personnel has become a problem in both branches due to transfers as a result of the start of operation of the New Sundarijal WTP and retirements of staff. JET will request KUKL upper management to fill the position of water quality analysis personnel and provide technical training to the newly assigned staff.
Improvement of Technical Capability	Although water quality analysis personnel at each branch office receive guidance from the central water quality lab, mistakes are often made in the field due to a lack of understanding by staff. JET continues to provide expert guidance and encourages proactive technical improvement efforts, such as regular seminars from the central water quality laboratory.
Efforts to improve water quality using water quality data	Water quality measurement data from each branch is being sent to the central water quality lab and data is being accumulated. Data are discussed and reviewed with JET and the central lab at monthly debriefing meetings, but the results have not yet been used to improve water quality at the taps. The core members need to discuss how to use water quality data and establish the use of data within the organization.
Maintenance of analytical equipment and response to equipment failure	In some branches the analytical equipment was not adequately cleaned and maintained. JET will instruct them to pay attention to the dirt and deterioration of analytical equipment, especially sampling cells. In addition, JET will provide guidance on the establishment of an annual procurement plan and regular procurement of necessary consumables and reagents so that they can be replenished as needed from the central water quality lab.

2.4.4 Implementation Policy of Output 4 Activities

(1) Direction of activities

Traditionally, the major source of dissatisfaction among KUKL's customers has been the lack of water supply volume, but it is expected that the complaints received from customers will become more diverse after the water supply from the Melamchi River is realized and the New Sundarijal WTP start its full operation. Therefore, KUKL is focusing on improving customer satisfaction in order to improve water supply services in the future.

The project will ensure that the results of the project will be disseminated among water users by making them realize the improvement of water service. JET will then actively support public relations activities that lead to improved water service, such as the start of billing and tariff collection based on accurate meter reading and the gradual expansion of water supply hours.

These activities will be expanded in stages after confirming customers' recognition and trust in KUKL based on the results of the customer satisfaction survey, aiming for a virtuous cycle as shown below.

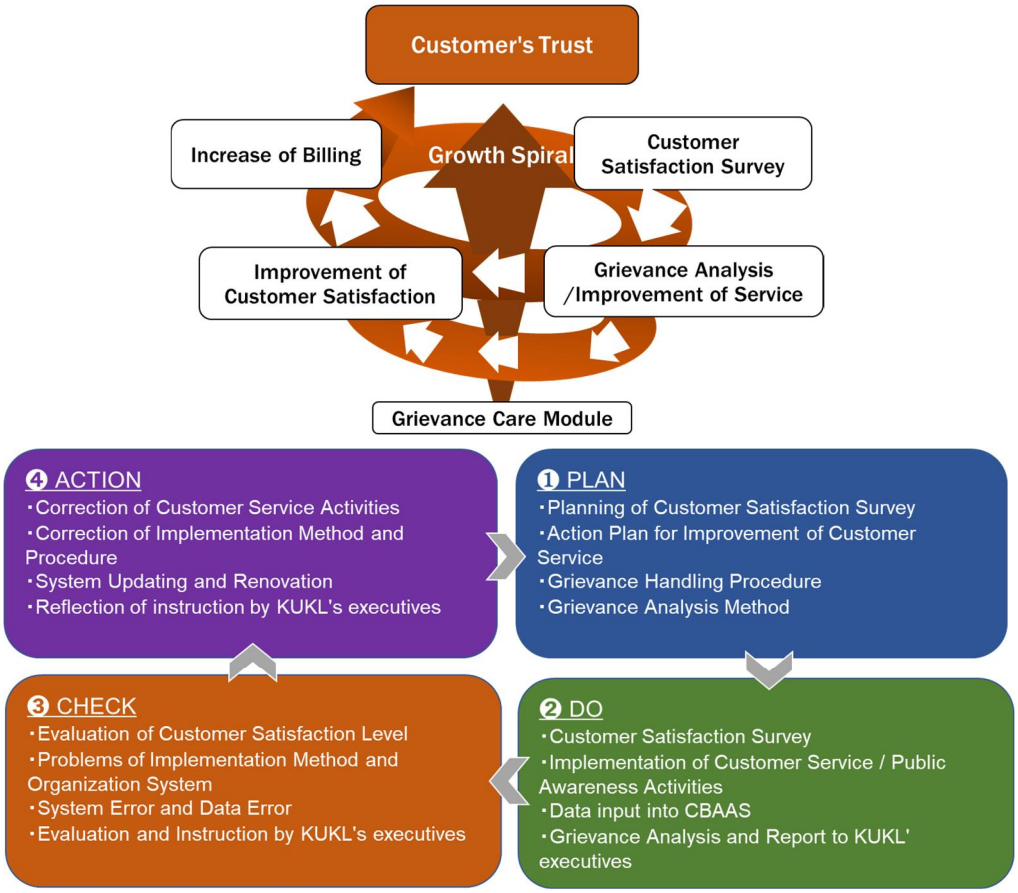


Figure 2.4.4 PDCA Cycle for Improvement of Customer Service

(2) Challenges and measures to achieve Output 4

Based on the results of the activities to date, the outlook for the achievement of the performance indicators planned in the PDM is shown below.

1) Indicator 4-1

The future plan of customer services management is prepared.

JET proposes the establishment of a planning committee to share and discuss the current status and issues related to customer service in order to develop a future plan for customer service management. Currently, the project is focusing on sharing information on the current status of customer service and improvement measures, and is aiming to establish a system for reporting the results of analysis of customer requests and grievances, which is being conducted as part of the Output 4 activities.

The following is a list of issues to be addressed in order to achieve Indicator 4-1.

Table 2.4.14 Issues to achieve the indicator 4-1

Issues	Contents and measure
Establish a reporting system for analyzing customer requests and grievances.	Reporting of the results of the analysis of customer grievance information to KUKL managerial staff is underway as Activity 4-8, and the reporting system is currently being used on a voluntary basis at Head Office, seven branch offices, and the Wastewater Operation Division. To date, this reporting process has not been formally adopted within KUKL and is being implemented on an individual basis by C/Ps who are active in training for Output 4. Work has begun within KUKL to institutionalize this improvement.
Establishment of planning committee	After the establishment of the reporting system, JET plans to create an opportunity to discuss measures for KUKL as a whole or externally, with the aim of holding a plenary meeting at the upper levels of KUKL based on reports from each branch office, etc. Discussions regarding this improvement began at the end of Term-2 and moved toward institutionalization within KUKL.

2) Indicator 4-2

Customer satisfaction about KUKL's customer care is improved.

Compared to the first customer satisfaction survey, the second survey also shows an improvement in customer satisfaction with customer care and with overall service of KUKL. This result is likely due in large part to the progress of Melamchi Water Supply Project, but it has also drawn attention to the response of staff in the field, and the challenge for the future is to raise awareness of KUKL as a whole beyond the scope of the activities in Output 4.

The following is a list of issues to be addressed in order to achieve Indicator 4-2.

Table 2.4.15 Issues to achieve the indicator 4-2

Issues	Contents and measure
Continue service improvement activities	Already, improvement was seen in the second survey compared to the first customer satisfaction survey. On the other hand, there is still room for improvement in telephone support and online system support, so continued efforts are required.
Raise awareness of KUKL as a whole	The second customer satisfaction survey showed an increase in satisfaction with KUKL as a whole. On the other hand, it has been recognized that raising awareness of KUKL as a whole beyond the scope of activities in Output 4 is an issue. In Term-3, this will be considered an important issue, and JET and C/Ps plan to propose countermeasures.

3) Indicator 4-3

The results of customer complaints analysis and how KUKL responds to their complaints are regularly reported to KUKL's management.

Currently, compilation and analysis of complaints are underway by C/s through Activity 4-2 and Activity 4-7, and these results will be compiled into a report as Activity 4-8.

There are differences in the achievement level of capacity development among C/Ps, and there are variations among branches in reporting process and its contents. In Term-3, JET aims to establish a reporting system by improving the capacity of all members of Output 4 activities, mainly through guidance by TOT.

The following is a list of issues to be addressed in order to achieve Indicator 4-3.

Table 2.4.16 Issues to achieve the indicator 4-3

Issues	Contents and measure
Establish a reporting system for analyzing customer requests and grievances.	Reporting of the results of the analysis of customer grievance information to KUKL managerial staff is underway as Activity 4-8, and the reporting system is currently being used on a voluntary basis at Head Office, seven branch offices, and the Wastewater Operation Division. To date, this reporting process has not been formally adopted within KUKL and is being implemented on a genus basis by C/Ps who are active in training for Output 4. Work has begun within KUKL to institutionalize this improvement.

4) Indicator 4-4

Public awareness activities are planned and developed by KUKL and implemented annually from 2022.

The awareness-raising action plan was developed in 2022 and is being implemented on an ongoing basis as of the end of Term-2. KUKL itself will monitor and advise on the establishment of a structure and budget for continued implementation.

Since PID has been conducting PR activities since 2017 and has secured a continuous budget, the JET plans to develop effective awareness-raising activities in Term-3 with PID as a partner, referring to the good practices implemented by PID and incorporating its know-how into the activities of Output 4.

The following is a list of issues to be addressed in order to achieve Indicator 4-4.

Table 2.4.17 Issues to achieve the indicator 4-4

Issues	Contents and measure
Continue to conduct awareness-raising activities after project completion	The plan for awareness-raising activities has been drafted for 2022 and is being implemented. The plan will be updated according to issues based on the results of customer satisfaction surveys and other information. In Term-3, JET will monitor and advise KUKL on the establishment of a system to enable it to continue its activities and to secure a budget for this purpose, with an emphasis on sustainability.
Building collaborative relationships with PID	The project plans to collaborate with PID, which is active in public relations activities, with the goal of holding regular meetings.

2.4.5 Implementation Policy of Output 5 Activities

(1) Direction of activities

In this project, JET and KUKL will work together to improve KUKL's internal training system and implement activities so that KUKL can implement the PDCA cycle for internal training in cooperation with the technical departments/sections. And the project will enhance the organizational structure for human resource development, which is the foundation of waterworks business operation.

The Output 5 Action Team and KUKL's Training & Research Section will work together to develop and implement training plans, evaluate and analyze training results, and reflect the results in the next plan, in order to create a system that functions through the PDCA cycle.

Figure 2.4.5 PDCA Cycle for Internal Training System

(2) Challenges and measures to achieve Output 5

Based on the results of the activities to date, the outlook for the achievement of the performance indicators planned in the PDM is shown below.

1) Indicator 5-1

An overall structure of training (rough structure) for KUKL staff is developed.

The training up to Term-2 was led by JET, and a tentative overall training plan for KUKL has been prepared.

From now on, the Training & Research Section will work closely with the training groups and related departments of each output members to develop more accurate training plans in accordance with the Training Supervision Manual.

It is expected that the Training & Research Section will be able to develop an overall training plan by the time the project is completed.

The following is a list of issues to be addressed in order to achieve Indicator 5-1.

Table 2.4.18 Issues to achieve the indicator 5-1

Issues	Contents and measure
Capacity building for Training & Research Section	Currently, the work related to training is being transferred from Output 5 Action Team to the Training & Research Section as a full-time staff member has been assigned to this section. In the future, capacity building of the Training & Research Section should be promoted to improve its capacity to formulate training programs. At present, the relationship between the Training & Research Section and each training group and related departments is weak, and JET will support KUKL to maintain close communication with them to actively exchange information on training plans.
Response to External Factors	Flexibility is needed to respond to external factors affecting the training plan, such as the availability of water supply from the Melamchi River and the number of DMAs where the new water distribution pipeline will be operational. To this end, the organizational changes to the Output 5 Action Team described below will ensure that the Training & Research Section is in constant communication with related organizations and other departments, and will establish a system to obtain the latest information when necessary.

2) Indicator 5-2

The number of training programs that KUKL plans and implement by itself (without JET's support) is more than 10 courses.

As described in the details of activities up to Term-2, more than 30 training programs are planned for 2024 and 2025, albeit tentatively.

In the future, as mentioned above, the project plans to reduce the involvement of JET in training and increase the number of training programs conducted primarily by KUKL. Currently, KUKL is not able to conduct training on its own due in part to the results of internal lecturers yet to be determined, but from the second half of 2024, more KUKL-led training is planned, and the indicator is expected to be achieved.

The following is a list of issues to be addressed in order to achieve Indicator 5-2.

Table 2.4.19 Issues to achieve the indicator 5-2

Issues	Contents and measure
Capacity building for Training & Research Section	As with Indicator 5-1, the Training & Research Section has just been substantively established and cannot operate without the support of JET and the Output 5 Action Team. JET will promote capacity building in the Training & Research Section so that this section can take the lead in implementing training programs, while deepening cooperation with internal instructors and other results training groups.

3) Indicator 5-3

The number of trainers in each area is more than target values.

Specific training instructor targets are as follows.

Table 2.4.20 Target number of trainers to be trained

No	Technical Field	Training Course (Draft)	Number of trainers to be created (Minimum)	Number of candidate trainer as of the end of Term-2
1	Water Distribution Management	GIS Operation	2	3
		GIS Mobile App *1	-	3
		Hydraulic Analysis	2	2
		Water Distribution Control	1	2
2	NRW Management	Anti-illegal connections	1	6
		Meter accuracy control	2	3
		Commercial Losses (Basics of NRW)	2	5
		Customer data input/check *1	-	4
3	Water Quality Management	Water quality control	3	2
		Water treatment	3	6
4	Customer Management	Customer care	1	3
		Meter reading	2	3
		Total	19	42

*1: Added in Term-2

Currently, candidates for internal training instructors are being selected for each training theme defined in each output, and various training programs are being implemented with the support of JET in order to meet the above target number.

Although internal lecturers will be gradually determined in each output in the second half of 2024, the targets are expected to be achieved.

The following is a list of issues to be addressed in order to achieve Indicator 5-3.

Table 2.4.21 Issues to achieve the indicator 5-3

Issues	Contents and measure
Clarify treatment of internal lecturers within the organization	It is desirable that more staff members engage in friendly competition to become internal instructors and to improve the technical skills of KUKL. To this end, incentives for becoming an internal lecturer should be clarified. Currently, the Training Supervision Manual proposes that lecturers be compensated in accordance with the common regulations for public institutions in Nepal, but the Manual has not been approved within KUKL at this time. JET reminds the CEO through the project manager on the Nepalese side for his understanding and approval. In addition, JET will continue to request KUKL to consider the construction of a point scoring system for personnel evaluation for staff who become internal lecturers.
Deepening the relationship between internal instructors and the training section	As mentioned above, the Training & Research Section has just been established and has not yet established relationships with the various departments within KUKL. The internal lecturers and the Training & Research Section will maintain close communication, and JET will support the smooth implementation of the internal training program under communication with the staff selected as internal lecturers.

Chapter 3: Detail of Implementation Method of the Project

Chapter 3: Detail of Implementation Method of the Project

3.1 Detail of activity related to Output 1 in Term-3 (2024-2025)

Output 1	The capacity of water distribution management utilizing GIS is enhanced.

3.1.1 Continuation/follow-up from Term-2

[Activity 1-1] Decide the utilization plan and operation rule of GIS.

<Progress in Term-2>

Through the activities until the end of Term-2, the IT environment for operating GIS within KUKL and the acquisition of technology have progressed.

A working flow of digital information sharing from the field to the GIS has been established and supervisors have made progress in digitizing their work.

(1) GIS Management Policy

The GIS server will centrally manage GIS master data related to the new water distribution network. The GIS server and the GIS operation PCs at each branch office were connected via an internal network, and access rights for each user were set on the PCs at each branch office in order to upload GIS data to the folders/files in the server.

GIS staff at each branch office will collect GIS data on new customers, new water supply facilities, leakage information, etc., and periodically update the data in the server. In addition, tablet devices were distributed to supervisors responsible for field work so that they could manage customer information on new connections/disconnections with GIS data.

Table 3.1.1 Agreements on how to operate the GIS

Item	Agreements
Basic Policies of GIS Operating Rules	The following three basic policies have been established as method of operation for the time being. These policies will be reflected in the preparation of future Standard Operating Procedures (SOPs). ➢ Proper capture and recording of field information ➢ Improve accuracy of GIS data updating process ➢ Joint work with IT section for data management and ensuring security
Data Operation System	The management method of GIS data to be exchanged between the server at the Head Office and the operation PCs at each branch office shall be defined separately for the initial operation phase and the subsequent full-scale operation phase, respectively. In the initial phase of operation, the server will be used as a file server to manage the data files of each branch office in an integrated manner. Subsequently, full-scale operation will start when the GIS skills and GIS data management capabilities of each GIS staff have been improved. At that stage, Data Base Software (open source) will be installed on the server and the transition will be made to GIS data management using a database.

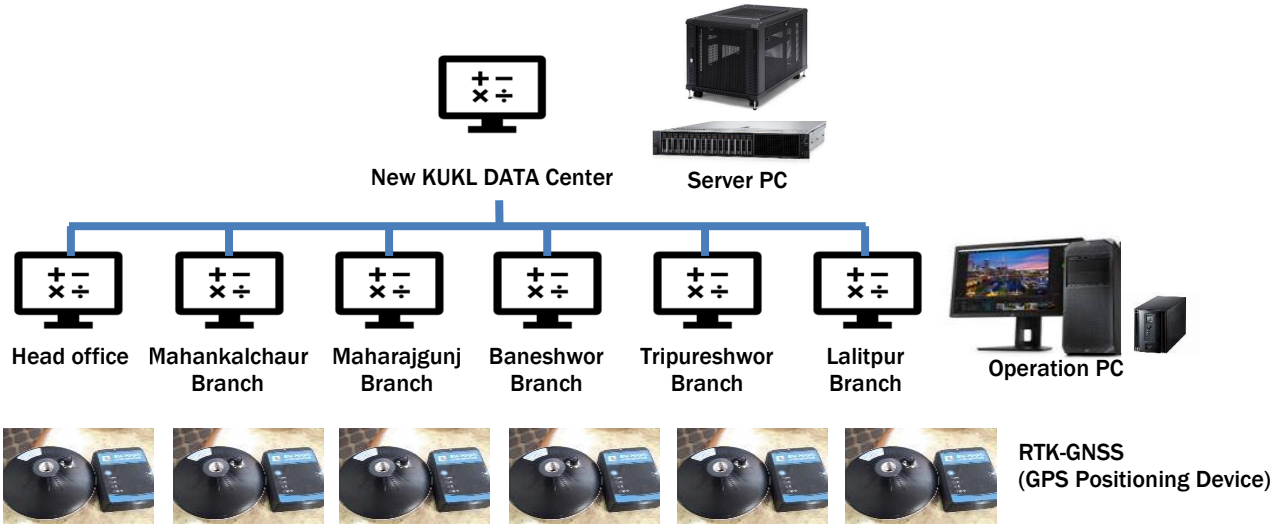


Figure 3.1.1 Management system of GIS data

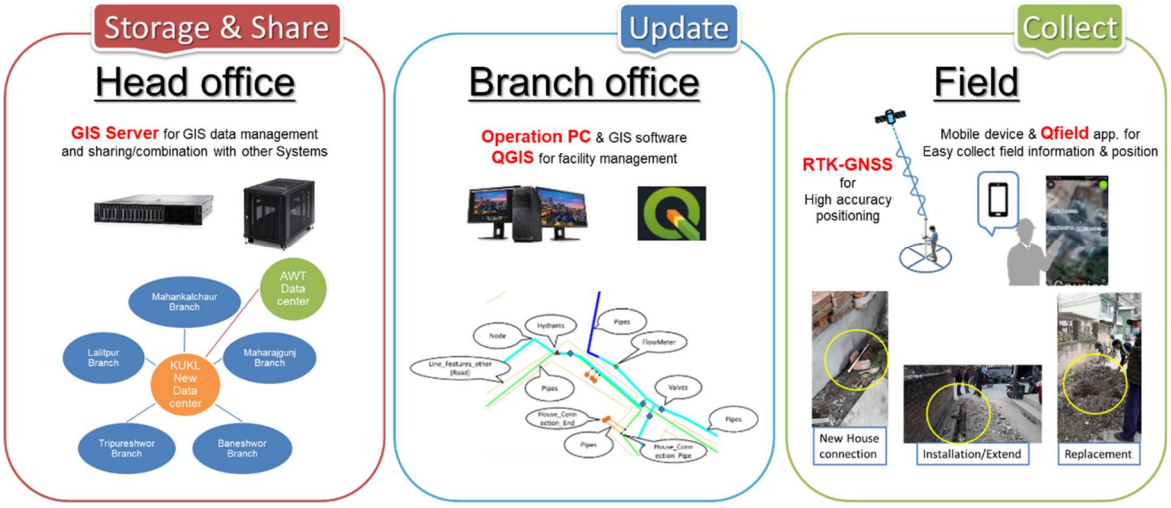


Figure 3.1.2 GIS data utilization plan and operation policy

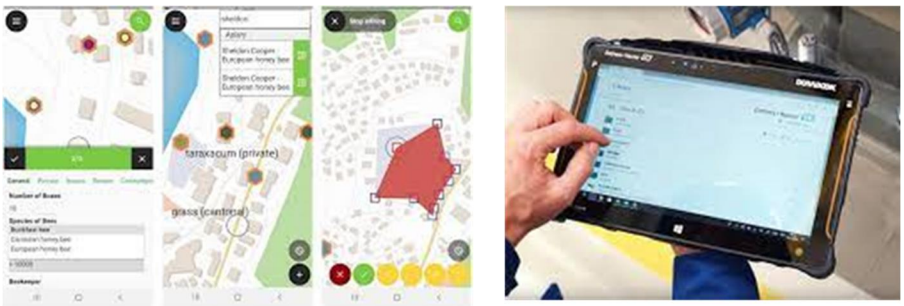


Figure 3.1.3 GIS data collection using tablet devices

(2) GIS Equipment and Geological Positioning System

In order to update the GIS data produced by the DNI project in the future, equipment capable of measuring equivalent positional accuracy will be required.

For water supply facilities, positional deviations of a few centimeters are not a major problem, so the high-precision devices generally used in the topographic surveying are not necessary. On the other hand, cellular phones and handheld GPS are not appropriate because the measurement error can be up to 10 meters, depending on the position and number of satellites.

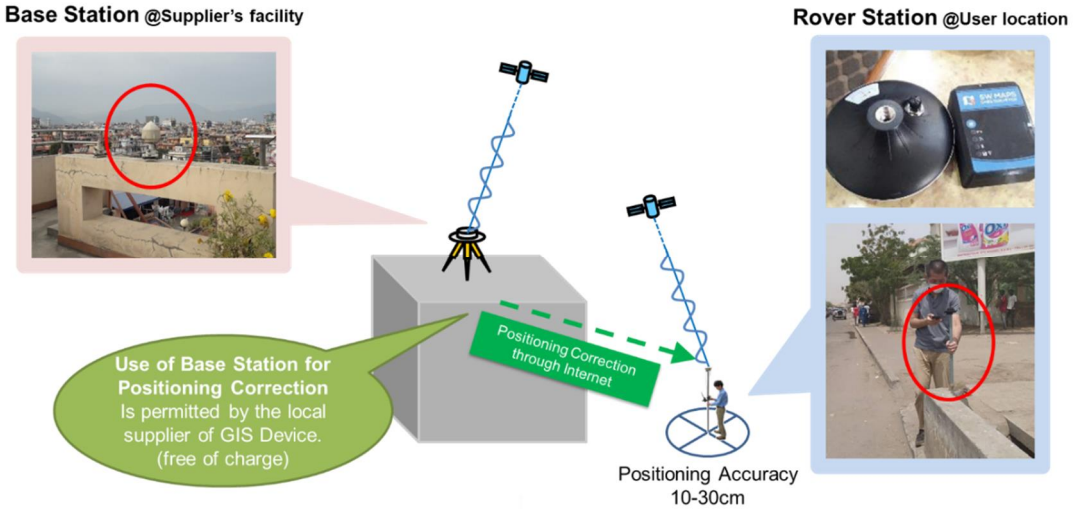


Figure 3.1.4 Positioning methods for updating GIS data

The advantage of using GIS for information management is the ability to visualize various facility and customer information on a map with the correct location. The new pipe network information is maintained as GIS data, and RTK-GNSS is used to obtain location information by the contractor of the Melamchi Water Supply Project.

RTK-GNSS is a positioning method that can determine the position of a mobile station (Rover) in real time by simultaneously performing GNSS observations at the reference station (Base), whose exact position is known, and the mobile station, whose position is to be determined, and correcting errors using information received from the reference station and satellites.

If the reference station (Base) can be set up on the roof of a building or in other locations where continuous observation is possible, on-site observation can basically be handled by a single person on the mobile station side.

The measurement equipment has also become more and more convenient in recent years, as it is designed to allow observers to move around on foot, and can use the mobile Internet for communication with the reference station, and the measurement controller can be operated with a smartphone and an application software.

Since a reference station (Base) has been established in the Kathmandu Valley by the Melamchi Water Supply Project, the JICA Expert Team selected equipment that can utilize this reference station for efficient GIS operation.

<Activity Plan in Term-3>

To make appropriate and efficient use of these devices and GIS data, and to promote efficient use of GIS in other operations as well, including reviewing working processes and improving working skill through the introduction of GIS, the JICA Expert Team (herein after referred to as "JET") will continue to follow up in Term-3.

In addition, JET will follow up with the IT section to ensure proper operation and management of the GIS servers as well.

[Activity 1-2] Conduct training program (OJT) on GIS operation.

<Progress in Term-2>

Through the activities until the end of Term-2, the basic knowledge related to GIS and practical operation techniques have spread established among KUKL staff.

Through the training conducted in Term-2, the following candidate trainers for internal training on GIS have been selected.

Table 3.1.2 Candidate trainers for internal training on GIS

Module	Name	Organization*1	Position
GIS Operation & Management	Ms. Bina Maharjan	Manager of Kirtipur Branch	Engineer (Level 8)
	Mr. Akrur Nath Sharma	CEO Secretariat, Head Office	Engineer (Level 7)
	Mr. Hem Bahadur Burhathoki	Manager of Bhaktapur Branch	Engineer (Level 7)
GIS Field Data Collection	Ms. Bimala Bhattarai	Baneshwor Branch	Supervisor (Level 5)
	Mr. Mohan Lal K C	Tripureshwor Branch	Supervisor (Level 5)
	Mr. Purna Bahadur B K	Mahankalchaur Branch	Supervisor (Level 5)

Note *1: Organization as of April 2024

<Activity Plan in Term-3>

In Term-3, activities will focus on the implementation of organizational training by potential instructors in order to establish an internal training system for the systematic propagation and transmission of skills within KUKL.

[Photograph] Training of GIS Operation

		
Training in Baneshwor Branch (Aug/2022)	Training in Tripureshwor Branch (Aug/2022)	Training in Mahankalchaur Branch (Aug/2022)
		
On-site training of Mobile GIS Device (Mar/2023	On-site training of RTK-GNSS Positioning Device (Apr/2023)	Follow-up training (June/2023)
		
1-week group training at NWSSTC Nagarkot (June/2023)	1-week group training at NWSSTC Nagarkot (June/2023)	1-week group training at NWSSTC Nagarkot (June/2023)
		
Special training for supervisors (June/2023)	Training for supervisors about utilization of tablet device (July/2023)	On-site training for supervisors about utilization of tablet device (July/2023)

[Activity 1-3] Import GIS data which is taken over from PID into KUKL's GIS system.

<Progress in Term-2>

Among the DMAs in the ring road, DMA2.4, DMA3.5, and DMA9.1 were completed and the certification documents and GIS data were handed over to KUKL on June 22, 2023.

On the other hand, DMA4.1 and DMA4.2 have not yet been completed, but water supply through the new distribution network has started. For this reason, JET requested PID to provide GIS data of those DMAs informally prior to the official hand over.

JET analyzed these GIS data and converted them into Geopackage files, confirming the contents of the database structure and attribute information in advance, and imported them as provisional data to the server and PCs at the branch offices. By understanding the contents of the GIS data in advance, when the GIS data is officially provided by the PID, the data inspection and data conversion can smoothly transition to the daily data updating process.

Since a lot of defects have been identified in the data provided by PID, KUKL has requested PID to check and correct the quality of the data.

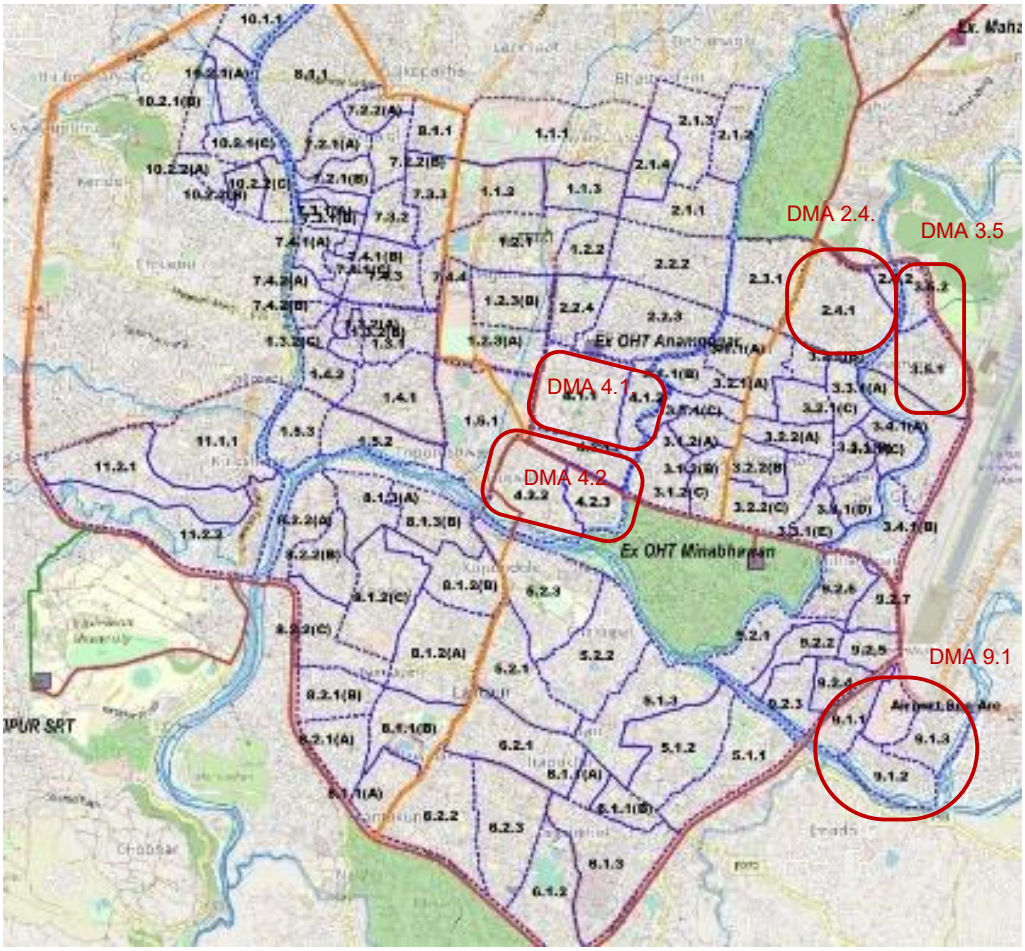


Figure 3.1.5 DMA to be constructed within the ring lead

At the end of Term-2, the following problems were identified in the data provided by PID, which were corrected through a series of discussions with PID and the contractor. The KUKL branch office will take the lead in making the corrected GIS data consistent with the information in the billing system, and JET will assist in this process.

Table 3.1.3 Defects in the GIS data handed over

Issues confirmed in Aug/2023	Issues confirmed in Sep/2023
➢ The GIS data contains layers of data such as customer locations, water pipes, valves, etc., and each layer is associated with attribute information. ➢ Attribution information that should accompany each layer should be defined in advance, but the DMA GIS data handed over deviates from this rule. ➢ The Hand-over Certification Report lists customers who have completed water main connections within the DMA, but the number of customers, customer numbers, and some meter numbers do not match the GIS data. ➢ The rule for stating the customer number is incorrect. ➢ Misspelled customer number, connection number, or meter number.	➢ The description of attribute information does not yet fully comply with the rule. Since it would take time and effort to completely revise this, it would be realistic to accept the information as long as only the important information needed for the time being is described. ➢ Customer numbering in DMA 2.4 and DMA 9.1 has been mostly corrected. ➢ There are two types of data for customer identification, "Connection ID" and "Customer ID," but these are mixed in the GIS data. KUKL will not use "Connection ID" in the future, and will correct this in the GIS data update process conducted by the branch office.

According to PID, new "DMA1.5", "DMA3.3", "DMA3.4", "DMA7.1" and "DMA10.1" are being prepared for completion and handover. JET instructed KUKL that these GIS data be reviewed in advance by the data inspection team within KUKL to ensure that there were no inconsistencies in the data entered before handover.

The construction of the DMA by the DNI project has been delayed significantly and the handover of GIS data to KUKL will still take time. This risk of delay in external conditions has been assumed since the beginning of the project and the following activities for the new water distribution pipe network in the ring road will need to be implemented in Term-3.

<Activity Plan in Term-3>

In Term-2 the data intake process was confirmed using provisional data of DMAs.

In Term-3, an inspection and acceptance system will be established for the GIS data to be officially provided by PID in conjunction with the handover of the DMA, and an environment should be created to make the provided data appropriate for data updating.

(1) GIS data check items

The official data should be inspected focusing the following items, and for each error, KUKL is required to notify PID to confirm and correct the data.

Data Definition:	Availability of data definition documents and consistency of their contents.
Coordinate system setting:	Is it set to WGS84-UTM45N?
Object Layer:	Are there any anomalies in consistency with the data definition document?
Attribution Information:	Are there any anomalies in consistency with the data definition document?
Object Information:	Detection of abnormal shapes by geometry check

(2) Preparation of data updating work

JET will convert the data into the GeoPackage format that is convenient for work in KUKL and prepare the data for updating work by dividing it by branch wise.

Shapefile, the most popular data format in conventional GIS, consists of multiple files with the same name, which causes problems such as complicated file management, character code restrictions, and the existence of size limits.

New formats suitable for modern GIS handling include GeoDatabase and GeoPackage, and the GIS data provided by PID conforms to the Geodatabase format.

GeoDatabase is a standard ArcGIS data format designed by Esri, the developer of Arc GIS, to store GIS data. Since KUKL is using the open source QGIS as a GIS application this time, we will convert the data to the Geopackage format recommended there.

GeoPackage is a standard developed by OGC (Open Geospatial Consortium) that allows multiple data (even raster data) to be stored in a single file. Compared to the shapefile format, the file size and the allowable number of attribute field characters are larger.

[Activity 1-7] Conduct trainings on hydraulic analysis and water distribution management.

<Progress in Term-2>

In the activities until the end of Term-2, KUKL staff members acquired the basic knowledge necessary for hydraulic analysis, including understanding ultrasonic flow meters, flow measurement, water pressure control, and the theory of hydraulic analysis, as well as practical training using hydraulic analysis software.

In the area of water distribution management, in addition to GIS, hydraulic analysis, flow measurement and water pressure management will be separated as specific technical areas and training materials will be developed.

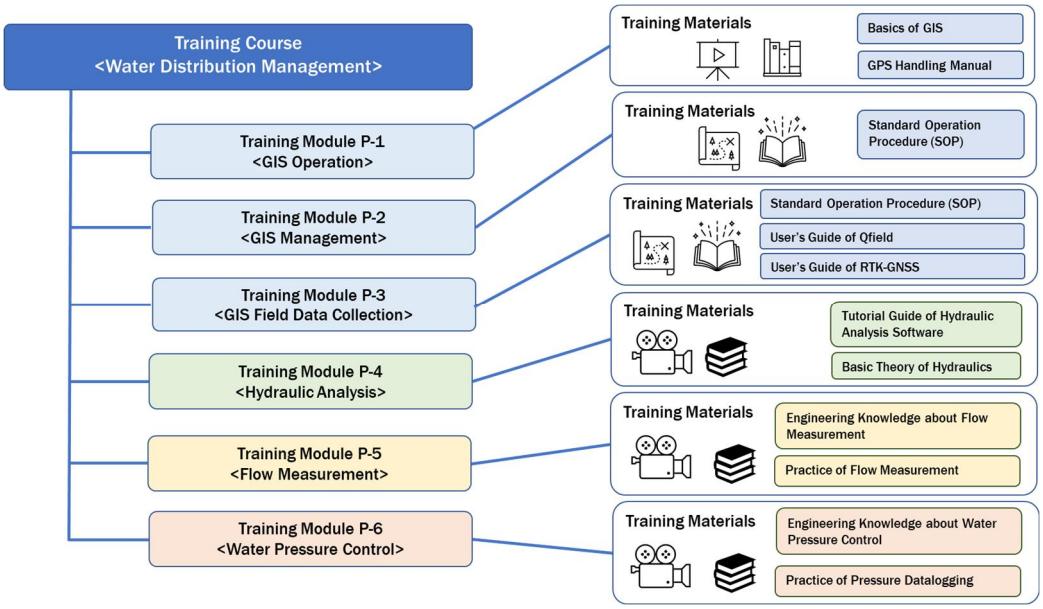
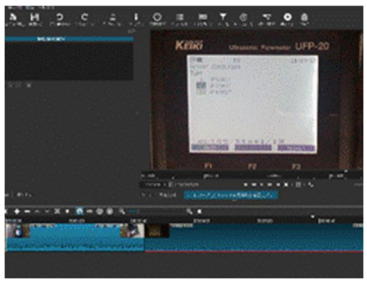
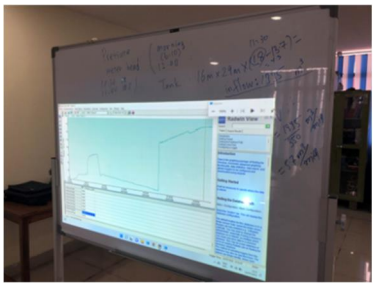


Figure 3.1.6 Composition of internal training module in the field of water distribution management

[Photograph] Training on water distribution management

		
Screen for creating training video materials	Training Video Materials	Lecture in the Mahankalchaur Branch (Feb/2022)
		
Field practice in the Mahankalchaur WTP (Feb/2022)	Field practice in the Mahankalchaur WTP (Feb/2022)	Field practice in the Mahankalchaur WTP (Feb/2022)
		
Lecture in the Project Office (July/2022)	Practice at Anamnagar OHT (July/2022)	Practice at Anamnagar OHT (July/2022)
		
Practice at Anamnagar OHT (July/2022)	Setting of pressure logger (July/2022)	Lecture about pressure data analysis (July/2022)

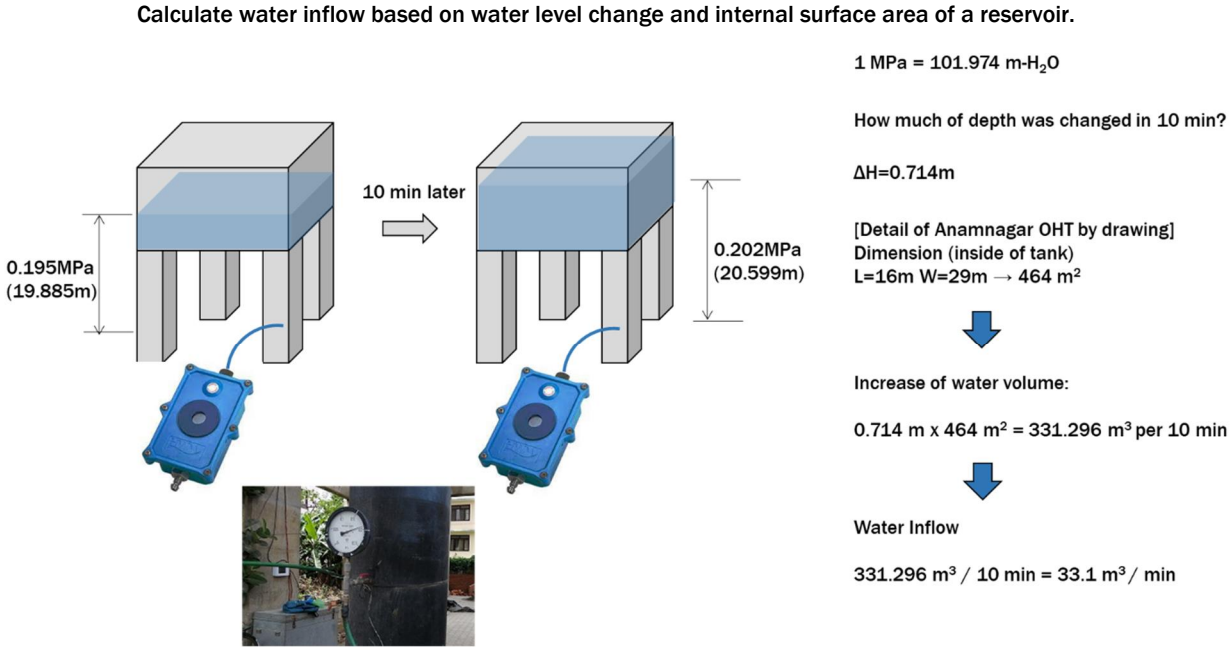


Figure 3.1.7 Flow rate calculation method at Anamnagar OHT

Through the training to date, the following candidate trainers have been selected for internal training on Water Distribution Management.

Table 3.1.4 Candidate trainers for internal training on Water Distribution Management

Module	Name	Organization*1	Position
Hydraulic Analysis	Mr. Krishna Kumar Sah	Manager of Lalitpur Branch	Engineer (Level 8)
	Ms. Shalini Jha	Lalitpur Branch	Engineer (Level 7)
Flow Measurement	Mr. Anil Kumar Tikhatri	Manager of Madhapur-Thimi Branch	Engineer (Level 8)
	Mr. Amardip Kumar Sah	Tripureshwor Branch	Overseer (Level 5)
Pressure Control	Mr. Anil Kumar Tikhatri	Manager of Madhapur-Thimi Branch	Engineer (Level 8)
	Mr. Amardip Kumar Sah	Tripureshwor Branch	Overseer (Level 5)

Note *1: Organization as of December 2022

<Activity Plan in Term-3>

In Term-3, a model district will be set up for hydraulic simulation using GIS data of DMAs handed over to KUKL through PID to disseminate the hydraulic analysis technique among the KUKL staff.

Furthermore, JET will enhance the capacity of the candidate lecturers selected in Term-2 to conduct internal training in KUKL, and establish a system to ensure the sustainable implementation of technical transfer within the organization.

[Activity 1-8] Prepare an SOP on data input and updates of GIS.

<Progress in Term-2>

By January 2022, the first draft of SOP was prepared; from July 2022, GIS operation training was conducted using this SOP to identify items and contents necessary to update the SOP, while confirming the opinions of engineers and supervisors and challenges they face.

By the end of September 2023, operating procedures for individual instruments such as GIS, RTK-GNSS, and mobile GIS were prepared and updated to be consistent with KUKL's daily operations through on-the-job training.

Table 3.1.5 Record of SOP creation for GIS operations

Version	Contents
First draft	Establishment of GIS utilization and operation policy ➢ Composition of GIS equipment (GIS software, GIS server, PC for updating, RTK-GNSS, mobile device and mobile GIS App) ➢ Individual GIS technologies and policies (QGIS, QField, RTK measurement, data quality inspection, information security) ➢ GIS data structure and updates (database/layer/individual data structure and definitions, attribute information, location accuracy, background maps)
Second draft	Preparation of GIS individual operating procedures and standards ➢ GIS data (layer and attribute definitions, code numbering structure standards) ➢ QGIS Operating Procedures (Introduction to GIS, Basic Operations, Applied Operations, QField Project Data Preparation Procedures) ➢ QField Operating Instructions (Basic Operation, Customer Mapping) ➢ RTK-GNSS (GNSS overview, basic operation, SWMap software operation) ➢ GIS Data Quality Control Manual (quality indicators, quality requirements, quality inspection methods) ➢ Information security measures (overview, types of risks, countermeasure methods, understanding of information assets held and residual risks) ➢ GIS Server Access Authorization Policy
Final version (Plan)	Develop GISstandard operating procedures and operational guidelines 成 ➢ Integrate individual policies, standards documents, and operating procedures ➢ Operational Guidelines for GIS Technology and Equipment

<Activity Plan in Term-3>

Starting in 2024, an operational guideline for GIS technology describing how to utilize and operate GIS should be developed and completed as an SOP integrated with the operating procedures already developed. The final version of the SOP will be distributed to each branch office as an official document after approval by the Head Office.

[Activity 1-9] Update GIS data as daily routine work.

<Progress in Term-2>

Through activities until the end of Term-2, JET has been able to guide the updating of data for the existing water distribution network as a routine operation, and have laid the groundwork for the future establishment of the updating process for GIS data for new water distribution networks.

PID has officially provided GIS data to KUKL for three completed DMAs, but these data need to be corrected.

On the other hand, the data on the existing water distribution pipes held by KUKL was converted to a structure equivalent to that of the GIS data to be provided by PID in the future, and is now ready to be used as supervisor’s daily work.

As a result of activities in Term-2, supervisors at each branch office can now collect, record, and document field information for new connections and renewals, switching from a paper-based system

to a digital one, and share information digitally with branch office engineers. The collaboration between supervisors and engineers has established a digital flow of information sharing from the field to the GIS, and the ability to update data on the existing water distribution pipe network as a routine operation has been recognized within KUKL as a major achievement of the project activities.

<Activity Plan in Term-3>

Within KUKL, updating GIS data has become a routine task. However, in order for the updated GIS data to be used continuously as basic information for various operations, the quality of the data must be properly maintained.

To this end, JET will prepare a quality control manual as part of the SOP and work with KUKL to create an environment that facilitates the transfer of quality control within the organization. The possibility of establishing an organized quality control system, such as the establishment of a quality inspection room, will also be considered.

3.1.2 Activities to be initiated in Term-3

[Activity 1-4] Compile the customer data by DNI/DMA wise.

The organization of this data is an important process for linkage with the electronic billing system and grievance information to be considered in Activity 1-10.

JET will check the consistency of the GIS data imported through [Activity 1-3], including customer information, water meter locations, and other water facility location information. The data will then be organized as GIS data for each DNI/DMA and used for hydraulic analysis of the distribution network and water distribution planning for each DNI/DMA.

KUKL is in the process of conducting GIS data inspections of the handed-over DMAs, and the status at the start of Term-3 is as follows.

Table 3.1.6 Inspection status of GIS data handed over by PID

DMA	Sub-DMA	Receipt date of GIS data	Current issues after data inspection by KUKL	Response to be taken by KUKL
1.5	1.5.1 1.5.2 1.5.3	21/Feb/2024	Checked: No. of missing House Connection End data	Waiting until the end of April for correction of database by PID
2.1	2.1.1 2.1.2 2.1.3 2.1.4	27/Feb/2024	Checked: No. of missing House Connection End data	Waiting until the end of April for correction of database by PID
2.3	2.3.1	21/Feb/2024	Checked: No. of missing House Connection End data	Waiting until the end of April for correction of database by PID
2.4	2.4.1 2.4.2	29/Feb/2024	In a meeting in January with PID, it was known that they have updated the list. But the project side have not received the revised list	Waiting until the end of April for correction of database by PID
3.2	3.2.1 3.2.2	27/Feb/2024	Checked: No. of missing House Connection End data <2254 data matched out of 2638> checking under process	Waiting until the end of April for correction of database by PID
3.3	3.3.1	27/Feb/2024	Checked: No. of missing House Connection End data <613 data matched out of 2307> checking under process	Waiting until the end of April for correction of database by PID
3.4	3.4.1	27/Feb/2024	Checked: No. of missing House Connection End data <206 data matched out of 1061> checking under process	Waiting until the end of April for correction of database by PID

DMA	Sub-DMA	Receipt date of GIS data	Current issues after data inspection by KUKL	Response to be taken by KUKL
3.5	3.5.1 3.5.2	29/Feb/2024	In a meeting in January with PID, it was known that they have updated the list. But the project side have not received the revised list	Waiting until the end of April for correction of database by PID
7.1	7.1.1	21/Feb/2024	Checked: No. of missing House Connection End data Geometry checking under process	Waiting until the end of April for correction of database by PID
8.2	8.2.1 8.2.2	27/Feb/2024	Checked: No. of missing House Connection End data	Waiting until the end of April for correction of database by PID
9.1	9.1.1 9.1.2 9.1.3	21/Feb/2024	In a meeting in January with PID, it was known that they have updated the list. But the project side have not received the revised list	Waiting until the end of April for correction of database by PID
9.2	9.2.1 9.2.2 9.2.3 9.2.4 9.2.5 9.2.6 9.2.7	21/Feb/2024	Checked: No. of missing House Connection End data <3001 data matched out of 4007> checking under process	Waiting until the end of April for correction of database by PID
10.1	10.1.1	21/Feb/2024	Checked: No. of missing House Connection End data Geometry Checking under process	Waiting until the end of April for correction of database by PID

[Activity 1-5] Conduct hydraulic analysis of distribution network utilizing GIS.

The hydraulic analysis program "SW WSP V3" provided by Softwel, which was used for trainings in Term-2, will continue to be used for the hydraulic analysis utilizing GIS data, which enables KUKL smooth integration with GIS. In addition, the above software will be installed on desktop PCs provided to each branch office for centralized data management.

As a practical technique for hydraulic analysis using GIS data, GIS data provided by PID will be incorporated into PCs and a DMA will be selected to serve as a model district (pilot area). After checking the quality of the GIS data provided, locate valves and flow meters and organize hydraulic analysis conditions. The information obtained from the hydraulic analysis will then be compared and analyzed with the actual water supply conditions in the pilot area. In order for confirmation of the water supply situation, the water distribution time will be tabulated and the water pressure within the area will be measured.

The practice of hydraulic analysis can be performed sequentially starting with the DMAs that have been switched to the new pipeline with disconnection of old pipe network.

The status as of the end of March 2024 is as follows.

Table 3.1.7 Status of switchover to new water distribution pipe network

DMA	Sub-DMA	Use of old pipe network	Use of new pipe network	Remarks
1.5	1.5.1 1.5.2 1.5.3	Still in use	In use	Both old and new water distribution pipe network in use.
2.1	2.1.1 2.1.2 2.1.3 2.1.4	Still in use	In use	Both old and new water distribution pipe network in use.
2.3	2.3.1	Still in use	In use	Both old and new water distribution pipe network in use.

DMA	Sub-DMA	Use of old pipe network	Use of new pipe network	Remarks
2.4	2.4.1 2.4.2	Still in use	In use	Both old and new water distribution pipe network in use.
3.2	3.2.1 3.2.2	Still in use	In use	Both old and new water distribution pipe network in use.
3.3	3.3.1	Still in use	In use	Both old and new water distribution pipe network in use.
3.4	3.4.1	Still in use	In use	Baneshwor branch office is carrying out activities to shut down the old distribution pipe
3.5	3.5.1	Out of service	In use	Switchover to new distribution pipe was completed.
	3.5.2	Still in use	Partially in use	Switchover to the new distribution pipe is completed only in the Baneshwor branch administrative area. Old pipe is still in use in the Mahankalchaur branch administrative area.
7.1	7.1.1	Still in use	In use	Both old and new water distribution pipe network in use.
8.2	8.2.1 8.2.2	Still in use	In use	Both old and new water distribution pipe network in use. Lalitpur branch office is carrying out activities to shut down the old distribution pipe.
9.1	9.1.1 9.1.2 9.1.3	Out of service	In use	Switchover to new distribution pipe was completed.
9.2	9.2.1 9.2.2 9.2.3 9.2.4 9.2.5 9.2.6 9.2.7	Still in use	In use	Both old and new water distribution pipe network in use. Baneshwor branch office is carrying out activities to shut down the old distribution pipe.
10.1	10.1.1	Still in use	In use	Both old and new water distribution pipe network in use.

[Activity 1-6] Prepare the water distribution plan based on the results of hydraulic analysis and actual situations of water distribution.

Although Melamchi Water Diversion Tunnel has been in full operation since March 2023, it will be closed during the rainy season (June to October) to prevent the inflow of high turbidity raw water. In the meantime, the operation of the New Sundarijal WTP can be continued by switching to intake water from the Bagmati River. This is an emergency measure, but it is not expected to be resolved quickly.

During the rainy season, the conditions for conducting hydraulic analysis within the DMAs are not sufficiently favorable because of the reduced water supply and greatly restricted water supply hours within the ring road. Therefore, water distribution planning for each branch and DMAs will focus on the dry season, November through May.

JET will review the differences between the results of the hydraulic analysis conducted in Activity 1-5 and the actual water distribution situation, and discuss with KUKL possible improvement measures for water distribution management that they can implement. In particular, the actual water operation continues to be a trial-and-error situation in which water is distributed according to the amount of water available.

Actual water supply conditions may differ from the hydraulic analysis results due to changes in water usage and pipeline conditions in the DMAs. Standard operating procedures, such as the method of adjusting the water from each distribution reservoir and the necessity and timing of valve opening and closing, should also take such changes in conditions into account.

In addition, even during the period when Melamchi Water Diversion Tunnel is in operation, there will always be the constraint of hourly water supply in the city. Monitoring will be conducted to avoid imbalances within the same DMA, and a draft water allocation plan (management plan) will be developed to eliminate the imbalances.

[Activity 1-10] Examine integration of computerized billing system and information of customer complaints into GIS.

With regard to CBAAS (Computerized Billing and Account System), the electronic billing system currently implemented by KUKL, the JICA Expert Team will discuss with KUKL the linkage between complaint information stored in CBAAS and GIS data, and study the possibility of integrating CBAAS and GIS systems.

Since KUKL has restrictions on sharing data containing personal information with other systems, direct sharing methods via programs will not be employed. Specific integration and management methods will be considered for how to link with GIS systems, update frequency, contents to be shared, and visualization in GIS, taking into account information security risks.

3.1.3 Activity timeline related to Output 1 in Term-3

The timeline of activities related to Output 1 for Term-3 is shown below.

Table 3.1.8 Timeline of activities related to Output 1 in Term-3

Planned Activities	2024												2025												2026		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1-1: Decide the utilization plan and operation rule of GIS.																											
Reconsideration of operational rules				●					●				●														
Approval by KUKL									●				●					●									
1-2: Conduct training program (OJT) on GIS operation,																											
Training of Trainers (TOT)				●					●																		
Conductiong Internal Trainings									●				●					●									
1-3: Import GIS data which is taken over from PID into KUKL's GIS system.																											
Quality inspection of GIS data of handed-over DMAs				●	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→				
Data modification, format conversion				●	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→				
1-4: Compile the customer data by DNI/DMA wise.																											
Organize GIS data of DMAs				●					●				●					●									
Supporting the use of data for non-revenue water management activities				●					●				●					●									
1-5: Conduct hydraulic analysis of distribution network utilizing GIS.																											
Organize GIS data for DMAs, select DMAs for hydaulic analysis							●	●			●	●															
Creation of hydraulic analysis models and analysis of simulation results							●	●			●	●															
1-6: Prepare the water distribution plan based on the results of hydraulic analysis and actual situations of water distribution.																											
Monitoring of BDS operational status							●	●	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→		
Measuring water distribution pressure and organizing issues for water distribution planning								●			●	●			●	●		●					●				
Prepare water distribution plans for each branch office								●			●	●			●	●		●					●				
1-7: Conduct trainings on hydraulic analysis and water distribution management.																											
Training of Trainers (TOT) for Hydraulic Analysis											●	●															
Internal Training for Hydraulic Analysis												●						●						●			
Training of Trainers (TOT) for Distribution Management											●	●															
Internal Trainers (TOT) for Distribution Management												●						●						●			
1-8: Prepare an SOP on data input and updates of GIS.																											
Revision and finalization of SOPs				●	→	→	→	→	→	→	→	→	→	→	→	→	→	→									
1-9: Update GIS data as daily routine work.																											
Patrol guidance for each branch office				●	→	→	→	→	→	→	→	→	→	→	→	→	→	→									
1-10: Examine integration or computerized billing system and information of customer complaints into GIS.																											
Identification of customer data management system in use at KUKL				●					●																		
Identification of issues for integration of bthe computerized illing system with GIS				●					●				●					●									

3.2 Detail of activity related to Output 2 in Term-3 (2024-2025)

Output 2	The capacity of NRW reduction is enhanced.

3.2.1 Continuation/follow-up from Term-2

[Activity 2-1] Define the roles/responsibilities of Head Office and Branches for NRW reduction activities.

<Progress in Term-2>

In Term-1 and Term-2, a draft of the roles and responsibilities for non-revenue water reduction measures was developed in consultation with KUKL.

Improvements from the current situation in the proposed division of roles regarding non-revenue water include the following:

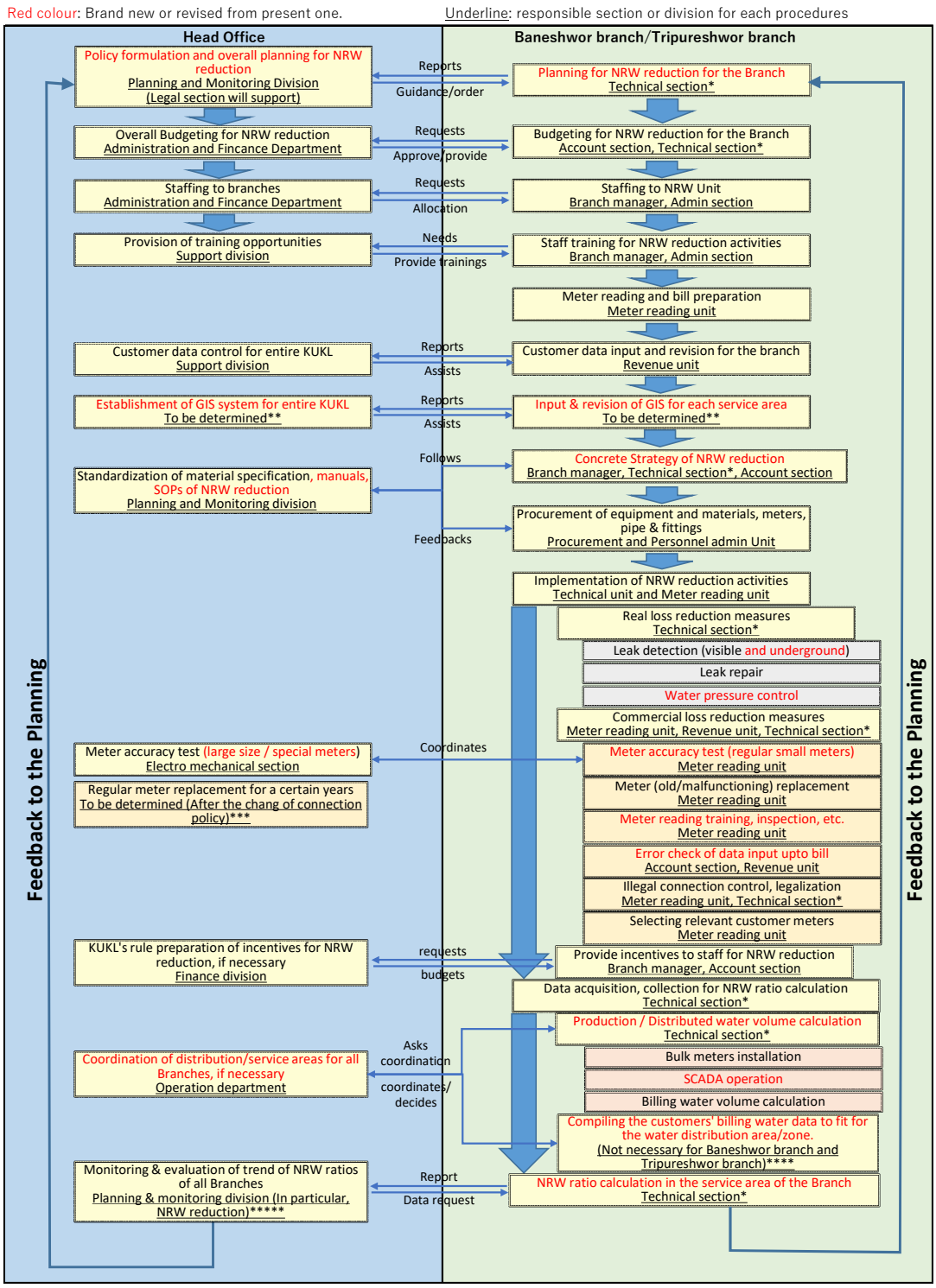
- To create a policy and plan to reduce non-revenue water in the future.
- To assign dedicated NRW staff, not currently in place, to the Head Office and the Branch Offices to plan, implement and monitor non-revenue water reduction.
- The NRW Section at Head Office should aim to become a group of experts, providing guidance and support to the branch offices, calculating the NRW ratio, preparing an annual NRW reduction plan, and supporting the policy review by the managerial staff of KUKL.
- The NRW Section of the Head Office also prepares manuals and SOPs for NRW reduction.
- To prepare GIS data on leakage points, customer information, etc. and utilize these information for non-revenue water control.
- To enhance the meter accuracy checks, which are currently carried out only at Head Office and Electromechanical Department, to enable all branch offices to carry out the checks. In the case of special meters, only the head office will be in charge.
- To facilitate work to match the distribution areas to customer management areas on branch basis so that NRW ratio can be calculated in each branch (to be progressed following completion of the DNI).

<Activity Plan in Term-3>

The division of roles for non-revenue water reduction measures should be determined through calculating work of non-revenue water in the handed-over DMAs and discussing measures against commercial losses.

Based on the draft prepared in Term-1, JET will continue discussions with KUKL and make modifications as appropriate, taking into account knowledge gained through on-the-job training on non-revenue water control measures, etc.

Figure 3.2.1 Present situation of roles and responsibilities of Head Office and Branch Offices for NRW reduction



*Technical section is consists of Production section, Distribution section and NRW section. These section chief is covered by one person in Baneshwor branch and Tripureshwor branch, so these sections can be considered as one section.

**Since the responsible person of GIS data will be decided in the future activity of output 1, the responsible section will be determined in futur

***Since the Connection policy should be revised to replace the customer meters regularly, responsible section will be decided later

****Since the boundry of DNI No.4 corresponds to the boundary of cover area of Baneshwor branch and Tripureshwor branch, it is not necessary

*****Since NRW section in Head office doesn't have enough staff, it's covered by Planning & monitoring division for the time being

Figure 3.2.2 Desirable division of roles and responsibilities of Head Office and Branch Offices for NRW reduction

[Activity 2-2] Decide the data collection process of NRW ratio.

<Progress in Term-2>

While the (draft) role assignment of non-revenue water reduction measures (see previous section) has already been developed in Term-1, the operationalization of the data collection process can be carried out after the DNI project has progressed and the operation of the new distribution network in DMA has been handed over to KUKL.

As of the end of Term-2, DNI project is still ongoing and only a few DMAs have been handed over. However, water supply from Melamchi continues to be constrained and the switchover to the new distribution network has not yet been realized.

On the other hand, in DMA 4.1.2, the calculation of NRW ratio was started on a trial basis in June 2023 (see [Activity 2-6] below), since the water supply by the new distribution network was started, although before the official handover. The findings obtained here will be developed in the DMA to be transferred subsequently and reflected in decisions on the data collection process.

<Activity Plan in Term-3>

Based on the draft assignment of roles for non-revenue water reduction measures, the process for measuring, collecting, and storing non-revenue water rates will be studied in collaboration with KUKL to clarify a system that enables the organization to accurately monitor non-revenue water ratio.

Since the operation of these data collection processes will take place after the management of the new water distribution network is handed over to KUKL, it will be necessary to establish a system with optimal timing, keeping an eye on the status of the transfer.

[Activity 2-3] Conduct trainings on NRW reduction measures.

<Progress in Term-2>

In Term-2, JET promoted the capacity building of KUKL staff through thematic training of trainers (TOT) based on the training plan agreed upon between KUKL and JET. The commercial loss prevention on which this project will focus has four major objectives as shown in the figure below:

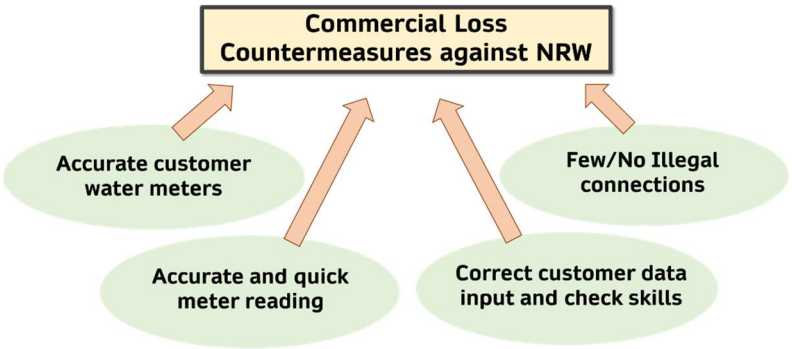


Figure 3.2.3 Implementation Policy of Commercial Loss Prevention

① Customer meters are accurate.

② Accurate and fast meter reading

③ Accurate input and error check of customer billing data.

④ Few or non-existent illegal connections

To achieve the above four policy, four major training courses on NRW control (commercial losses) were planned, adding a complementary basic training course as a preliminary step to raise the basic understanding on NRW.

In the area of non-revenue water management (commercial losses), training materials were created for each module, with the basics, customer meter accuracy verification, meter reading techniques, data entry and checking skills, and illegal connection control as separate areas.

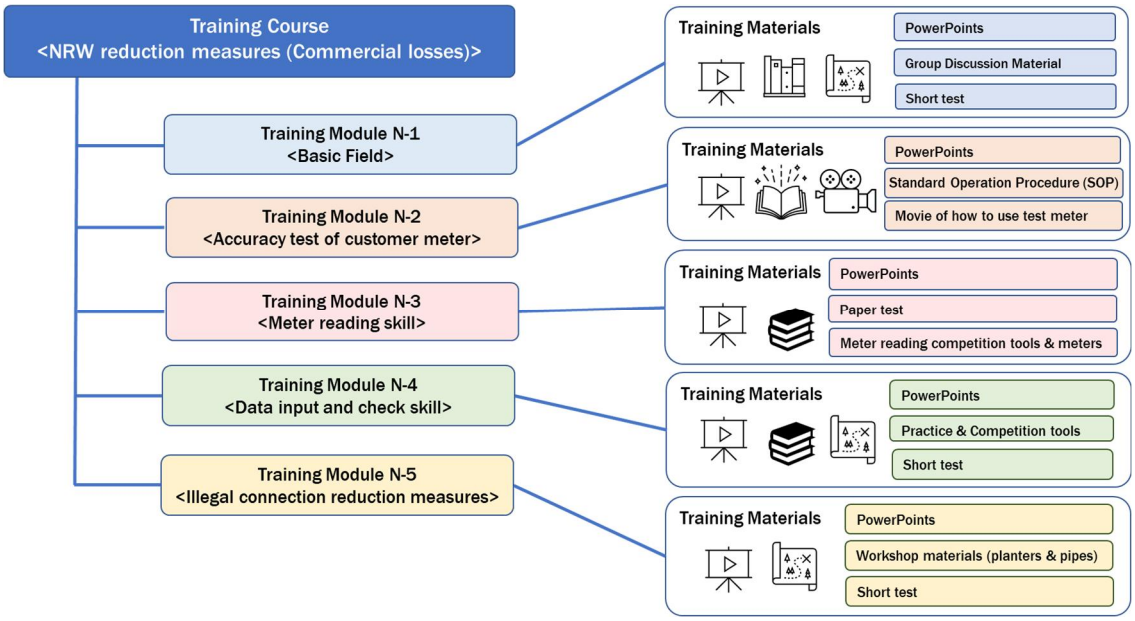


Figure 3.2.4 Composition of internal training module in NRW reduction measure

Through the training conducted in Term-2, the following candidate instructors were selected for internal training on non-revenue water reduction measures (commercial losses).

Table 3.2.1 Candidate trainers for internal training on Non-revenue Water Management

Module	Name	Organization*1	Position
Basics of NRW	Mr. Krishna Kumar Sah	Manager of Lalitpur Branch	Engineer (Level 8)
	Ms. Bina Maharjan	Manager of Kirtipur Branch	Engineer (Level 8)
	Mr. Akrur Nath Sharma	CEO Secretariat, Head Office	Engineer (Level 7)
	Mr. Pravin Bhurtel	Madhapur-Thimi Branch	Overseer (Level 5)
	Mr. Amardip Kumar Sah	Tripureshwor Branch	Overseer (Level 5)
Meter accuracy testing techniques	Mr. Hem Bahadur Budhathoki	Manager of Bhaktapur Branch	Engineer (Level 7)
	Mr. Umesh Kumar Mehata	Electromechanical Dept.	Engineer (Level 7)
	Mr. Akrur Nath Sharma	CEO Secretariat, Head Office	Engineer (Level 7)
Meter reading techniques	Mr. Puspa Raj Dahal	Baneshwor Branch	Supervisor (Level 5)
	Mr. Purna Karki	Bhaktapur Branch	Senior Meter Reader (Level 4)
	Mr. Sekhar Khadka	Bhaktapur Branch	Senior Meter Reader (Level 4)
Customer data entry/check skill	Mr. Surya Bahadur Khatri	Finance Section, Wastewater Operation Division	Account Officer (Level 7)
	Mr. Kapil Karki	IT Section	Overseer (Level 5)
	Ms. Shakuntala Khanal	Maharajgunj Branch	Assistant Finance Officer (Level 6)
	Mr. Janak K C	Madhyapur-Thimi Branch	Senior Meter Reader (Level 4)
	Mr. Krishna Kumar Sah	Manager of Lalitpur Branch	Engineer (Level 8)

Module	Name	Organization*1	Position
Illegal connection reduction techniques	Mr. Nabin Neupane	Maharajgunj Branch	Senior Asst. Account Officer (Level 5)
	Ms. Shalini Jha	Lalitpur Branch	Engineer (Level 7)
	Mr. Udaya Acharya	Maharajgunj Branch	Overseer (Level 5)
	Mr. Buddha Ram Mahjarjan*2	Kirtipur Branch	Assistant Technical Officer (Level 6)
	Mr. Kiran Giri*2	Kirtipur Branch	Assistant Finance Officer (Level 6)

Note *1: Organization as of Dec 2023

Note *2: Equipment Tutor

[Photograph] Training of Trainers (TOT) on Basics of Non-revenue Water

		
Basic training on NRW management (Commercial Losses) (11/Dec/2022)	Opening Remark (11/Dec/2022)	Group Discussion (11/Dec/2022)
		
Awarding of Certificate of Completion (11/Dec/2022)	Additional training KUKL branch manager at Tripureshwor branch (14/Dec/2022)	Additional training KUKL branch manager at Mahankalchaur branch (22/Dec/2022)

[Photograph] Training of Trainers (TOT) on Meter Accuracy Test Techniques

		
Lecture in TOT about meter accuracy	Setting of Test Meter	Practice of measurement of meter error
		
Practice of measurement of meter error	Achievement quiz	Closing remarks

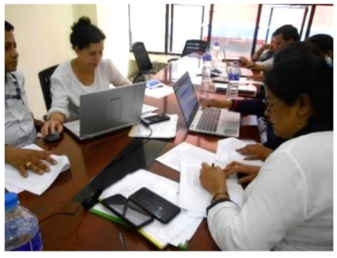
[Photograph] Training of Trainers (TOT) on Illegal Connection Control

		
Lecture by Akrur Nath Sharma	Lecture by Krishna Kumar Sah	Disassemble of water meter
		
Introduction of metal pipe detectors and leak detectors	Experience operating a leak detector	Experience operating a leak detector
		
Experience operating a metal pipe detector	Achievement test	Awarding of Certificate of Completion

[Photograph] Training of Trainers (TOT) on Meter Reading Techniques

		
Lecture by Lalitpur Branch Manager	Paper Test	Competition
		
Scoring by persons in charge	Competition of meter reading	Competition of meter reading
		
Competition of meter reading	Closing Ceremony	Closing Ceremony

[Photograph] Training of Trainers (TOT) on Reading Data Entry/Check Skill

		
Lecture by Mr. Surya Bahadur	Q%A with staffs of IT Section	Practice of data entry
		
Practice of data entry	Competition	Competition

<Activity Plan in Term-3>

Since two internal training sessions on "2) Customer Meter Accuracy Testing Skill " and "1) Basics of NRW" were held in August 2023 and December 2023 respectively, the other three training sessions will be prioritized in Term-3. Thereafter, a second internal training will be conducted as needed.

(1) Internal Training on Basics of NRW

Basic training is not intended to provide training in practical or specific skills, but rather to provide basic knowledge of the definitions, problems, and solutions for non-revenue water and commercial losses, and to promote an understanding of non-revenue water in general.

The internal training conducted during Term-2 included lectures, group discussions, and quizzes for 19 participants, all led by KUKL staff under the support by the JICA Expert Team.

Internal Training on Basics of NRW (Commercial Losses)

In Term-3, internal training in other areas will be prioritized, but JET will provide necessary support if the KUKL side requires its implementation.

(2) Internal Training on Meter Accuracy Testing Skill

The purpose of this training is to provide KUKL staff with the skills to verify the accuracy of customers' water meters in the field.

It is important to continuously monitor meter accuracy trends, not only to respond to customer complaints, but also to consider effective non-revenue water control measures.

In the training conducted in Term-2, 18 participants were invited from the 9 branches to which the test meters have been handed over, and the potential trainers who showed a high performance in the past TOT were appointed as instructor and demonstrators. The training was conducted under the initiative of KUKL with the support of JET, including the above-mentioned lectures, practical training, and achievement tests.

Internal Training on Meter Accuracy Testing Skill

In Term-3, internal training in other areas will be prioritized, but the JET will provide necessary support if the KUKL side requires its implementation.

(3) Internal Training on Meter Reading Skill

In order to improve meter reading skill, KUKL itself needs to continue working on improving its skill, not only to accurately determine the amount of water consumption, but also to improve the trust from customer about billing.

The internal training in Term-3 targets about 20 participants with the appointed KUKL staff who showed the top-performing through the past TOT.

Preparation for lectures, the above-mentioned paper tests and meter reading competitions will be conducted by KUKL with the assistance of JET.

TOT for Meter Reading Skill

(4) Internal Training on Data Input/Check Skill into the Billing Database

Meter reading and its input within KUKL is done manually. In recording accurate non-revenue water data, it is extremely important to prevent human error during data entry.

TOT for Data Input/Check Skill

In the training of Term-3, about 9 participants will be invited from the 9 branches to which the test meters have been handed over, and the potential trainers who showed a high performance in the past TOT will be appointed as lecturers and demonstrators. The training will be conducted under the auspices of KUKL with the support of the JET, including the above-mentioned lectures, practical training, competition, and achievement tests.

(5) Internal Training on Illegal Connection Measure

In developing and implementing measures to address non-revenue water (commercial losses), it is essential to deepen knowledge and improve skills in illegal connection measures.

TOT for Illegal Connection Measures (Operation of Leak Detector)

Through ongoing internal training, KUKL is expected to acquire an understanding of meter characteristics and mechanism, how to detect illegal bypass pipes, and proper customer care.

In the training of Term-3, about 20 participants will be invited from the 9 branches to which the test meters have been handed over, and the potential trainers who showed a high performance in the past TOT will be appointed as lecturers and demonstrators. The training will be conducted under the auspices of KUKL with the support of the JICA Expert Team, including the above-mentioned lectures, practical training and achievement tests.

Table 3.2.2 Outline of Internal Training on NRW Reduction Measures (Commercial Losses)

No.	Training Course	Timing	Contents	Target	No of trainees
1	Basics of NRW	Dec/2023 (Completed)	Lecture, Group Discussion, Achievement test	Branch Managers & Engineers other than Output 2 Action Team, Managerial Staff of Head Office	18
2	Meter Accuracy Testing Skill	Aug/2023 (Completed)	Lectures, Practice of Test Meter, and Achievement Test	Chief of Technical Field, Chief of Meter Reader	18
3	Meter Reading Skill	April/2024	Lecture, Paper-based meter reading, and Competition	Meter Reader (Approx. 2 persons per branch)	20
4	Data Input/Check Skill into the billing database	Feb/2025	Lecture, Q%A Session, Practice of Data Input/Check, Competition, Achievement Test	Section Chief and Staff in charge of data input	9
5	Illegal Connection Measure	July/2025	Lecture, Group Discussion, Workshop, and Achievement Test	Staff in charge of illegal connection measures (Meter Reader or Chief of Technical Field)	20

[Activity 2-4] Prepare maintenance plan for maintaining NRW ratio low.

<Progress in Term-2>

Regarding the maintenance plan to maintain NRW ratio low, it was agreed at the regular meeting of the Output 2 Action Team on December 20, 2022, that the plan was prepared based on the following framework and handed out to the members of action team.

Maintenance Plan for Maintaining NRW Ratio Low (1st draft)

Summary of Maintenance Plan for Maintaining NRW Ratio Low in the Medium & Long Term

Maintenance Plan to Keep Low NRW Ratio in Each DMA in the Short-Term

Contents

<Activity Plan in Term-3>

In Term-3, in collaboration with the members of Output 2 Action Team, JET will materialize each of the above-listed items and complete the maintenance and management plan, revising the contents based on the knowledge obtained through OJT.

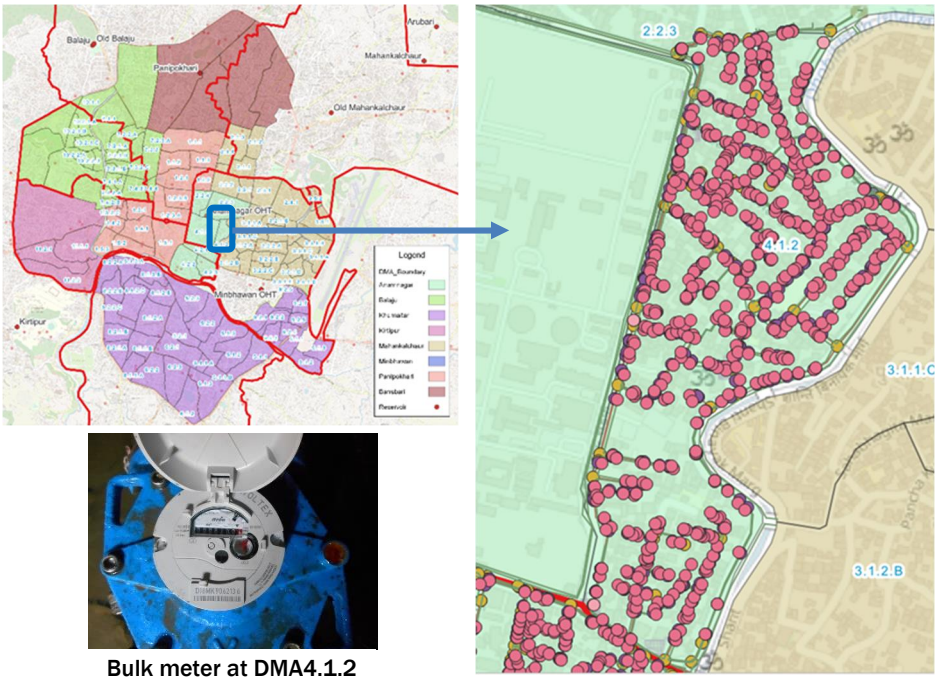
[Activity 2-6] Calculate NRW ratio monthly.

<Progress in Term-2>

In Term-2, training on how to calculate the non-revenue water ratio was provided during the TOT on Basics of non-revenue water.

Since there was no significant progress in the completion and handover of DMA until the end of Term-2, this activity should be implemented in Term-3.

However, since the DMA 4.1.2, prior to handover, switched to water supply through a new distribution network, the pilot work began with the collection and analysis of bulk meter readings and customer meter reading (consumption) data necessary to calculate the non-revenue water ratio. The knowledge obtained here can be used for the similar work in other DMAs that are scheduled to be handed over in the future.



Bulk meter at DMA4.1.2

Figure 3.2.5 Location of DMA4.1.2

Bulk meter reading has been conducted once a month, around the beginning of each month of Bikram Calendar, with staff from the Baneshwor Branch which manages the DMA4.1.2.

A list of customers within DMA 4.1.2 was extracted from the provisional GIS data in June 2023 and compared to the billing data for such customers obtained through the IT Section.

However, while the GIS data shows 570 customers, the IT Section data had only 435, a discrepancy of more than 100 cases was identified. This is due to the fact that there are customers whose customer ID are not registered in the GIS data or whose customer ID are registered incorrectly, and the data does not correspond when the customer numbers are extracted from the billing system based on the customer numbers. Subsequently, together with the IT Section and the Baneshwor Branch which manages customers in DMA 4.1.2, the DMA customer ID were checked one by one, and finally 521 customers using water service were identified.

In cases where customer numbers are not registered in the GIS data, water pipes have been laid but water service has not started because the contractor registration has not been completed. They will be potential customers who may use KUKL's water supply in the future and will be added to the customer list after they start using the water supply.

The meter reading dates from the historical billed water volume data based on the DMA 4.1.2 customer list updated above can be organized as follows.

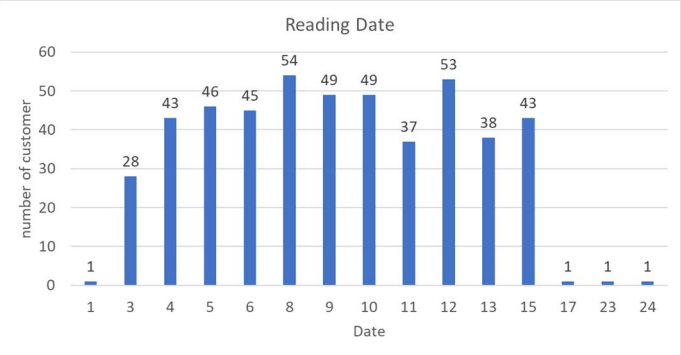


Figure 3.2.13 Meter reading date in DMA4.1.2

In DMA 4.1.2, almost all customers' water meters are read in the first half of each month, and the average meter reading date is the 9th of each month (Bikram calendar). Therefore, in principle, the bulk meter reading date is set on the 9th of each month to align with the meter reading interval, and the billed water volume obtained from the meter reading results is treated as the previous month's water consumption.

Since the meter reading interval and the period of water distribution measurement never coincide perfectly, the monthly non-revenue water rate is not important, and the non-revenue water ratio should be evaluated by a moving average over several months.

The immediate challenge is to reduce the number of customers who are not billed by meter reading (Unmetered customers), which should be addressed by the Baneshwor Branch.

Table 3.2.3 NRW ratio in DMA4.1.2

Reporting Month	Asadh 2080	Shrawan 2080	Bhadra 2080	Ashwin 2080
Bulk reading interval on Gregorian Calendar	June 16, 2023 - July 17, 2023	July 17, 2023 - Aug 26, 2023	Aug 26, 2023 - Sep 26, 2023	Sep 26, 2023 - Oct 29, 2023
Interval of bulk meter reading (days)	31	40	31	33
Distributed water volume (m^3)	8,179	10,808*3	7,486	7,716
Billing water volume (m^3)*1	4,120	5,714	6,006	5,160
Un-billed water volume (m^3)	4,059	5,094	1,480	2,556
Non-revenue water ratio (%)	49.6	47.1	19.8	33.1
Moving average of NRW ratio (%)	38.5 (13189/34189)			
Number of customers	489	489	491	491
Status of customer's meter				
Number of metered customers	382	385	391	384
Number of unmetered customers*2	107	104	100	107
Reading rate (%)	78.1	78.7	79.6	78.2

Note *1: Billed water volume for unmetered customers is counted at zero.
Note *2: Main reasons for unmetered customers are "door locks", "meter already removed", or "meter reading mistake".
Note *3: Bulk meter reading intervals are greater than other months (40 days).

The above-mentioned non-revenue water data is the value immediately after the start of the calculation, and the validity of this figure cannot yet be determined. The actual situation will be revealed in more detail through continued monitoring over the next several months, but the following points should be noted at this time.

- Water inflow to DMA 4.1.2 from mid-June to mid-July 2023 (Asadh 2080) is lower than the previous month because the Melamchi Water Diversion Tunnel was shut down on June 27 and the switch of water intake to the Bagmati River, an alternative water source, began on July 14, 2023.
- Approximately 20% of the billed water volume data are cases where the water meter cannot be checked or the meter itself is not available, and the billed water volume for these customers is counted as zero. Therefore, the billed water volume in the table above is considered to be lower than the actual value.
- DMA 4.1.2 has not yet been completed and the official delivery date has not yet been determined. The reason for this is not clear.
- In December 2023, the manager of Baneshwor Branch made a list of DMA 4.1.2 customers and provided it to the JICA Expert Team, with a total of 551 customers. This list was created based on meter reader information and meter reading routes, and is considered the most accurate.
- In DMA 4.1.2, water supply is also being provided by the old distribution pipes because closing the existing old pipes would stop water supply in some areas of the adjacent DMA. Therefore, as of December 2023, there is a mix of old and new water meter readings.

<Activity Plan in Term-3>

In Term-3, JET will support KUKL to organize internal training in basic areas by KUKL itself and to provide training to more KUKL staff.

Although only three DMAs have been completed and delivered so far, a certain number of DMAs are expected to be completed in the first half of 2024 and will be handed over to KUKL from time to time.

KUKL will then begin reading bulk meters and monitoring water consumption by DMA wise, while confirming customer information in the new distribution network and responding to customers who have not yet installed meters.

3.2.2 Activities to be initiated in Term-3

[Activity 2-5] Implement maintenance plan (prepared by Activity 2-4) for maintaining NRW ratio low.

Although this activity was planned to start based on the maintenance plan in Term-2 and beyond, no significant progress was made in the DNI project until the end of Term-2, and only three DMAs were handed over to KUKL.

Since the maintenance plan needs to be put into practice in the DMAs where the new distribution network has started supplying water, the same maintenance plan will be implemented in Term-3.

Although this project will end in Term-3, it is believed that if the maintenance plan can be implemented as on-the-job training at several DMAs in the ring road, KUKL itself can then expand similar activities to other DMAs.

The proposed items for the OJT on non-revenue water (commercial loss) measures to be implemented are as follows, which basically conform to the content of the lecture conducted as a TOT on illegal connection measures.

Items of OJT for NRW (Commercial Losses) Measures

1. Preparation of a customer list in DMA
2. Calculation of NRW ration in DMA
3. Monthly monitoring of NRW ratio
4. Listing of customers and residents who need to be visited（Suspicious illegal connection, unregistered customer, customer whose meter is not working, undesirable meter location）
5. Prepare visit plans for listed customers and residents
6. Technical inspection of customers and residents
7. Meter accuracy test
8. Legalization of illegal connection, Change of meter position, Meter replacement)
9. Incentive for the technical inspection team

<Reference: Incentive mechanism for technical inspection team >

JET proposed to KUKL the idea of paying the Technical Inspection Team a portion of the fines collected through the detection of illegal connections.

According to the core members of Output 2 Action Team, in the past, the Board of Directors has approved a proposal to pay a certain amount per illegal connection, but this has not been realized.

JET will continue to encourage the implementation of incentives for the Illegal Connection Reduction Team at regular meetings, as all believe these incentives will have a significant impact on the continuation of their activities.

If the maintenance plan is implemented without waiting for the completion and handover of the DMAs, it is desirable to apply this incentive system in the order of the DMAs for which the non-revenue water ratio can be calculated, in order to visualize the effects of implementation.

However, some branches may not yet have a DMA ready to calculate the non-revenue water ratio. In such cases, an idea to visualize the effect would be to measure the effect by the change in the amount of water billed by customers who have taken measures such as illegal connection measures (see table below).

Table 3.2.4 Example of benefit calculation from legalization of illegal connections

No.	Customer No.	Consumption (m3/month)		
		2016 Average	June 2018	
1	794341		21.00	past illegal user
2	794339		21.00	past illegal user
3	794337		21.00	past illegal user
4	795600		42.00	past illegal user
5	160045	0.31	0.31	past illegal user
6	794747		14.00	past illegal user
7	160497	0.00	31.00	past illegal user
:	:	:	:	:
98	xxxx	yy	zzz	past illegal user

	Consumption (m3/month)		
	2016 Average	June 2018	
Total	1,351.39	2,675.61	
Period		30	
Adjusted		2,712.77	
Increase		1,361.38	m^3/month

Note: Fines and other collections are also taken into account in monetary benefits.

[Activity 2-7] Head Office compiles Performance Indicators, such as amount of water production, amount of water distributed, or NRW ratio, which are collected at Branches.

At the KUKL Head Office, the NRW Section has been established under the direction of the Planning & Monitoring Division.

According to the agreement between KUKL and JET in the 4th JCC, it is envisioned that in the future, the non-revenue water data of DMAs will be consolidated at the head office and the NRW Section will be responsible for providing necessary support to each branch office. Therefore, the NRW Section will be responsible for compiling the operational indicators related to non-revenue water at the head office.

The chief of the Planning & Monitoring Division is a member of the Action Team for Output 1, but also participates in regular meetings for Output 2, so this person is fully aware of the status of Output 2 activities.

The content of the operational indicators will be discussed with the core members in the future. Possible operational indicators include the following.

- Distribution volume on monthly basis
- Billing volume on monthly basis
- Billing tariff on monthly basis
- NRW volume on monthly basis
- NRW ratio on monthly basis
- Distribution volume per connection（m^3/con-month）
- Billing volume per connection（m^3/con-month）etc.

As mentioned above, the completion and handover of DMAs in the ring lead will still take some time, so the number of DMAs for which the calculation of non-revenue water ratio can be initiated during the project period may be limited.

3.2.3 Activity timeline related to Output 2 in Term-3

The timeline of activities related to Output 2 for Term-3 is shown below.

Table 3.2.5 Timeline of activities related to Output 2 in Term-3

Planned Activities	2024												2025												2026		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
2-1: Define the roles/responsibilities of Head Office and Branches for NRW reduction activities.														●					●								
2-2: Decide the data collection process of NRW ratio.				●										●													
2-3: Conduct trainings on NRW reduction measures.				●										●					●								
(1) Internal Training on Meter Reading Skill				●																							
(2) Internal Training on Data Input/Check Skill into the Billing Database														●													
(3 Internal Training on Illegal Connection Measure																			●								
2-4: Prepare maintenance plan for maintaining NRW ratio low.				●										●					●								
2-5: Implement maintenance plan (prepared by Activity 2-4) for maintaining NRW ratio low				●	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
2-6: Calculate NRW ratio monthly.				●	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
2-7: Head Office compiles Performance Indicators, such as amount of water production, amount of water distributed, or NRW ratio, which are collected at Branches.														●	→	→	→	→	→	→	→	→	→	→	→	→	→
(1) Selection of KPI														●													
(2) Collection of KPI														●					●								
(3) Analysis of KPI																			●								

3.3 Detail of activity related to Output 3 in Term-3 (2024-2025)

Output 3	The capacity of O&M of WTPs and water quality control is enhanced.

3.3.1 Continuation/follow-up from Term-2

[Activity 3-1] Define the roles/responsibilities of WTPs, Branches, Head Office and laboratories in water quality control.

<Progress in Term-2>

(1) Building collaboration among departments related to water treatment plant operation

JET proposed the establishment of a partnership among the Water Treatment Plants, the Electromechanical Department for the maintenance of mechanical and electrical facilities, and the Central Water Quality Laboratory that plays a leading role in water quality analysis, as described below, and obtained a common understanding within the Action Team.

Under the current KUKL organization, the Production Division does not have command authority over each branch office. Therefore, in order to formally establish the interdepartmental collaboration proposed here, the reorganization must proceed with the approval of the CEO and Board of Directors.

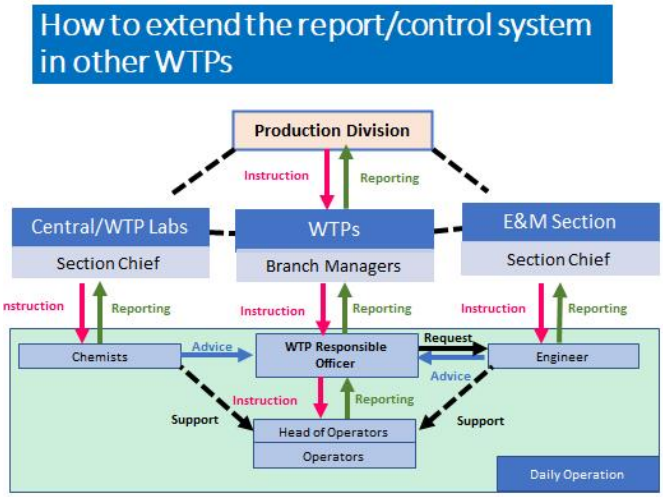


Figure 3.3.1 Collaboration among departments related to water treatment plant operation

In order to promote communication between different departments, it was agreed that monthly reporting meetings on water treatment plant operation would be held every month, and that a Water Treatment Plant Operation Monitoring Committee would be established, with meetings to be held quarterly as shown in the table below.

Table 3.3.1 Meeting and Committee for improvement of O&M of WTPs

Meeting	Items	Contents
WTP Operation Monthly Meeting	Participants	Support Division Chief, Production Division Chief, Branch Managers, Chief of WTPs, Chief of the Central Lab, Staffs of WTPs, Staffs of the Electromechanical Dept.
	Frequency	Monthly
	Theme	Report of O&M status of each WTP, Report of water quality of raw water, settled water and treated water
WTP Operation Monitoring Committee	Participants	Support Division Chief, Production Division Chief, Branch Managers, Chief of WTPs, Chief of the Central, Chief of Electromechanical Dept.
	Frequency	Quarterly
	Theme	Discussion about issues on WTP operation, Discussion about necessary support to resolve problems, Scheduling for support work

(2) Capacity building of water treatment plant operating staff

Basic technical guidance on water treatment was provided to improve the knowledge of water quality of staff involved in the operation and management of water treatment plants and to promote cooperation between water quality analysis staff and water treatment plant staff.

Water quality analysis staff and water treatment plant staff were invited to the central water quality laboratory to conduct demonstration experiments of jar tests and chlorine demand measurements, which provide important information for water treatment plant operation and management.

Subsequently, on-the-job training was provided to water treatment plant operation and management staff with the aim of improving their practical skills in water treatment plant operation based on the acquired basic knowledge of water treatment.

(3) Strengthening Cooperation with KUKL Branch Offices

In preparation for the start of water quality monitoring of water taps by the 9 KUKL branches, JET provided practical training in water quality analysis to branch staff who had no previous experience with water quality analysis. In parallel with these activities, JET led technical seminars on a regular basis to enhance the knowledge capacity of the staff.

The original technical seminar is now led by the C/P and is held monthly as a water quality monitoring debriefing meeting facilitated by the Central Laboratory Chief (Ms. Shailaja Adhikari) and attended by branch managers, water quality analysts, and Central Laboratory staff. Through these ongoing meetings, they have strengthened cooperation between each branch office and the central laboratory, and deepened common understanding of issues in water quality control.

<Activity Plan in Term-3>

(1) Water Treatment

A monthly meeting for reporting the operation status of water treatment plants and a monitoring committee of water treatment plant operation will be held for the following personnel:

- Managerial and technical staff involved in water treatment plant operation
- Staff of Water quality laboratories
- Staff of Electromechanical Department

The WTP Operation Monitoring Committee is scheduled to meet quarterly.

[Follow-up matters]

- **Through these meetings, KUKL staff shall recognize the importance of water treatment and organize/analyze information related to water treatment plant operations.**
- **Encourage stronger coordination among the different water treatment plants and related departments to strengthen the organizational system so that water treatment plants can operate ensuring water quality.**

Although reports are made at the monthly meeting and at the monitoring committee. KUKL has not voluntarily collected and stored information on the operation of the water treatment plants, analyzed this information, improved the operation methods by reflecting the analysis results, or improved the facilities themselves.

From Term-3, JET will start supporting to build a system that can collect and store information related to the operation of water treatment plants and analyze such information on a daily basis.

In addition, some chemicals used in the water treatment plants have been identified as being in poor storage and improper condition for use.

JET provides guidance on chemical inventory management, offer suggestions for improvement, and if possible, assists in creating a list of facilities and equipment owned by KUKL and managed by the Electromechanical Department, and in building a system that allows related information to be easily shared.

(2) Water Quality Control

With the start of operation of the New Sundarijal WTP and the implementation of water quality monitoring at the 9 KUKL branches, an organizational frame for water quality control has been established.

However, all information on water quality management is concentrated in the central water quality laboratory, and this information has not been organized and analyzed efficiently.

[Follow-up matters]

- **JET and KUKL select persons in charge of organizing and analyzing information. Furthermore, JET enhances cooperation among related departments and encourages the establishment of a system in which water quality data is reflected in the operation and management of the water treatment process and the maintenance of water distribution facilities.**
- **In the past, joint seminars and other activities among water quality labs, branch offices, and water treatment plants have been held to strengthen relationships and deepen understanding of technical knowledge. In addition to continuing these activities, a new division responsible for water distribution management shall be involved in the Output 3 activity to deepen the linkage between the maintenance of the water distribution network and water quality.**

In Term-3, JET will start formulating a "Water Quality Management Plan" that will include water quality monitoring, water treatment plant operation and management, and water distribution facility

maintenance.

In addition to technical content, this plan will clearly determine the relationship among the water quality laboratory, water treatment plants, and KUKL branch offices (reporting, information transmission, and chain of instructions), and clarify the division of duties.

[Activity 3-2] Conduct trainings on water treatment and water quality control.

<Progress in Term-2>

(1) Training on water treatment

The training related to water treatment was divided into two sessions, in accordance wtih the duties and technical level of the target participants. The first training session is for managerial and technical staff of water treatment plants, and the second session is for operators of water treatment plants. In both training sessions, participants were divided into two groups, one for the existing water treatment plant and the other for the New Sundarijal WTP.

Since the majority of the participants in the first training session were engineers, on-the-job training was provided through actual operation at a water treatment plant, in addition to various experiments on the theory of water treatment, jar tests, chlorine demand, etc. After the first training, candidates for future training instructors were selected from among the participants.

The second training was for water treatment plant operators, and was held at the water treatment plants to which the participants belong. This training also served as a training of trainers (TOT), with KUKL staff selected after the first training as instructors, and was conducted entirely in Nepali.

[The first session]

Comprehensive training on the following four items of water treatment was provided to managerial and technical staff of existing water treatment plants to promote capacity building of management and technical staff.

① Understanding water treatment process

② Understanding drinking water quality

③ Understanding several facilities of WTPs

④ Understanding operation method of facilities

Training materials for chief and engineers of water treatment plant were prepared in four areas: water treatment processes, water quality control in water treatment plants, water treatment plant facilities, and water treatment plant operation.

The training materials are still being updated, and in Term-3, video materials on water quality management, water treatment plant facilities, and water treatment plant operation and management will be created.

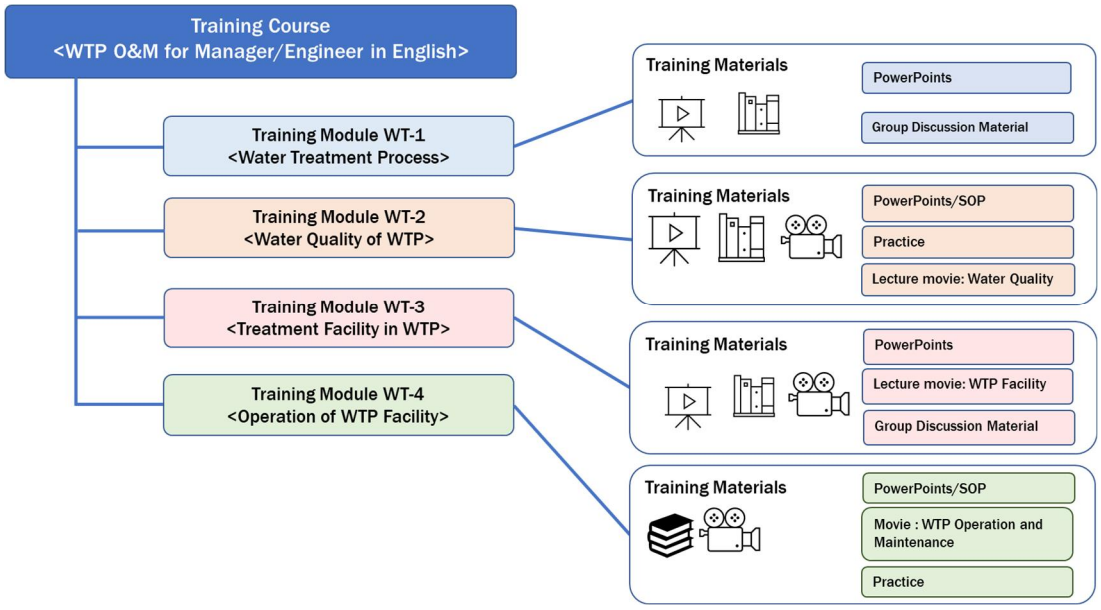
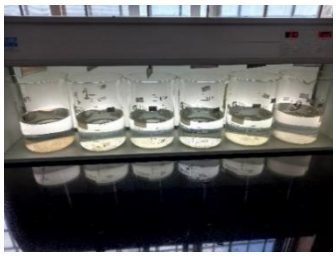


Figure 3.3.2 Composition of internal training module in the field of water treatment targeting managerial staff and engineer

[Photograph] The 1st session of training for water treatment

		
[Mahankalchaur Branch] Lecture on water treatment process	[Mahankalchaur Central Lab] Lecture on theory of jar test	Confirmation of optimal PAC dosing rate by jar test
		
[Mahankalchaur WTP] Operation of rapid sand filter	[Mahankalchaur WTP] Surface wash of rapid sand filter	[Mahankalchaur Branch] Diploma

[The second session]

In order to improve the skills of water treatment plant operators, training was conducted in Nepali language with Training of Trainers (TOT) on two important items directly related to water treatment plant operation.

① Understanding each facility of WTP

② Understanding operating method of each facility of WTP

For training materials for operators of water treatment plants, "W-3 Water Treatment Plant Facilities" and "W-4 Operation of Water Treatment Plant" were translated in Nepali, respectively (W-5 and W-6). Since the materials for operators were prepared in Nepali and lectures by KUKL staff were given in Nepali, the understanding of water treatment plant operators was highly enhanced.

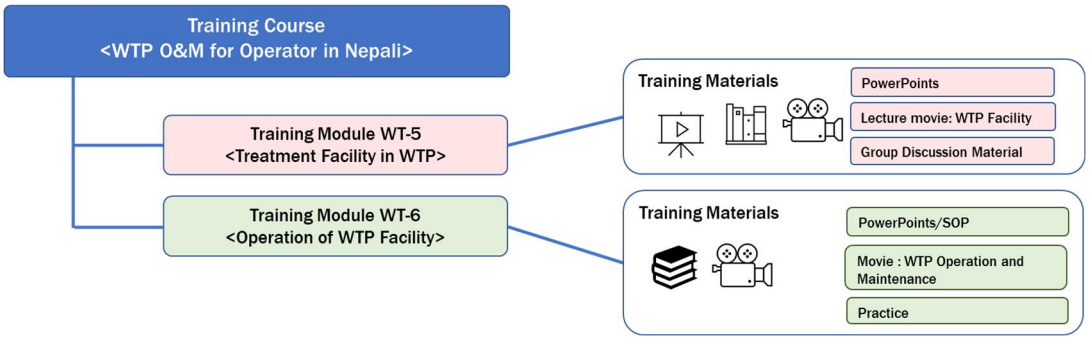


Figure 3.3.3 Composition of internal training module in the field of water treatment targeting operators and technicians

[Photograph] The 2nd session of training for water treatment

		
[Bansbari WTP] Lecture by KUKL staff (potential trainer)	[Mahankalchaur Central Lab] Practice of jar test	Practice of operation of sludge valve of sedimentation basin

(2) Training on water quality control

The main target group for training related to water quality control is laboratory staff at water treatment plants.

Basic matters related to water quality control were reviewed in the technical seminar conducted in 2021, and the educational materials prepared for that seminar continue to be used in this training program.

The training material is divided into four areas: "Water Quality Monitoring and WTP Operation (WQ-1)", "Data Quality Control and SOP Systems (WQ-2)", "Utilization of Monitoring Data (WQ-3)" and "Operation of Monitoring Equipment (WQ-4)". Of these, SOPs are used as teaching materials for the use of measuring instruments.

SOPs are revised as measurement methods and equipment are updated. Therefore, it is necessary to use the latest revised SOPs as teaching materials, and to continue to provide guidance to ensure that internal training is conducted each time SOPs are updated.

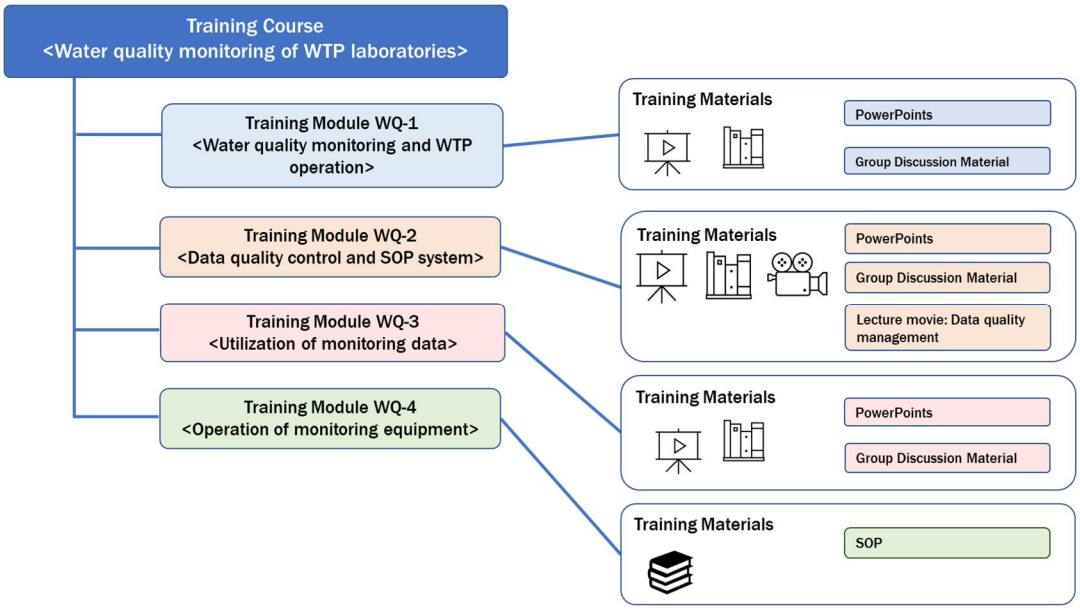


Figure 3.3.4 Composition of internal training module in the field of water quality control targeting laboratory staffs

Apart from a series of technical seminars, practical training in jar testing and chlorine demand analysis necessary for water quality control was conducted in the central laboratory. This exercise was also positioned as a TOT and was jointly supervised by JET and two potential trainers of water quality analysis.

[Photograph] Training on water quality control targeting laboratory staffs

		
[Mahankalchaur Central Lab] Instruction by a laboratory staff	[Mahankalchauir Central Lab] Jar test	[Mahankalchaur Central Lab] Discussion about jar testing result
		
[Mahankalchaur Central Lab] Chloring consumption/requirement test	[Mahankalchaur Central Lab] Experimants by trainees	[Mahankalchaur Central Lab] Discussion about chloring consumption

(3) Training for water quality monitoring personnel at branch offices

JET provided guidance to KUKL branch staff who had no previous experience in water quality measurement on how to handle measurement equipment and acquire data for the monitoring of water quality at city taps by the 9 KUKL branches.

The SOPs developed for the training focused on the handling of water quality analysis equipment and the accuracy control of monitoring data, and were used as teaching materials. Since it takes time to establish the habit of conducting water quality analysis while referring to SOPs, field visits and guidance are continued after the training is completed.

The personnel in the KUKL branch offices who are engaged in water quality analysis do not have basic training in water quality analysis, so the SOP descriptions alone are often not sufficient for their understanding.

Therefore, in preparation for future internal training, JET decided to prepare video materials on water quality analysis equipment operation, water quality analysis workflow, and data accuracy control in Term-3.

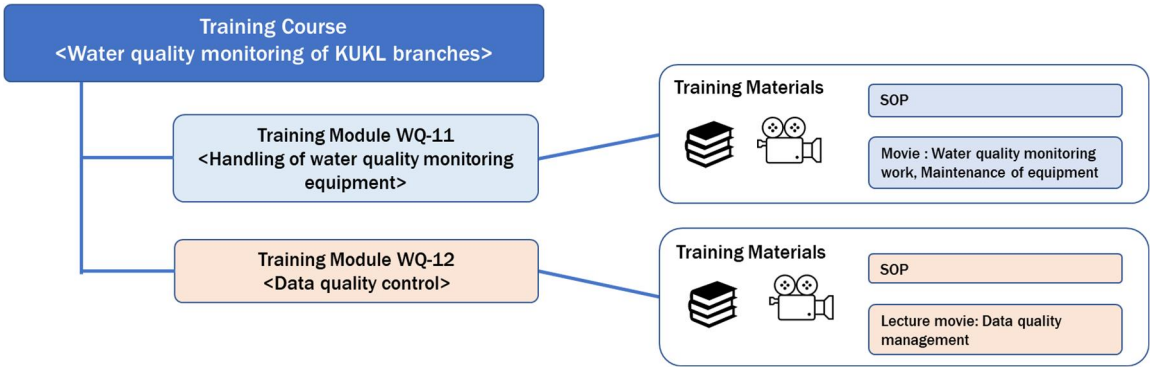


Figure 3.3.5 Composition of internal training module in the field of water quality control targeting staffs of branch offices

[Photograph] Training on water quality control targeting staffs of branch offices

		
[Mahankalchaur WTP] Water sampling guidance at taps	[Mahankalchaur WTP] Water sampling guidance at reservoirs	[Mahankalchaur Central Lab] Operation guidance of turbidity/residual chlorine measurement

<Activity Plan in Term-3>

(1) Water Treatment

[Continuation of basic training]

At the three existing water treatment plants, JET will provide guidance on the operational know-how using the equipment once the ongoing improvements to the chemical dosing facilities are completed.

At the New Sundarijal WTP, training will be provided to increase maturity and achieve efficient operation when raw water turbidity fluctuates greatly.

In both cases, short-term TOT-based training should be repeated to ensure that the technology is well established.

[Follow-up matters]

- **Repeat the training with short-term TOT at the three existing water treatment plants, utilizing the improved chemical dosing facilities.**
- **At the New Sundarijal WTP, JET will check the operational status and provide guidance on technical uncertainties and solutions to improve operational maturity and efficiency.**

[Establishment of Internal Training System]

At the time this project was initiated in March 2021, the completion and handover of the New Sundarijal WTP was not yet in sight.

Therefore, while providing the necessary support for the handover of the facilities, the project activities included on-the-job training at three existing water treatment plants that will require continuous operation in the future.

In Term-3, JET will support the establishment of a sustainable training system, as internal training will begin in earnest with KUKL staff serving as instructors.

[Newly proposed activities]

In the case of the New Sundarijal water treatment plant, 10 months have passed since KUKL took over operational management from the contractor.

While it is inherently desirable to improve the operation to be more economical and efficient while taking into account changes in raw water quantity and turbidity, the operation still follows the basic method instructed by the contractor, leaving room for improvement.

The following improvements can be made at this time.

① Response to sudden increase in turbidity (20-30 NTU) of raw water inflow during dry season

② Response to power outages

③ Establish economical operating methods, such as reducing excessive backwashing

The New Sundarijal WTP currently can receive 170 MLD of water from Melamchi Diversion Tunnel during the dry season, but during the rainy season, the production volume will drop to 40-50 MLD as the plant switches intake to the Bagmati River.

In Term-2, during the rainy season when raw water from the Bagmati River is used, JET and KUKL temporarily changed the filtration rate for a short period of time, allowing us to understand the

actual load generated at the facility and points to keep in mind during operation.

For the time being, the water supply from the Melamchi River is limited to the dry season only, but the water quality is good and turbidity is low during that period. Therefore, it is considered possible to secure a water treatment capacity of 200 MLD, with an increase of about 20% from the original capacity, by devising operational methods even with the current facilities.

This increase of 30 MLD is equivalent to the capacity of more than one existing water treatment plant, and even though it is limited to the dry season, it is a great advantage for KUKL to be able to realize this increase in water supply.

Based on the requests from KUKL, the following activities will be implemented at the New Sundarijal WTP in Term-3 to enhance the capacity of KUKL operators and to increase water production.

① Confirmation of the impact on the entire facility when 200 MLD of raw water, a 20% increase, flows into the water treatment plant.

② Confirmation of floc sedimentation effect in sedimentation basin.

③ Confirmation of the impact of increasing the filtration rate by 20% (e.g., increase of water level in the filtration basin, outflow of turbidity from filter, etc.)

④ Checking the affordability of related facilities, especially drug dispensing facilities, etc.

(2) Water Quality Control

JET will continue to provide on-site guidance during the stay in Kathmandu and through online seminars from Japan to improve and sustain the water quality analysis capacity of the laboratories in water treatment plants and KUKL branch offices.

[Follow-up matters]

- **As New Sundarijal WTP is now fully operational, JET will prepare SOPs and provide training of water quality analysis to the plant's laboratory staff.**
- **JET will provide technical guidance for the additional water quality staff at each branch office (currently under consideration for increase at each branch office).**

Maintenance of service reservoirs is another important factor of water quality management. Although guidance on the maintenance of service reservoirs has been provided in Activity 3-4, the lack of active coordination between those responsible for the management of the facilities and the section in charge of water quality control is a problem.

In Term-3, JET will guide the use of water quality monitoring data, especially the incorporation of water quality monitoring data from each branch office into the maintenance and management of water distribution reservoirs.

Regarding the water quality monitoring plan by the branch offices, water quality monitoring of service reservoirs was added in the second half of Term-2.

In Term-3, JET will work with the Central Water Quality Laboratory and each branch office to develop a maintenance plan for service reservoirs based on water quality data (seasonal changes in turbidity and residual chlorine) and further improve water supply quality in cooperation with the supervisors of reservoir.

[Activity 3-3] Prepare SOPs of water treatment and water quality control.

<Progress in Term-2>

(1) Development of SOPs for water treatment

This activity is to compile a Standard Operating Procedure for the operation and maintenance of the main water treatment plants in the Kathmandu Valley to ensure the stable provision of adequate drinking water quality.

In Term-1, JET led the preparation of a draft SOP (English version) for the Mahankalchaur WTP, the base facility for the training.

In Term-2, an SOP development committee was established with the members of the Output 3 Action Team, and the SOP (draft in English) for the Mahankalchaur WTP was finalized after identifying contents to be modified through real operation and feedback from KUKL staff. In addition, KUKL and JET collaborated to develop SOPs for the existing water treatment plants in Bode and Bansbari using these SOPs as a model.

Since none of the personnel actually engaged in the daily operation of the water treatment plant have the higher education necessary to understand advanced water treatment principle, and their English skill is insufficient, a simplified SOP for operators was prepared in a Nepali language version. The instructions for using the Nepali version of the SOP are as follows.

- The Nepali SOP is a simplified version for current and newly hired operators to get an overview of the water treatment plant and the basic knowledge required for its operation.
- Nepali SOP consists of 1) Water Treatment Plant Overview, 2) Flocculation and Sedimentation Basin, 3) Rapid Filtration Basin, 4) Chemical Dosing Facility, and 5) How to proceed with daily operation.

The SOPs were revised by fully reflecting the opinions of KUKL staff, and two types of practical reference materials, "simplified SOPs" and "SOPs for operators," were prepared in English and Nepali versions for each of the four water treatment plants.

At the end of Term-2, in the existing water treatment plants (Mahankalchaur, Bansbari, and Bode) , the improvement of coagulant and chlorine dosing facilities is underway, and the SOPs should be revised after the chemical dosing facilities are improved.

Table 3.3.2 Composition of SOP for water treatment

No.	Type/Use	Current Statut	Photo：SOP Nepali version for operators
1	Main SOP (English) For Engineer and Chief of WTP Whole Integrated Version	In preparation To be finalized by December 2023	
2-1	Simplified SOP (English version) Reference document for daily operating work and internal training	Already prepared but to be revised in 2024 and 2025	
2-2	Simplified SOP (Nepali version) Reference document for daily operating work and internal training	Already prepared but to be revised in 2024 and 2025	
3-1	SOP for operators (English version) Reference document for daily operating work and internal training	Already prepared but to be revised in 2024 and 2025	
3-2	SOP for operators (Nepali version) Reference document for daily operating work and internal training	Already prepared but to be revised in 2024 and 2025	

(2) Development of SOPs for water quality control

In Term-1, the Output 3 Action Team began to develop SOPs for water quality control while providing basic training through online technical seminars.

Unlike in the case of water treatment field, KUKL laboratories are staffed with highly educated specialists. The capacity assessment confirmed that these staff had a sufficient level of knowledge and experience in water quality analysis, so the SOP could be prepared by KUKL staff themselves, with minor advice from JET.

On the other hand, although the technical level of the staff is sufficient, there is a high need for support from JET in establishing a system to utilize SOPs in daily operations and to maintain the accuracy of water quality analysis, as well as in improving the quality of work for the branch offices.

Table 3.3.3 Composition of SOP for water quality analysis

No.	Parameters	Current Status
1	Sampling and preservation	The 1st draft was already prepared but to be revised in 2024 and 2025. (*1)
2	pH	
3	Turbidity	
4	EC	
5	Color	
6	Total hardness	
7	Total alkalinity	
8	Total iron	
9	Total ammonia	
10	Total chloride	
11	Residual chlorine	
12	MPN (coliform group and fecal coliforms)	
13	Data collection and accuracy control	
14	Turbidity for branch for branch water quality monitoring	
15	Residual chlorine for branch water quality monitoring	

*1: Revision of SOPs will be done together with the establishment of a system for SOP text management.

<Activity Plan in Term-3>

(1) Water Treatment

SOPs for the three existing WTPs (Mahankalchaur, Bansbari, and Bode) and the New Sundarijal WTP were mostly prepared by the end of Term-2.

However, in the latter half of Term-2, KUKL has started to improve the chemical dosing facilities at these water treatment plants (installation of rotameters for flow measurement and piping work). Therefore, the SOPs prepared so far need to be revised based on the results of these facility improvements.

[Follow-up matters]

- **JET has been in charge of SOP preparation until the end of Term-2, but from Term-3 onward, KUKL must proceed with preparation and updating on its own initiative.**

(2) Water Quality Control

JET and KUKL will make necessary modifications to the SOPs created so far and create additional SOPs while observing actual measurement operations and field work conditions.

[Follow-up matters]

- **In the process of revising SOPs, it is important for those who perform measurement operations to find technical issues (hereinafter referred to as "awareness").**
- **Guidance should be provided to lab and branch measurement personnel so that they can "become aware" through seminars and on-site guidance.**
- **JICA experts will promote interaction and collaboration between the Central Water Quality Laboratory and those in charge of measurements at each water purification plant by holding seminars and other events to facilitate better communication between both parties.**

From Term-3, JET and KUKL will establish rules and persons in charge of management of SOP document (SOP revision procedures, document storage, and version control), and JET will provide guidance to ensure that new SOPs are created and revised on an ongoing basis.

Since it is desirable that SOPs be managed centrally together with SOPs of water treatment plants, a management system that can provide cross-sectional guidance for water treatment plant management and water quality analysis should be established.

Specifically, the following items will be determined and documented as Master SOPs.

- Administrator of SOP
- Methods of managing document data. (Secure dedicated data storage)
- Establish SOP preparers/revisers and approvers.
- Rules for SOP version management: collecting old SOPs, distributing new SOPs and explaining their contents.

[Activity 3-4] Prepare monitoring plan of waler treatment and water quality control.

<Progress in Term-2>

Based on the water quality monitoring previously conducted by KUKL, water quality monitoring is being implemented to reflect improvements incorporated in the project activities. The status of this implementation will be periodically checked and evaluated to update the final water quality monitoring plan.

(1) Water quality monitoring at water treatment plant

Water quality monitoring of the water treatment process (raw water, after coagulation and sedimentation treatment, after sand filtration, and clear water reservoir) is conducted at the Mahankalchaur, Bansbari, Bode, and New Sundarijal WTPs. The monitoring procedures for each water plant are as follows.

Table 3.3.4 Water quality monitoring for water treatment

Plant	Monitoring point	Frequency	Items to be monitored
Mahankalchaur	Raw water, Settled water, Filtered water and Tanker station	3 times per day	Appearance, Color, Temperature, Turbidity, pH, Electro Conductivity, Alkalinity, Hardness, Calcium, Magnesium, Iron, Ammonia, Chloride, Residual Chlorine, Escherichia coli
Bansbari	Raw water, Settled water, Filtered water and Tanker station	Same as above	Appearance, Color, Temperature, Turbidity, pH, Electro Conductivity, Residual Chlorine
Bode	Raw water, Settled water and Filtered water	Same as above	Same as above
New Sundarijal	Raw water, Settled water and Filtered water	Same as above	Same as above

(2) Water quality monitoring at water taps

Water quality monitoring at the water taps to be conducted by the KUKL Branch Office covers turbidity and residual chlorine. Since the water supply is severely constrained during periods when the water supply from the Melamchi River is shut down, the specific dates of monitoring frequently change to accommodate the city's water transmission and distribution schedule.

In the future, the monitoring points will be controlled with GIS data, and information on changes and additions to monitoring points will be managed with GIS data as well in the future.

Table 3.3.5 Water quality monitoring plan for each branch office

Branch	Monitoring Points	Frequency
Baneshwor	Total 5 points MinbhawanSRT, Pabitra chowk, Bharosha Hospital, Maitidevi Chowk, Gyaneshwor quarters Now, only Minbhawan SRT is under monitoring.	Once per week
Bhaktapur	Total 5 points Bansbari public tap, Janaswasthe medical shop, Khauma citizen bank, Bansagopal, Sallaghari	Once per week
Chhetrapati	Total 3 points Newroad Bata Company Public tap, Naradevi, Dhalko	Once per week
Kirtipur	Total 8 points Jakha SRT, Panga public tap, Adinath Chobhar SRT, Bhajangal SRT, KUKL office, Kalo tanki, Samal Dhoka Public water tap, Devdhoka SRT Now, only 3 points (Panga public tap, Bhajangal SRT and Kalo tanki) are under monitoring,	Once per week
Lalitpur	Total 3 points Saibu SRT, Nakhu Bull tap, Jawarakhel tap	Once per day at Saibu SRT Once per week or Once per

Branch	Monitoring Points	Frequency
		month at other points.
Madhapur – Thimi	Total 4 points Lokanthali new reservoir, Bhattarai Niwas Sinti Tar, Dhunche Pakha, Sankhadhar chowk	Once per week or Once per month
Maharajgunj	Total 4 points Jaldhunga, Mahapur Manga, Lhosal, Pipalbot Now only 3 points (Jaldhunga, Lhosal, Pipalbot Mahapur) are under monitoring	[Rainy season] Once per 5-6 days [Dry season] Once per 9-10 days
Mahankalchaur	Total 5 points Guheshwori, Maijubahal, Siphal, Handigaun, Maligaun	Once per week
Tripureshwor	Total 6 points Kuleshwor area, Soltimod area, Lagan, Jaisideval, Kastamandap public tap, Tahachal campus Now only 1 point of Sundarighat WTP is under monitoring.	Once per week in the original plan, but now only once per day at Sundarighat WTP

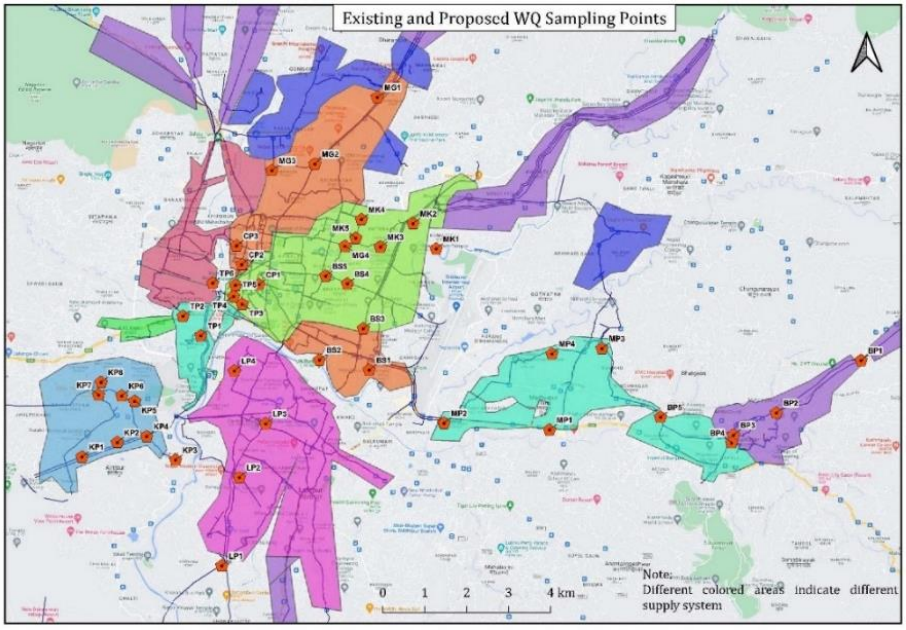


Figure 3.3.6 Water Quality Monitoring Points by Branches

<Activity Plan in Term-3>

(1) Water Treatment

Continued technical follow-up through monthly reporting meetings on water treatment plant operations and through the monitoring committee of WTP operation, each of which meets monthly and quarterly respectively.

(2) Water Quality Control

Regarding the Water Quality Monitoring Plan by branch offices, it was decided to add the new service reservoirs constructed under the BDS project to the monitoring scope, as The New Sundarijal WTP has started its full-scale operation in March 2023.

Although the monitoring based on these changes began in the second half of Term-2, the revision and its implementation of the monitoring plan for reservoirs will be followed up by JICA experts.

[Activity 3-5] Monitor the water quality based on the monitoring plan prepared in Activity 3-4.

<Progress in Term-2>

(1) Status of operation and water quality monitoring for drinking water treatment

In order to ensure that the staffs of the branch offices and the head office are accurately aware of the daily water treatment plant operation status, monthly reporting meetings are held to confirm water quality data and problems that need to be improved at the four water treatment plants.

The following is an example of the water quality and operational status of the Mahankalchaur WTP among the monitoring details reported at the monthly water treatment plant operation report meetings.

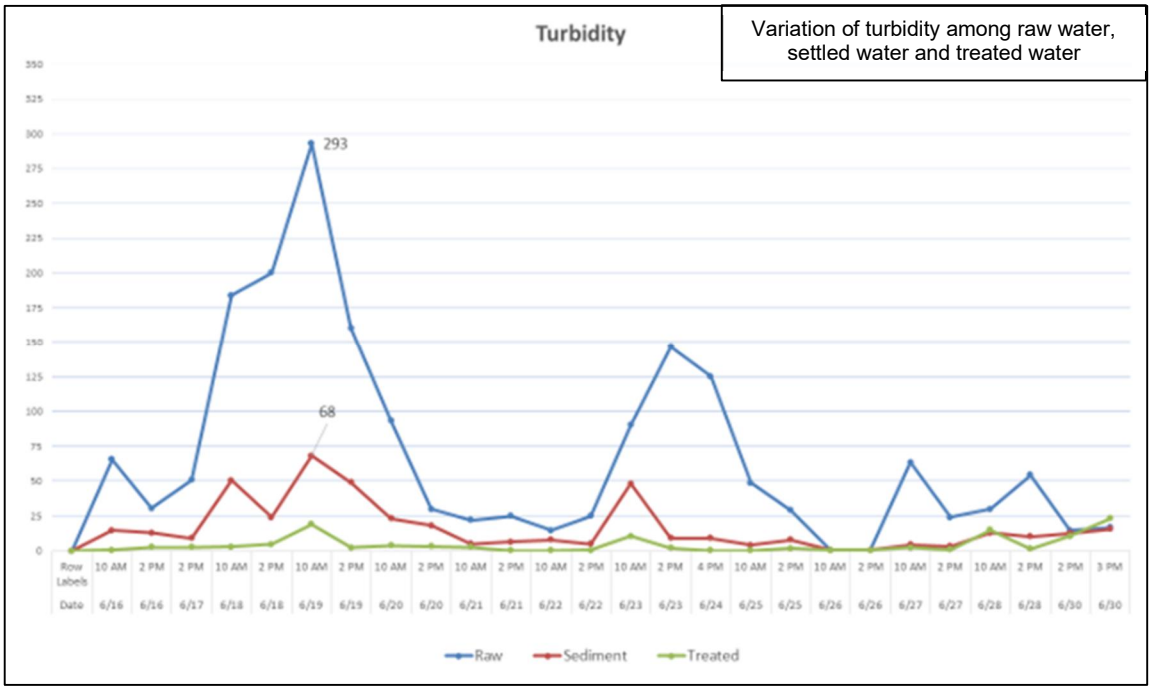
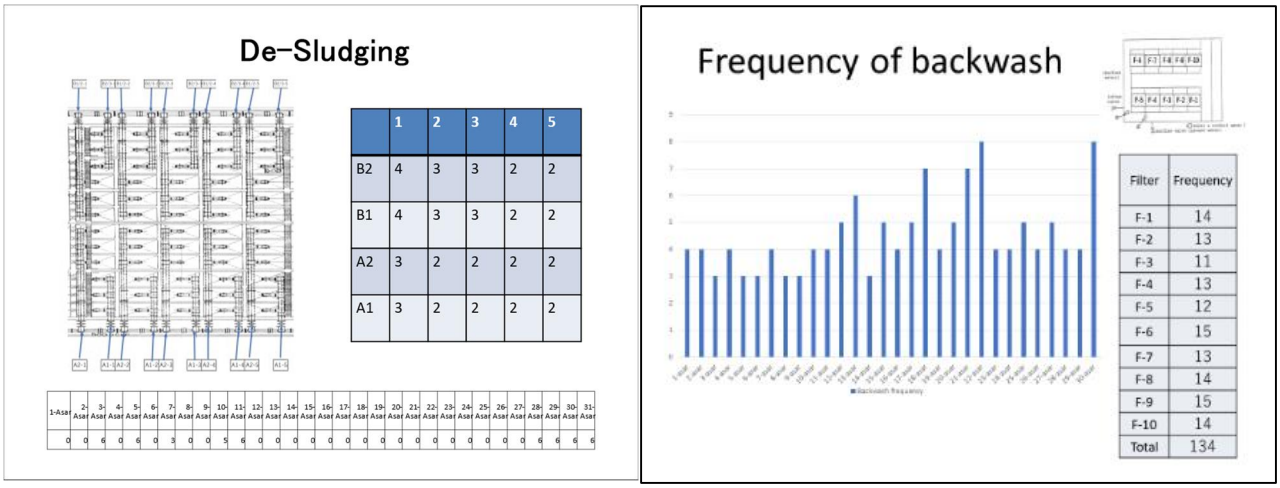


Figure 3.3.7 Result of water quality monitoring at Mahankalchaur WTP



	1	2	3	4	5
B2	4	3	3	2	2
B1	4	3	3	2	2
A2	3	2	2	2	2
A1	3	2	2	2	2

Filter	Frequency
F-1	14
F-2	13
F-3	11
F-4	13
F-5	12
F-6	15
F-7	13
F-8	14
F-9	15
F-10	14
Total	134

Frequency of de-sludging of Sedimentation Basin

Frequency of backwash of filter basin

Figure 3.3.8 Operation Status of Mahankalchaur WTP

Water quality monitoring at the water treatment plants is conducted by laboratory staff, but monitoring is not conducted on Saturdays and holidays because the laboratory staff is not available.

On the other hand, the automatic water quality measuring device introduced by the Electromechanical Department targets raw water and is effective for monitoring of water treatment process. However, there is no equipment capable of monitoring treated water, and a constant water quality monitoring system has not been established.

(2) Monitoring result at water taps in the city

Water quality monitoring (turbidity and residual chlorine) of city taps is continuously conducted by branch staff; an assessment of tap water quality as of December 2023 is presented below. The detailed data are shown in "(4) Assessment of Water Quality Improvement at Water Taps".

Among Nepal's water quality standards, turbidity has almost achieved the standard of 5 NTU or less in all branches except Bhaktapur and Tripureshwor.

However, for residual chlorine, the percentage of samples satisfying the range of drinking water quality standards (0.1-0.5 mg/L) did not reach 95% in all branches.

JET has proposed and implemented improvements to the chlorine dosing facilities (controlling the dosing rate by installing rotameters, renewing blocked pipelines, and adopting advanced bleaching powder), and the team expects improvements in Term-3.

Table 3.3.6 Outline of water quality data provided by branches

Evaluation	Good	Fair	Poor
Requirement	At least 95% of the data satisfy the following ranges. Turbidity < 1 NTU 0.1 < FRC < 0.2mg/L	At least 95% of the data satisfy the following ranges. Turbidity < 5 NTU 0.1 < FRC < 0.5mg/L ＊In accordance with NWQS	Does not satisfy Good and Fair conditions. Percentage of samples meeting Turbidity <5 NTUs less than 95%. FRC concentration range is not consistent, and concentrations outside the range of water quality standards are detected.
Turbidity	Maharajguni, Chetrapati, Baneshowor	Mahankalchaur, Madhyapur-Thimi, Lalitpur, Kirtipur	Bhaktapur, Tripreshowor
Residual chlorine	---	---	All the branches

Until the end of Term-2, many of the branches were understaffed on water quality monitoring personnel. This was mainly due to personnel transfers following the start of operations at the New Sundarijal WTP, which resulted in the withdrawal of personnel who had been responsible for water quality analysis at each branch office. This has resulted in situations where the planned monitoring points cannot be covered and the monitoring points are reduced or changed to only water treatment plants and reservoirs.

Since KUKL is not able to make decisions on matters related to personnel matters such as staff recruitment alone, for the time being, KUKL will take action by reviewing the monitoring plan in accordance with the manpower of the branch offices.

Note that recruiting, which had been suspended since November 2023, has resumed, and the number of newly hired staff has begun to increase. Several engineers or technicians will be assigned to the branch offices, which is expected to eliminate bottlenecks in future activities.

(3) Assessment of water quality improvement at water treatment plants

Comparison of the quality of water treatment (water quality in the clear water reservoirs) at the three existing water treatment plants and the New Sundarijal WTP was conducted at the beginning

of the project and at the end of Term-2. The items compared were water turbidity and residual chlorine.

A summary of the water quality data for the source of the water treatment plant and the water quality data to be assessed is provided below:

[Water quality data in the existing water treatment plants]

Start of the project: Data from April 2020 to March 2021

End of Term-2 (2023): Data from July 2022 to October 2023

Table 3.3.7 Main water source of the water treatment plants

WTP	Rainy season	Dry season
Mahankalchaur	Surface water (Bagmati River)	Surface water (Bagmati River)
Bode	Underground water(Manohara River) Groundwater (Deep wells)	Underground water (Manohara River) Groundwater (Deep wells)
Bansbari	Surface water (Shivapuri River) Surface water (Bishnumati River)	Surface water (Shivapuri River) Surface water (Bishnumati River)
New Sundarijal	Surface water (Bagmati River)	Surface water (Melamchi River)

Table 3.3.8 Outline of water quality in the clear water reservoirs

Mahankalchaur WTP		Start of the project (2021)	End of Term-2 (2023)
Turbidity (NTU)	Maximum	28.8	174
	Average	4.9	3.5
	Minimum	0.8	0.1
Residual Chlorine (mg/L)	Maximum	2.10	4.3
	Average	0.63	0.8
	Minimum	0.04	<0.1
Bansbari WTP		Start of the project (2021)	End of Term-2 (2023)
Turbidity (NTU)	Maximum	6.4	7.7
	Average	2.1	0.3
	Minimum	0.6	0.1
Residual Chlorine (mg/L)	Maximum	1.0	2.0
	Average	0.6	0.6
	Minimum	0.2	0.1
Bode WTP		Start of the project (2021)	End of Term-2 (2023)
Turbidity (NTU)	Maximum	6.1	33.2
	Average	2.1	1.7
	Minimum	0.5	0.5
Residual Chlorine (mg/L)	Maximum	1.4	3.6
	Average	0.4	0.7
	Minimum	<0.1	0.1
New Sundarijal WTP		Start of the project (2021)	End of Term-2 (2023)
Turbidity (NTU)	Maximum		12.4
	Average		1.5
	Minimum		0.1
Residual Chlorine (mg/L)	Maximum		10.0
	Average		0.5
	Minimum		<0.1

Turbidity is evaluated based on the occurrence rate of data below 5 NTU, the drinking water quality standard of Nepal.

Residual chlorine is evaluated based on the rate of occurrence of data that is above 0.5 mg/L, the

upper limit of the drinking water quality standard, taking into account the loss in the distribution network. Note that the drinking water quality standards of Nepal set the residual chlorine at the tap in the range of 0.1-0.5 mg/L. The target control concentration of residual chlorine at the outlet of the water treatment plant continues to be discussed in consultation with the Output 3 Action Team.

Table 3.3.9 Achievement status of water quality indicator

Mahankalchaur WTP			
Parameters	Indicator	Start of the project (2021)	End of Term-2 (2023)
Turbidity	≤ 5NTU	Achievement rate: 67.4%	Achievement rate: 88.8%
Residual Chlorine	0.5 mg/L ≤	Achievement rate: 52.8%	Achievement rate: 61.4%
Bansbari WTP			
Parameters	Indicator	Start of the project (2021)	End of Term-2 (2023)
Turbidity	≤ 5NTU	Achievement rate: 99.5%	Achievement rate: 99.9%
Residual Chlorine	0.5 mg/L ≤	Achievement rate: 48.0%	Achievement rate: 59.3%
Bode WTP			
Parameters	Indicator	Start of the project (2021)	End of Term-2 (2023)
Turbidity	≤ 5NTU	Achievement rate: 97.2%	Achievement rate: 99.9%
Residual Chlorine	0.5 mg/L ≤	Achievement rate: 28.1%	Achievement rate: 61.3%
New Sundarijal WTP			
Parameters	Indicator	Start of the project (2021)	End of Term-2 (2023)
Turbidity	≤ 5NTU	-	Achievement rate: 95.9%
Residual Chlorine	0.5 mg/L ≤	-	Achievement rate: 31.9%

Table 3.3.10 Assessment results of the Mahankalchaur WTP

Parameters	Assessment results
Turbidity	➢ The achievement rate of turbidity has improved from 67.4% to 88.8%. However, since the project requires that the percentage of 5 NTU be more than 95 %, the capacity of the water treatment operation and management needs to be further improved. ➢ Comparing the distribution of data here, the peak shifts to the range below 1.5 NTU at the end of Term-2. Therefore, some improvement in the ability to operate and manage the water treatment process can be observed. ➢ However, even at the end of Term-3, approximately 10% of the turbidity of treated water still exceeds 5 NTU. It is necessary to further improve the ability to respond to changes in raw water turbidity and to maintain and manage the sedimentation basin and sand filtration basin.
Residual Chlorine	➢ The frequency of residual chlorine of 0.5 mg/L or higher increased from 52.8% to 61.4%, but the number of occurrences of 0.1 mg/L or lower and 1.0 mg/L or higher increased at the end of Term-2. This may be due to the fact that the chlorine injection rate was not properly controlled, and the injection rate was often over- or under-applied. ➢ The Mahankartur WTP is in the process of improving its chlorine dosing system, and has finally installed a rotameter and is ready to control the dosing volume. ➢ Data acquisition and organization should continue to clarify the distribution of residual chlorine concentrations when the chlorine dosing rate is controlled.

Table 3.3.11 Assessment results of the Bansbari WTP

Parameters	Assessment results
Turbidity	➢ Turbidity control has shown its achievement rate at 95% or higher since the beginning of the project. ➢ The distribution of the data shows that 95% of the samples had 3 NTU or less at the beginning of the project, while more than 95% had 1 NTU or less at the end of Term-2. This can be evaluated as a reflection of the improvement in capacity through this project.
Residual Chlorine	➢ The frequency of residual chlorine greater than 0.5 mg/L ranged from 48.0% to 59.3%, but by the end of Term-2, the distribution of data had widened. ➢ At the Bansbari WTP, the chlorine dosing rate is controlled based on raw water flow rate only, but the method of controlling the injection rate needs to be verified based on water quality data to further improve the control capability. ➢ It is possible that the raw water flow rate at the Bansbari WTP is not accurately measured. It is necessary for KUKL staff to understand that knowing the accurate raw water flow rate is necessary for proper dosing rate management.

Table 3.3.12 Assessment results of the Bode WTP

Parameters	Assessment results
Turbidity	➢ Turbidity control has shown its achievement rate at 95% or higher since the beginning of the project. ➢ The distribution of the data shows that 95% of the samples had 3.5 NTU or less at the beginning of the project, while more than 95% had 2.5 NTU or less at the end of Term-2. This can be evaluated as a reflection of the improvement in capacity through this project.
Residual Chlorine	➢ The frequency of residual chlorine above 0.5 mg/L improved from 28.1% to 61.3%, but the chlorine injection facility at the Bode water treatment plant is in need of repair. Therefore, controlled chlorine injection is not taking place.

Table 3.3.13 Assessment results of the New Sundarijal WTP

Parameters	Assessment results
Turbidity	➢ The percentage of water with a turbidity of 5 NTU or less is 95.9%, which means that the project purpose has been achieved. ➢ The New Sundarijal WTP is a new facility and has not experienced sludge accumulation in the sedimentation basins or deterioration of sand filter as the existing water treatment plants. ➢ Therefore, it is expected to achieve higher quality water treatment, i.e. lower turbidity ➢ It was decided in consultation with the central laboratory that water treatment plant operators will measure pH and turbidity in order to respond to changes in water quality during nights and holidays when the water quality laboratory is not in operation. By operating the water treatment plant according to water quality even during nighttime and holidays, it is expected that water quality will be improved in the future.
Residual Chlorine	➢ The percentage of residual chlorine above 0.5 mg/L is 31.9%. ➢ Since the New Sundarijal WTP uses chlorine gas, the residual chlorine can be controlled more easily and appropriately compared to the existing water treatment plant that uses a rusted powder solution. ➢ However, the residual chlorine data were widely distributed, suggesting that the chlorine injection rate was not properly controlled. ➢ Capacity enhancement of the water quality laboratory at the new Sundarijal water treatment plant began in December 2023. This is expected to enhance the ability to monitor turbidity and residual chlorine concentrations, as well as the ability to make improvements related to chemical dosing rates based on the results of chlorine demand tests and other experiments. ➢ In addition, from Term-3, it is necessary to focus on the optimization of the water treatment process and to work on achieving higher quality of treated water.

(4) Assessment of water quality improvement at water taps

The following is a summary of tap water quality data at the end of Term-2.
The Kirtipur branch monitors three sites, two of which are water distribution reservoirs, so the number of tap data is small.

Tables 3.3.38 and 3.3.39 show the percentage of samples meeting drinking water quality standards (turbidity: =<5 NTU, residual chlorine: 0.1-0.5 mg/L).

Figures 3.3.15 and 3.3.16 show the distribution range (box-and-whisker diagram) of water quality data for each branch.

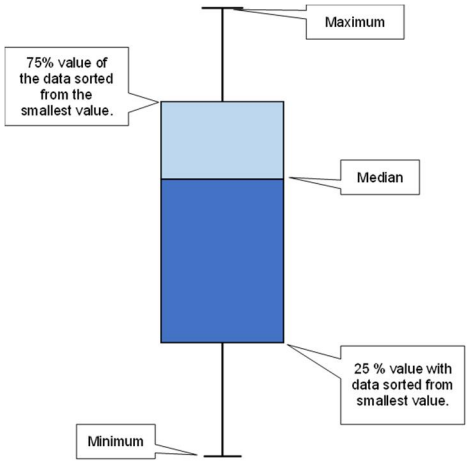


Figure 3.3.9 box-and-whisker diagram

Table 3.3.14 Assessment results of water quality at the taps

Parameters	Assessment results
Turbidity	About 95% or more of the data in the seven branches, except for Tripureshwor and Bhaktapur branches, conform to the standard values. As described in section "(3) Assessment of water quality improvement at water treatment plants", this may be because turbidity is well controlled at the water purification plants. However, it is necessary to further verify the soundness of the pipeline management by checking against the water quality data of the water service reservoirs. The data distribution shows that most of the data is less than 5 NTU, except for the Bhaktapur branch, which has less than 5 NTU. The Baneshwor branch, however, had the largest data with 20.5 NTUs. The branch manager of Bhaktapur explained that there is a water supply Lalitpur, but this is due to construction work being done upstream of the water source. However, the Bhaktapur branch has a median value of 4.3 NTU and a 75th percentile value of 8.0 NTU, indicating a high turbidity level compared to other branches. Therefore, it is necessary to consider improvement measures, including maintenance of water service reservoirs and pipelines.
Residual Chlorine	The compliance rate with water quality standards ranged from 38.9% to 89.1%. However, as described in section "(3) Assessment of water quality improvement at water treatment plants", the dosing rate control of residual chlorine has not yet been fully implemented. Therefore, the residual chlorine data obtained in this study cannot be considered results obtained under controlled conditions. The Lalitpur branch had a residual chlorine concentration of more than 0.9 mg/L at the taps due to the application of an additional chlorinating agent (bleaching powder) at the Saibu water distribution reservoir. However, the chlorine dosage is not strictly controlled, and one or two bags (45 kg) of bleaching powder are put into the water distribution reservoir every morning (interviewed by Lalitpur branch manager). The residual chlorine at the Mahankalchaur branch was also relatively high, with a maximum value of 4.0 g/L (it may be possible that they forgot to close the valve on the chlorine injector at this time: Ms. Shailaja Adhikari). Thus, there is still a need to monitor and provide guidance on how to implement chlorination.

Table 3.3.15 Outline of turbidity of the water taps in different branches

Branch	Data collection period	Number of data	Maximum (NTU)	Average (NTU)	Median (NTU)	Minimum (NTU)	Achievement rate to NWQS
Maharajguni	2023/2/15 – 2023/9/21	47	0.85	0.41	0.37	0.10	100%
Chhetrapati	2023/2/16 – 2023/9/15	45	0.54	0.28	0.24	0.06	100%
Baneshwor	2023/3/16 – 2023/9/30	47	20.5	1.79	1.29	0.21	97.9%
Mahankalchaur	2023/1/4 – 2023/10/4	107	6.45	1.93	2.74	0.17	97.2%
Lalitpur	2023/2/12 – 2023/8/18	38	2.80	1.49	1.43	1.10	100%
Kirtipur	2023/2/17 – 2023/9/3	19	7.25	1.83	1.50	0.04	94.7%
Tripureshwor	2023/1/19 - 2023/5/24	47	8.60	4.09	3.59	2.27	76.6%
Madhapur - Thimi	2023/1/2 – 2023/9/10	87	4.50	1.49	1.21	1.00	100%
Bhaktapur	2023/2/3 – 2023/9/29	133	16.5	5.56	4.26	1.15	64.7%

Table 3.3.16 Outline of residual chlorine of the water taps in different branches

Branch	Data collection period	Number of data	Maximum (mg/L)	Average (mg/L)	Median (mg/L)	Minimum (mg/L)	Achievement rate to NWQS
Maharajguni	2023/2/15 – 2023/9/21	47	0.82	0.28	0.24	0.12	85.1%
Chhetrapati	2023/2/16 – 2023/9/15	45	1.45	0.43	0.27	0.06	73.1%
Baneshwor	2023/3/16 – 2023/9/30	47	1.05	0.45	0.36	0.19	63.3%
Mahankalchaur	2023/1/4 – 2023/10/4	107	4.03	0.88	0.26	0.06	42.1%
Lalitpur	2023/2/12 – 2023/8/18	38	1.52	1.21	1.20	0.91	0%*1
Kirtipur	2023/2/17 – 2023/9/3	19	0.36	0.12	0.10	0.01	38.9%
Tripureshwor	2023/1/19 - 2023/5/24	47	0.61	0.32	0.29	0.16	89.4%
Madhapur - Thimi	2023/1/2 – 2023/9/10	87	0.69	0.20	0.18	0.03	66.5%
Bhaktapur	2023/2/3 – 2023/9/29	133	1.36	0.54	0.51	0.05	48.1%

Note *1: Lalitpur's residual chlorine concentration was greater than 0.9 mg/L, exceeding the standard range.

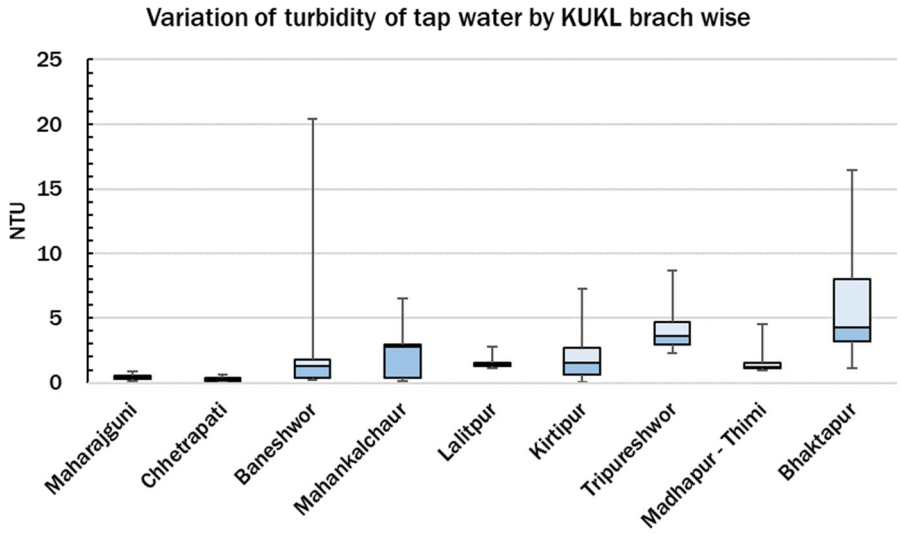


Figure 3.3.10 Outline of turbidity at the taps

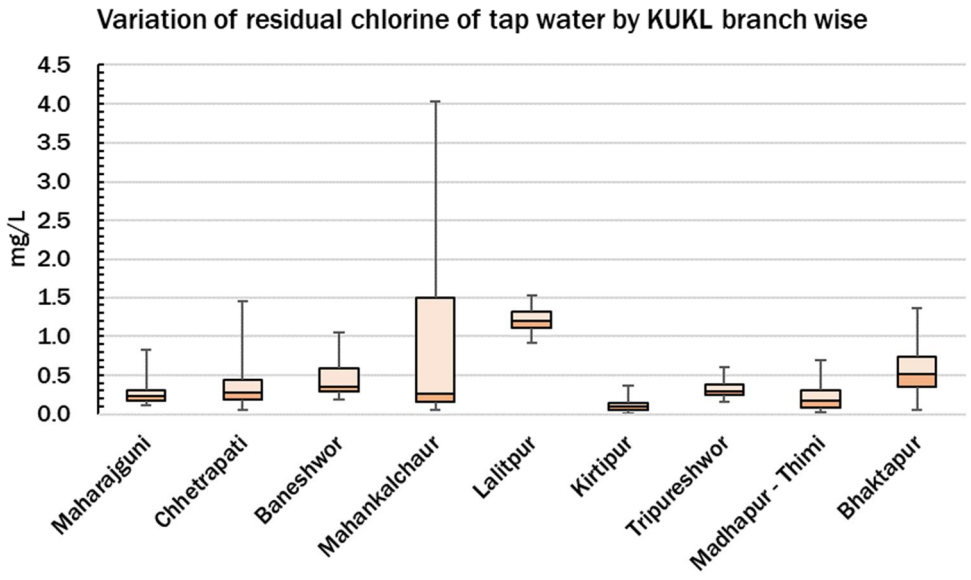


Figure 3.3.11 Outline of residual chlorine at the taps

<Activity Plan in Term-3>

(1) Water Treatment

Through the monthly meeting for reporting of operation status of WTPs attended by managerial staffs in charge of water production, chief of WTPs, staff of water quality laboratories, and staff of the Electromechanical Department, as well as quarterly monitoring committee, the status of water quality control based on the monitoring plan will be confirmed by all concerned and issues and measures will be discussed.

(2) Water Quality Control

The water quality monitoring at the water treatment plant conducted by the laboratories and the water quality monitoring at the taps conducted by the branch offices will be monitored through regularly scheduled stakeholder meetings (including online), and technical follow-up will be continued by JET.

Regarding water quality monitoring by the branch offices, the water distribution plan from The New Sundarijal WTP (date and time of water supply) has a significant impact on the implementation of the monitoring plan.

Although monitoring plans are reviewed from time to time according to water supply conditions, records of these revisions (changes in monitoring points, changes in sampling times) should be kept in the laboratories.

In addition, water quality analysts in branch offices are not in the habit of recording supplementary information (original field data, calculation process, etc.) related to water quality analysis. The project will establish a system to keep and manage various records of water quality analysis work at each branch office, because not only the results of water quality tests, but also the supplementary information behind the results will be important information when verifying the data later.

Currently, when water quality data from each branch office is reported to the central water quality laboratory, it is sent via SMS from the mobile phone of the person in charge. This is due to the fact that there is no Internet connection between each branch office and the central water quality laboratory, but even data collected in this manner needs to be managed after establishing data sharing rules.

JET has been proposing improvements to this issue since Term-1, and the central lab is gradually making improvements such as the creation of a common format. However, since Term-3 is the final phase of the project, JET will strongly encourage both the branch offices and the central water quality laboratory to further establish the improvement measures.

[Branch office]

- Make it a practice for water quality analysts to carry a field notebook with them.
- Storage of field books, data sheets, and related electronic data: It is desirable to have a dedicated person at each branch office, consider making it the responsibility of the branch office manager.

[Central lab]

- Select a person responsible for compiling, organizing, and storing water quality data
- Establish rules for data storage (e.g., rules for storing data on PCs, data formatting, data backup rules, etc.)

[Activity 3-6] Reflect the monitoring results to waler quality improvement and effective water treatment.

<Progress in Term-2>

Currently, water quality monitoring is underway at the target water treatment plants (Mahankalchaur, Bansbari and Bode) and New Sundarijal WTP.

Water quality monitoring data from the water treatment plant is reported at the monthly water treatment plant operation meeting attended by personnel from the water treatment plants, the water quality laboratories, and the Electromechanical Department, where issues related to water treatment plant operation and water quality improvement, solutions, and requests to the electrical machinery department for facility improvements are discussed.

Table 3.3.17 WTP Operation Meeting

Date	Discussed Items
19/Oct/2022	➢ Explanation of analytical results of turbidity fluctuations in raw water, settled water and treated water using the Mahankalchaur WTP operation record in Sep 2023 as an example. ➢ Report on the completion of the installation and adjustment of the PAC and Lime dosing pumps at the Mahankalchaur WTP and plans to conduct an orientation for operators.
18/Nov/2022	➢ Report on the operation of existing WTPs, operating conditions and their analysis ➢ Status of instruction to operators after improvement of chemical dosing facilities (PAC/Lime). ➢ Prospects for resumption of operation of New Sundarijal WTP.
12/Feb/2023 日	➢ Report on operation of three existing WTPs. ➢ Brief description of simplified Nepali SOP for Mahankalchaur WTP. ➢ Upcoming activities.
23/Mar/2023	➢ Report on operation of three existing WTPs. ➢ Hand-over of New Sundarijal WTP.
19/Apr/2023	➢ Report on operation of three existing WTPs and New Sundarijal WTP. ➢ Situation of water diversion from the Melamchi River. ➢ Chlorine Dosing at Mahankalchaur WTP.
16/May/2023	➢ Report on operation of three existing WTPs and New Sundarijal WTP. ➢ Operating methods of treatment plant and precautions against high turbidity of raw water in rainy season.
14/Jun/2023	➢ Report on operation of three existing WTPs and New Sundarijal WTP. ➢ On-the-Job Training in water treatment field.
17/Jul/2023 日	➢ Report on operation of three existing WTPs and New Sundarijal WTP. ➢ Agreement of establishment of the monitoring committee of WTP operation.
1/Sep/2023	➢ Change the date of the monthly report meeting according to the Nepalese calendar of driving records. ➢ Improvement of actions against high turbidity of raw water at the Mahankartur WTP, Bansbari WTP and Bode WTP.
5/Nov/2023	➢ Check the inflow of water at each water treatment plant at the beginning of the dry season. ➢ The Bode WTP and Bansbari WTP have switched to using Alum on an interim basis due to running out of PAC stock. The current facility is unable to control the proper injection volume of Alum, so the company requests the procurement of PAC as soon as possible. ➢ Rotameter for injecting bleaching powder solution has been installed in Mahankalchaur WTP, and the JICA Expert Team requests that it be installed in Bansbari and Bode as soon as possible.

<Activity Plan in Term-3>

The project continues celebrate the monthly meeting and quarterly monitoring committee for operation of water treatment plant that has been held from Term-2.

At these meetings, the staff in charge of water treatment plant, water quality laboratory, and electromechanical facilities will participate to confirm the operational status of the water treatment plants, water quality control, and problems, and to discuss solutions and requests to the Electromechanical Department in order to improve operations and maintenance.

3.3.2 Activities to be initiated in Term-3

All activities will be continued from Term-2 and no new activities will be initiated in Term-3.

3.3.3 Activity timeline related to Output 3 in Term-3

The timeline of activities related to Output 3 for Term-3 is shown below.

Table 3.3.18 Timeline of activities related to Output 3 in Term-3

Planned Activities	2024												2025												2026		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
3-1: Define the roles/responsibilities of WTPs, Branches, Head Office and laboratories in water quality control.																											
Monthly meeting on WTP operation.			●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●			
WTP Operation Supervising Committee.			●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●			
Organize water quality information and select analyst.							●																				
Development of water quality management plan.							●	—	—	—	—	—	—	●													
Approval by KUKL of Water Quality Management Plan.														●					●								
3-2: Conduct trainings on water treatment and water quality control.																											
Guidance of operation of New Sundarijal WTP.			●	●																							
Conduct TOT on operation of New Sundarijal WTP.			●	●																							
Conduct internal training on operation of New Sundarijal WTP.			●	●																							
Operation guidance for existing 3 WTPs.						●			●										●								
Conduct TOT on operation of existing 3 WTPs.						●													●								
Conduct internal training on operation of exting 3 WTPs.						●																					
Monthly meeting on water quality control.			●	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	●			
Guidance ot water quality control for staff of New Sundarijal WTP.						●								●													
Development of maintenance plan of reservoir and follow-up of its implementation.						●								●					●								
3-3: Prepare SOPs of water treatment and water quality control.																											
Revision of SOP on operation of WTPs.						●	—	—	—	—	—	—	—	●	—	—	—	●	—	—	—	—	—	▸			
Revision of SOP on water quality analysis.							●	—	—	—	—	—	—	—	●	—	—	—	●	—	—	—	—	▸			
Development of SOP for laboratory of New Sundarijal WTP and its revision.							●	—	—	—	—	—	—	—	●	—	—	—	—	—	—	—	—	▸			
Establishment of management system of SOP documents.							●								●				●								
3-4: Prepare monitoring plan of waler treatment and water quality control.																											
Formulate an operation plan in compliance with SOPs for WTP operation.														●				●									
Preparation of reservoir monitoring plan and follow-up of its implementation.							●							●	●			●	●								
3-5: Monitor the water quality based on the monitoring plan prepared in Activity 3-4.																											
Establishment of water quality monitoring data management system for branch offices and central laboratory.							●							●	●				●								
3-6: Reflect the monitoring results to waler quality improvement and effective water treatment.																											
Compliance and confirmation of WTP operation based on water quality management plan.			●			●	●	●						●	●	—	—	●	●	—	—	—	—	▸			

3.4 Detail of activity related to Output 4 in Term-3 (2024-2025)

3.4.1 Continuation/follow-up from Term-2

[Activity 4-1] Prepare a plan of customer satisfaction survey including survey design and TOR for survey company.

<Progress in Term-2>

(1) Overall plan

The customer satisfaction survey was designed and conducted to determine customer perceptions of water supply service improvements. The points to be considered in the activities are as follows.

- The 1st customer satisfaction survey was conducted during the Term-1 of activities to identify the current status of customer satisfaction and issues to be addressed to improve it. The results of this survey will serve as a baseline and will be used as the basis for evaluation indicators for this project.
- The study area was divided into about 10 survey plots so that the status of related infrastructure development projects within the Kathmandu Valley and the expression of the results of this project could be identified and analyzed.
- The size of the customer satisfaction survey was set at 100 customer per survey plots , which is a statistically reasonable sample size from each compartment, for a total sample size of 1000.
- The customer satisfaction survey was outsourced to an external consultant, but its supervision was conducted by a team of JET in collaboration with KUKL.
- In order to implement the PDCA cycle of water utility management, it is desirable for KUKL to continue conducting customer satisfaction surveys at its own resource after the project is completed. For this reason, the JICA Expert Team actively involved KUKL staff in the survey to be conducted under local re-commissioning to enhance their capacity to plan and conduct the survey.

Table 3.4.1 Overall plan of the customer satisfaction survey

Items	Contents
Timing of on-site interview	The first study: October 2021 The second study: June 2023 The third study: planed around the middle of 2025
Target area	13 areas including 11 DNI areas within the ring road
Number of sample	1000 customers of KUKL water supply service
Survey method	On-site Interview with KoBo Collect and KoBo Toolbox
Analytical policy	Detailed analysis of crosstabulations, year-to-year comparisons, satisfaction levels, etc. ➢ The survey results will be cross tabulated and analyzed by use category (household/business), water supply system, gender, age (by attribute), region (branch office), and water supply area, depending on the nature of the question. In addition, some questions will be analyzed by year-to-year comparison. ➢ The survey will be conducted on the basis of a 5-point scale ("very satisfied," "a little satisfied," "normal," "a little dissatisfied," and "very dissatisfied") for satisfaction level. Cross-tabulation among potentially relevant questions for detailed analysis of water quality and satisfaction with KUKL's efforts.
Items of questionnaire	➢ Satisfaction with water services provided by KUKL ➢ Question regarding water quality at tap ➢ Question regarding water tariff ➢ Question regarding KUKL's effort for stable water supply ➢ Question regarding water meter ➢ Question regarding communication with customers by KUKL ➢ Questions regarding matters that KUKL should undertake in the future

(2) Determination of the number of survey targets and list of questions

The survey population was defined as 1,000 customers of KUKL within the ring road, and the number of surveys was determined according to the percentage of customers in the water distribution area (DNI numbers) to be constructed by the DNI project.

Table 3.4.2 Distribution of sample size for customer satisfaction survey

No	DNI	Number of Customers in 2020	Percentage	Sample	
				The first survey in 2021	The second survey in 2023
1	DNI 1	10,713	12.2%	122	124
2	DNI 2	6,869	7.8%	78	78
3	DNI 3	11,445	13.0%	130	129
4	DNI 4	5,291	6.0%	60	60
5	DNI 5	6,350	7.2%	72	72
6	DNI 6	5,159	5.9%	59	60
7	DNI 7	15,754	17.9%	179	178
8	DNI 8	5,746	6.5%	65	64
9	DNI 9	3,238	3.7%	36	36
10	DNI 10	1,715	1.9%	19	19
11	DNI 11	4,513	5.1%	51	51
12	OHT Mimbhawan	5,348	6.1%	61	61
13	Gausala	5,971	6.8%	68	68
	Total	88,112	100.0%	1,000	1,000

Table 3.4.3 List of questions

Questions			Added items from the second survey
		<< PART I >> Water usage	
Q.	0.1	How often do you receive water from KUKL?	✓
Q.	0.2	Do you use water storage tank at home?	✓
Q.	1	How do you drink water from KUKL?	
Q.	2	How do you use KUKL water for cooking?	
Q.	3	How do you feel about the water supplied by KUKL?	
Q.	4	If you are no satisfied, why?	
Q.	5	Is the water supply distribution schedule announced in advance?	
Q.	6	How do you think about the announcement?	
Q.	7	Do you know if you have a water meter?	
Q.	8	Do you know if you have a problem with water service connections owned by customer?	
Q.	9	How much is the water tariff on average?	
Q.	10	Do you think it is expensive for the service?	
Q.	11	How do you obtain water other than water supply by KUKL?	
Q.	12	How much is the water on average? (other than water supply by KUKL)	
Q.	13	How much volume is water by KUKL within the whole water use in your house?	
		<< PART II >> Awareness	
Q.	14	Do you know the efforts for stable water supply / securing of water sources?	
Q.	15	Have you had any communication with KUKL staff within the last 12 months?	
Q.	16	What was the method of contact?	
Q.	17	What was the purpose of contact?	
Q.	18	How did you feel about the communication services by KUKL?	
Q.	19	How do you want KUKL to communicate?	
Q.	20	Have you got any information on or from KUKL within the last 12 months?	
Q.	21	If yes, how?	
Q.	22	What kind of information do you want KUKL to share?	
Q.	23	Do you know where the nearest KUKL office to communicate is?	
Q.	23.1	KUKL has a useful homepage, do you know it?	✓

Questions			Added items from the second survey
Q.	23.2	Have you used KUKL online system?	✓
Q.	24	How do you hope the services by KUKL to be improved in future?	
Q.	25	How would you rate KUKL service?	
Q.	26	Would you state your opinion, request, or anything, please?	
		<< PART III >> Interviewee's information (if possible)	
Q.	27	Name	
Q.	28	Address	
Q.	29	Period of inhabitancy	
Q.	30	Position in the family	
Q.	30.1	Main profession of the family head	✓
Q.	31	Purpose of water use	
Q.	32	Number of people using water	
Q.	33	Landlord or renter	
Q.	34	Ethnic group	
Q.	35	Religion	
Q.	36	Contact number	
Q.	37	Connection Number	
		<< PART IV >> Interviewee's information (by surveyor)	
Q.	38	Gender	
Q.	39	Age group	

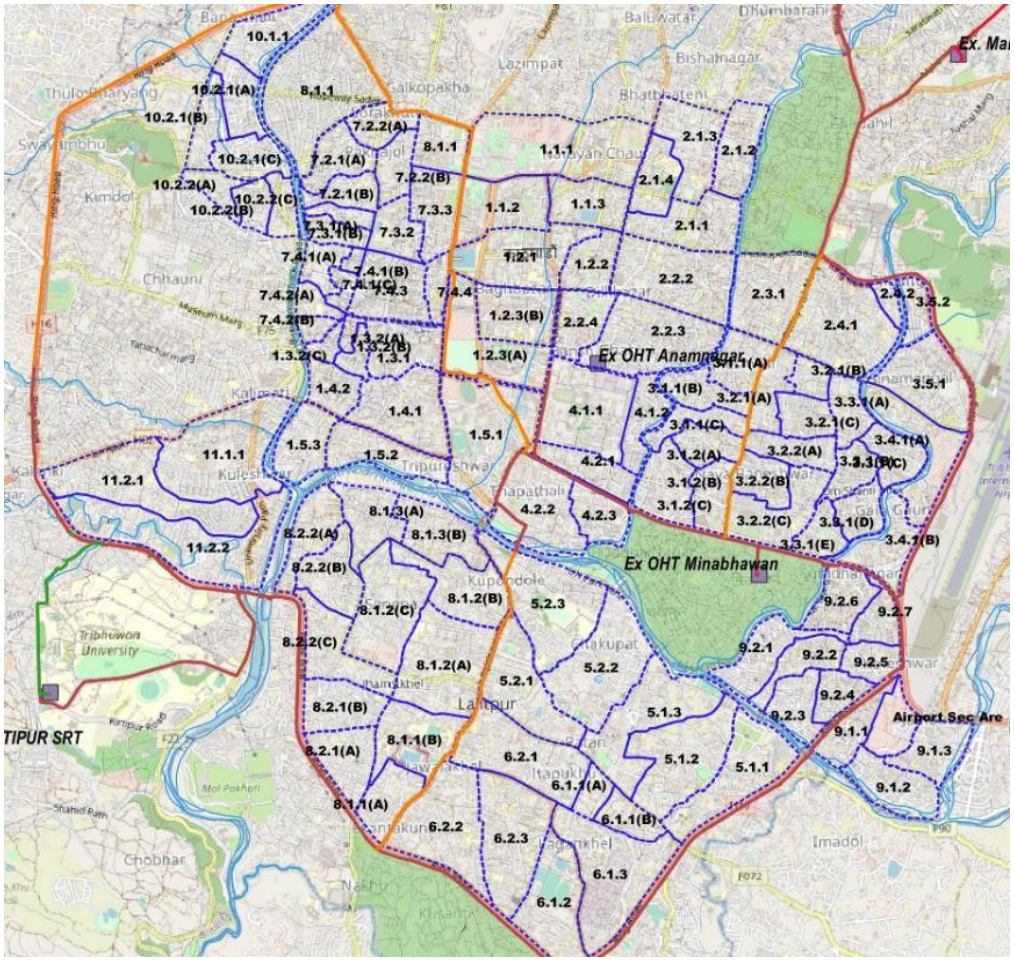


Figure 3.4.1 Target area of the customer satisfaction survey

<Activity Plan in Term-3>

The overall plan has already been prepared in Term-1. After analyzing the results of each survey, necessary revisions will be made in Term-3. As a result of the surveys up to the second survey, the following items are to be improved in the next survey.

- Add categorized choice responses to the questionnaire that categorize the reasons why customers are dissatisfied, which is important for service improvement. (So far, there have been some cases where answers were given in abstract expressions, which were not useful for the analysis. On the other hand, the open-ended response section will remain so as not to exclude non-optional opinions.)
- The number of questions in the questionnaire was increased from the first to the second round, thus increasing the burden on respondents. Based on the results of the analysis, the JICA Expert Team will consider removing unnecessary questions since there are similar questions with little difference in answers.
- In the statistical process up to the 2nd survey, C/Ps learn how to organize raw data. In the third survey, the C/Ps will conduct an orientation with the survey company, etc., and communicate specific instructions from the C/Ps to the survey company on how to better organize the data.

[Activity 4-2] Conduct customer satisfaction survey at baseline, mid- term and end-line.

<Progress in Term-2>

(1) Interview

The first interview was conducted in October-November 2021 as a baseline survey, followed by a second interview in May-June 2023, when the Melamchi Water Supply Project showed its progress.

For the second survey, stickers with online payment information and a QR code for the KUKL web page were created and distributed to increase understanding of KUKL among customers.

[Photograph] Customer Satisfaction Survey

<table>
<tr><td>  </td><td>  </td><td>  </td></tr>
<tr><td>[The first survey]
Orientation for surveyers</td><td>[The first survey]
Interview to a customer</td><td>[The first survey]
Interview to a customer</td></tr>
<tr><td>  </td><td>  </td><td> 
</td></tr>
<tr><td>[The second survey]
Interview to a customer</td><td>[The second survey]
Interview to a customer</td><td>[The second survey]
QR Code Sticker</td></tr>
</table>

(2) Aggregate processing of survey results

As a result of the survey, KUKL and JET obtained a great deal of useful information. On the other hand, it is necessary to continue this survey in the future, and it has been an issue from the beginning to be able to accurately and promptly process this enormous amount of data within KUKL as we promote the digitization of complaint-handling information, etc.

The assessment of KUKL staff competencies showed that many of the Output 4 Action Team and Supporting members were inexperienced in the use or operation of spreadsheet software (e.g., Microsoft Excel).

Therefore, in order to reduce dependence on each person's ability and to automate as much as possible, JICA Expert Team proposed the implementation of training for simple and reliable information processing using database software (Microsoft Access), which was discussed with and agreed upon by the Action Team and IT section of KUKL head office. The database software has been installed on the desktop PCs for customer care procured by the project team and provided to KUKL, and deployed at each branch office.

Training on compiling and analyzing customer satisfaction survey results using the database began in May 2022, followed by November-December 2022 and June-July 2023.

Although the C/Ps were initially perplexed by the introduction of the new technology, as they went through each training session, they seemed to realize how interesting it was to be able to process vast amounts of data as they wished, and they became more willing to participate in training sessions, even voluntarily holding training sessions.

At present, not all C/Ps are able to freely use the database, but some C/Ps have reached a level where they can instruct others, and it is expected that they will become more proficient in using the database through future activities.

As of July 2023, the project has certainly enhanced the information processing capacity of KUKL staff and has been able to train 3 TOT candidates and appoint the following responsible persons according to their aptitude from among the C/Ps who are actively engaged in the program.

Reporting Manager (1 person) :	Collect and maintain reports from all KUKL branches.
SOP Manager (2 persons):	Update and maintain SOPs.
PA Sub-Leader (2 persons):	Facilitate external public relations activities

The "PA Sub-Leader" have been selected from the supporting members for public relations activities, and the leader (PA Leader) is Ms. Chapala Dhakal, a member of Output 4 Action Team.

The status of participation in the training and achievement of goals during June and July 2023 is as follows.

Table 3.4.4 Participation and achievement of training

Output-4		Period	June – July, 2023												
Attendance & Certification		Activity	Phase-III Training Attendance /Achievement												☆:You have more to learn ★★: Certified ★★★:Trainer Candidate ★★★:Certified ★★★★:Trainer Candidate
			Regular Training				Focused Training @Ngrkt				Regular Training / Superiority				
No.	Branch	Member	01	02	03	★	04	05	06	★	07	08	★	★	
01	Lalitpur	Ambika	✓	✓	✓	★					✓	✓	★	★	★★★
02	Mahankal.	Pradeep	✓		✓	★	✓	✓	✓	★	✓	✓	★	★	★★★★
03	Baneshwr.	Chudamani					✓	✓	✓	★	✓✓	✓	★		★★
04	Kirtipur	Biswajit	✓	✓	✓	★	✓	✓	✓	★	✓	✓	★	R	★★★-R (Rep. manager)
05	MaharajG.	Geeta	✓	✓	✓	★	✓	✓	✓	★	✓	✓	★	S	★★★-S (SOP manager)
06	Tripuresh.	Matina	✓	✓	✓	★	✓	✓	✓	★	✓	✓	★	P	★★★-P (PA sub-leader)
07	Mad. Thimi	Santos			✓✓	☆	✓	✓	✓	★	✓	✓	★		★★
08	Bhaktapur	Bimala	✓✓	✓		☆	✓	✓	✓	★	✓	✓	★		★★
09	Chhetrap.	Rajeeb	✓	✓	✓	★	✓	✓	✓	★	✓	✓	★	★	★★★★
10	Sewarage	Shailendra		✓	✓	☆		✓	✓	★	✓	✓	★		★★
11	W. Quality	Binod						✓	✓	★					★
12	Head Office	Santusha	✓	✓	✓	★					✓✓	✓	★	P	★★-P (PA sub-leader)
13	Head Office	Kabin	✓	✓	✓	★	✓	✓	✓	★	✓	✓	★	S	★★★-S (SOP manager)
14	Head Office	Kaushila					✓	✓	✓	★	✓	✓	★		★★
15	Ex. Bhakt.	Rakesh		✓	✓	★	⇒Transferred to another division								★
16	Head Office	Pramila					✓	✓	✓	★	✓	✓	★		★★

[Photograph] Data Analysis of Customer Satisfaction Survey by KUKL

Practice of data handling

Training by KUKL staff (TOT)

Presentation of data analysis result

(3) Analysis of survey result

Examples of outputs obtained through training in data analysis are shown below.

1) Use of water supplied by KUKL

The question asked about the use of the water supplied by KUKL: in the 2021 survey results, about 47% of customers did not use it for drinking, while more than half drank it in some way; in 2023, the number of customers who did not use it for drinking decreased to 39%, while the percentage of customers who drank it increased.

As for whether or not they used it for cooking, the 2021 survey results show that about 67% of the customers used it in some way. On the other hand, about 33% of customers did not use KUKL water for cooking purposes either.

The 2023 survey results showed an improvement in usage, with about 87% using it for cooking

and about 13% not using it for cooking.

In addition, washing, laundry, and bathing are indicated as uses other than the above in the responses to other questions.

In another question, about 47% of the customers indicated that there were "changes related to water quality" compared to before, and many of the details suggest improvements in water quality.

Although the details of the improvement are to be analyzed in the future, it can be inferred that the main factor is the improvement in water quality after the water was distributed from the Melamchi River, rather than improvements in the operation and management of the existing water treatment plant.

Table 3.4.5 Use of water supplied by KUKL

Use	2021		2023	
	Drinking	Cooking	Drinking	Cooking
Direct	4.4%	50.6%	6.0%	72.9%
After boiling	21.2%		17.0%	
After treated by filter etc.	27.1%	16.5%	38.0%	14.3%
No use for drinking/cooking	47.3%	32.9%	39.0%	12.9%

2) Water sources other than water supply by KUKL

Customers were asked about their use of water sources other than KUKL, with "Jar water" being the most common source in both 2021 and 2023, followed by private vendors or self-supplied water sources (wells).

"Jar water" is served in 20L bottles, as shown in the photo below, and is commonly used with servers. The decrease in the total number of respondents is interesting in combination with the increase in the use of KUKL-supplied water as described in the previous section.

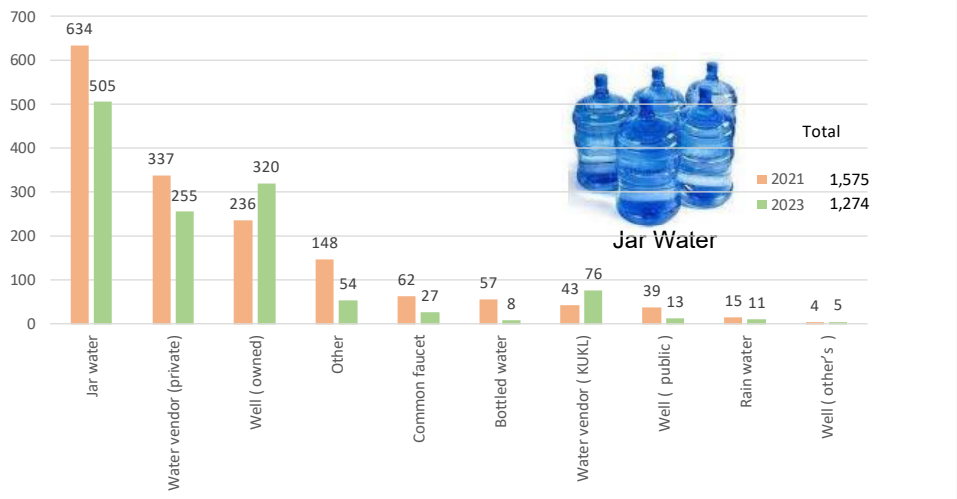


Figure 3.4.2 Water source other than water supply by KUKL

3) Customer satisfaction and sufficiency rate of KUKL supply KUKL water supply in domestic demand

Customer satisfaction is almost perfectly proportional to the average value of the sufficiency rate (rate of KUKL water supply to domestic water demand).

It is clear that when the in-home demand is satisfied by expanding the KUKL water supply, customer satisfaction improves in proportion to this increase.

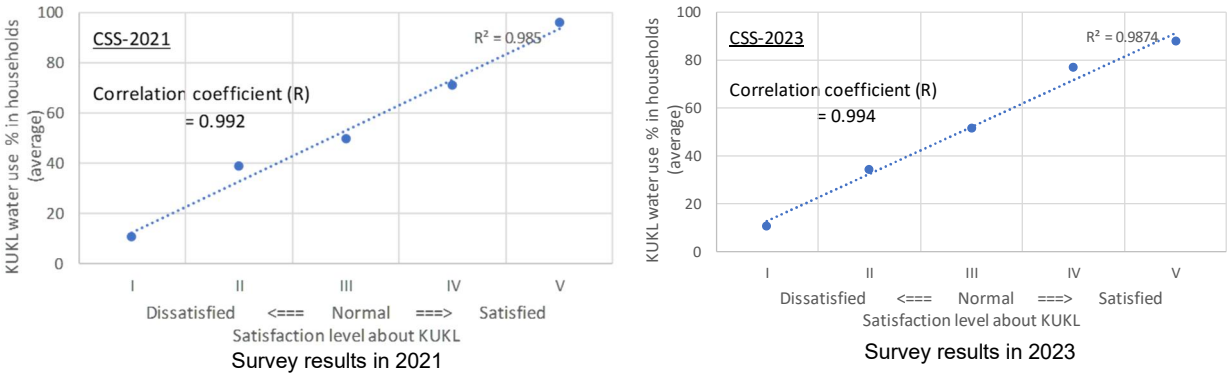


Figure 3.4.3 Relation between customer satisfaction and sufficiency rate of KUKL water supply in domestic demand

4) Satisfaction with KUKL water supply in terms of water quality

In the customer satisfaction survey, GPS location information of the water supply service area is also recorded, allowing cross-analysis with responses to water quality and other questions.

Changes in satisfaction with water quality in the first and second surveys were organized and plotted on a map based on geological information, as shown in the figure below., which provides some understanding of regional characteristics such as water quality. The results of the 2023 survey are still being analyzed.

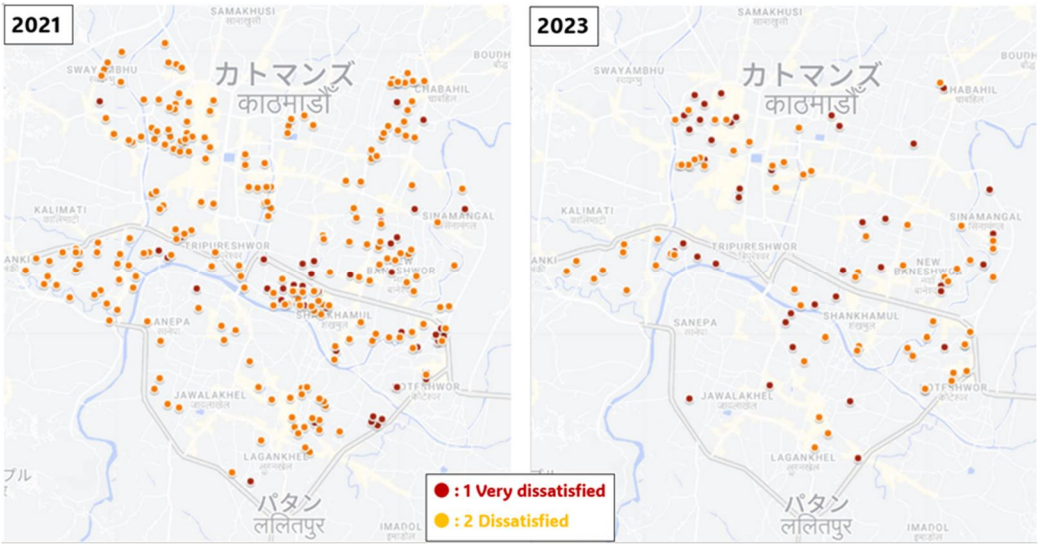


Figure 3.4.4 Distribution of customers who reported dissatisfaction with water quality

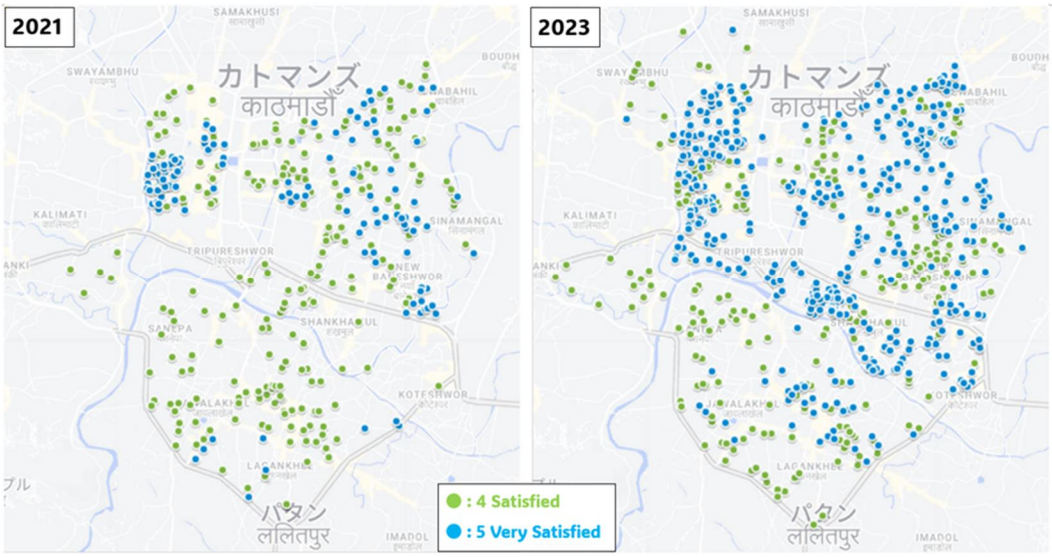


Figure 3.4.5 Distribution of customers who reported satisfaction with water quality

5) Customer satisfaction with overall service of KUKL

The horizontal axis shows I (very dissatisfied) to II (a little dissatisfied), III (normal), IV (a little satisfied), and V (very satisfied), and the vertical axis shows the number of responses from among 1,000 respondents. 2021 and 2023 peaked at IV (a little satisfied) for both years.

On the other hand, the responses seen in I-III in 2021 decreased in 2023, while the responses in IV and V increased markedly, indicating that customer satisfaction is steadily improving.

As mentioned above (Figure 3.4.4), customer satisfaction is strongly correlated with water supply (the percentage of KUKL supply water sufficiency within customer households) (correlation coefficients of 0.992 (2021) and 0.994 (2023)), so the increase in water supply due to the Melamchi Water Supply Project is assumed to be the direct reason.

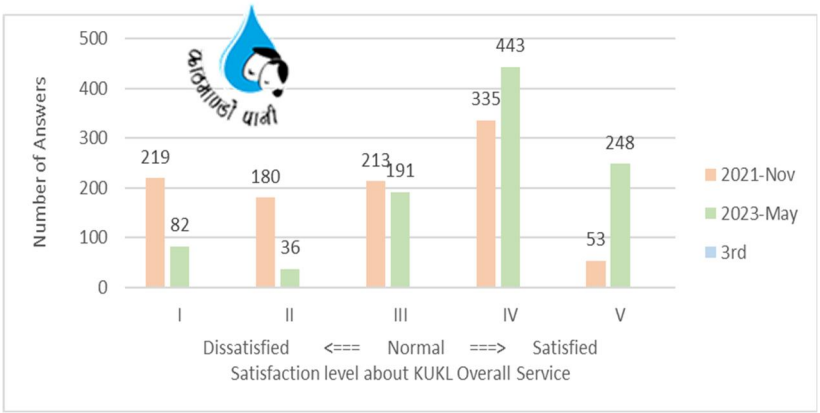


Figure 3.4.6 Customer Satisfaction with overall service of KUKL

6) Customer satisfaction with customer attention (telephone)

The peak of satisfaction with telephone attention moved from III (normal) to IV (a little satisfied), indicating a trend toward improvement in telephone service. In addition, the total number of responses decreased from 113 in 2021 to 48 in 2023.

According to the C/P, this may be due to the fact that "after the water supply from Melamchi started in earnest, the number of complaint calls has definitely decreased."

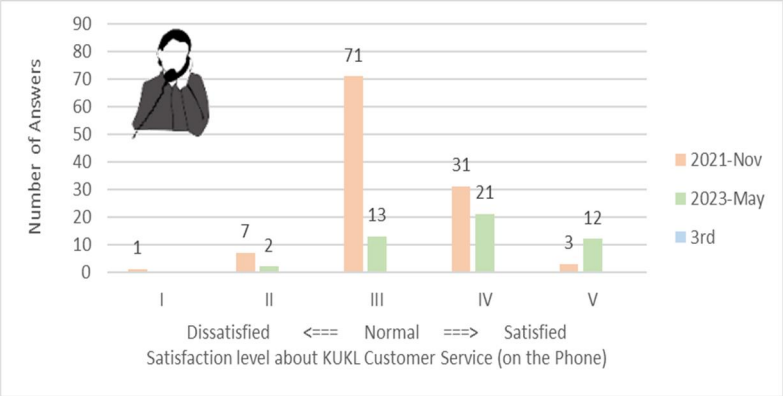


Figure 3.4.7 Customer satisfaction with telephone attention by KUKL

7) Customer satisfaction with customer attention (face-to-face)

According to the C/P, it was noted that communication with customers in the field has increased as water supply from Melamchi has begun in earnest and more work has been done to check water meters, register new customers, etc.

It is also desirable to note that most of the responses to the on-site customer service were IV-V. Based on these results, JICA Expert Team suggested that the Customer Service Report be shared within KUKL and that regular meetings with the PID be established.

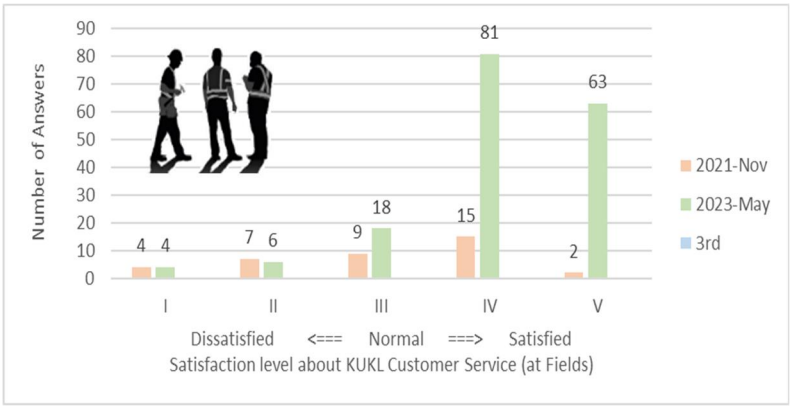


Figure 3.4.8 Customer satisfaction with on-site attention by KUKL

8) Sufficiency of KUKL water supply for domestic demand

As shown in the chart below, the number of customers who reported 100% sufficiency of KUKL water supply doubled. Figure 3.4.11 shows the distribution by water distribution area and Figure 3.4.12 shows the distribution of customers based on GPS information. The realization of the Melamchi Water Supply Project and the results of this JICA technical cooperation project activities can be visually confirmed.

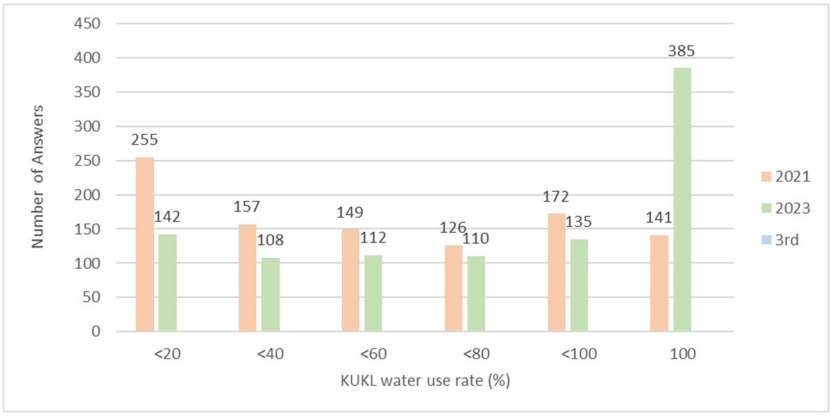


Figure 3.4.9 Sufficiency of KUKL water supply for domestic demand

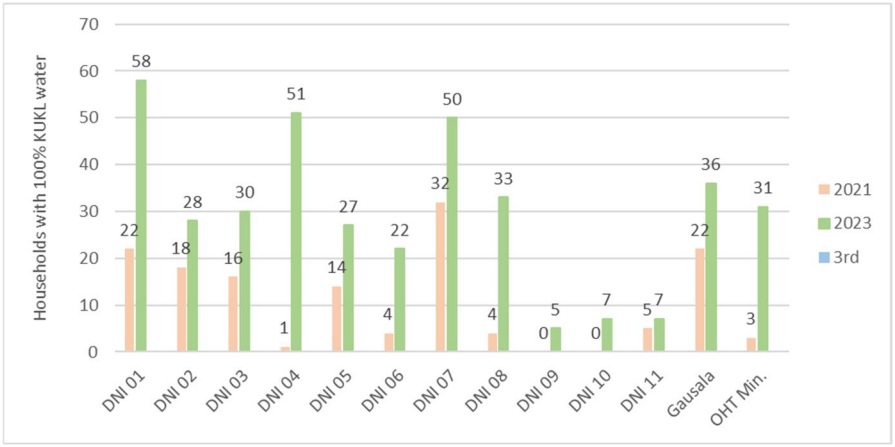


Figure 3.4.10 DNI number to which the customer belongs that responded with 100% sufficiency of KUKL water supply

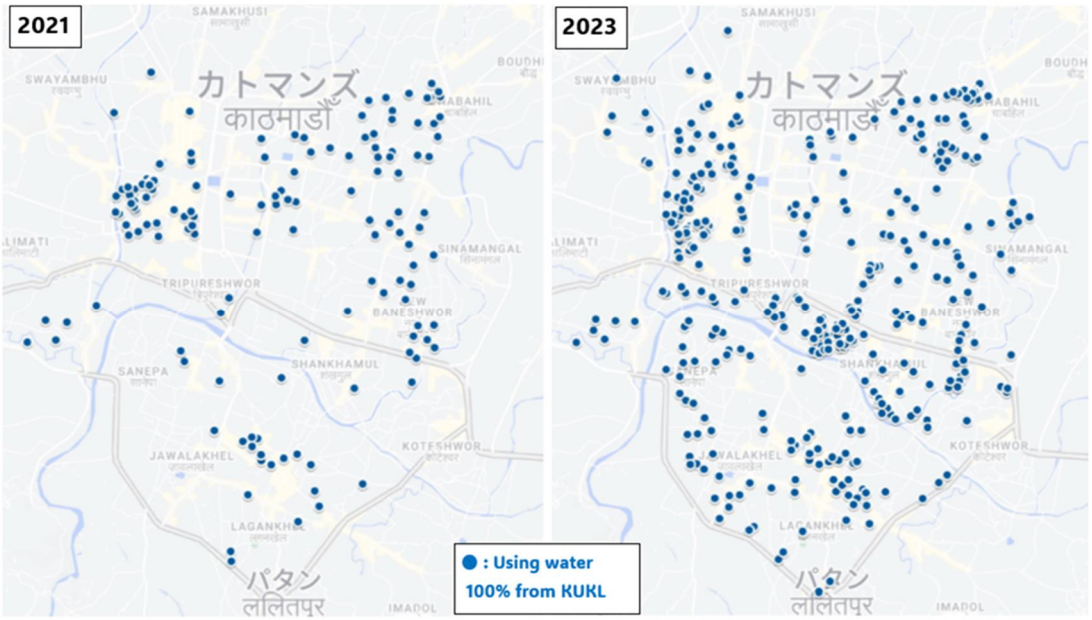


Figure 3.4.11 Distribution of customers who responded with 100% sufficiency of KUKL water supply

9) Level of use of online systems

As shown in the chart below, there are few users of online services other than fee payment. Since a certain number of respondents answered "Yes" to the question about the fee payment system, Figure 3.4.14 shows the breakdown of these respondents by age group. The number of "Yes" responses peaked among those in their 40s, but declined among those in their 50s and above, despite the relatively high number of responses. On the other hand, the number of "Yes, I would like to use it" responses was a constant across generations, and JICA Expert Team and KUKL plan to continue the promotion in the future.

Looking at the responses to the question "Usage of Online Systems," which was added to the question for the first time this time, it can be seen that the number of users is steadily increasing for the rate payment system (to be launched in January 2022). On the other hand, the number of users of the grievance system and the self-metering reading system is low, indicating the need for further discussion on how to improve these systems.

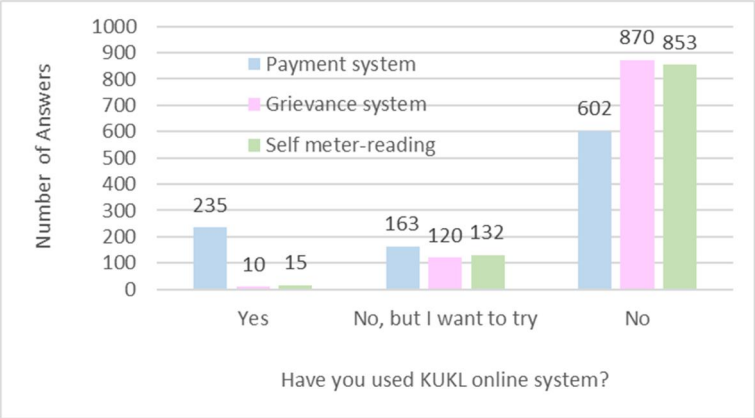


Figure 3.4.14 Experience using KUKL's online system

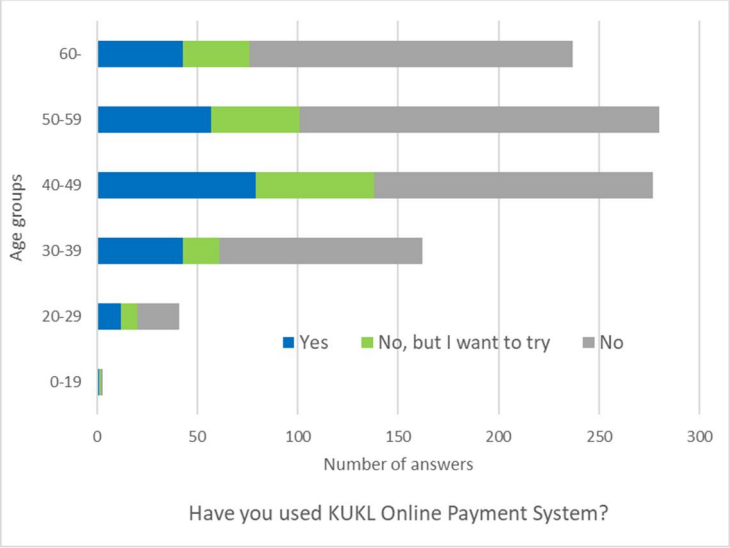


Figure 3.4.15 Breakdown by age of respondents for online payment system

<Activity Plan in Term-3>

The third survey is scheduled to be conducted in November 2024. This period corresponds to the beginning of the dry season, and water supply from the New Sundarijal WTP is expected. Since the first phase of the survey was also conducted around November, it will be easy to compare and analyze the survey results before and after water supply from Melamchi. The second survey was conducted in May, making it possible to compare seasonal differences.

[Activity 4-3] Prepare a plan for measures to improve customer satisfaction.

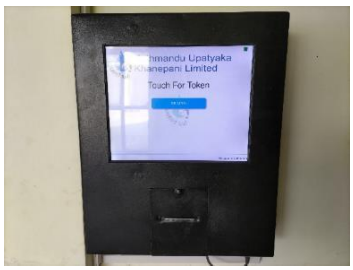
<Progress in Term-2>

As of July 2023, work is in progress to compile the analysis results of Activity 4-2 and Activity 4-7 into a report as Activity 4-8. An action plan is being drafted based on this report.

On the other hand, KUKL itself has gradually begun activities to improve customer service, and has improved the posting of information about visiting customers at each branch office. In addition, the introduction of a token system at each branch office counter is also being carried out with KUKL's own budget.

Customers press a button on the machine, receive a number slip, and wait until their number is called. Since the number currently being handled is displayed, there is no longer a need to wait in long lines at the counter, which is a great improvement in terms of customer service.

[Photograph] Measures to improve customer contact at branch offices

		
Customer call number	Token machine	Counter of Tripureshwor Branch

<Activity Plan in Term-3>

Statistical processing of the results of the 1st and 2nd customer satisfaction surveys and their detailed analysis were conducted for KUKL staff as on-the-job training. In the latter half of Term-2, KUKL began organizing the results of the analysis and formulating an action plan to apply them to customer service improvement. In Term-3, based on the results of the third customer satisfaction survey, the action plan being formulated together with the C/P will be reviewed.

The customer satisfaction survey also records the location of the water supply service area, enabling cross-analysis with the responses to water quality and other questions. This enables cross-analysis of responses to water quality, etc. Regional characteristics of water quality, etc., are identified to some extent, and information is also shared with Output 3 Action Team.

The results of such analysis can be used as a factor in selecting sampling points for water quality inspections at taps conducted by each branch office. In addition, by conducting fixed-point observations, it would be possible to evaluate the effectiveness of water service improvements in terms of both water quality items and customer satisfaction.

In addition, the last two customer satisfaction surveys, conducted before and after the Melamchi water supply, mapped the improvement in water supply conditions by KUKL. Satisfaction was also found to have increased accordingly.

The third survey is scheduled at the same time as the first survey, which will allow for even more accurate comparisons and is expected to be useful for updating the Action Plan.

[Activity 4-6] Prepare an activity plan for data management utilizing the Customer Grievance Module, analysis of customer complaints and improvement of customer care management.

<Progress in Term-2>

Through the activities of Term-1, the contents of the grievance handling system, its operational status, and issues related to customer service were clarified.

In the future, it will be necessary to address issues and improve customer response management while utilizing the complaint handling system in the activities led by Output 4 Action Team. Discussions were held with the Action Team regarding activities for this purpose, and the following items were raised.

Table 3.4.6 Proposed activities for improvement of customer relations management

No.	Activity
1	Analyze the reasons of low access to Grievance Management System (GMS) and consult for improvement
1-1	Review & Update the interface for customers in GMS
1-2	Public Awareness (access promotion)
2	Identify obstruction in internal system and GMS and suggest countermeasures
2-1	Consult on introduction of additional function (e.g. Tracking system)
2-2	Consult on necessity of prompt evaluation (by customer)
3	Improve the PC operation skills for KUKL staff
4	Consult on utilization of provided PC for conventional reception of grievance (at branch front desk & telephone)
5	Reflect the result of Customer Satisfaction Survey
6	Organize, Manage & Analyze accumulated data in GMS
7	Review customer management and revise
8	Systemize internal reporting system
9	Consult on information disclosure
10	Public Awareness (appeals to customers)
11	Check & Action of revised version

Activities No. 1 and No. 2 (above-mentioned) were implemented after January 2022, when the first proposal was discussed. As a result, sub-items No. 1-1, 1-2, 2-1, and 2-2 were proposed as specific proposals and implemented through February of the same year. Other activities were implemented in the second and subsequent term.

The online application system for customer's grievance, which has been in operation since around December 2021, was initially not user-friendly, so the interface was improved as an Output 4 activity, and access promotion to the KUKL web page was also conducted.

JET provided their impressions of the interface, and then the C/P proposed improvements, which were added, changed, deleted, etc., with the cooperation of the IT Section. The following is an example of the improvement work on some of the files that were actually used.

Table 3.4.7 Example of improvements process to the customer grievance handling system

Table-1' Reorganization of Grievance Module in KUKL HP

No.	Category	Sub Category	To be clarified (Kimura didn't understand)	
1. →	Interruption in supplies	Due to failure of ~~pumplift~~	Lift => Pump?	
2. →		Due to breach of ~~pipeline~~~~canal~~	Canal => pipeline?	
3. →		Due to damage in valve		
~~3.~~4. →		Any other reason		
~~4.~~5. →	Quantity ~~in supply~~	Interruption/leakage due to individual supply/line breakdown	individual supply => service connection?	
~~5.~~6. →		Interruption/leakage due to breakdown in the source/mains	(of KUKL)	
~~6.~~7. →		Insufficient quantity ~~viz a viz standards~~	Standard? Average? Others nearby?	
8. →		Time of supply	(Midnight)	
9. →		Intermittence of supply		
~~7.~~10.	~~Quantity and~~ quality	Deteriorated quality caused by WTP~~Inadequate supply~~	Meaning?? (deteriorated quality caused by WTP??, not contaminated through pipeline↓)	
~~8.~~11.	~~→~~	Deteriorated quality caused by pipelines~~Contaminated supply~~	(quality)	
~~9.~~12.	~~Quantity of supply~~	Deteriorated quality of ground water~~Untreated supply~~	Ground water?	
~~10.~~1.	~~→~~	~~Treated supply (Turbid, bad taste, & odour, any other)~~	~~Asking about quality?~~	
~~11.~~1.	Meters	Damaged		
~~12.~~1.	~~→~~	Defective		
16. →		Different from billing		
~~13.~~1.	Bills	For bills where additional information from the field relating to correctness of readings etc is required	(Different from meter)	
~~14.~~1.	~~→~~	For bills where no additional information from field is required		
19. →		Online payment		
~~15.~~2.	~~Grant of permission for use~~	~~Grant of permission for use of water from irrigation works~~	~~Personally possible?~~	

In the July 2023 activity, JET and KUKL examined KUKL internal documents regarding the online system, which still has a slow growth in the number of users.

The figure below shows that the number of users increased in early 2022, when the KUKL web page access promotion was implemented in the activities of Outcome 4, but that access has not been maintained since then.

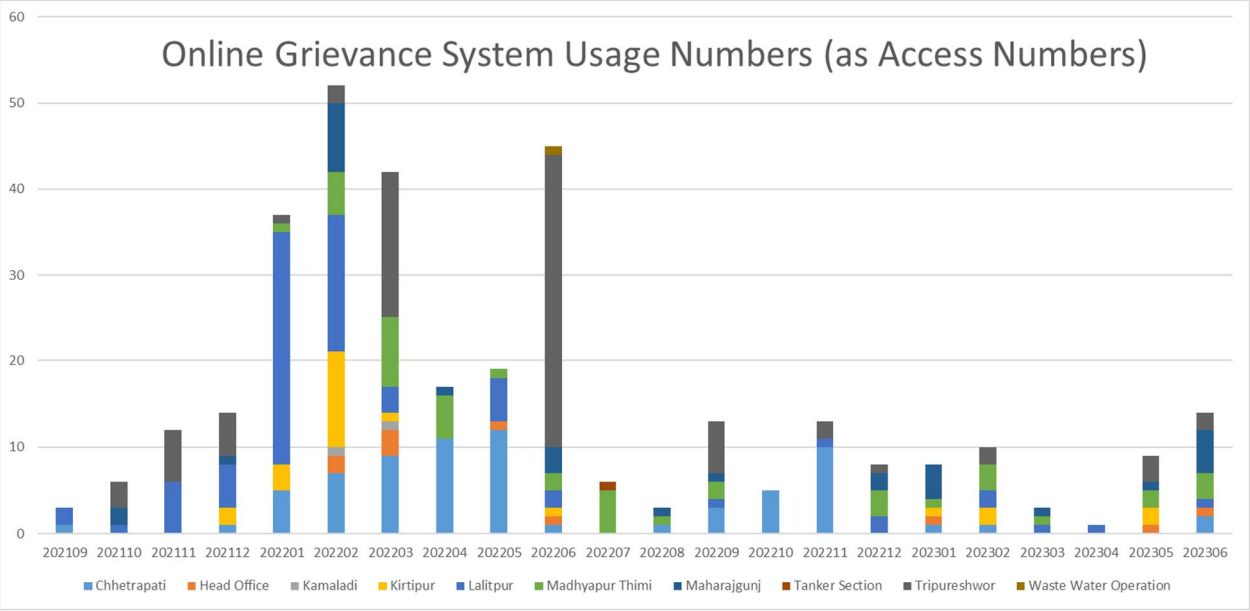


Figure 3.4.16 Level of use of online grievance system

The chart shown below is the status of processing by KUKL in our system. The horizontal line is the branch office, the line to the back is the processing process, and the numbers represent the status stopped at that stage.

The front of the chart shows the reception stage, and the innermost shows the state of resolution. This distribution favors the situation closer to the back, but many branches have been put on hold. The second from the left, Chhetrapati branch office, is in a relatively good condition.

This situation may have led to user dissatisfaction and a decrease in the number of users of the online system, and was addressed at the meeting of Output 4 Action Team, and also in the report in Activity 4-8.

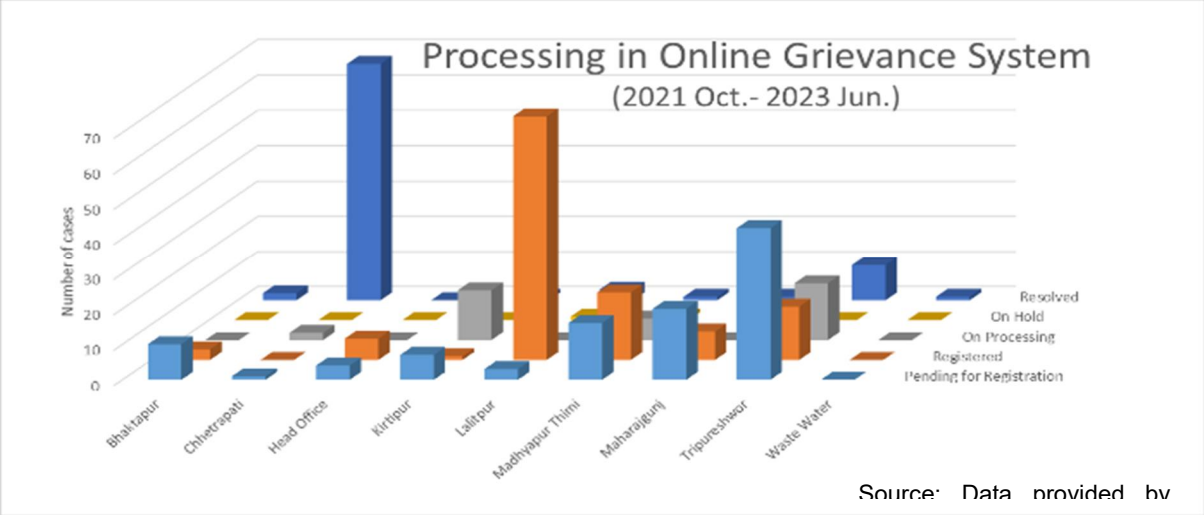


Figure 3.4.17 Status of grievance handling process by branch office

<Activity Plan in Term-3>

The activities identified in Activities 4-5 (Term-1) have been under continuous implementation since the beginning of Term-2.

The activity plan developed early in Term-2 was revised by the C/P in the second half of Term-2 through finding through activities and parallel customer satisfaction surveys.

The JICA Expert Team will support the establishment and ongoing implementation of a system to ensure that activity plans are regularly reviewed in Term-3.

[Activity 4-7] Analyze the customer complaints.

<Progress in Term-2>

At the start of the project, all record keeping of grievance information was done on paper, which did not allow for analysis of grievance information.

In June 2022, the project started to compile and analyze the results of grievance and requests, using the inputted information, and this activity is still ongoing.

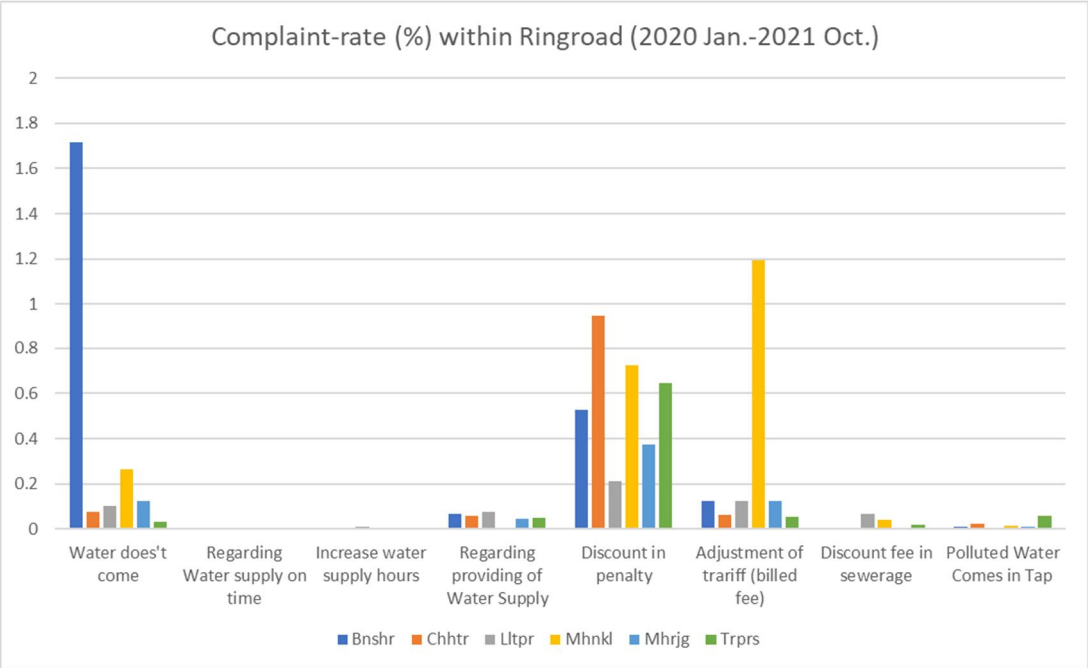


Figure 3.4.18 Percentage of grievance
(No of grievance/No of customers in branches within the ring road (%)

<Activity Plan in Term-3>

JET is currently supporting the systemization of complaint information processing to prepare for future increase in the number of grievances and diversification of their grievance contents.

At the start of the project, all grievance information was recorded and managed in paper form, but the information is now being digitized using desktop PCs provided by the project.

It should be noted that the use of the online grievance handling module has not yet grown, and the majority of grievances are handled by face-to-face at each branch office.

In Term-2, the JET and C/Ps began using this data to compile and analyze grievance and request response records. In Term-3, this activity will be continued, and support will be provided by the JICA Expert Team to improve the skills of direct input into PCs at the counter.

In addition, in Term-3, to increase the number of users of the online grievance handling module, guidelines, including updating the system, will be finalized and reflected in the Action Plan.

As shown in Figure 3.4.19 of Chapter 3, " Level of use of online grievance system" the use of the online system temporarily increased due to the polo motion accessing the KUKL website.

However, since then, the number of grievances has been decreasing, and this is partly due to the fact that KUKL itself does not respond promptly to grievances filed online. Therefore, this measure will be included in the Action Plan.

Furthermore, complaint information obtained through the system will be organized from the following perspectives, and training will be conducted for each process.

① Classification and categorization

② Analysis（e.g., whether the problem is related to the operation of KUKL, a one-time problem, or a potentially recurring problem）

③ Planning measures

At the same time, JET will support KUKL in adapting as careful a response as possible referring to Japanese good practice.

Example in Tokyo Metropolitan Bureau of Waterworks

- **Complaints and customer feedback are categorized.**
- **Complaints and requests are published in monthly and annual reports.**
- **A committee headed by the director general takes up problems, discusses and analyzes them, and assigns solutions to the respective departments.**
- **The responsible department will explore, propose, and implement solutions.**

[Activity 4-8] Report the results of analysis on customer complaints to KUKL management.

<Progress in Term-2>

In Term-2, a reporting system was introduced on a trial basis using the outputs obtained through the training. In this reporting system, each CP of Output 4 submits a written report to a higher level within the organization (e.g., branch director) for approval (signature) and reports to the KUKL Head Office.

In December 2022, a pilot reporting system was implemented using the results obtained through the training for Output 4. As of July 2023, a customer service report reflecting the results of the second customer satisfaction survey has been prepared and reporting is ongoing using the reporting system.

In this reporting system, each C/P of Output 4 submits a report prepared by the C/P to a higher level within the organization (e.g., branch director), which is then approved (signed) by the branch director and others and reported to KUKL headquarters (currently Mr. Prakash Rai, Output 4 Leader). Currently, the reporting system is used on a voluntary basis at the Head Office, seven branch offices, and the Wastewater Operation Division.

At the end of Term-2, discussions were initiated to institutionalize this reporting process.

However, to date, there has been no formal adoption of this reporting process within KUKL, and it has been implemented on an individual basis by C/Ps who are actively involved in the training of Output 4. This improvement has been discussed at Action Team meetings and in discussions with the CEO, and is making progress toward becoming established and institutionalized.

As the next step, based on the reports from each branch, KUKL is planning to hold a plenary meeting at the upper levels of KUKL to create a forum for discussions on matters that require KUKL-wide or external measures.

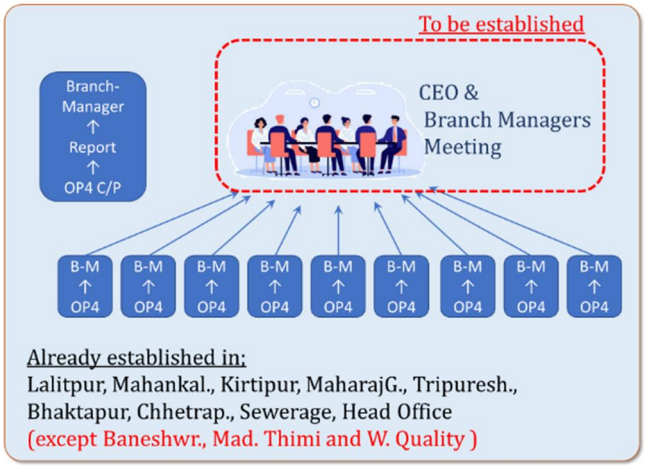


Figure 3.4.19 Reporting system of grievance handling

<Activity Plan in Term-3>

In Term-3, the committee will hold meetings (chaired by the CEO and including technical staff) based on reports from each branch, etc., with the aim of establishing and institutionalizing this process. At this meeting, JET will then assist KUKL in discussing the need for a response as a whole or external measures, and also propose the publication in the KUKL Annual Report of information on complaints, the results of their analysis, and the decisions made by the Committee.

[Activity 4-9] Conduct trainings on customer care (how to behave to customers) targeting for staff in charge or customer care and meter readers.

<Progress in Term-2>

In order to begin training related to customer service, a meeting was held in July 2022 to discuss communication problems that have been experienced. The purpose of this meeting was as follows.

- C/Ps from each branch office participating as support members review the status of communication with customers at the branch office level.
- Improvements noticed by C/Ps and experts will be incorporated into future training materials.

The JICA expert team prepared training materials suitable for the current situation in Nepal, referring to training materials utilized by the Tokyo Metropolitan Bureau of Waterworks and materials published by AWWA (American Water Works Association). These materials will be used in future internal training sessions.

The following materials were proposed and presented by the experts as teaching materials.

- Presentation document for Customer Care
- Participatory training materials
  - ① Group Discussion Themes: Good service and Bad service
  - ② Mock Debate Themes: Agree or Disagree about wearing uniforms
  - ③ Case Study Themes: Learning from Failures
  - ④ Roll Playing Themes: Meter Reader versus Customer at site
- Q&A Case Book

In addition, it was confirmed that the training materials need to be updated through repeated exchanges of opinions with C/Ps, as it is most important to make the content in line with Nepalese conditions, taking into consideration the differences in social environment between Nepal and Japan.

In relation to this activity, the parties concerned agreed that Ms. Chapala Dhakal will be the leader of this training-related activity and Mr. Chet Bahadur Ayer, will be the deputy leader, considering the activities after the project is completed or in the absence of Japanese experts.

(1) Preparation for TOT

In Output 4 Action Team Meeting held on June 12, 2023, the TOT course on Customer Care Training was proposed by JICA Expert Team and the contents was agreed by all participants.

The training course for meter readers, which will be required as internal training in the future, will be arranged based on the General Customer Care training course.

As with the GIS training in Output 1, group training at the NWSSTC managed by DWSSM was made possible by borrowing the NWSSTC, so the session of first two days of the training schedule were conducted at the project office, and that of the last two days were conducted at the NWSSTC as group training with overnight stays.

Table 3.4.8 Outline of TOT for Customer Care

Item	Contents	
Objective	Acquire training skills to improve customer satisfaction.	
Period	Training in the Project Office: 20-21 June 2023 Training camp at NWSSTC: 3-4 July 2023	
Type	Lecture and Group Work	
Trainer	Overall supervision and guidance: Mr. Yoji Matsui	
Target	Section in charge of customer service at Head Office and Branches	
Program	Day 1	[14:30～15:30] Review the last year's activities (Customer care training in Tokyo) Understand basic concept of customer care in water utilities and ToT schedule [15:30～16:30] Group discussion: Experience group discussion and learn the process of facilitating it
	Day 2	[14:30～16:40] Group work: Understand some methods of training for customer care. Experience group work and learn the process of facilitating it 1. Group Discussion, 2. Debate, 3. Case Study, 4. Role playing [16:40～17:00] Facilitator's Role: Learn some tips for facilitating group work
	Day 3	Learn and discuss training materials: Understand the contents of training material and modify it suitable for KUKL.
	Day 4	Test, Presentation Practice Certificate

(2) Details of TOT for Customer Care

1) Day 1

JET and participants first reviewed the discussions at the July 2022 meeting, and then confirmed how to proceed with this TOT based on the training for customer applied in the Tokyo Metropolitan Bureau of Waterworks.

Then, group discussion-type training was conducted as a preparation for the participatory training scheduled for Day 2 onward.

- Discussion of three basic questions about customer care:
  - ① Who is customer ?
  - ② What customer want ?
  - ③ What happen if mishandle ?
- Individual study ⇒ Group discussion ⇒ Group summary ⇒ Presentation by group wise ⇒ Overall discussion

2) Day 2

Support members of Output 2 participated as trainees in four types of participatory training.

- Group Discussion Training

  The participants discussed the difference between "good service" and "bad service," referring to examples from supermarkets and restaurants, and reflecting on the actual situation at their own branch office counter.

- Debate Training

  Theme: Do you need a uniform?

  Uniforms were distributed in KUKL before, those but are rarely worn. The discussion was divided between those in favor and those opposed to this situation.

- Case Study Training

  The participants picked up incidents that were likely to occur at the branch office, and discussed and presented the following three points: (1) measures to control the incidents that were occurring, (2) causes of the incidents, and (3) measures to prevent the incidents from occurring.

- Roll Playing Training

  Two participants recreated the communication between a meter reader and a customer that occurs at a meter reading site. Based on a scenario prepared in advance, a more realistic exchange was developed by the participants.

After a series of training sessions, the JICA expert explained the points to be noted as Facilitator.

The participants' impression of each participatory training program was positive and showed a sense of active participation. The participants were also familiar with the discussions and presentations, and their understanding of the process of each type of training seemed to be high.

3) Day 3

Basic training was completed by Day 2, and on Day 3, the content of the previous training was arranged to suit the actual situation at KUKL. Participants were divided into groups, each group was assigned a theme, and the training materials (PowerPoint slides) were revised through discussions.

After that, the JICA expert explained the non-verbal expressions required for the instructor role, and the participants were assigned to self-study in their lodgings in preparation for the practice test (for all participants) scheduled for the fourth day of the training.

The practice test focuses on seven points: eye contact, gestures, hand movements, movement around the podium, high and low voice, loud and quiet voice, and slow and fast speech speed.

4) Day 4

On Day 4, as the final stage of preparing training materials for customer care in line with KUKL's operations, the participants prepared Nepali PowerPoint slides for KUKL's internal training, based on the content discussed up to the previous day. Since it takes time to complete the slides in Nepali, the participants will continue working on their own assignments after the training.

Next, a paper test was administered to test their understanding of the content of the training material. Since the questions were asked in English and the answers were written in Nepali (not multiple-choice), the scores ranged from 15.25 to 4.0 points on a 20-point scale, with an average score of 7.88 points, resulting in a wide range of evaluation points.

However, the test questions provided an opportunity to review the content of the training material again, and the participants took the material very seriously, suggesting that the initial objective was achieved.

At the end of the session, as previously announced, a non-verbal expression practice test was conducted. The participants enjoyed themselves and actively participated in the test, which proved to be a good experience for them to check their own ability to express themselves.

[Photograph] TOT for Customer Care

		
Orientation of TOT	Presentation after Group Discussion	Explanation about Roll Playing Training
		
Pseudo-communication with participants playing the roles of meter reader and customer	Closing remarks by Deputy CEO, Bijay Timilsina	Awarding of Certificates

Table 3.4.10 Participants in TOT for Customer Care

No	Name	Organization	Position	Day 1	Day 2	Day 3	Day 4
1	Ms. Geeta Pokhrel	Maharajgunj	Admin. Officer, Level 7, Admin.	✓	✓	✓	✓
2	Ms. Matina Shakya	Tripureshwor	Admin. Officer, Level 7, Admin.	✓	✓	✓	✓
3	Ms. Shantusha Kaspal	Head Office	Asst. Computer Officer, Level 6, Admin.	✓	✓	--	--
4	Mr. Chudamani Luitel	Baneshwor	Asst. Admin. Officer, Level 6, Admin.	--	--	✓	✓
5	Mr. Santos Raj Ojha	Madhyapur-Thimi	Assistant Administration (Level - 4)	（✓）		✓	✓
6	Mr. Binod Kumar Oli	Water Quality	Assistant Administration (Level 4)	--	--	✓	--
7	Mr. Bishowjit Bhandari	Kirtipur	Assistant Administration (Level 4)	✓	✓	✓	✓
8	Mr. Rajeeb Kumar Singh	Chhetrapati	Assistant Administration (Level 4)	✓	✓	✓	✓
9	Mr. Pradeep Chapagain	Mahankalchaur	Assistant Administration (Level 4)	✓	✓	✓	✓
10	Mr. Rakesh Chaudhary	New Sundarijal	Asst. Account, Level -4, Admin.	✓	✓	--	--
11	Mr. Shailendra Shresths	Wastewater	Senior Assistant -5	--	✓	✓	--
12	Ms. Ambika Bogati	Lalitpur	Admin. Assistant - 4	✓	✓	--	--
13	Mr. Kabin Dhwaj Adhikari	Head Office	Senior Assistant -5	✓	✓	✓	✓
14	Ms. Bimala Khadka	Bhaktapur	Senior computer operator	(✓)	✓	✓	✓
15	Ms. Kaushila Bhandari	Head office	Office Assistant	--	--	✓	✓

<Activity Plan in Term-3>

Regarding customer service training, basic training was almost completed by the end of Term-2, and the project will shift those trainings from TOT stage to the internal training stage in Term-3. A Nepali version of the PowerPoint materials for lectures was prepared in Term-2. In Term-3, this material will be revised to incorporate KUKL case studies, and will be used in the internal training.

In addition, while the TOT in Term-2 has focused on strengthening the knowledge required for lecturers, the selection of lecturers will also incorporate an evaluation of their practical customer service experience, as its experience is also considered essential for the actual role of lecturer.

In setting up the training modules, the course on customer relations for the general public that was conducted in Term-2 will be arranged for meter readers, and necessary content will be built for each theme, such as data processing, analysis, and awareness-raising activities.

Training courses and modules related to Output 4 are planned as follows.

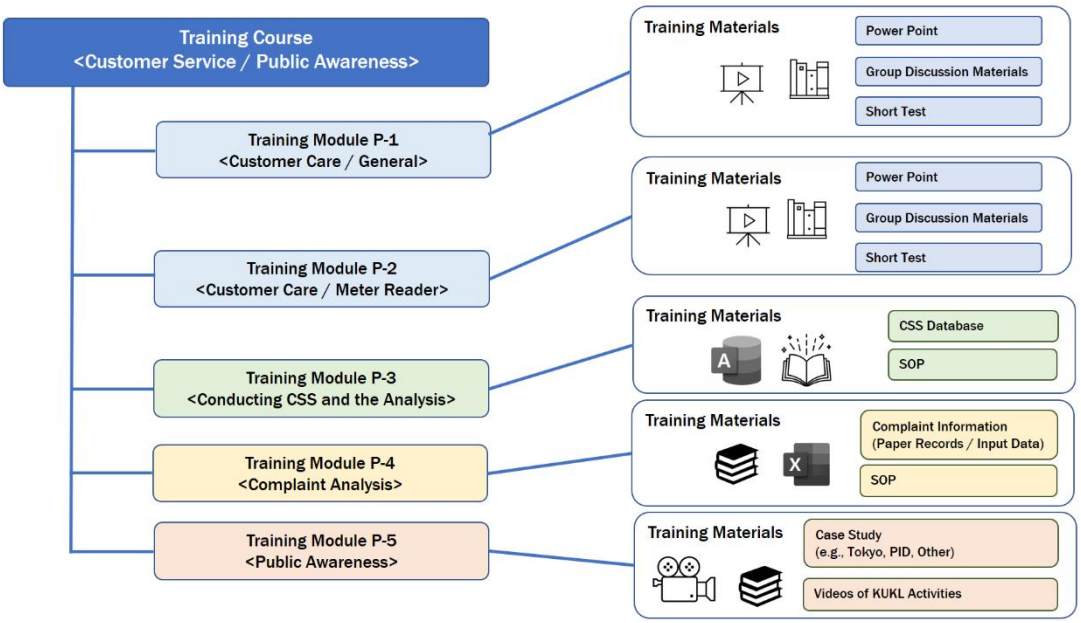


Figure 3.4.20 Composition of internal training module in the fields of customer service and public awareness

[Activity 4-11] Conduct public awareness activities based on Activity 4-10.

<Progress in Term-2>

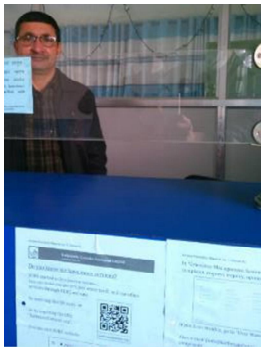
The following is a detailed description of the activities implemented in accordance with the action plan developed in Activity 4-10.

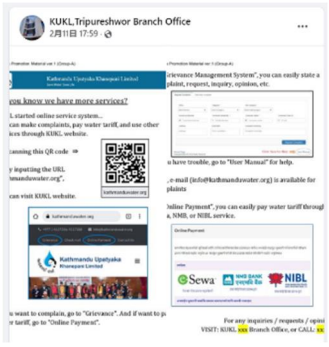
(1) Access Promotion

Since many C/Ps commented that one of the reasons for the low number of users of the online grievance application system was the lack of awareness of the system among customers, JET and KUKL staff prepared useful materials for posting at branch counters and distributing leaflets. The completed materials are now being used at branch counters and on social networking sites, including a QR code that shows direct access to the KUKL web page.

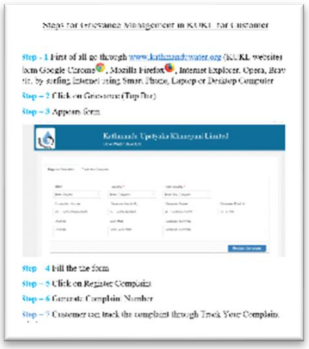
On the other hand, JET created a QR code stamp on a trial basis so that existing materials with a substantial inventory previously used by KUKL could also be used to promote the public awareness activities. Since then, additional stamps have been created with KUKL's budget and distributed to each branch office.

[Photograph] Example of Access Promotion Material





Posting at counters at Baneshwor Branch
Promotion by SNS of Tripureshower Branch



Online Grievance Application System
Explanatory Materials for use of online payment system

[Photograph] Stamp of QR Code

E QR codes stamped on existing distribution forms (left) and on the back of receipts (right).
There are no restrictions on the creation, use, etc. of QR Codes, and no copyrights are involved.

(2) Creation of the project's common name/catchphrase

It was suggested that the official name of the project as determined by R/D was very long and inconvenient for KUKL staff to know and for the impact of the project on the people of Kathmandu. Therefore, the Output 4 Action Team discussed a common name for the project, and a catchphrase and logo were created that was both easy to read and remember.

KTM-WIP

Water is life! Save it!

Figure 3.4.21 Project Logo and Chachphrase

KTM means "Kathmandu," WIP means "Water Supply Improvement Project," and "Water is Life. Save it!" was proposed by one of the C/Ps. This is used in the design of the uniforms, etc.

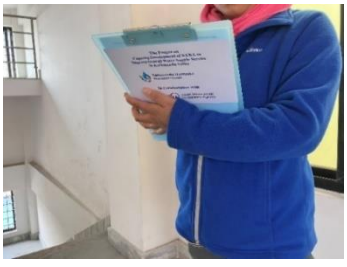
(3) Creation/distribution of goods

As the first phase of PR materials, polo shirts and caps were created to be worn by staff working in the field. These were worn on a daily basis by employees who have contact with customers at water treatment plants, water quality control, water meter reading, customer service, etc. They were distributed during visits to CEO and branch offices.

From now on, C/Ps will wear these uniforms in principle when conducting activities in contact with customers, in order to enhance their sense of participation and ownership in the project, as well as to improve their impression on the public. After the uniform distribution, the Tripureshwor and Mahankalchaur branches publicized the distribution on social networking sites.

In addition, clipboards with the project logo were created and distributed to meter readers. When we observed meter readers reading meters, we observed that they were having difficulty filling out the meter reading results on paper. In the future, it is expected that this will not only make the meter reading process easier, but also improve customer confidence in the project and promote the project.

[Photograph] Materials for Public Relations

<table>
<tr><td>  </td><td> 
</td><td>  </td></tr>
<tr><td>Distribution of uniforms with CEO of KUKL</td><td>Publication in SNS by Mahankalchaur Branch</td><td>Distribution of uniforms at Tripureshwor Branch</td></tr>
<tr><td>  </td><td>  </td><td>  </td></tr>
<tr><td>Distribution of uniforms at Tripureshwor Branch</td><td>Meter reading with recording paper</td><td>Clip board</td></tr>
</table>

The procurement of PR materials must be determined under discussion with KUKL after the start of Term-2, those that are expected to be effective should be selected and prepared. The differences between the initial plan and the actual PR materials prepared are shown below.

The timing of procurement of mugs with the project logo will be shifted to Term-3, as they are considered effective for publicity and awareness activities in collaboration with the PID in Term-3.

(4) Information sharing within KUKL

As the Melamchi Water Supply Project has progressed, opportunities for communication with customers in the field have increased.

In the field, supervisors, meter readers and others have contact with customers as part of their daily work, and it is highly likely that the response of KUKL staff or PID staff, etc., other than those in Output 4, affects customer satisfaction.

Therefore, raising the awareness of the entire KUKL staff beyond the framework of each output has become an issue. In response to this, JET has begun efforts to build a system to share information within KUKL on the output of Output 4.

(5) Cooperative discussions with PID

Discussions with PID began in January 2022 and have resulted in PID members participating in Output 4 Action Team meetings and Output 4 members participating as observers in PID activities.

From these activities, JET proposed to hold regular meetings with PID, based on the following findings and the belief that collaboration with PID would lead to the continued implementation of efficient KUKL public relations activities.

- PID has been conducting public relations activities since 2017 and has an ongoing budget.
- It is not efficient or budgetary enough for KUKL to plan public relations activities for water supply projects from scratch.
- KUKL intends to continue to conduct periodic customer satisfaction surveys, not only during this project, but also in the future, so that a post-evaluation including PID activities can be shared within KUKL.
- KUKL's understanding of PID activities and participation in regular meetings and events is meaningful for improving KUKL's activities.
- For example, it would be possible to advise the PID on the results of a customer satisfaction survey from the perspective of KUKL.

The meeting was held between the PID and a team of private consultants who will undertake the PID's public relations activities, KUKL and JET, and all of them reached a working-level agreement on future collaboration and the establishment of regular meetings. The approval process for management will take place within the PID from July 2023 onwards.

Table 3.4.11 Outline of meeting with PID

Item	Contents
Date	July 13, 2023　11：00～12：00 (Nepal Time)
Location	PID Office
Theme	・Confirmation of public relations activities conducted by PID ・Proposal of joint collaborative meeting between KUKL and PID
Participants	[PID] Ms. Bidhya Bhandari / Sociologist, PID Ms. Pramila Adhikari / Sociologist, PID Mr. Chandra Bhakta Bistha / Team leader, PID/CASSC Mr. Anil Belbase / C.M.F, PID/CASSC

Item	Contents
	[KUKL] Ms. Chapala Dhakal / Assistant Manager, Administration, Head Office [JICA Expert Team] Mr. Koji Kimura (Customer Service 1/Awareness Activities) Mr. Tilak Mohan Bhandari (Technical Advisor, JICA Expert Team) Mr. Pankaj Kumar Bhandari (Assistant Engineer, JICA Expert Team)
Summary of discussion	JICA Expert Team proposed and all participants agreed to hold regular meetings for the purpose of collaboration between PID, which conducts ongoing public relations activities, and KUKL, which conducts customer satisfaction surveys.

<Activity Plan in Term-3>

Considering these circumstances, KUKL's awareness-raising activities are more efficient and sustainable when conducted in collaboration with PID, and JET will support the holding of this conference and the implementation of collaborative activities in Term-3.

[Activity 4-12] Summarize and review the results of public awareness activities and utilize it for next plan.

<Progress in Term-2>

The Awareness Action Plan is being implemented, managed and updated mainly by the Public Awareness Manager (Ms. Chapala Dhakal of the Action Team) and two PA-Sub Managers. As of the end of November 2023, the work is stalled due to the retirement of one PA-Sub Manager, but the position will be filled in December 2023.

<Activity Plan in Term-3>

This activity will begin at the end of Term-2 and will be fully implemented in Term-3. By revising the plan already developed, each activity will spiral up to contribute to "customer awareness" of water service improvements and "increased confidence" in KUKL.

Based on the results of awareness-raising activities underway, changes in C/P awareness and trends in customer satisfaction survey results will be investigated, issues will be identified and discussed for resolution, and reflected in the activity plan.

3.4.2 Activities to be initiated in Term-3

All activities will be continued from Term-2 and no new activities will be initiated in Term-3.

3.4.3 Activity timeline related to Output 4 in Term-3

The timeline of activities related to Output 4 for Term-3 is shown below.

Table 3.4.12 Timeline of activities related to Output 4 for Term-3

Planned Activities	2024												2025												2026		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
4-1: Prepare a plan of customer satisfaction survey including survey design and TOR for survey company.																											
Discussion of areas for improvement based on the results of the second survey.				●					●																		
Preparation of questionnaire for the third survey.									●																		
4-2: Conduct customer satisfaction survey at baseline, mid- term and end-line.																											
Interview for customers											●																
Analysis of the study results													●					●									
4-3: Prepare a plan for measures to improve customer satisfaction.																											
Analysis of customer requests and grievances.				●																							
Prepare an action plan based on the results of the above analysis.				●	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→				
4-4: Review the Customer Grievance Module's level of functioning on the Computer Billing and Accounting System (CBAAS) and current practice of customer care.																											
Completed up to Term-2																											
4-5: Identify activities necessary to fully utilize the Customer Grievance Module and improve the customer care management.																											
Completed up to Term-2																											
4-6: Prepare an activity plan for data management utilizing the Customer Grievance Module, analysis of customer complaints and improvement of customer care management.																											
Formulate action plans for customer response management.			●	●	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→			
4-7: Analyze the customer complaints.																											
Digitization of complaint ledgers.			●					●			●								●								
Analysis of grievances information.			●	●				●			●								●								
4-8: Report the results of analysis on customer complaints to KUKL management.																											
Reporting in each branch.				●					●					●					●								
Establishment of planning committee.				●	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→			
4-9: Conduct trainings on customer care (how to behave to customers) targeting for staff in charge or customer care and meter readers.																											
Conduct TOT on customer service							●												●								
Preparation of training materials of customer service							●												●								
Cduct internal training on customer service								●												●							
4-10: Planning of Awareness Activities																											
Completed up to Term-2																											
4-11: Conduct public awareness activities based on Activity 4-10.																											
Continuous implementation of awareness activities				●	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→			
Coordination with PID				●					●										●								
4-12: Summarize and review the results of public awareness activities and utilize it for next plan.																											
Analisis of activity results on awareness activities				●										●													
Identification of issues and revision of action plan				●					●					●					●								

3.5 Detail of activity related to Output 5 in Term-3 (2024-2025)

3.5.1 Continuation/follow-up from Term-2

[Activity 5-1] Identify the training necessary for KUKL staff, [Activity 5-2] Prepare an overall training program (rough plan) necessary for KUKL staff, and [Activity 5-3] Prepare a database (on Excel basis) on training programs.

<Progress in Term-2>

Output 5 Action Team places a high priority on identifying training needs in the work of formulating training, as described in the Internal Training Supervision Manual described below.

In Term-1, baseline surveys and capacity assessments were conducted by JET in each output group, and training needs were identified after analyzing the results.

Based on this, the Output 5 Action Team shared the baseline survey report with all members in Term-2 to confirm how the training needs were determined after understanding all survey results for each output.

Since Term-2, the Output 5 Action Team and the Training & Research Section have been providing lateral support for the baseline survey and capacity assessment update work.

The current overall training program is as follows.

Table 3.5.1 Overall Training Program

Items of training	2024												2025											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
OP1-1: Training for GIS Operation																								
Training of Trainers (TOT)				●					●															
Internal Training									●				●					●						
OP1-2: Training for Hydraulic Analysis and Water Distribution Management																								
Training of Trainers (TOT) for Hydraulic Analysis											●	●												
Internal Training for Hydraulic Analysis												●						●						●
Training of Trainers (TOT) for Water Distribution Mangement											●	●												
Internal Training for Water Distribution Management												●						●						●
OP2: Training for Non-Revenue Water Management																								
Internal Training for Meter Accuracy Testing				●																				
Internal Training for Meter Reading														●										
Internal Training for Entry/Check of Customer Data														●										
Internal Training for Illegal Connection Measure																			●					
OP3: Training for Water Treatment and Water Quality Control																								
Operation Training of New Sundarijal WTP			●																					
Training of Trainers (TOT) for Operation of New Sundarijal WTP			●																					
Internal Training for Operation of New Sundarijal WTP			●																					
Operation Training of existing three WTPs							●	●											●					
Training of Trainers (TOT) for Operation of Existing 3 WTPs							●	●											●					
Internal Training for Operation of Existing 3 WTPs							●	●																
Training for Laboratory staffs at New Sundarijal WTP							●																	
Planning of Maintenance Plan of Reservoirs and Follow-up Training							●																	
OP4: Training for Customer Care																								
Training of Trainers (TOT) for Customer Service							●												●					
Preparation of Training Materials for Customer Service							●												●					
Conducting Internal Training for Customer Service								●												●				
OP5: Supporting and Supervising of Trainings			●	●			●	●	●		●	●	●	●				●	●	●				●

Output 5 Action Team and the Training & Research Section will provide lateral support for all trainings scheduled under Outputs 1-4.

The above schedule is tentative, as it is affected by external factors such as the operational status of the New Sundarijal WTP and the completion date of the DNI project.

In Term-3, the overall training program will be updated flexibly while confirming changes in the training schedule due to the results of each project.

A draft of the proposed training database was prepared by the Output 5 Action Team during Term-1. The training database was created in Excel, which KUKL staff are familiar with, and consists of a cover page, a results aggregation section, and a response input sheet. The draft training database is designed to be linked to a feedback survey to be administered after the training. To increase the response rate to the feedback survey, descriptive responses are reduced as much as possible, and most of the questions are in the form of multiple-choice questions.

In Term-2, this training database (draft) has been utilized for each training, and while accumulating data for each training, the results are shared with the Action Teams for each output.

In addition, the database staff of the five results action teams continue to revise the draft's unusable parts in the actual work to make it easier for them to use.

The contents of the database will continue to be reviewed in the PDCA cycle, and revisions and additions will be made as necessary, with the aim of completing the database in the final year of the project.

The structure of the training database (draft) is shown below.

Table 3.5.2 Composition of Training Database (Draft)

Items	Contents
Cover	Name of Training Course, Contents of Training Course, List of Trainers, List of Trainees, etc.
Evaluation Summary	1) Programme Output 2) General 3) Contents and Programme Design 4) Awareness of Programme 5) Trainer & Facilitation 6) Coordination
Answer input	1) Programme Outputs (Multiple-choice + some are descriptive) ➢ Was this training related to your present work field? ➢ How much of the objective of the training course was achieved? ➢ How much of the knowledge gained from the training can be used in your practical work? ➢ Which of the course contents did you like the most or was useful for you? ➢ Which of the course contents did you like the least? ➢ Which course content was supposed to be included? (with reasons if any) 2） General（Multiple-choice） ➢ How did you feel about the coverage of the training course? ➢ Did you learn from experience of the participants (trainers and trainees)? ➢ Was it possible for you to communicate efficiently with the participants (trainers and trainees)? ➢ Was it possible for you to participate in the discussions and exercise activities? 3）Contents and Programme Design (Multiple-choice) ➢ The content will be beneficial and helpful for the better performance of the present work field? ➢ The content was of an appropriate depth and easy to understand. ➢ The content was logically sequenced. ➢ The course was relevant to addressing the problems and issues. ➢ The topics were presented in logical order and its delivery was based on practical approach. ➢ The time allocation was sufficient for the practice and exercise. ➢ What did you think of the training materials? 4）Awareness of the Programme (Multiple-choice) ➢ Invitation was informed in a proper timing. ➢ Would you recommend the training to your colleague? 5）Trainer and Facilitation (Multiple-choices) ➢ Did the trainer deliver the classes with appropriate example related to the present work field? ➢ Was there enough time allocated for questions and discussions? ➢ Did the trainer have extensive knowledge about the subject matter? ➢ Was the trainer helpful, informative and approachable? ➢ Was the lecture well-prepared? / Were instructions clear and understandable? ➢ Did the trainer have sufficient knowledge about subject matter and efficiently used the time frame?

Items	Contents
	➢ Did the trainer encourage the participation and interaction of the participants during the session? ➢ What did you think of the training venue? 6) Coordination (Multiple-choices) ➢ How would you rate co-ordination between the trainer and trainees?

<Activity Plan in Term-3>

A tentative version of the overall training program has been prepared, but will be reviewed at the beginning of the year and modified flexibly as circumstances change.

A training database has also been created and is already accumulating data. The training database will be modified as needed for convenience.

[Activity 5-4] Prepare a manual for internal training management.

<Progress in Term-2>

After consultation between the Action Team and JET, an internal training supervision manual was developed, and the manual is being used on a pilot basis for training implementation in Term-2.

The internal training supervision manual is positioned in the same way as SOPs for other output activities, and even if the person in charge of training is replaced due to personnel changes, etc., the content of the manual allows the new person to conduct internal training by performing his/her duties in accordance with this manual.

As shown below, the Internal Training Supervision Manual is divided into a "Preparation Phase," an "Implementation Phase," and an "Evaluation Phase.

The content of the manual focuses particularly on the preparation phase, which includes a needs assessment through a baseline survey and capacity assessment, which was also conducted for this project.

This is intended to eliminate risk factors at the training formulation stage, as training failures are generally caused by discrepancies between training content and training needs.

In addition, the Internal Training Supervision Manual includes provisions for paying a daily allowance to incentivize internal instructors and rules for catering for long training sessions. However, these are items that are not in the current KUKL bylaws, and the manual is subject to approval by the CEO, which has not been granted at this time.

Like the database, the internal training supervision manual is also in draft form. KUKL will continue to use the manual in actual training sessions, review its contents in the PDCA cycle, and revise and add to it as necessary, aiming to complete it in the final year of the project.

Table 3.5.3 Contents of Internal Training Supervision Manual

Phase	Contents
Preparation Phase	1) Needs Assessment ➢ Baseline Survey and Capacity Assessment 2) Plan Formulation ➢ Decision of Theme and Contents ➢ Cost Analysis and Budgeting 3) Training Course Outline for Design 4) Selection of Trainer 5) Selection of Trainee 6) Training of Trainer (TOT) 7) Administration ➢ Stationery and Equipment

Phase	Contents
	➢ Personal Protective Equipment ➢ Code of Conduct for Trainee ➢ Anti-Covid-19 Measures ➢ Medical Issues, Emergencies and Indemnity ➢ Logistics ➢ Catering ➢ Classroom Booking ➢ Certificate
Implementation Phase	1) Confirmation of classroom and its facilities 2) Orientation 3) Monitoring ➢ Note-taking/Recording 4) Mid-term Evaluation (During the Training) 5) Daily Care ➢ Cleaning ➢ Replenishment of Stationery, Water and Learning/Teaching Material ➢ Complaints
Evaluation Phase	1) Preparation of Feedback Sheet and Assessment Guide 2) Analysis of Data and Feedback 3) Evaluation Report 4) Lesson Learned

<Activity Plan in Term-3>

As for the Internal Training Supervision Manual, the first draft has been completed and the Output 5 Action Team has conducted training in accordance with it on a pilot basis. When the internal training is fully implemented in Term-3, the JET and C/Ps will check for consistency with the contents of the said manual and make appropriate revisions if there appear to be any discrepancies or defects. During the implementation of the project, trial and error will be repeated, and a final version will be created by the end of 2025.

The manual has not yet been approved by KUKL, and JET will continue to urge KUKL's internal approval process through the Nepalese project manager.

[Activity 5-5] Conduct trainings on internal training management targeting for the nominated staffs of Output 5 members and Human Resources Development Section.

<Progress in Term-2>

The following training on training supervision was conducted for the internal training staff in charge of each output. The training was divided into small groups for each output in order to encourage input from the support members, many of whom were younger staff who would be in charge of the actual training.

In this training, after lectures aimed at acquiring the basic knowledge necessary to implement internal training, the participants used the Internal Training Supervision Manual as a teaching material, and confirmed questions and unclear points while simulating actual internal training from the preparation phase to the evaluation phase.

In consideration of the sustainability of KUKL, this training was conducted with the main instructor being the person in charge of the internal training supervision manual, assisted by a Japanese expert.

Table 3.5.4 Conducted Training for Internal Training Supervision

	Person in charge of Output 1 Field /Leader of Output 5	Person in charge of Output 2 / Output 4 Field	Person in charge of Output 3 Field	Person in charge Output 5 Field
Date	9/Feb/2022	11/Feb/2022	20/Feb/2022	2/Mar/2022
Location	Project Office of JICA Expert Team			
Participants from Action Team	Mr. Arjun Babu Dhakal Mr. Shankar Thapa	Mr. Dipendra Bdr. Oli	Ms. Radha Dhakal Ms. Niru Burlakoti	Mr. Bir Bdr, Chand
Participants from Supporting Members	Mr. Sunil Chaudhary	Ms. Neha Adhikari Ms. Manju Manandhar	Mr. Bijaya Bijracharya	Mr. Ramesh Dhungana Mr. Kabin Dhoj Adhikari

Since two permanent staff members were assigned to the Training & Research Section in the middle of Term-2, the same training for internal training personnel as described above was conducted in February, May, and June 2023.

However, these two full-time staff members were replaced in November 2023, and two new staff members were assigned to the Training and Research Section. Therefore, training for these two new staff members was conducted again.

[Photograph] Training for Internal Training Supervision



Explanation about the training supervising manual

<Activity Plan in Term-3>

By the end of Term-2, the members of the Action Team and the staff in charge of the Training & Research Section have already received training on the methods and know-how of training implementation.

Training on training supervisory skills will continue to be provided on a regular basis, especially for the staff of the Training & Research Section, which is primarily responsible for internal training.

The project is also considering providing training on training supervisory skills to all staff selected as internal training instructors through the TOT.

[Activity 5-6] Prepare training programs (modules) on the fields that the Project targets such as GIS, Hydraulic Analysis, Water Distribution Management, Water Quality Control, Water Treatment, Customer Management in collaboration with staff in the relevant section

<Progress in Term-2>

In order to accommodate the various training programs, the Output 5 Action Team formed groups in charge according to the technical areas of each output, as show below. Each group consisted of a combination of core and support members.

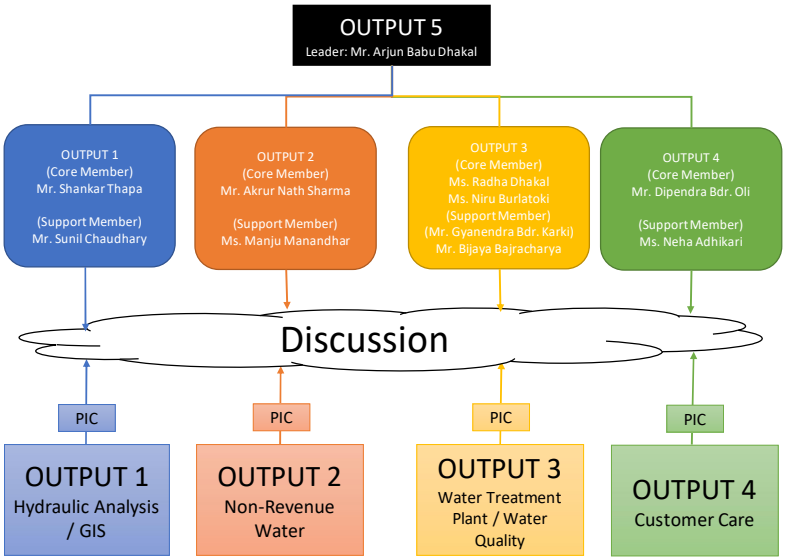


Figure 3.5.1 Formation of groups in charge

In particular, the Action Team members were composed of staff from various departments within KUKL. The team's main task was only to support the implementation of training, and no particular technical expertise was required.

However, since KUKL had no experience in conducting internal training led by themselves, and since each core member also needs some technical knowledge in helping to develop the training plan (training module), the JET and Output 5 Action Team decided to assign each member's expertise to match the training content of each output as closely as possible.

On the other hand, the Action Team members for Output 5 were not originally selected based on their expertise, and for Outputs 1 and 4, there were differences in the expertise and training content of the core members.

The original plan envisioned that the groups in charge of each of these outputs and representatives of each output group (* assuming internal instructors) would discuss and plan the number of training sessions, etc. However, OJT for each output is ongoing through Term-2, and at this time, we are in process of selection of potential instructors from KUKL staff.

For Output 2 and Output 3, for which the expertise of the members in charge of Output 5 is already aligned with the content of the training, they are advising both groups in the development of their training plans (training modules).

Due to periodic personnel transfer within KUKL, it was necessary to reorganize the group in charge of training at the end of Term-2.

In preparation for the internal training to be fully launched in Term-3, JET is providing necessary support taking into consideration such issues as ensuring communication with potential lecturers, sustainability after the project, and compatibility of the training content with the expertise of the

person in charge of Output 5.

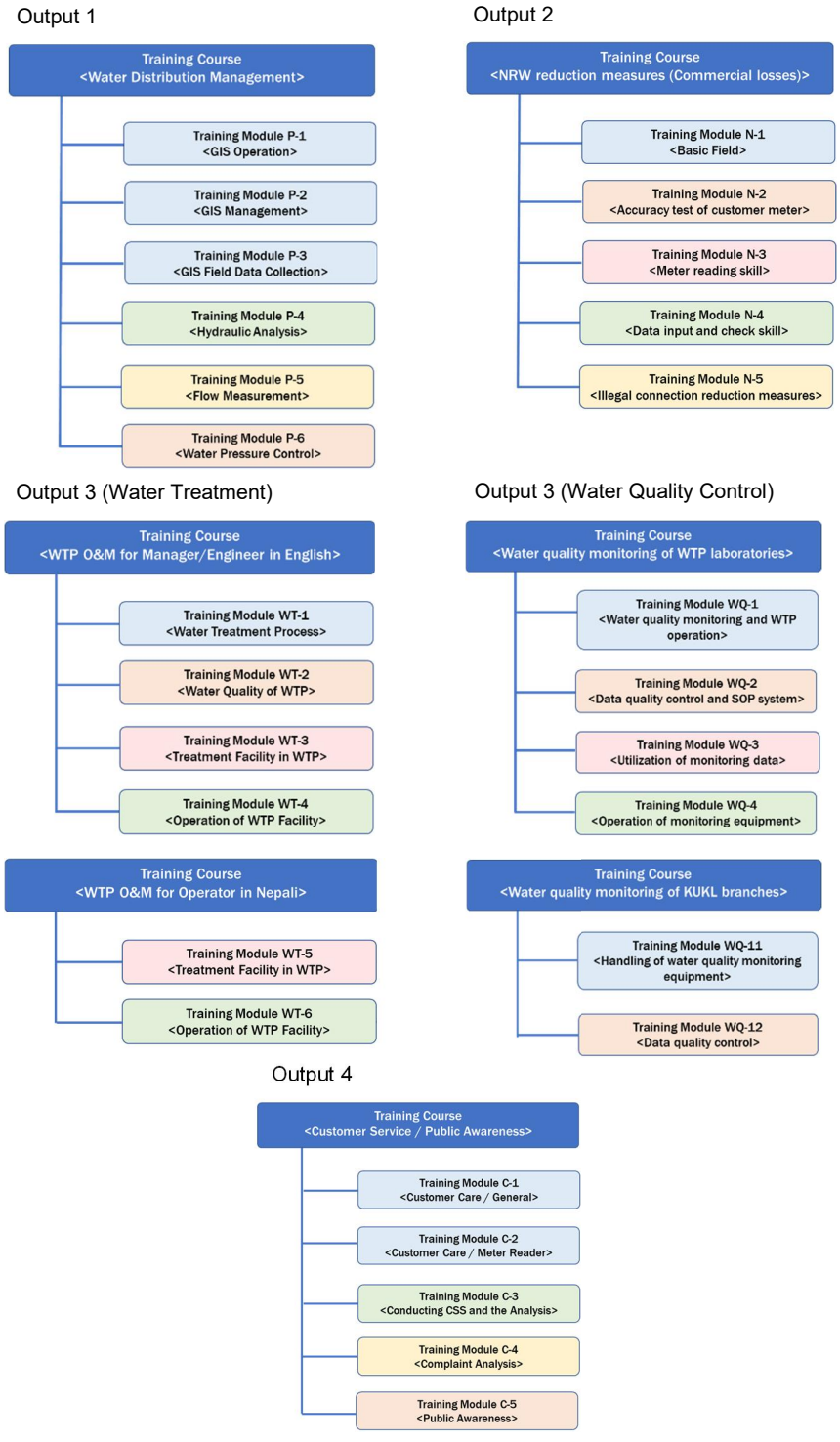


Figure 3.5.2 Internal Training Module

<Activity Plan in Term-3>

The training plan (training modules) has been prepared by each output activities. However, as mentioned above, the schedule may be affected by external factors, and the timing of implementation will be flexible.

JET will also support the Training & Research Section to deepen the relationship between the section and the training groups and departments in charge of each output, and to increase opportunities to discuss training plans in each field.

By the end of the project, the Training & Research Section will compile an internal training plan for the entire KUKL after the project.

[Activity 5-7] Prepare for trainings such as development of training materials, examination of how to measure the effectiveness of training, etc., in collaboration with staff in the relevant section.

<Progress in Term-2>

As shown in Figure 3.5.1, a group responsible for each output was formed among the members of the Output 5 Action Team to begin preparations for implementation for each training.

However, during Term-2 and the early phases of Term-2, the spread of the Covid-19 within Nepal required KUKL to refrain from holding meetings of more than 5 people even within the organization, which forced each Output training to be conducted online and in small groups. Therefore, there were few opportunities for the Output 5 Action Team to support those trainings.

On the other hand, despite these restrictions, the members of the Output 5 Action Team also participated in the training conducted in each Output as much as possible to understand how the training was conducted and the participants' reactions, and to prepare for the internal training supervision.

Once it is possible to conduct training in a regular face-to-face format, the training supervisor for each output, in collaboration with JET from each output and the leaders of each Action Team, provides support for the preparation of the training plan, outline design, and overall operational management in accordance with the Internal Training Supervision Manual.

<Activity Plan in Term-3>

Following the activities of Term-2, the Output 5 Action Team and the Training & Research Section will continue to provide lateral support in preparing for the implementation of training for each output. The involvement of the Training & Research Section will be further increased in Term-3.

In addition to supporting the preparation of individual training programs, the Training & Research Section will also review the evaluation methods of training programs in consultation with the relevant departments.

[Activity 5-8] Conduct training of trainers (TOT) in each area.

<Progress in Term-2>

As in [Activity 5-7], the implementation of training of trainers (TOT) was also supported in accordance with the internal training supervision manual.

The guidance and evaluation of the TOT will basically be carried out by JET for each output. The Output 5 Action Team has already appointed a training supervisor for each of Output 1 to Output 4 based on their expertise, and each supervisor will implement the TOT in consultation with the internal trainer for the respective Output.

To date, JET and Output 5 Action Team have provided lateral support for the implementation of TOT

for each of the Outcome 5 activities as described below.

<Activity Plan in Term-3>

Following the activities of Term-2, the TOT for each output will be supported by the Output 5 Action Team and the Training & Research Section. The involvement of the Training & Research Section will be increased in Term-3.

[Activity 5-9] Conduct trainings. (Support training implementation as staff in charge of training management)

<Progress in Term-2>

As in [Activities 5-7 and 5-8], training is conducted in accordance with the Training Supervision Manual.

At this time, not all support items have been implemented because the internal training system has not yet been established, but basically the support tasks described below will be carried out.

Table 3.5.5 Supporting work to be conducted by Output 5 Action Team

Preparation Phase	Implementation Phase	Evaluation Phase
1. Needs survey 1.1 Baseline survey 1.2 Capacity assessment	1. Confirmation of classroom and its facilities	1. Preparation of feedback sheet and
2. Plan formulation 2.1 Decision of theme and contents 2.2 Cost analysis and budgeting	2. Orientation	2. Analysis of data and feedback comments
3. Training course outline for design	3. Monitoring 3.1 Note-taking/Recording	3. Evaluation report
4. Selection of trainer	4. Mid-term evaluation	4. Lession learned
5. Selection of trainee	5. Daily care 5.1 Cleaning 5.2 Replenishment of stationery, water and teaching material 5.3 Complains handling	
6. TOT (Training of Trainer)		
7. Administration 7.1 Stationery and equipment 7.2 Personal protective equipment 7.3 Code of conduct for trainee 7.4 Anti-Covid-19 measures 7.5 Medical issues, emmergency and indemnity 7.6 Logistics 7.7 Catering 7.8 Classroom booking 7.9 Certification		

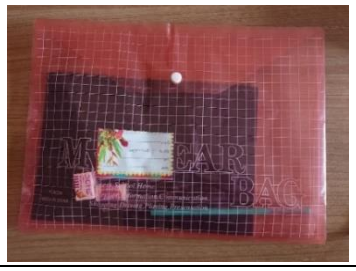
In the training programs up to Term-2, lectures have been conducted jointly by JET and potential instructors of KUKL staff. For internal training in Term-3, the involvement of JET will be gradually reduced and the autonomy of internal training instructors will be enlarged.

The ultimate goal is to be able to complete the planning, implementation, and evaluation of lectures solely by KUKL's internal training instructors. Therefore, the involvement of JET will be gradually reduced for the Output 5 Action Teams, training for the Training & Research Section, and support for internal trainers.

The Output 5 Action Team set up the venue and arranged catering for the "Information Sharing Workshop on Training in Japan" related to Output 3 held in January 2023 in the conference room of the Central Lab at the Mahankulture Branch Office.

In preparation for the on-the-job training at New Sundarijal WTP for Output 3, which started on February 7, 2023, the person in charge of the Output 5 Action Team and the chief of the Training & Research Section visited the training site in advance to confirm classrooms and equipment and to select local caterers, since it was the first training outside of Kathmandu.

[Photograph] Supporting for Training related to Output 3

		
[Mahankalchaur Branch] Workshop in the Central Lab	Stationery prepared by KUKL	Conference Room in New Sundarijal WTP

<Activity Plan in Term-3>

Following the activities of Term-2, the trainings for each output will be supported by the Output 5 Action Team and the Training & Research Section. The involvement of the Training & Research Section will be increased in Term-3.

[Activity 5-10] Summarize and review the results of trainings.

<Progress in Term-2>

At the end of each training program, a feedback survey is administered to all trainees by the training supervisor of Output 5. The survey results are input into a database to quantify and analyze the results as much as possible. The database is divided into the following six areas to evaluate the training results from various perspectives.

① Training results

② Overview of training

③ Training contents and design

④ Awareness of training

⑤ Trainer and facilitation

⑥ Coordination

Although the feedback survey includes some evaluation items for the instructors, the main purpose of the survey is basically to evaluate the implementation of the training itself. The evaluation of technical aspects is conducted jointly by the instructors and JET at the time of each training.

<Activity Plan in Term-3>

As implemented in Term-2, feedback surveys will be conducted at all training sessions by the Output 5 Action Team and the Training & Research Section, and the results will be input into a training database to analyze the good and bad points of each training session.

[Activity 5-11] Reflect the training results to next training plans.

<Progress in Term-2>

The feedback survey after the training, and the training results compiled in the training database, are emailed to the training participants for each output for the part related to each output, and shared within the Output 5 Action Team for the part related to training implementation.

Currently, most of the training is conducted mainly by specialists in each output, and the training is generally highly evaluated by the trainees.

Items that were rated slightly lower than the other evaluation items are communicated to each outcome and reflected in the content as lessons learned for the next training plan.

Table 3.5.6 Excerpt of Sample of Training Database

2. General			
2-1	2-2	2-3	2-4
How did you feel about the coverage of the training course?	Did you learn from experience of the participants(trainers and trainees)?	Was it possible for you to communicate efficiently with the participants (trainers and trainees)?	Was it possible for you to participate in the discussions and exercises actively?
3	3	3	3
2	3	3	3
2	3	3	3
2	3	3	3
1	3	3	1
2	3	3	3
2	3	3	3
2.0	3.0	3.0	2.7

For example, the relatively low evaluation on the "scope of training" will be reported to the training group for the relevant output, and the content will be improved before the next training depending on the need.

The following is a list of the main trainings for which results analysis was conducted by the Output 5 Action Team as part of activities in Term-2.

Overall, the feedback was high, as many of the basic training and TOTs were conducted and led by JET until the end of Term-2. Feedback obtained from the training programs in which training supervision was conducted is shown in the table below.

Only points where improvement was indicated are shown, but all were rated a little lower than the other questions, and 60-70% of the responses were positive.

Table 3.5.7 Major trainings analyzed by the Output 5 Action Team

Output	Date	Training theme	Items to be improved
Output 1	19-23/June/2023	GIS operation (NWSSTC in Nagarkot)	・Poor environment of training venue.
	11, 13, 14/Dec/2023*1	GIS operation (TOT at the Tripureshwor Branch)	-
Output 2	11/Dec/2022	NRW measure (commercial losses) / Meter accuracy test (TOT at the Mahankalchaur Branch)	・Low achievement of training objectives.
	23/May/2023	NRW measure (commercial losses) / Meter accuracy test (TOT at the Mahankalchaur Branch)	・Difficult to understand the content of the training.
	15-16/Aug/2023	Meter accuracy test (TOT at the Mahankalchaur Branch)	・Low achievement of training objectives.
	5/June/2023	Meter reading skill (TOT at the	・Low achievement of training

Output	Date	Training theme	Items to be improved
		Mahankalchaur Branch)	objectives. ・Lack of logical sequencing of training.
	20/June/2023	Customer data input/check skill (TOT at the Tripureshwor Branch)	・Low achievement of training objectives.
	5/Dec/2023	Basics of NRW - Commercial Losses (TOT at the Mahankalchaur Branch)	-
Output 3	14-16/June/2022 21-23/June/2022 28-30/June/2022	Water treatment (OJT at the Mahankalchaur WTP)	・Low achievement of training objectives. ・Difficult to understand the content of the training materials.
	7-10/Feb/2023 14-17/Feb/2023 20-26/Feb/2023	Operation of WTP (OJT at the New Sundarijal WTP)	・Few similarity between the training content and the regular work. ・Difficult to understand the content of the training. ・Lack of relevance between the training content and the actual problem in daily work. ・Lack of logical sequencing of training.
	11-14/Dec/2023	Water quality control and laboratory test (OJT at the Mahankalchaur Central Lab)	-
Output 4	14/16/June/2023 19-23/June/2023 3-6/July/2023	Customer data handling, Data analysis, Customer service (TOT at the Tripureshwor Branch)	・Low achievement of training objectives. ・The training does not cover enough content. ・Difficult to understand the content of the training. ・Lack of relevance between the training content and the actual problem in daily work.
	12-13/Dec/2023	Communication skill (TOT at the Tripureshwor Branch)	-

*1: The feedback survey is in progress

Overlooking the results to date, there is a tendency for the evaluation of "achievement of training objectives" to be low, but after analyzing the results, it was thought that this was due to the fact that the questions were written and translated into Nepali in a way that was difficult to understand.

When updating the database and revising the questionnaire for the feedback survey, which is currently underway, this part of the questionnaire needs to be improved and changed to text that is easier for respondents to understand.

As for the low evaluation of "ease of understanding the training" and "logical sequencing of the training content," the responses were influenced by the low English proficiency among the trainees, since the lectures and materials were conducted in English when the training was conducted by JET.

From the latter half of Term-2, internal instructors selected through the TOT will increasingly give lectures in Nepali, so the above problem of low evaluation was pointed out less frequently.

As mentioned earlier, the most of training by internal instructors selected for each output will begin in earnest in Term-3, but it is not necessarily that the training will continue to receive high evaluations as in Term-2, when JET took the lead in implementing the training. Therefore, the process of analyzing the results of this training and reflecting them in the next training plan will be important.

Several personnel were recruited by KUKL in November 2023 during the second half of Term-2, and a chief with a background as an engineer was assigned to the Training and Research section as well.

JET has been discussing the process to date and future issues with the chief of the Training and Research Section. In Term-3, the Training and Research Section is expected to collaborate with all

parties and departments concerned to analyze the training results in detail from a technical perspective in cooperation, and reflect the results in improving the content of the next training program.

<Activity Plan in Term-3>

The results of analysis obtained in [Activity 5-10] will be shared by the Output 5 Action Team and the Training & Research Section with each output group that conducted the training and related sections under their jurisdiction. If the result of analysis identifies areas for improvement or items to be added, they will be reflected in the training plan and content for the next term.

3.5.2 Activities to be initiated in Term-3

Individual activities are mainly continuation and follow-up of activities from Term-2, and there are no new activities to be started in Term-3.

However, in order to sustain the project after its completion and to accommodate the internal training that will begin in earnest in Term-3, the project team has proposed two reorganizations as described below.

(1) Enhancement of Training & Research Section

The Training & Research Section that should be responsible for implementing internal training, has had virtually no staff assigned to it since the project's inception, and discussions have continued with KUKL to resolve this issue.

In January 2023, one full-time staff member and one concurrent staff member were assigned to the section, but were replaced again in November of the same year by personnel transfer; two appointed staff members were assigned toward the end of Term-2, partly as a result of the resumption of recruitment at KUKL, which resulted in the hiring of several staff members.

The current staffing structure is a total of four, including the two concurrent staff members already assigned to the section.

Table 3.5.8 Staffing of the Training & Research Section

Staff	Current situation
Ms. Bina Khanal（Chief） *Replacement of predecessor Mr. Milan Thapa	(full-time) ・Hired through Recruitment Process (2019/2020) and joined KUKL in November 2023 ・Assistant Manager (Level 8) ・A lot of experience in water supply projects as a civil engineer in NGOs and private consulting firms
Ms. Muna Chaulagain *Replacement of predecessor Ms. Santusha Kasapal	(full-time) ・Assistant Computer Officer（Level 6） ・Transferred from Baneshwor Branch Adm. ・Plans to retire next year
Mr. Kabin Dhoj Adhikari	(Concurrent) ・Supporting member of Output 5 ・Concurrently serving in three other divisions
Mr. Akrur Nath Sharma	(Concurrent) ・Core member of Output 5 ・Concurrently serving in Planning and Support Department (Chief)

Following the enhancement of the Training & Research Section in January 2023, discussions were held with the Output 5 Action Team and the project manager on the KUKL side, and it was agreed that the training support tasks currently being carried out by the Output 5 Action Team would be gradually transferred to the Training & Research Section.

However, although progress has been made in strengthening the personnel of the Training and Research Section, the full-time chief, Mr. Bina Khanal, has just joined KUKL in November 2023 and is still in the process of building internal connections.

Ms. Muna Chaulagain, who supports the chief as secretary, has also just transferred from another bureau and is new to training-related work.

In addition, the two staff members who are concurrently assigned to other departments have heavy workloads and cannot be expected to provide support except in emergency situations. Currently, the precarious situation of the Training and Research Section has not been resolved, and the Action Team of each output will continue to provide support as needed until the Training and Research Section is able to conduct training programs on its own.

If the Training and Research Section becomes a stable organization, it must also be given the authority to take budgetary measures to sustain internal training.

The budget for internal training, which is under the jurisdiction of the project manager, is being negotiated with upper management to be allocated to the Training & Research Section. Ideally, the Training & Research Section should be given the authority for internal training, so that requests for training can be sent to the Training & Research Section from the training groups and related departments of each output, and the budget for each training will be allocated through the Training Division.

However, as of now, the Training & Research Section does not have the capacity to handle all training operations, so the first priority is to enhance the structure of the organization, including increasing the number of staff.

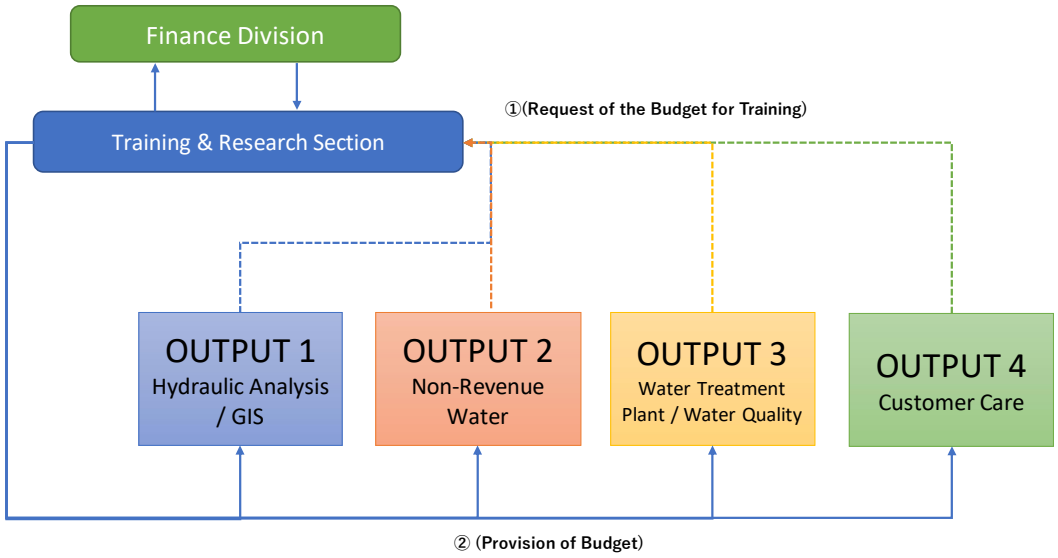


Figure 3.5.3 Budget process for training (draft)

Regarding internal training, which will begin in earnest from Term-3, the Training & Research Section should play a central role while providing lateral support for each training program.

For this reason, the JICA Expert Team has been providing the chief of Training and Research Section with intensive training for internal trainers on an individual basis since the second half of the second term.

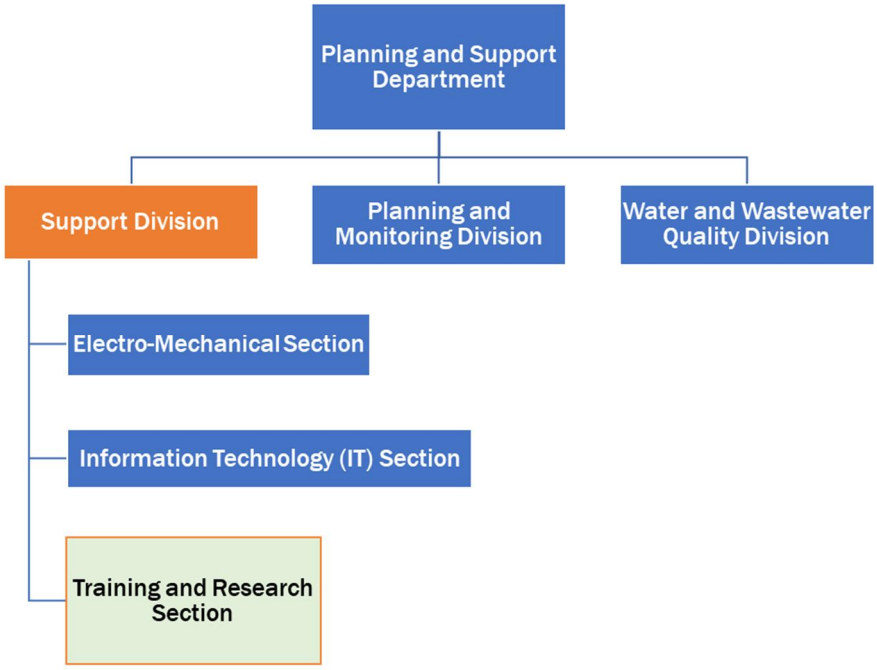


Figure 3.5.4 Organization chart related to the Training & Research Section

(2) Reorganization of the Output 5 Action Team

As noted above, some members of the Output 5 Action Team may not have day-to-day work related to the technical theme of each Output. (e.g., the person in charge for training of Output 1 (GIS) is the chief of Tanker Section.)

Unlike other output groups, the Output 5 Action Teams will be dissolved after the completion of this project, and there were concerns from the beginning of the project about their sustainability.

During the project period, a full-time staff member was assigned to the Training and Research Section, and an organizational structure to manage internal training is being established, but it is still difficult for the section to support all training programs under its current structure.

Considering this situation, the need for the reorganization of Output 5 Action Team was discussed in consultation with the project manager of KUKL and the Output 5 Action Team. Many of original members of the Output 5 Action Team had the same concerns about the sustainability of Output 5 as JET, and finally agreed on the direction of the reorganization at the Output 5 members meeting on June 14, 2023.

As shown in the chart below, in the new organizational structure, for each output training, one or two staff members from the relevant department was selected to be included in the team for Output 5. (e.g., Output 4 - Customer Service training supervision is handled by Customer Relation Section staff)

The selection of the project team was decided in consultation with the KUKL project manager, the leader of Output 5 Action Team, and JET.

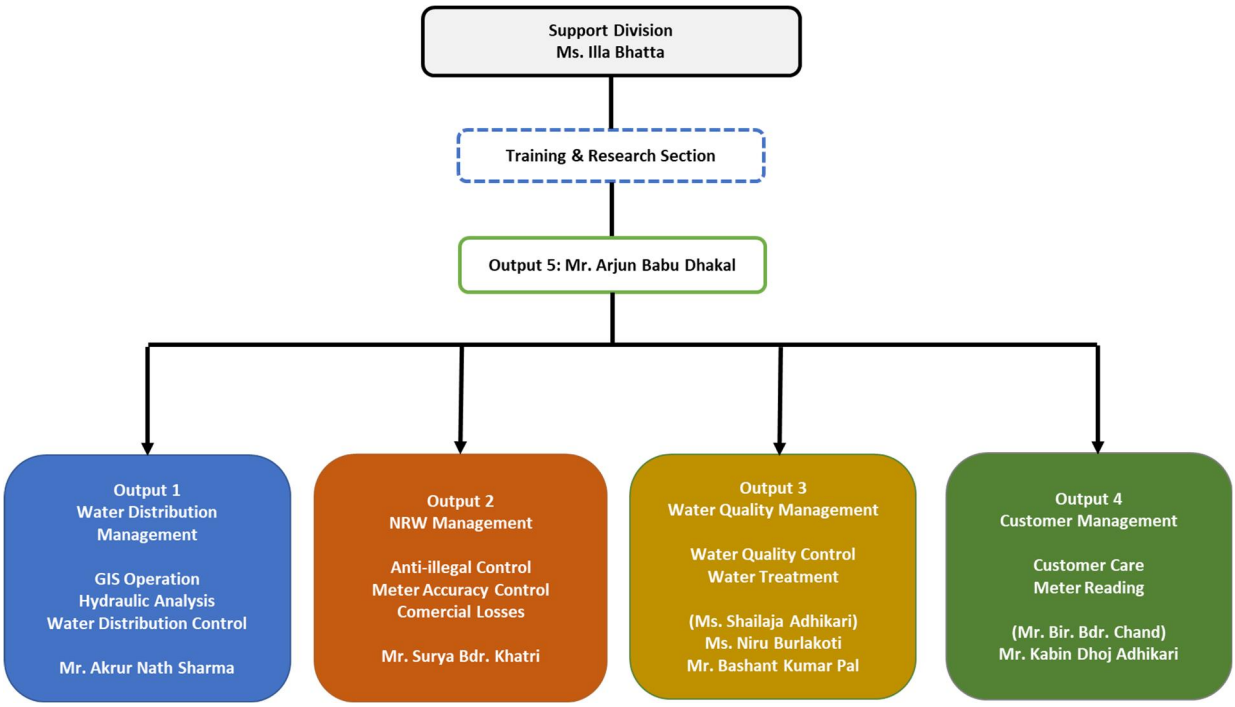


Figure 3.5.5 New Organizational Structure of Output 5 Action Team

As for the Output 5 Action Team, it will continue to be led by Mr. Arjun Babu Dhakal, and the new members will be in charge of training support for each output.

Supervisory training for newly appointed staff was conducted from June 14, when the reorganization was decided, until the end of the month, based on the training supervision manual and database.

Through discussions with the Chief of the Training & Research Section and the members of the Output 5 Action Team, the following assignments of tasks necessary for training supervision were determined, taking into consideration the current organization and work description of KUKL.

While the goal is that the Training & Research Section will eventually be responsible for all activities related to training support, for the time being the roles will be divided among the Training & Research Section, Output 5 Action Team, and JET to conduct internal training until the Section is fully staffed.

Table 3.5.9 Work assignment of the main tasks of training supervision

Preparation Phase	Training Section	Output 5	JET	Relevant Output
1) Preparation of contents and schedule of Training			✔	✔
2) Selection of Trainers			✔	✔
3) Selection of Trainees				✔
4) Issurance of letter to Project Manager	✔			
5) Booking the classroom or venue	✔			
6) Preparation of teaching material (Textbook)			✔	✔
7) Preparation of stationary	✔			
8) Booking of Catering (Lunch and coffee break) and drinking water	✔			
9) Meeting with Trainers	✔			✔
10) Preparation of Certificates			✔	
Implementation Phase	**Training Section**	**Output 5**	**JET**	**Relevant Output**
1) Confirmation of classroom and facilities/equipment	✔	✔		
2) Confirmation of Catering Service	✔	✔		
3) Support for training	✔	✔		
4) Implementation of feedback survey	✔	✔		
Evaluation Phase	**Training Section**	**Output 5**	**JET**	**Relevant Output**
1) Input of the results of the survey in database		✔		
2) Share the results with the relevant Output group		✔		
3) Store the results in the Database	✔			✔

3.5.3 Activity timeline related to Output 5 in Term-3

The timeline of activities related to Output 5 for Term-3 is shown below.

Table 3.5.10 Timeline of activities related to Output 5 for Term-3

Planned Activities	2024												2025												2026		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
5-1: Identify the training necessary for KUKL staff.			●											●													
5-2: Prepare an overall training program (rough plan) necessary for KUKL staff.			●											●													
5-3: Prepare a database (on Excel basis) on training programs.		●	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→			
5-4: Prepare a manual for internal training management.		●	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→			
5-5: Conduct trainings on internal training management targeting for the nominated staffs of Output 5 members and Human Resources Development Section.				●									●	●										●			
5-6: Prepare training programs (modules) on the fields that the Project targets in collaboration with staff in the relevant section																											
Sharing of training modules for each output activity			●												●												
Reflection on KUKL internal training implementation plan			●												●												
Assistance in preparing annual budget review documents				●												●											
5-7: Prepare for trainings such as development of training materials, examination of how to measure the effectiveness of training, etc., in collaboration with staff in the relevant section.																											
Creation of training materials			●											●													
Study on how to measure the effectiveness of the training			●																								
Preparation for Training		●	●			●	●	●		●	●	●	●				●	●	●				●				
5-8: Conduct training of trainers (TOT) in each area.			●	●			●	●	●		●	●	●	●				●	●	●				●			
5-9: Conduct trainings. (Support training implementation as staff in charge of training management)			●	●			●	●	●		●	●	●	●				●	●	●				●			
Enhancing the Training & Support Division at KUKL Head Office			●	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→			
Clarification of the role of the Training & Support Division				●																							
5-10: Summarize and review the results of trainings.			●	●			●	●	●		●	●	●	●				●	●	●				●			
5-11: Reflect the training results to next training plans.				●	●			●	●	●		●	●	●	●				●	●	●				●		

3.6 Matters common to each output

3.6.1 Explanation of Work Plan for Term-3

JET will prepare a work plan (draft for Term-3) to explain the overall picture of the project, the activity policy and methods for Term-3 based on the progress of the activities in Term-2, and the implementation process, etc. to the Nepalese parties concerned.

The Work Plan (Phase 3) will be drafted by early March 2024. The contents will be confirmed with KUKL as the local activities start, and finalized based on discussions. The finalized Work Plan will be submitted to JICA by mid-May 2024.

3.6.2 Provision of easily accessible training materials

In this project, training materials, videos, SOPs, guidelines, manuals, etc. will be digitized and uploaded to the project portal website built on an external web hosting server, so that the materials created for each output activity will continue to be used by many staff members in a continuous and effective manner after the project terminates.

In the second half of Term-3, a series of data will be transferred to KUKL's internal server, and JET will work with the IT section to provide a convenient access method for staff to help implement sustainable internal training.

http://www.kukl-jica.sakura.ne.jp

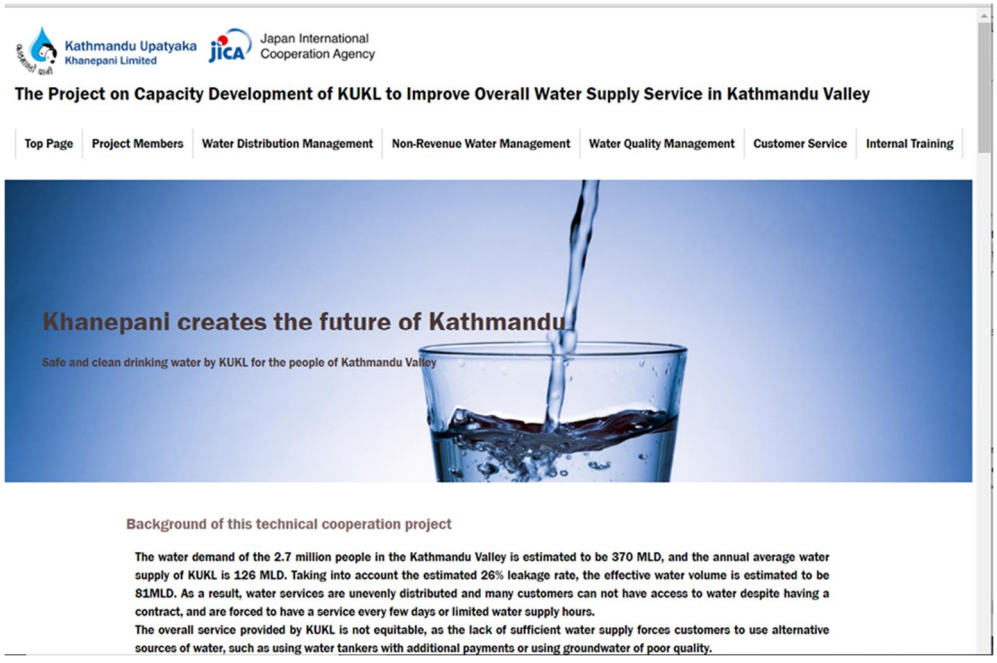


Figure 3.6.1 Project Portal Site (Tentative Version)

3.6.3 Implementation of the training in Japan

In the training in Japan, JET will formulate and provide a training program that utilizes the high quality and diverse assets of the Tokyo Metropolitan Waterworks Bureau (TMWB). TMWB prepares a training plan based on the "Human Resources Securing and Training Policy" and conducts various training at the "Training and Development Center", which is the largest water supply training facility in Japan.

This training center can provide practical training using the training field as well as classroom lectures on the training system and specialized fields. Furthermore, it transfers the know-how of training implementation and supervision necessary for improving the training system within KUKL.

(1) Selection of participants

The theme of the fifth and final session is the acquisition of practical techniques that contribute to the reduction of non-revenue water, and there is little room for non-KUKL personnel to reflect this in their daily work. Therefore, the target participants will be selected among JET and CEO of KUKL and the project manager of KUKL, with the approval of JICA Headquarters.

Table 3.6.1 Outline of the 5th training in Japan

Item	Contents
Objective	Technical training on non-revenue water reduction will be provided to ensure that the non-revenue water rate remains at a low level after the end of the project and that the water services are sustainable. The aim is to develop practical methods and a broader perspective, which can be applied to day-to-day operations in a manner appropriate to KUKL.
Target	To be selected 7 persons from Output 2 Core Members
Training place	Tokyo Metropolitan Government Waterworks Bureau / Tokyo Water Co., Ltd.
Expected output	Promotion of proactive activities and active involvement of counterparts in the project. The acquisition of knowledge and skills through training, the propagation of awareness through intra-organizational feedback upon return, and the synergies with project output.
Period	9 days in September 2024 (Tentative)

Table 3.6.2 Candidate of participants in the 5th training in Japan

No	Name	Organization*1	Position
1	Mr. Narayan Karna	Manager, Mahankalchaur Branch	Engineer
2	Ms. Bina Maharjan	Manager, Kirtipur Branch	Engineer
3	Mr. Susil K C	KVWSMB	Engineer
4	Mr. Akrur Nath Sharma	CEO Secretariat, Head Office	Engineer
5	Mr. Hem Bahadur Budhathoki	Manager, Bhaktapur Branch	Engineer
6	Mr. Surya Bahadur Khatri	Wastewater Operation Division	Account Officer
7	Mr. Surendra Rawal	Manager, Chhetrapati Branch	Engineer

(2) Tentative schedule

Table 3.6.3 Schedule of the 5th training in Japan

Date	Time	Activities
2/Sep/24		Transfer from KTM to Tokyo
3/Sep/24	AM	Briefing in JICA Training Centre / Program Orientation by JET
	PM	[Lecture] Outline of water services in Tokyo
4/Sep/24	AM	[Lecture] History of challenges against leakage reduction in Tokyo
	PM	[Site visit] Visit to Branch Office (Daily operation / Administration devices and system / Mapping devises / Meter storage) Visit to Call Center in Sazazuka
5/Sep/24	AM	[Lecture] Service connection facilities / Management of water tank owned by customer / Leakage attention
	PM	[Lecture] Management of customer meter / Leakage control
6/Sep/24	AM	[Field practice] Leakage monitoring and control by DMA wise
	PM	[Field practice] Leakage detection, Service connection work

Date	Time	Activities
7/Sep/24		Free
8/Sep/24		Free
9/Sep/24	AM	Raising awareness of improvement among staffs (5 Whys)
	PM	Training evaluation meeting, Opinion Exchange, Diplomat
10/Sep/24		Transfer from Tokyo to KTM

3.6.4 Preparation of the Project Completion Report

JET will prepare a draft project completion report around November 2025 which will include the results of the project activities, the achievement of the project purpose, recommendations and lessons learned for achieving the overall goal.

The draft report will be reported to the Nepalese side at the final JCC after confirmation by JICA Headquarters. After obtaining final agreement on the contents of the report from JICA and Nepalese organizations concerned, a bound report will be submitted to the Nepalese side.

3.7 Work Schedule

[Term-3]

The preparation work in Japan will begin in early March 2024 and a work plan (draft version) for the Term-3 will be prepared. After that, local works will begin based on the Work Plan that has been confirmed by JICA.

The deliverables and submission timeline for each term are as follows. Monitoring sheets will be prepared in collaboration with Japanese experts and KUKL project managers and submitted to JICA.

Table 3.7.1 List of documents to be submitted to JICA in Term-3

Term	Documents	Deadline	Number of copies
Term-3	Work Plan (Term-3)	The draft version: within 1 months after starting the Term-3 The final version: within 3 months after starting the Term-3	2 copies of English version
	Monitoring Sheet Ver.7	6 months after submission of version 6	1 copy of English version
	Monitoring Sheet Ver.8	6 months after submission of version 7	1 copy of English version
	Monitoring Sheet Ver.9	6 months after submission of version 8	1 copy of English version
	Project Brief Note (Term-3)	March 18, 2026	Report (PDF and Word) Power Point Sheet recorded in CD-R
	Project Completion Report	March 18, 2026	2 copies of Japanese version 6 copies of English version

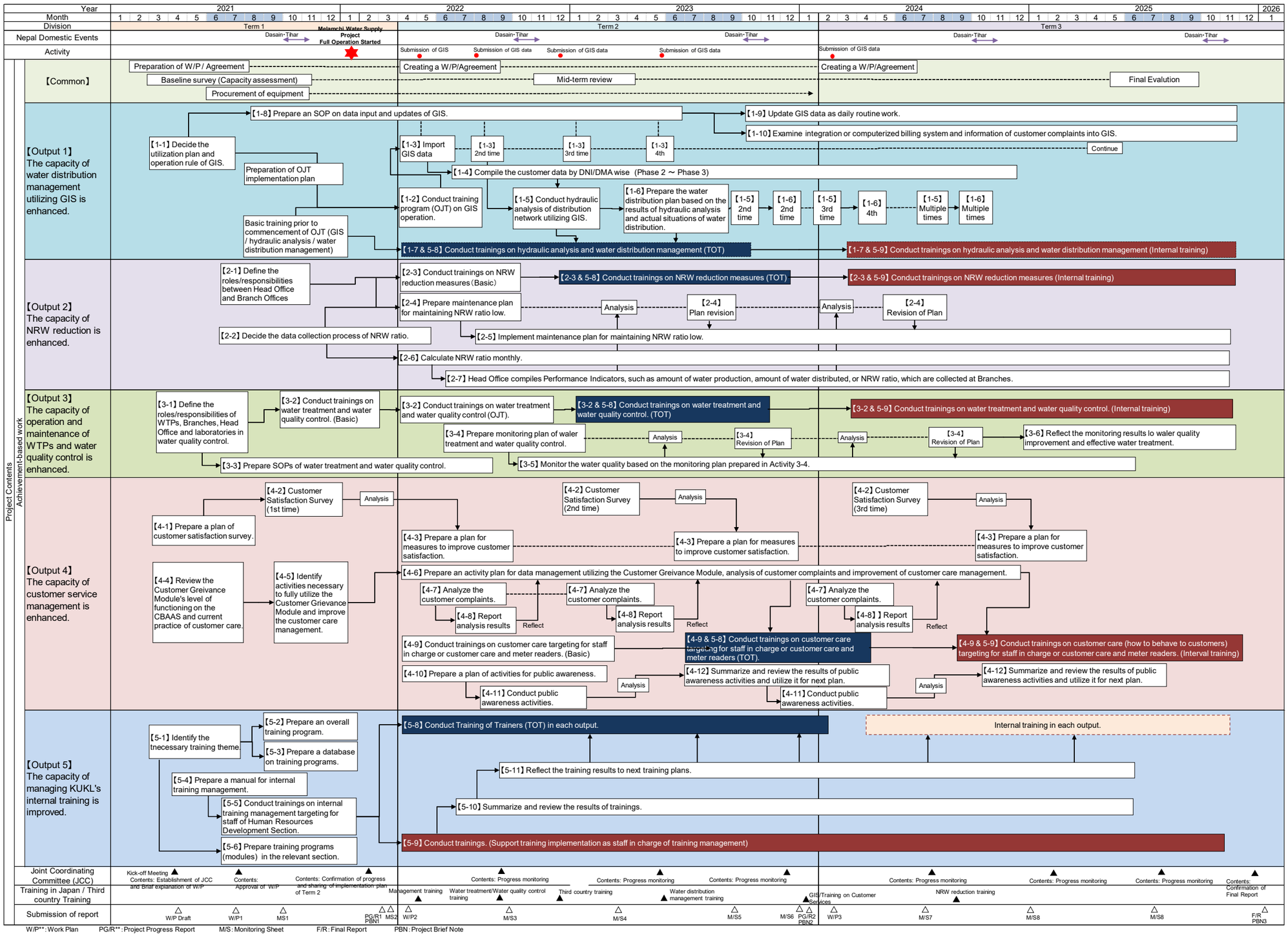
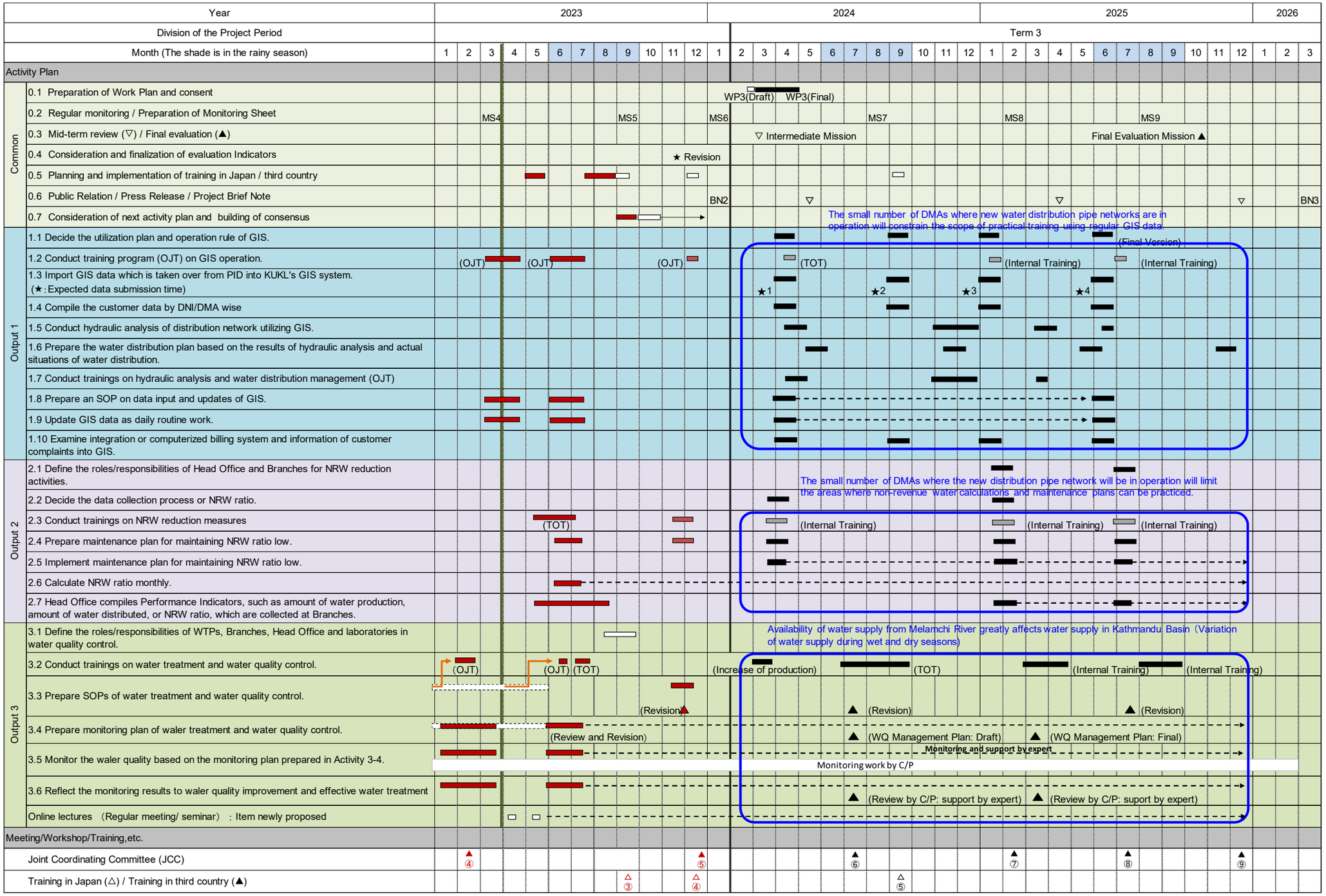
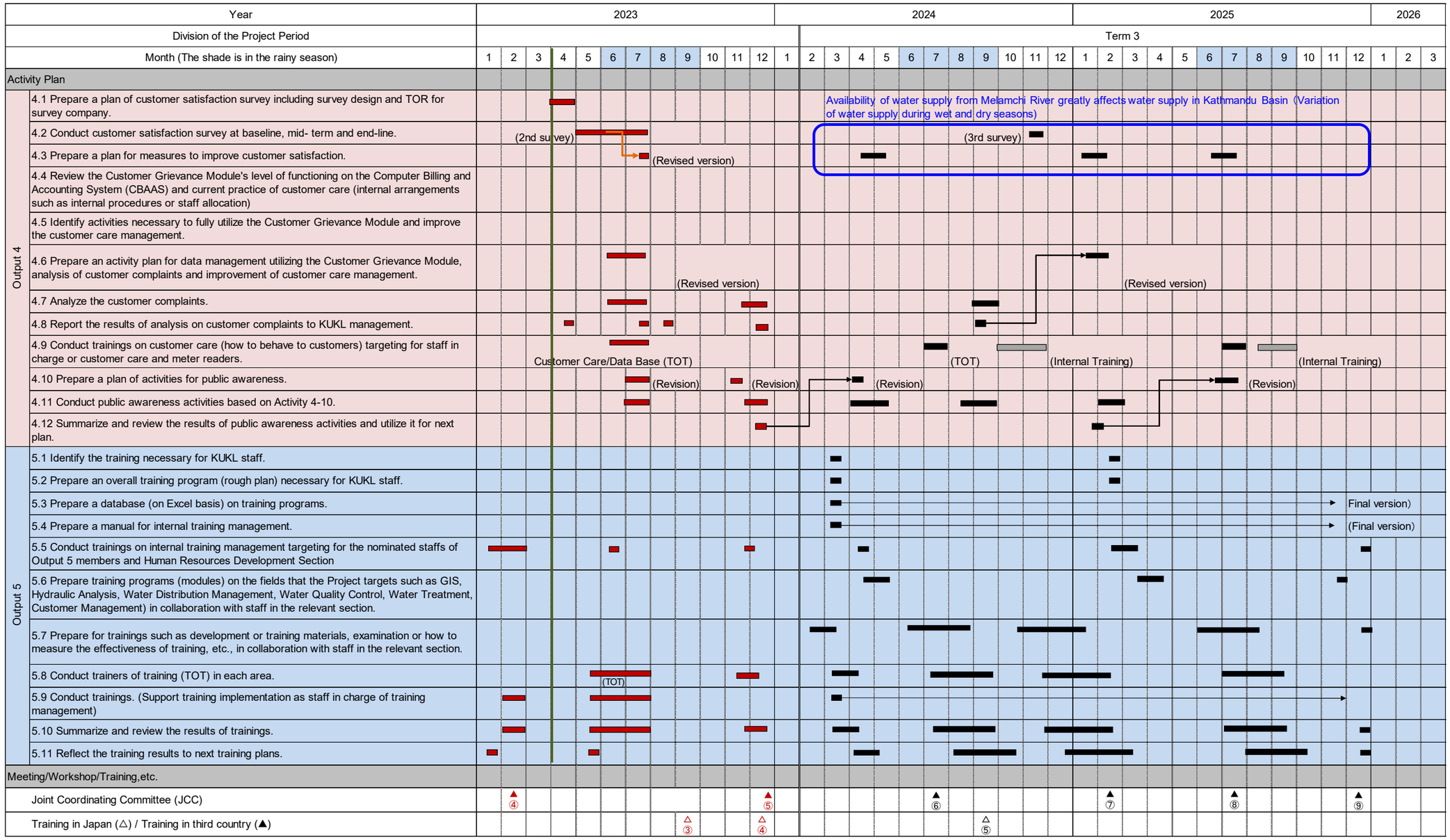


Figure 3.7.1 Flowchart of the Project Activities

Table 3.7.2 Work Schedule




Year
2023
2024
2025
2026
Division of the Project Period
Term 3
Month (The shade is in the rainy season)
1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3
Activity Plan
Output 4
4.1 Prepare a plan of customer satisfaction survey including survey design and TOR for survey company.
Availability of water supply from Melamchi River greatly affects water supply in Kathmandu Basin (Variation of water supply during wet and dry seasons)
4.2 Conduct customer satisfaction survey at baseline, mid- term and end-line.
(2nd survey)
(3rd survey)
4.3 Prepare a plan for measures to improve customer satisfaction.
(Revised version)
4.4 Review the Customer Grievance Module's level of functioning on the Computer Billing and Accounting System (CBAAS) and current practice of customer care (internal arrangements such as internal procedures or staff allocation)
4.5 Identify activities necessary to fully utilize the Customer Grievance Module and improve the customer care management.
4.6 Prepare an activity plan for data management utilizing the Customer Grievance Module, analysis of customer complaints and improvement of customer care management.
(Revised version)
(Revised version)
4.7 Analyze the customer complaints.
4.8 Report the results of analysis on customer complaints to KUKL management.
4.9 Conduct trainings on customer care (how to behave to customers) targeting for staff in charge or customer care and meter readers.
Customer Care/Data Base (TOT)
(TOT)
(Internal Training)
(Internal Training)
4.10 Prepare a plan of activities for public awareness.
(Revision)
(Revision)
(Revision)
(Revision)
4.11 Conduct public awareness activities based on Activity 4-10.
4.12 Summarize and review the results of public awareness activities and utilize it for next plan.
Output 5
5.1 Identify the training necessary for KUKL staff.
5.2 Prepare an overall training program (rough plan) necessary for KUKL staff.
5.3 Prepare a database (on Excel basis) on training programs.
Final version)
5.4 Prepare a manual for internal training management.
(Final version)
5.5 Conduct trainings on internal training management targeting for the nominated staffs of Output 5 members and Human Resources Development Section
5.6 Prepare training programs (modules) on the fields that the Project targets such as GIS, Hydraulic Analysis, Water Distribution Management, Water Quality Control, Water Treatment, Customer Management) in collaboration with staff in the relevant section.
5.7 Prepare for trainings such as development or training materials, examination or how to measure the effectiveness of training, etc., in collaboration with staff in the relevant section.
5.8 Conduct trainers of training (TOT) in each area.
(TOT)
5.9 Conduct trainings. (Support training implementation as staff in charge of training management)
5.10 Summarize and review the results of trainings.
5.11 Reflect the training results to next training plans.
Meeting/Workshop/Training,etc.
Joint Coordinating Committee (JCC)
④ ⑤ ⑥ ⑦ ⑧ ⑨
Training in Japan (△) / Training in third country (▲)
③ ④ ⑤
Local work (Plan)
Local work (Actual)
Activity affected by the progress of related
Domestic work in Japan

Chapter 4: Project Implementation Structure

Chapter 4: Project Implementation Structure

4.1 Project Implementation Structure

The project implementation structure, including the JICA Expert Team (hereinafter referred to as "JET"), is as follows.

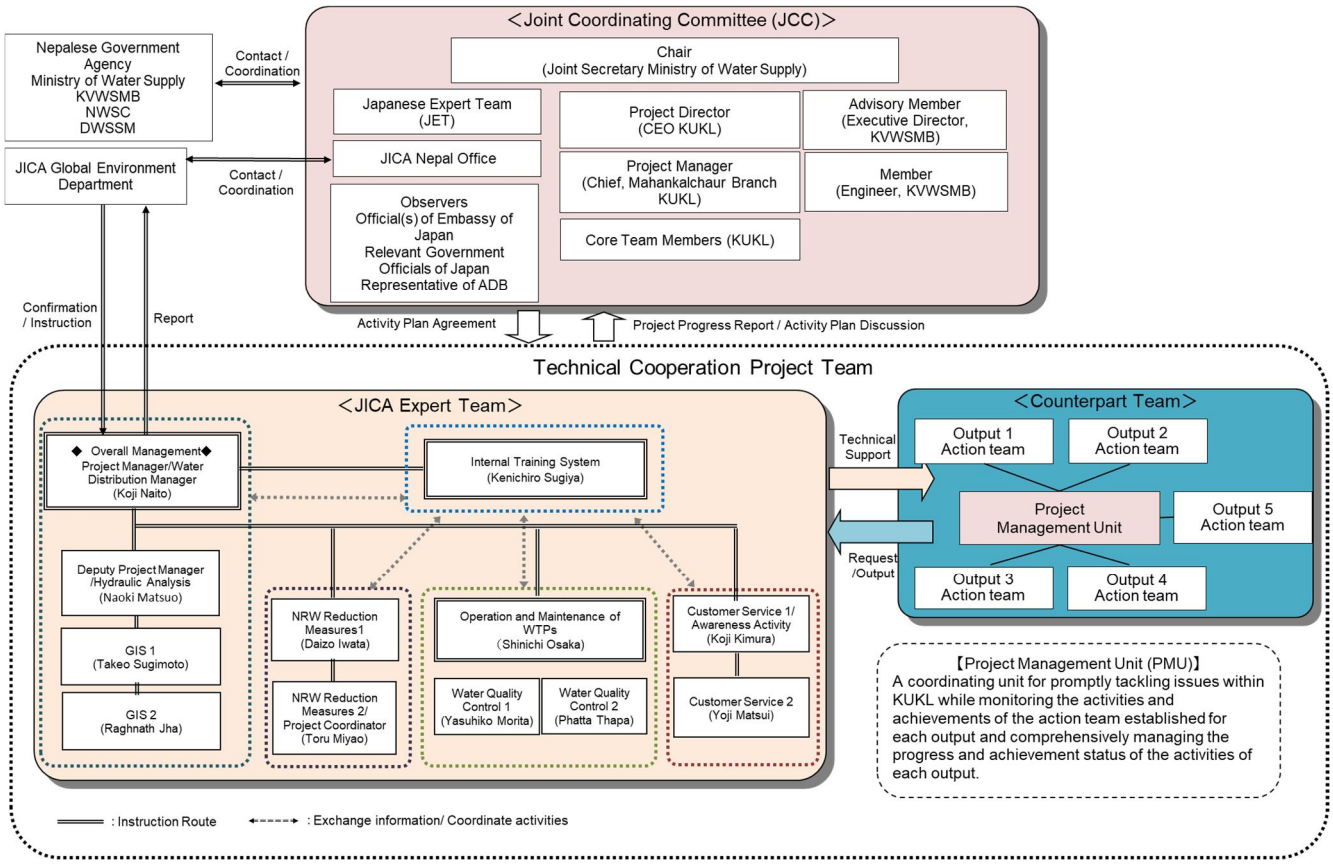


Figure 4.1.1 Project Implementation Structure

In order to ensure that this implementation system would continue after the project started and that the C/P would be actively involved in the project activities even when JET were away from Nepal, several local engineers were employed by JET to ensure smooth communication between JET and Nepalese sides.

In particular, the Technical Advisor is a staff member who was working on Kathmandu's water supply projects as the Technical Director of KUKL for many years and plays a major role in liaison and coordination not only with KUKL but also with MoWS and KVWSMB.

Table 4.1.1 Local engineers employed by JET

No	Name	Position	Supporting Work
1	Tilak Bhandari	Technical Advisor	➢ Liaison with upper management of MoWS and KUKL ➢ Work instructions to KUKL branch offices
2	Pankaj Bhandari	Chief Assistant Engineer	➢ Monitoring of work progress related to Output 1 to 5 ➢ Technical support for JET related to Output 3 to Output 5 ➢ Monitoring of progress of Melamchi Water Supply Project ➢ Technical guidance to KUKL in the absence of JET ➢ Coordination of online meeting
3	Palpasa Prajapati	Assistant Engineer	➢ Technical support for JET related to Output 1 to Output 2 ➢ Management of procured equipment ➢ Local expenses management ➢ Other secretarial work

4.2 Joint Coordinating Committee (JCC)

In technical cooperation projects, in addition to monitoring project activities, it is necessary to establish a decision-making body involving a higher agency with command-and-control authority over the implementing agency, KUKL, in order to resolve issues faced by each activity.

At the start of this project, the Joint Coordinating Committee (JCC) was established to approve the activities, results and plans planned for the project, and to make decisions on how to resolve the issues.

The JCC meets approximately every six months to review the results of the regular monitoring of the project within the stakeholders, to agree on the overall direction of the plan and to make decisions on how to resolve issues.

[Role of JCC]

- Review and monitoring of the overall project activities according to the PO and the achievement of the project according to the PDM
- Approval of the annual activity plan according to the PO
- Discussion and advice on events occurring during project implementation

Table 4.2.1 Composition of JCC

Roles	Name	Organization
Chair	Mr. Sunil Kumar Das*1	Joint Secretary, Ministry of Water Supply (MoWS)
	Ms. Meena Shrestha	Joint Secretary, Ministry of Water Supply (MoWS)
Project Director	Mr. Milan Kumar Shakya*2	Chief Executive Director, KUKL
	Mr. Gyanendra Bahadur Karki*3	Chief Executive Director, KUKL
	Mr. Ashok Kumar Paudel	Chief Executive Director, KUKL
Project Manager	Mr. Umesh Babu Marahatta	Deputy Manager, Chief of Production Division, KUKL
Advisory Member	Mr. Sanjeev Bickram Rana	Executive Director, KVWSMB
Member	Mr. Chandan Kumar Shah	Engineer, KVWSMB

Note *1: Replaced by Ms. Meena Shrestha after his retirement in February 2022.
Note *2: From March 2021 to June 2023.
Note *3: From July 2023 to March 2024.

A summary of the JCC held at the end of Term-2 is shown in Table 4.2.2 and 4 JCCs are scheduled in Term-3 as shown in the Table 4.2.3.

Table 4.2.2 Outline of the 5th JCC meeting

Items	Contents
Date and time	December 18th, 2023, 13:00 - 15:15 (Nepal Standard Time)
Type	Conference Room of KUKL Head Office with Web conference of MS Teams
Purpose	Report on the project progress and commitment of actions to be taken by KUKL toward the start of Term-3
Items of discussion	1. Mid-term evaluation by KUKL managerial section 2. Progress of the project and activities to be conducted in Term-3 3. Changes in Key Performance Indicators of KUKL during the project 4. Actions to be taken by KUKL for Term-3
Participants	[Nepalese side: 11] ・Ms. Meena Shrestha (Joint Secretary, Ministry of Water Supply) ・Mr. Ram Chandara Dhakal (Chief Finance Officer, KVWSMB) ・Mr. Rajendra Sapkota (Project Director, PID) ・Mr. Gyanendra Bahadur Karki (CEO, KUKL) ・Mr. Ramesh K C (Deputy Manager, Chief of Water Operation Division, Head Office) ・Dr. Dol Prasad Chapagain (Deputy Manager, Chief of Wastewater Operation Division, Lalitpur) ・Mr. Umesh Babu Marahatta (Deputy Manager, Chief of Support Division, Head Office) ・Mr. Ujjwal Shrestha (Deputy Manager, Chief of Planning and Monitoring Division,/Project Manager of PMU , Head Office) ・Ms. Shailaja Adhikari (Assistant Manager, Chief of Water/Wastewater Quality Assurance Division) ・Mr. Dipendra Bahadur Oli (Assistant Manager, Company Secretary, Chief of Procurement Section) ・Ms. Bina Khanal (Assistant Manager, Chief of Training and Research Section, Head Office) [Japanese side: 14] ・JICA Headquarters: 1 ・JICA Nepal Office: 5 ・JICA Expert Team: 9 ・Local engineer of JET: 3
Comments by JICA Nepal Office	[Mr. Akimitsu Okubo] He expressed gratitude to all participants and counterparts for providing this opportunity of the 5th JCC meeting. He stated that it was a good opportunity for him to know many activities ongoing under KUKL and issues facing this moment. Water sector is a vigorous sector for the Japanese government providing financial assistance and technical support to the government of Nepal. After completion of the Melamchi project, KUKL will manage all the facilities for water supply in Kathmandu. To support KUKL for management of overall water supply and newly constructed facilities through Melamchi project, JICA has started this technical cooperation project. JICA closely monitors this status and progress of this project and the performance of KUKL. From perspective of the project, we could see several reformative actions, such as human resources recruitment and financial allocation. He would like to express an appreciation to CEO, Mr. Gyanendra Bahadur Karki, and the entire KUKL team for making an effort to this project. He also could see there are several trainings and capacity development program. The key question rises “how to monitor effectiveness of training provided by the project to improve KUKL’s performance”. The training is not a purpose but is just one of the tools to achieve the goal based on PDM. JICA would like to request KUKL and the project team to closely monitor the effectiveness of the trainings and capacity development program in a day-to-date operation and service improvement of KUKL. JICA believes that Mr. Gyanendra Bahadur Karki takes a strong leadership and getting support from MoWS for KUKL to be able to overcome the technical and financial challenges with the wish of successful implementation of the project.
Comments by JCC members	[Mr. Gyanendra Bahadur Karki] He expressed gratitude to all participants and counterparts for their time and productive discussions during the 5th JCC meeting. The main purpose of the project is to enhance the capacity of KUKL employees and deliver improved services to customers. While Term-2 of the project has concluded successfully, and Term-3 is set to commence soon. He congratulated the team for the success of Term-2 and extended best wishes for Term-3. When KUKL start the project, the project faced many problems as like COVID-19 and water

Items	Contents
	scarcity. But until Term-2, KUKL has started the following actions under the guidance of the Japanese Expert Team. - Training and Research Section has been reactivated and allocated dedicated staffs. - 10 GIS dedicated persons has been selected to check the PID data before handover of DMAs. - Establishment of grievance handling unit at the Head Office and Branch Offices. The project has provided a good opportunity for KUKL employees to improve the overall system of KUKL. Furthermore, many core members of the output have had the opportunity to visit a third countries to acquire new technologies. Customer satisfaction survey has been conducted twice, which has shown the tendency of improvement on customer satisfaction with KUKL's services, regarding which Output 4 core members are in Japan to expanding their knowledge. He repeatedly expressed gratitude to the project team and the people of Japan for their unwavering support in the capacity building project. [Mr. Rajendra Sapkota] He expressed his thought that this meeting is a good opportunity to all the relevant stakeholder to set in a single platform and discuss the project activities. The project has done a tremendous effort to enhance the overall capacity of KUKL. However, the Japanese Expert Team has diagnosis some problem in each output during implementation of the project activities, which should be address by concerned agencies immediately. He stated that in all the aspect, KUKL should improve and learn a lot of things from the Japanese Expert Team as the largest private organization in Nepal to provide water service to the customer. Further, PID also learned a lot about NRW management, GIS and so on. He stated that all the bodies related to Wash sector in Nepal should consult with JET and learn a lot from them. Furthermore, he stated that PID had hand over 4 DMAs in the past and learned some problem during handover process. Those lessons learned will be reflected to the next handover process and more than 10 DMAs will be handed over soon after the resumption of Melamchi water. Moreover, he informed that PID is going to implement SCADA system in February 2024. He requested JET to support during preparation of SCADA module, if possible. Finally, he concludes that, KUKL should implement the suggestion which are pointed out by JET, and he wishes for the success of Term-3. [Ms. Meena Shrestha] She thanked JET and others relevant organizations for participating and supporting KUKL in the 5th JCC meeting of this technical cooperation project. She mentioned that Ministry of Water Supply (MoWS) is happy with JICA for continuous support to Nepal in many sectors. She congratulated to the project for the success of Term-2 and wishes to great success in Term-3. She recommended that KUKL promptly address the concern highlighted by JET in each output. On the other hand, she conveyed information to the meeting that a new secretary of MoWS has been assigned and the new secretary has committed to ensuring the delivery of Melamchi water within three weeks. Furthermore, she strongly requested KUKL to address any issues before the commencement of Melamchi operations, as we agreed to implement all the terms until the project's completion. She expressed gratitude to all the experts for conducting OJT, internal training, and training in third countries to enhance the capacity of KUKL employees and improve the overall organizational system. Furthermore, she suggested KUKL to keep the rooster of TOT members of KUKL, even they are retired or resigned. After this technical cooperation project, KUKL can utilized those retired or resigned TOT members as a resource person. Delays in handing over the DMA by PID may also affect internal training on GIS. If this impact does not allow KUKL staff to gain sufficient GIS experience during the project period, temporary hiring of outside experts should be considered. However, this decision should be discussed internally first. MoWS is always there for any necessary assistance to accelerate project activities.

Table 4.2.3 Schedule of JCC

Time	Nepalese side	Discussion matters of meeting
6th JCC	Around July 2024	Discussion about progress and challenges
7th JCC	Around February 2025	Discussion about progress and challenges
8th JCC	Around July 2025	Discussion about progress and challenges
9th JCC	Around December 2025	Discussion about final evaluation by JICA

4.3 Detail of Project Implementation Structure

4.3.1 Overall structure on the Nepalese side

The structure for operation and management of this project on the Nepalese side is shown below.

[Issues]

In this project, it was considered necessary to create a system that would enable KUKL to tackle the issues by monitoring the activities and performances of the action teams set up for each output, and by comprehensively managing the progress and achievements of the activities for each output.

[Ingenuities]

It was proposed, and agreed by KUKL, to establish a Project Management Unit (PMU), separate from the Joint Coordinating Committee (herein after referred to as JCC), to facilitate the management of the overall project progress and information sharing, as well as to resolve issues quickly. The PMU members consisted of the Action Team Leaders for each output and the Nepalese Project Manager for this project.

The Action Teams for each output consist of core members within KUKL. The Action Teams will develop the activities defined in the PDM in collaboration with JET, and supporting members selected from the Head Office and each branch office will also participate in the activities for on-the-job training, technical guidance and internal trainings.

The JCC is a decision-making body consisting of upper management from MoWS, KVWSMB, and KUKL, and is responsible for reviewing the progress of project activities and removing impediments to those activities.

On the other hand, the PMU, consisting of core members who actually participate in project activities, functions as a forum for the practical consensus building of the project and a place where the C/Ps of each output can actively exchange opinions.

By establishing a PMU consisting of managerial staff of KUKL, the project members are not only able to take the lead in resolving issues, but are also able to report to JCC members in a timely manner through the PMU.

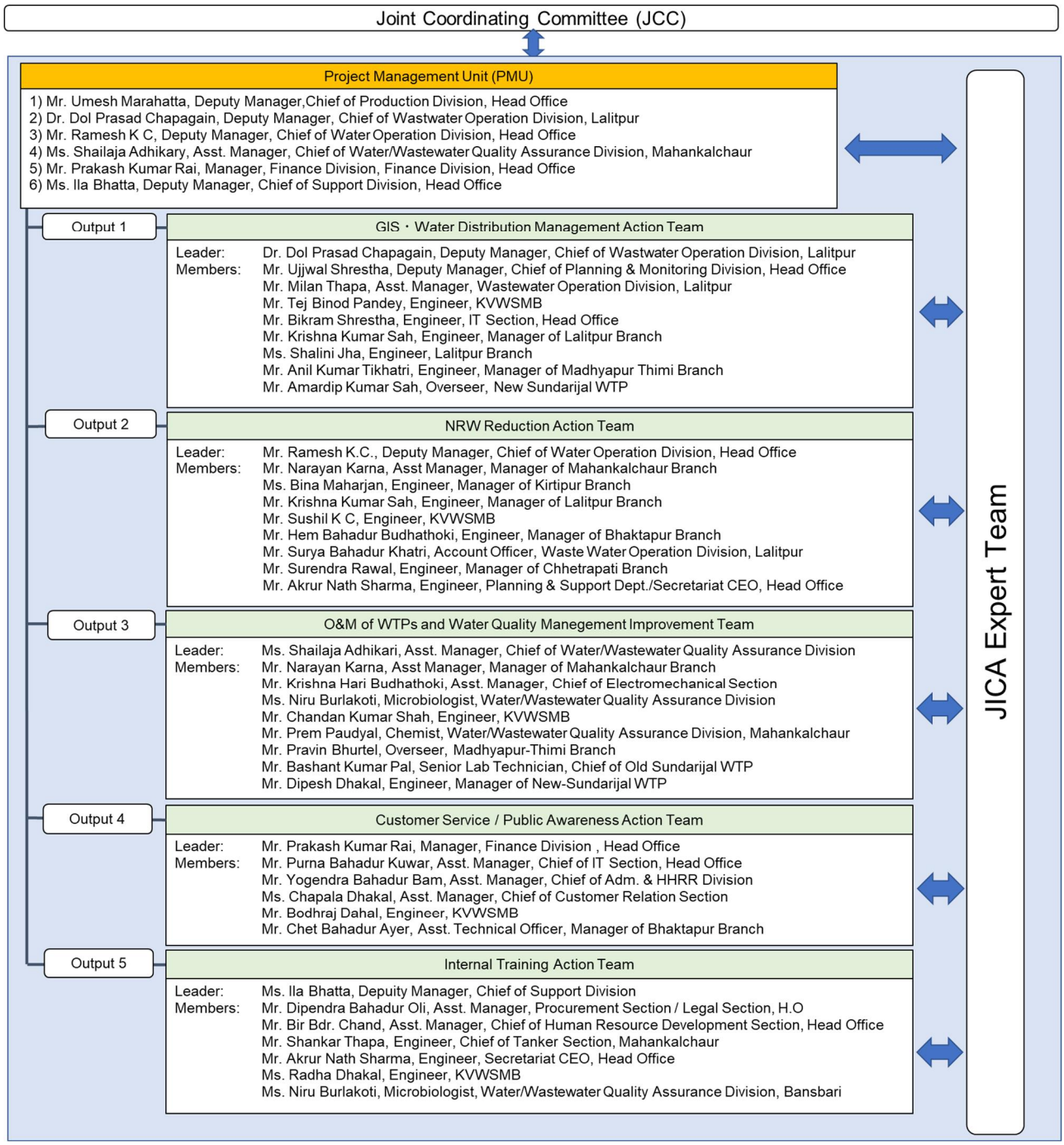


Figure 4.3.1 Project Operation and Management Structure on the Nepalese side

4.3.2 Allocation of the counterpart personnel

At the second JCC on February 14, 2022, the members of the Action Team responsible for this project activity were selected from KUKL staff and approved in JCC.

Subsequently, after changes due to several personnel promotions, transfers, and retirements, the membership composition was modified and decided as follows as of the end of Term-2.

In addition, when basic training and on-the-job training provided by JET were conducted, other KUKL staff members engaged in work in the field participated in those training as supporting members.

Table 4.3.1 Members of action team for each output

Output	Name	Organization
Output 1	Dr. Dol Prasad Chapagain (Leader)	Deputy Manager, Chief of Wastewater Operation Division, Lalitpur
	Mr. Ujjwal Shrestha	Deputy Manager, Chief of Planning & Monitoring Division, Head Office
	Mr. Milan Thapa	Assistant Manager, Wastewater Operation Division, Lalitpur
	Mr. Tej Binod Pandey	Engineer, KVWSMB
	Mr. Bikram Shrestha	Engineer, IT Section - Head Office
	Mr. Krishna Kumar Sah	Engineer, Manager of Lalitpur Branch
	Ms. Shalini Jha	Engineer, Lalitpur Branch
	Mr. Anil Kumar Tikhatri	Engineer, Manager of Madhyapur-Thimi Branch
	Mr. Amardip Kumar Shah	Overseer, Tripureshwor Branch
Output 2	Mr. Ramesh K.C. (Leader)	Deputy Manager, Chief of Water Operation Division, Head Office
	Mr. Narayan Karna	Assistant Manager, Manager of Mahankalchaur Branch
	Mr. Susil K.C.	Engineer, KVWSMB
	Mr. Hem Bahadur Budhathoki	Engineer, Manager of Bhaktapur Branch
	Mr. Surya Bahadur Khatri	Account Officer, Wastewater Operation Division, Lalitpur
	Mr. Surendra Rawal	Engineer, Manager of Chhetrapati Branch
	Mr. Krishna Kumar Sah	Engineer, Manager of Lalitpur Branch
	Ms. Bina Maharjan	Engineer, Manager of Kirtipur Branch
	Mr. Akrur Nath Sharma	Engineer, Planning & Support Dept./Secretariat CEO, Head Office
Output 3	Ms. Shailaja Adhikari (Leader)	Assistant Manager, Chief of Water/Wastewater Quality Assurance Division
	Mr. Narayan Karna	Assistant Manager, Manager of Mahankalchaur Branch
	Mr. Krishna Hari Budhathoki,	Assistant Manager, Chief of Electromechanical Section
	Ms. Niru Burlakoti	Microbiologist, Water/Wastewater Quality Assurance Division
	Mr. Chandan Kumar Sah	Engineer, KVWSMB
	Mr. Prem Paudyal	Chemist, Water/Wastewater Quality Assurance Division, Mahankalchaur
	Mr. Pravin Bhurtel	Overseer, Madhyapur-Thimi Branch
	Mr. Bashant Kumar Pal	Assistant Technical Officer, In charge of Old Sundarijal WTP
	Mr. Dipesh Dhakal	Engineer, Chief of New Sundarijal WTP
Output 4	Mr. Prakash Kumar Rai (Leader)	Manager, Chief of Administration and Finance Division, Head Office
	Mr. Purna Bahadur Kuwar	Assistant Manager, Chief of IT Section - Head Office
	Mr. Yogendra Bahadur Bam	Assistant Manager, Chief of Adm. & Human Resources Division - Head Office
	Ms. Chapala Dhakal	Assistant Manager, Chief of Customer Relation Section, Head Office
	Mr. Bodhraj Dahal	Engineer, KVWSMB
	Mr. Chet Bahadur Ayer	Assistant Technical Officer, Mahankalchaur Branch
Output 5	Ms. Illa Bhatta (Leader)	Deputy Manager, Chief of Support Division
	Mr. Dipendra Bahadur Oli	Assistant Manager, Chief of Procurement Section / Legal Section

Output	Name	Organization
	Mr. Bir Bahadur Chand	Assistant Manager, Chief of Human Resources Development Section - Head Office
	Mr. Shankar Thapa	Engineer, Chief of Tanker Section, Mahankalchaur
	Mr. Akrur Nath Sharma	Engineer, Planning & Support Dept./Secretariat CEO, Head Office
	Ms. Radha Dhakal	Engineer, KVWSMB
	Ms. Niru Burlakoti	Microbiologist, Water/Wastewater Quality Assurance Division, Bansbari
	Ms. Bina Khanal	Assistant Manager, Chief of Training & Research Section

Note *1: Organization as of December 2023

Table 4.3.2 Supporting Members for each output

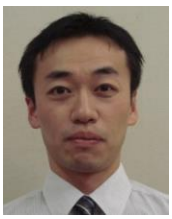
No.	Name	Section	Position	Remark
Output 1 Supporting Members				
1	Mr. Hem Bahadur Budhathoki	Manager - Bhaktapur Branch	Engineer (Level 7)	Joind in 2022
2	Mr. Pravin Bhurtel	Madhapur-Thimi Branch	Overseer (Level 5)	
3	Ms. Roshani Khatri	Tripureshwor Branch	Overseer (Level 5)	Joind in 2022
4	Mr. Bijay Bishwakarma	Manager - Baneshwor Branch	Engineer (Level 7)	
5	Mr. Jitendra Shah	Maharajgunj Branch	Overseer (Level 5)	
6	Mr. Niwash Guragian	Lalitpur Branch	Asst. Tech. Officer (Level 6)	
7	Mr. Akrur Nath Sharma	CEO Secretariat, Head Office	Engineer (Level 7)	
8	Mr. Nrigendra Shrestha	Head Office	Tech. Officer (Level 7)	
9	Mr. Puspa Bhandari	Maharajgunj Branch	Supervisor (Level 5)	
10	Mr. Raushan Kumar Shah	Tripureshwor Branch	Overseer (Level 5)	Joind in 2022
11	Mr. Chet Bahadur Ayer	Mahankalchaur Branch	Asst. Technical Officer (Level 6)	
12	Mr. Ranjit Bohara	Wastewater Operation Division	Civil Overseer (Level 5)	
13	Mr. Prativa Bhattarai	Wastewater Operation Division	Civil Overseer (Level 5)	
14	Mr. Suman Bahadur Basnet	Manager, Tripureshwor Branch	Engineer (Level 7)	
15	Mr. Sumit Kumar Shah	New Sundarijal WTP	Supervisor (Level 5)	
16	Mr. Rajendra Deshar	Chhetrapati Branch	Asst. Technical Officer (Level 6)	
17	Mr. Ajaya Kumar Chaudhary	Baneshwor Branch	Overseer (Level 5)	
18	Mr. Udaya Acharya	Maharajgunj Branch	Overseer (Level 5)	
19	Ms. Bina Maharjan	Manager, Kirtipur Branch	Engineer (Level 8)	
	Mr. Kamal Pun	Lalitpur Branch	Engineer (Level 7)	Resigned in Sep 2022
	Mr. Madhav Pandey	Maharajgunj Branch	Asst. Tech. Officer (Level 6)	Retired in Dec 2022
	Mr. Rabin Khadka	Maharajgunj Branch	Engineer (Level 7)	Resigned in July 2023
	Mr. Yamuna K C	Chhetrapati Branch	Overseer (Level 5)	Resigned in 2021
	Ms. Rachana Adhikari	Planning and Support Department, Head Office	Engineer (Level 7)	Resigned in 2022
Output 2 Supporting Members				
1	Mr. Krishna Hari Bhdhathoki	Manager - Electromechanical Dept.	Asst. Manager (Level 8), Technical	
2	Mr. Pravin Bhurtel	Madhapur-Thimi Branch	Overseer (Level 5)	
3	Mr. Amardip Kumar Sah	Tripureshwor Branch	Overseer (Level 5)	
4	Mr. Tijendra Jung Karkee	Electromechanical Dept.	Asst. Account Officer (Level 6)	
5	Mr. Nabin Neupane	Maharajgunj Branch	Senior Asst. Account Officer (Level 5)	
6	Mr. Buddha Ram Maharjan	Kirtipur Branch	Asst. Tech. Officer (Level 6)	
7	Ms. Urmila Bhandari	Madhapur-Thimi Branch	Asst. Account Officer (Level 6)	
8	Mr. Udaya Acharya	Maharajgunj Branch	Overseer (Level 5)	
9	Mr. Rajendra Bahadur Bam	PID	Adm. Officer (Level 7)	
10	Mr. Krishna Bahadur Shrestha	Chhetrapati Branch	Supervisor (Level 5)	
11	Mr. Sumit Kumar Shah	New Sundarijal WTP	Supervisor (Level 5)	
12	Ms. Sita Kandel	Tripureshwor Branch	Senior Asst. Account Officer (Level 5)	Joind in 2022
13	Mr. Sudarshan Sapkota	Lalitpur Branch	Senior Meter Reader (Level 4)	
14	Mr. Bikash Maharjan	Madhapur-Thimi Branch	Engineer (Level 7)	
15	Mr. Rajendra Deshar	Chhetrapati Branch	Asst. Tech. Officer (Level 6)	
16	Mr. Kapil Karki	IT Section - Head Office	Overseer (Level 5)	
	Mr. Durga Bahadur Basnet	Head Office	Asst. Manager (Level 8), Administrative	Retired in 2023
	Ms. Rachana Adhikari	NRW - Head Office	Engineer (Level 7)	Resigned in 2022
	Mr. Rabin Khadka	Maharajgunj Branch	Engineer (Level 7)	Resigned in July 2023
	Mr. Satish Kumar Dutta	Head Office	Act. Deputy CEO	Retired in Dec 2021
	Mr. Gopi Krishna Khadka	Tripureshwor Branch	Senior Account Asst. (Level 5)	Resigned in 2022

No.	Name	Section	Position	Remark
Output 3 Supporting Members				
1	Ms. Bina Maharjan	Manager - Kirtipur Branch	Engineer (Level 8)	
2	Mr. Manish Dhungana	Manager - Maharajgunj Branch	Deputy Manager (Level 9), Technical	
3	Mr. Bickram Acharya	PID	Engineer (Level 7)	
4	Mr. Gyanendra Bdr. Karki	Deputy CEO - Head Office	Act. Deputy CEO (Level 11), Technical	
5	Mr. Hem Bahadur Budhathoki	Manager - Bhaktapur Branch	Engineer (Level 7)	
6	Ms. Roshani Khatri	Tripureshwor Branch	Overseer (Level 5)	
7	Mr. Krishna Kumar Sah	Manager - Lalitpur Branch	Engineer (Level 8)	
8	Mr. Sumit Kumar Shah	New Sundarijal WTP	Supervisor (Level 5)	
9	Ms. Sachita Dhital	New Sundarijal WTP	Senior Lab Technician (Level 5)	
10	Mr. Pundari Nepal	Water/Wastewater Quality Assurance Division (KVWSMB)	Lab Assistant (Level 3)	
11	Mr. Santosh Kaphle	Water/Wastewater Quality Assurance Division (Bode)	Lab Technician (Level 4)	
12	Ms. Pranita Tuladhar	Water/Wastewater Quality Assurance Division (Central)	Senior Lab Technician (Level 5)	
13	Mr. Dinesh Adhikari	New-Sundarijal WTP	Senior Lab Technician (Level 5)	
14	Ms. Ratna Bhatta	Water/Wastewater Quality Assurance Division (Bode)	Senior Lab Technician (Level 5)	
15	Mr. Dipak Thapa	E&M Section, Sundarighat	Overseer (Level 5)	
16	Mr. Suresh Pradhananga	Bhaktapur Branch	Senior Technical Officer (Level 6)	
17	Mr. Niwash Babu Bhattarai	Water/Wastewater Quality Assurance Division (Bansbari Lab)	Lab Assistant (Level 3)	
18	Mr. Bhim Prasad Koirala	Maharajgunj Branch, Bansbari WTP	Supervisor (Level 5)	
19	Mr. Laxman Chaudhary	New Sundarijal WTP	Civil Overseer (Level 5)	
20	Ms. Reshma Kawang	Electromechanical Dept.	Engineer (Level 7)	Joind in 2022
	Ms. Puranjan Nepal	New-Sundarijal WTP	Lab Assistant (Level 3)	Resigned in Oct 2023
	Mr. Bhola Dhungana	Mahankalchaur Branch	Asst. Tech. Officer (Level 5)	Retired in April 2024
	Mr. Madhav Pandey	Bansbari WTP	Asst. Tech. Officer (Level 5)	Retired in Dec 2022
	Mr. Satish Kumar Dutta	Head Office	Act. Deputy CEO	Retired in Dec 2021
	Mr. Sunil Kumar Shah	New Sundarijal WTP	Engineer (Level 7)	Resigned in Sep 2021
	Mr. Hariram Rimal	Chief - Bode WTP	Engineer (Level 7)	Resigned in Sep 2022
Output 4 Supporting Members				
1	Mr. Nawal Singh Saud	Customer Service -(CR /PR)-Head Office	Administrative Officer (Level 7)	
2	Ms. Matina Shakya	Customer Service -(CR /PR)-Tripureshwor	Administrative Officer (Level 7)	
3	Mr. Bishowjit Bhandari	Customer Service -(CR /PR)-Kirtipur	Assistant Administration (Level 4)	
4	Mr. Binod Kumar Oli	Customer Service -(CR /PR)-Quality	Assistant Administration (Level 4)	Joind in Jan 2022
5	Mr. Rajeev Kumar Singh	Customer Service -(CR /PR)-Chhetrapati	Assistant Administration (Level 4)	Joind in May 2022
6	Mr. Pradeep Chapagain	Customer Service -(CR /PR)-Mahankalchaur	Assistant Administration (Level 4)	Joind in Apr 2022
7	Mr. Rakesh Chaudhary	New Sundarijal WTP	Assistant Account (Level 4) Admin	Joind in June 2022
8	Mr. Shailendra Shrestha	Customer Service -(CR /PR)-Wastewater Operation Division	Senior Assistant (Level 5)	Joind in Nov 2022
9	Ms. Ambika Bogati	Customer Service -(CR /PR)-Lalitpur	Assistant Administration (Level 4)	Joind in Nov 2022
10	Mr. Kabin Dhwaj Adhikari	Customer Service -(CR /PR)-Head Office	Senior Assistant (Level 5)	Joind in Nov 2022
11	Mr. Santos Raj Ojha	Customer Service -(CR /PR)-Thimi	Senior Meter Reader	Joind in June 2022
12	Ms. Pramila Kunwar	Customer Service -(CR /PR)-Tripureshwor	Asst. Assistant (Level 4)	Joind in July 2022
13	Mr. Shikhar Pun Magar	IT Section - Head Office	Senior Computer Operator (Level 5)	Joind in July 2023
14	Pradip Ghimire	Customer Service -(CR /PR)- Maharajgunj	Asst. Administrative Officer, Level 6	Joind in March 2024
15	Ms. Bhagwati Paudel	Customer Service -(CR /PR)- Baneshwor	Asst. Administrative Officer, Level 6	Joind in March 2024
16	Mr. Suresh Pradhananga	Customer Service -(CR /PR)- Bhaktapur	Sr. Technical Officer (Level 6)	Joind in March 2024
17	Briksesh Kumar Raut	Customer Service -(CR /PR)- Head Office	Asst. Administrative Officer, Level 6	Joind in March 2024
	Mr. Bijay Timilsina	Chief-Administration and Finance Dept., Head Office	Act. Deputy CEO (Level 11)	Retired on Nov 2023
	Ms. Santusha Kasapal	Customer Service -(CR /PR)-Dhal Mahaskha	Asst. Computer Officer (Level 6)	Retired on Sep 2023
	Mr. Kamal Bahadur Bam	Customer Service -(CR /PR)-Lalitpur	Administrative Officer (Level 7)	Replaced in Nov 2022
	Mr. Labu Thapa	Customer Service -(CR /PR)-Madhyapur Thimi	Asst. Administrative Officer (Level 6)	Replaced in 2021
	Ms. Rita Paudel	Customer Service -(CR /PR)-Madhyapur Thimi	Assistant Administration (Level 4)	Replaced in June 2023
	Mr. Shankar Raj Joshi	Customer Service -(CR /PR)-Baneshwor	Administrative Officer (Level 7)	Replaced in 2021
	Mr. Pramodnath Rimal	Customer Service -(CR /PR)-Bhaktapur	Asst. Administrative Officer (Level 6)	Replaced in June 2022
	Mr. Rajendra Bahadur Bam	Customer Service -(CR /PR)-Chhetrapati	Administrative Officer (Level 7)	Replaced in 2021
	Ms. Maya Lama Poudyal	Customer Service -(CR /PR)-Quality	Asst. Computer Officer (Level 6)	Replaced in Jan 2022
	Ms. Geeta Pokhrel	Customer Service -(CR /PR)-MaharajGunj	Administrative Officer (Level 7)	Replaced in March 2024
	Mr. Chudamani Luitel	Customer Service -(CR /PR)-Baneshwor	Asst. Administrative Officer (Level 6)	Replaced in March 2024
	Ms. Kaushila Bhandari	Customer Service -(CR /PR)-Head Office	Office Assistant	Replaced in March 2024
	Ms. Bimala Khadka	Customer Service -(CR /PR)-Bhaktapur	Senior Computer Operator	Replaced in March 2024
Output 5 Supporting Members				
1	Mr. Gyanendra Bdr. Karki	Deputy CEO, Head Office	Act. Deputy CEO (Level 11), Technical	
2	Ms. Manju Manandhar	Human Resources Development Section, Head Office	Admin. Officer (Level 7)	
3	Mr. Ramesh Dhungana	Chief of Administration Section, Baneshwor Branch	Asst. Admn. Officer (Level 6)	
4	Mr. Kabin Dhoj Adhikari	Human Resources Development Section	Senior Assistant (Level 5)	
5	Mr. Sunil Chaudhary	Human Resources Development Section	Computer Operator (Level 4)	
6	Ms. Neha Adhikari	Head Office - IT Section	Overseer (Level 5)	
	Mr. Bijaya Bajracharya	Human Resources Development Section	Senior Assistant (Level 5)	Resigned in June 2022

4.3.3 Formation of JET

Table 4.3.3 List of Japanese Experts

Charge	Name	Organization	Principal Roles
Leader /Water Distribution Management	Mr. Koji NAITO 	CTII	- Total Management of JET - Supervision of all outputs and activities - Progress management to achieve project purpose - Monitoring of the project in collaboration with the KUKL's project manager - Regular report to JICA - Customer satisfaction survey contract - Recruitment of local staff - Decision of equipment to be procured by JET - Support for public relations activities by KUKL - Planning and implementation of OJT for water distribution management
Deputy Project Manager / Hydraulic Analysis	Mr. Naoki MATSUO 	CTII	- Sub-Management of JET - Progress monitoring of DMA project (External Condition of Output 1 & Output 2) and discussion and coordination with Nepalese side - Planning and implementation of OJT for hydraulic analysis - Proposal of improvement measures for water distribution management based on hydraulic analysis results ・Assistance for Leader of JET - Planning and supervision of the training in the third country
GIS1	Mr. Takeo SUGIMOTO 	Pasco	- Planning of GIS utilization and its operation - Planning and implementation of OJT for GIS operation and maintenance - Preparation of SOP for GIS operation and maintenance - Selection of GIS equipment - Procurement of GIS equipment
GIS2	Mr. Raghunath JHA 	CTII	- Planning of GIS utilization and its operation - Planning and implementation of OJT for GIS operation and maintenance - Preparation of SOP for GIS operation and maintenance

Charge	Name	Organization	Principal Roles
NRW Reduction Measure 1	Mr. Daizo IWATA 	NSC	- Study of data collection process related to NRW - Planning and implementation of OJT for countermeasure of apparent losses - NRW management planning - Data collection, analysis of NRW indicator
NRW Reduction Measure 2 /Coordinator	Mr. Toru MIYAO 	CTII	- Planning and implementation of OJT for countermeasure of real losses - Assistance for Leader of JET - Logistics coordination - Preparation of procurement of equipment and material - Preparation of recruitment of local staff - Support for reporting work
O&M of WTPs	Mr. Shinichi OSAKA 	TECI	- Planning and implementation of OJT for O&M of WTPs - Preparation of SOPs - Monitoring plan of O&M of WTPs and its implementation. - Revision of SOPs based on the result of monitoring
Water Quality Control 1	Mr. Yasuhiko MORITA 	TECI	- Planning and implementation of OJT for Water Quality Controls - Preparation of SOPs ・Monitoring plan of O&M of water quality control and its implementation. - Revision of SOPs based on the result of monitoring
Water Quality Control 2	Mr. Phatta THAPA 	TECI	- Observation of O&M training in the new Sundarijal WTP. - Planning and implementation of OJT for Water Quality Controls - Preparation of SOPs ・Monitoring plan of O&M of water quality control and its implementation. - Revision of SOPs based on the result of monitoring

Charge	Name	Organization	Principal Roles
Customer Service1 /Public Awareness	Mr. Koji KIMURA 	NSC	- Planning, implementation, and supervision of customer satisfaction survey - Evaluation and analysis of customer satisfaction survey results - Support for improving customer service / creating action plans for responding to complaints - Analysis of complaints from customers - Planning and implementation of OJT for Customer Service - Planning and implementation of Public Awareness Activities - Monitoring and analysis of Public Awareness Activities
Internal Training System	Mr. Kenichiro SUGIYA 	IDCJ	- Identification of needs of training in KUKL - Support of preparation of internal training database - Preparation of Internal Training Manual - Planning and implementation of OJT for Internal Training Division - Support for establishment of Internal Training System in KUKL
Customer Service 2	Mr. Yoji MATSUI 	TW	- Evaluation and analysis of customer satisfaction survey results - Support for improving customer service / creating action plans for responding to complaints - Support for preparation of Internal Training Curriculum - Provision of Know-How of internal training in Tokyo Metropolitan Water Service - Planning and supervision of the training in Japan

CTII: CTI Engineering International Co., Ltd.

TECI: TEC International Co., Ltd.

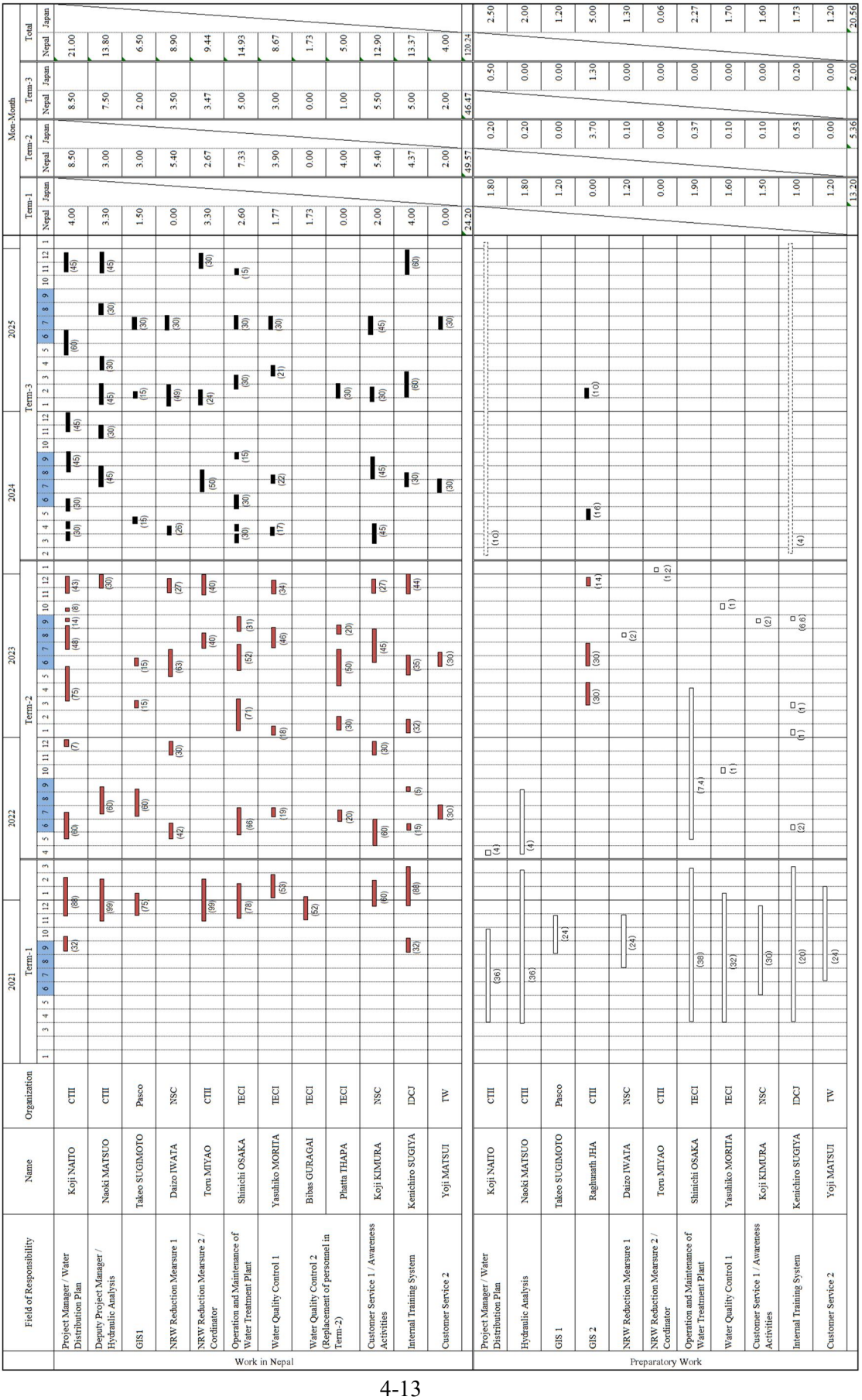
NSC: Nihon Suido Consultants Co., Ltd.

IDCJ: International Development Center of Japan

TW: Tokyo Water Co., Ltd.

4.4 Dispatch Plan of JET

Table 4.4.1 Schedule of Dispatch of JET



Chapter 5: Evaluation Process of the Project

Chapter 5: Evaluation Process of the Project

5.1 Regular Monitoring

In technical cooperation projects, the JICA Expert Team (hereinafter referred to as "JET") and KUKL must jointly monitor the project and submit the results to JICA on a default monitoring sheet.

In the monitoring sheet, the status of outputs achieved compared to the start of the Project and the prospects for achieving the project purpose and overall goal should be expressed in an easy-to-understand manner based on the results of the activities. In addition, the project implementation structure, operational innovations and lessons learned should also be described.

Monitoring results are reviewed at the JCC meetings held every six months, and are also used to confirm future activity plans and budget security, and to discuss important issues related to project implementation.

Figure 5.1.1 Contents of the Monitoring Sheet

Items	Description
I. Summary	
1. Progress	1-1 Progress of Inputs 1-2 Progress of Activities 1-3 Achievement of Output 1-4 Achievement of the Project Purpose 1-5 Changes of Risks and Actions for Mitigation 1-6 Progress of Actions undertaken by JICA 1-7 Progress of Actions undertaken by Government of Nepal 1-8 Other remarkable/considerable issues related/affect to the project
2. Delay of Work Schedule and/or Problems (if any)	2-1 Detail 2-2 Cause 2-3 Action to be taken 2-4 Roles of Responsible Persons/Organization
3 . Modification of the Project Implementation Plan	3-1 Plan of Operation 3-2 Other modifications on detailed implementation plan
4. Preparation of Government of Nepal toward after completion of the Project	
II. Annex	- Project Monitoring Sheet I: PDM - Project Monitoring Sheet II: PO

5.2 Response to Evaluation on Project Termination

KUKL and JET shall organize and provide materials, etc. prepared in relation to the implemented work to the evaluation team dispatched by JICA headquarters at the end of the Project, approximately six months before the end of the project, so that they can accurately recognize the status of the project activities, problems, and the process of solving issues faced.

In addition, JET will provide facilities during field surveys to the extent that it does not affect the project activities.

5.3 Project Evaluation Items

In managing the project, JET and KUKL will pay full attention to the five evaluation items, try to manage the project in a planned, effective and efficient manner in line with the PDM and PO, and flexibly change the activities in consultation with JICA according to the C/P capacity and changes in the environment around the project.

JET will accurately monitor the progress of the overall project and the achievement of results, discuss with the Project Management Unit of KUKL any changes in the direction of the project or activities as necessary, and report the results to JICA as appropriate.

The requirements to be met by the activities and results for each assessment item are summarized below:

Table 5.3.1 Examples of requirements for each evaluation criteria

No	Items	Example of Requirement
1	Relevance	・Consistency with Nepalese government policy ・Consistency with Japanese government policy ・Superiority of Japanese technology in the transfer of water supply technology ・Consistency with KUKL needs
2	Effectiveness	・To be expected to achieve project goals ・The activities and contents of each outcome clearly contribute to the achievement of the project purpose.
3	Efficiency	・The originally planned input has achieved the prescribed output. ・Efficient assistance has been implemented through cooperation/collaboration with other development partners. ・The cost burden on the Japanese side will not be higher than expected, and the cost on the Nepal side and existing equipment will be fully utilized. ・Technical guidance by JET flexibly responds to KUKL's needs and is implemented at the right time. ・The results of Japanese / third country training will be utilized to improve the work quality and capacity of KUKL. ・Procured equipment is properly managed and used continuously.
4	Impact	・Even after the project activities are completed, KUKL's efforts to improve technology will be systematically developed. ・The SOP, technical specifications, guidelines, etc. created by the project will contribute to sustainable business operations within KUKL. ・Project activities will improve the evaluation of KUKL by water customers. ・The created training curriculum and trained training instructors will contribute to the capacity building of water sector organizations other than KUKL.
5	Sustainability	・The SOP formulated in the project will be effectively utilized in KUKL's daily operation and maintenance. ・KUKL's efforts to spiral up after the project is materialized and implemented

Chapter 6: Procurement of Equipment and Materials

Chapter 6: Procurement of Equipment and Materials

6.1 Categorization of equipment and materials

The materials and equipment procured for technical cooperation projects can be categorized as follows:

Table 6.1.1 Category of equipment and materials

Type	Descriptions	Property rights
Equipment for donation	Goods and equipment to be provided at the request of the government of the recipient country for technical cooperation projects, etc.	KUKL
Equipment for project management (Property Lending)	Goods and equipment used by experts and study members to carry out technical transfer and local study.	JICA

Since the Project will last for about five years and the property and responsibility of the equipment and materials will be transferred to KUKL once the equipment and materials are donated, there is still a concern about how to deal with any failure or malfunction. For this reason, the JICA Expert Team (hereinafter referred to as "JET) decided that, in principle, all equipment and materials, except for consumables and those that are essential to be donated as soon as possible, would be classified as "Equipment for project management" under the property of JICA, and that JET would be responsible for dealing with any defects or problems during the project period.

[Attention]

The procured equipment and materials will be provided to KUKL by the end of Term-3 after discussing with KUKL how to manage the equipment and materials and confirming an appropriate storage and management environment.

6.2 Equipment and materials procured by Term-2

The following is a list of materials and equipment procured by the end of Term-2.

In accordance with the "Guidelines for Procurement and Management of Equipment and Materials under Consultancy Contracts (October 2022 version)" stipulated by JICA, when providing materials and equipment classified as "Equipment for project management" to KUKL, KUKL must prepare and submit to JICA a certificate of receipt that clearly states its responsibility for the management of the materials and equipment.

Table 6.2.1 Procured equipment and materials

Items	Quantity	Price (JPY)	Remark	Current Status	Items to be listed in a certificate of receipt
GIS Equipment (Output 1)					
GIS Application Software	1 set	0	Free of charge	-	
Desktop PC for GIS Operation including UPS and Security Software	6 pcs	2,203,762	Equipment for project management (Property Lending)	In use at KUKL branch office and head office	✔
GIS server including UPS, Security Software, Cabinet	1 pc	2,617,058	Equipment for project management (Property Lending)	In use at KUKL head office (Tripureshwor branch building)	✔
RTK-GNSS (Rover)	6 pcs	1,343,934	Equipment for project management (Property Lending)	In use at KUKL branch office and head office	✔
RTK-GNSS (Control Mobile Device)	6 pcs	476,880	Equipment for project management (Property Lending)	In use at KUKL branch office and head office	✔
Inspection Device of Customer Meter (Output 2/Output 4)					
Portable test meter	9 pcs	2,134,278	Equipment for project management (Property Lending)	In use at KUKL branch office	✔
Electronic water meter	1 pc	22,822	Consumables	Stored in the JICA Project Office	
Portable pulse logger	1 pc	25,000	Consumables	Stored in the JICA Project Office	
Equipment for rehabilitation of WTP (Output 3)					
Portable ultrasonic flow meter	1 pc	1,490,000	Equipment for project management (Property Lending)	Stored in the JICA Project Office	✔
Water Quality Measurement (Output 3)					
Potable Residual Chlorine Meter	9 pcs	1,122,238	Equipment for project management (Property Lending)	In use at KUKL branch office	✔
Portable Turbidity Meter	9 pcs	1,290,716	Equipment for project management (Property Lending)	In use at KUKL branch office	✔
Multi Pocket Meter	4 pcs	191,891	Equipment for project management (Property Lending)	In use at KUKL branch office	✔
Equipment for the activities of public awareness (Output 4)					
Laptop PC	1 pc	121,997	Equipment for project management (Property Lending)	Stored in the JICA Project Office	✔
Video Camera	1 pc	40,105	Consumables	Stored in the JICA Project Office	
Projector	1 pc	46,508	Consumables	Stored in the JICA Project Office	
Equipment for customer care (Output 4)					
Desktop PC	7 pcs	1,053,718	Equipment for project management (Property Lending)	In use at KUKL branch office and head office	✔
Water Pressure Monitoring (Output 1)					
Pressure Data Logger including Coiled Hose	10 pcs	450,895	Consumables	Stored in the JICA Project Office	
PC Communication Cable for Datalogger	5 pcs	133,032	Consumables	Stored in the JICA Project Office	
Others for project activities					
Multi-function color photocopy machine	1 pc	532,174	Equipment for project management (Property Lending)	Stored in the JICA Project Office	✔
Radio Handset Guiding	1 set	260,378	Equipment for project	Stored in the JICA	✔

Items	Quantity	Price (JPY)	Remark	Current Status	Items to be listed in a certificate of receipt
System			management (Property Lending)	Project Office	
Sound set for small scale lecture	1 set	86,600	Equipment for project management (Property Lending)	Stored in the JICA Project Office	✔
Sound set for middle scale lecture	1 set	150,124	Equipment for project management (Property Lending)	Stored in the JICA Project Office	✔
Supporting device for remote management work					
Smartphone	3 pcs	44,940	Consumables	Stored in the JICA Project Office	
Speakerphone for small scale meeting	1 pc	15,319	Consumables	Stored in the JICA Project Office	
Action Camera (GoPro)	1 pc	55,880	Equipment for project management (Property Lending)	Stored in the JICA Project Office	✔
Laptop PC	3 pcs	365,991	Equipment for project management (Property Lending)	Stored in the JICA Project Office	✔
Speakerphone for middle scale meeting	1 pc	61,957	Equipment for project management (Property Lending)	Stored in the JICA Project Office	✔

Table 6.2.2 Other equipment (miscellaneous expenses)

Items	Quantity	Price (JPY)	Remark	Current Status
Supporting Devices for GIS				
Tablet Device	29 pcs	1,231,080	Consumables	In use at KUKL branch office and head office
Printer	6 pcs	150,458	Consumables	In use at KUKL branch office and head office
Materials for Public Awareness				
Cap for Trainees of OJT	220 pcs	130,670	Consumables	Donated
Polo Shirts for Trainees of OJT	237 pcs	326,524	Consumables	Donated
Clipboard with logo	100 pcs	34,454	Consumables	Donated
Stickers with QR code	2,500 pcs	60,820	Consumables	Donated

6.3 Equipment and materials to be procured in Term-3 (2024-2025)

The procurement of PR materials was discussed with KUKL after the start of the second phase, and JET planned and agreed with KUKL to procure the materials shown in Table 4.3.1.

In Term-3, JET and KUKL plans to conduct publicity and awareness activities in collaboration with the PID, and will procure mugs with the project logo, which we believe will be effective for this purpose.

Table 6.3.1 PR Material to be procured by JET

Materials for Public Awareness		Price (JPY)	Remarks	Status
Procurement in Term-2 (2022-2023)				
Cap for Trainees of OJT	220 pcs	130,670	Consumables	Donated
Polo Shirts for Trainees of OJT	237 pcs	326,524	Consumables	Donated
Clipboard with logo	100 pcs	34,454	Consumables	Donated
Stickers with QR code	2,500 pcs	60,820	Consumables	Donated
Procurement in Term-3 (2024-2025)				
Mag with project logo	500 pcs	190,000 (Budget)	Consumables	Donated