Appendix 2.38

2nd Training in Japan
Training Materials in 2019

Program Orientation

2 September 2019
Kozo HAYASHISHITA
Training Management and Curriculum Development
WASMIP II

For providing safe and quality drinking water to people

1

Yokohama Water Company

- Water supply
- Sewage collection/treatment

Managed by the Municipality

City of Yokohama
- Waterworks Bureau
- Environment Planning Bureau (sewerage)

long and reliable history of operation

accumulated technology and expertise

national/local governments' making profit by business

prohibited by law

Yokohama Water as a private company established (2010)

prospective tool for business

in exchange for sharing tax obligation

2

2

Program

date		time				theme		venue
1-Sep	Sun					Arrival in Japan		
2-Sep	Mon	11:30	-	12:00	lec.	Program Orientation	E	JICA Yokohama
		13:30	-	15:00	obs.	Observation of Tokyo Waterworks Historical Museum	E	Tokyo
			-			Sensoji Temple in Akasusa District		
3-Sep	Tue	9:30	-	10:30	lec.	Introduction to water work in Japan	E	
		10:30	-	12:00	lec.	Introduction to water work in Yokohama	E	JICA Yokohama
		13:30	-	17:00	lec.	Non-Revenue Water Management	E	
4-Sep	Wed	10:30	-	12:00	lec.	Water Safety Plan	E	JICA Yokohama
		13:30	-	17:00	pra.	Water Safety Plan	E	
5-Sep	Thu	11:00	-	12:00	obs.	Water resource management and preservation	J	Doshi Village
		14:30	-	16:00	obs.	Surface water intake	J	Sagamihara City
6-Sep	Fri	9:00	-	10:00	lec.	Water quality management	E	
		10:15	-	11:45	lec.	Pipe replacement	J	JICA Yokohama
		13:00	-	16:00	pra.	Action Plan Formulation (1)	E	
7-Sep	Sat		-					
8-Sep	Sun		-					
9-Sep	Mon	9:30	-	10:30	lec.	Water tariff (1) = tariff system	E	
		10:30	-	12:00	lec.	Water tariff (2) = tariff collection	E	JICA Yokohama
		13:00	-	15:30	lec.	Enlightening education program for school children	J	
10-Sep	Tue	10:30	-	12:00	lec.	Operation and maintenance of small/medium-sized water utility	J	
		13:00	-	15:00	obs.	Operation and maintenance of small/medium-sized water utility	J	Hakone Town
						small excursion		
11-Sep	Wed	9:30	-	12:00	lec.	Operation and maintenance of water utility using ground water	E	Zama City
		14:00	-	16:00	obs.	Observation of Kawai Purification Plant	J	YWWB Kawai WTP
12-Sep	Thu	9:00	-	10:00	pra.	Action Plan Formulation (2)	E	JICA Yokohama
		10:45	-	12:00	lec.	Water meter	J	
		13:00	-	14:00	lec.	Leakage detection	J	YWWB Training Yard
		14:15	-	16:30	pra.	Leakage detection	J	
13-Sep	Fri	9:00	-	11:30	dis.	Evaluation Meeting	E	JICA Yokohama
		11:40	-	11:50		Closing Ceremony		
14-Sep	Sat					Departure from Japan		

3

3

Venue of program

4

4

1

Water Supply in Japan

- **Overview of Water Supply in Japan**
- **JWWA (Japan Water Works Association)**
- **New Water Vision**

Yokohama Waterworks Bureau

1

1.Nature of Japan

2

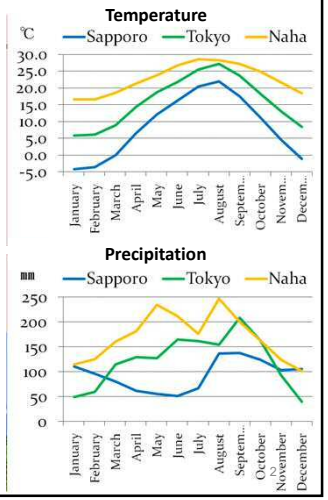
Island Country

- **4 big island and many small island**
- **3,000km; 377,972km²**
- **126.2 mil. people**

Sapporo

Tokyo

Naha

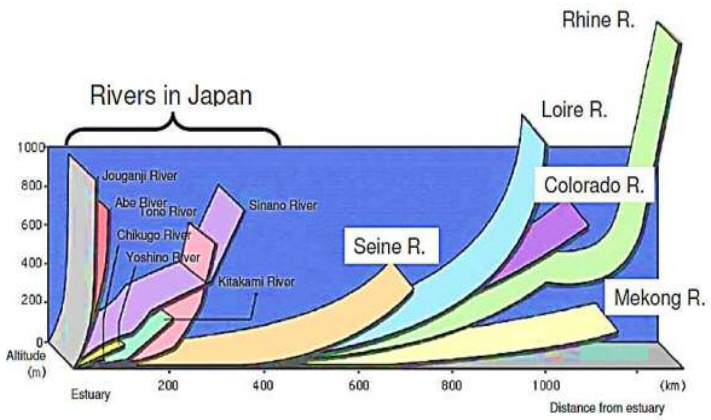


2

2.Feature of River

River gradients of Japan and the World

3



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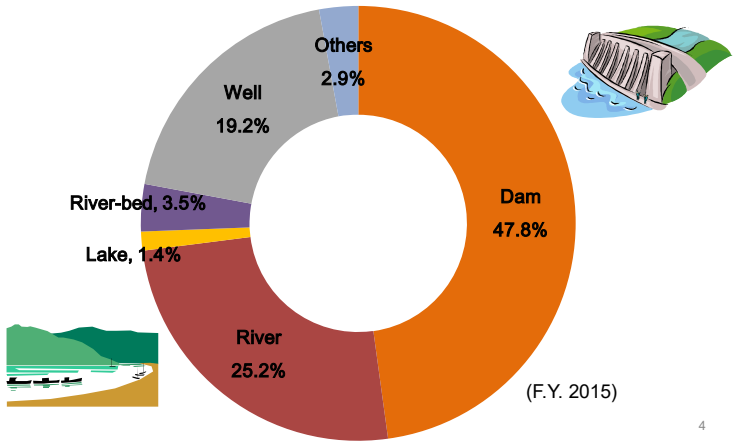
3.Water sources

4



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4

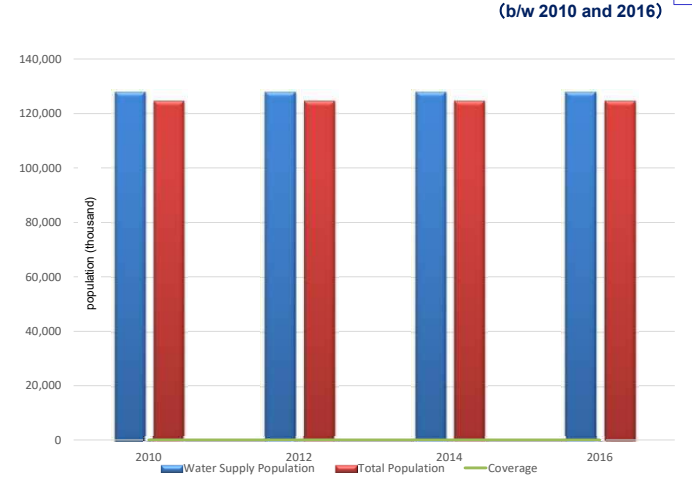
4

4.1.Water Supply Rate

5

5

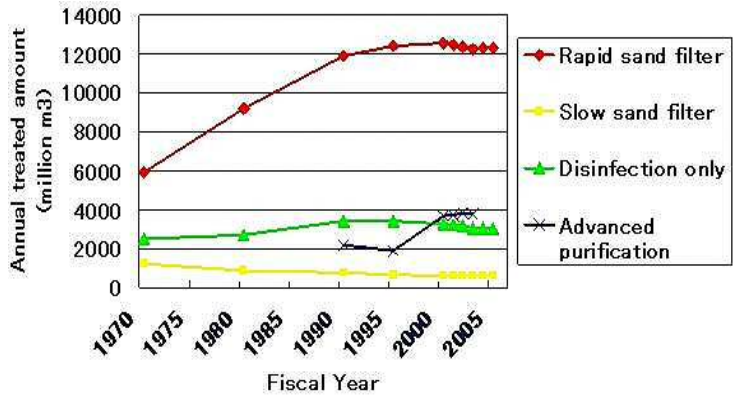
6



6

5.Types of Treatment Process

7



7

6. Administration System

8

Japanese administration has 3 layers

National Government

11 ministries

Water Supply

8

7.Regulation

9

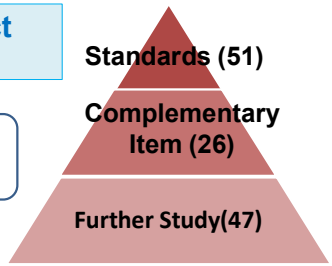
Waterworks Act (1957)

- Drinking Water Quality Standards
- Standards for facilities
- Business license for a water utility
- Supervision of water utilities
- Financial assistance

Local Public Enterprise Act

- Principal of Cost Recovery

Water Utilities = Public Enterprise



8.Japan Water Works Association (JWWA)

10

Public interest incorporated association to Water Utilities

1.Conference and Research Presentation

2.Research for management and Technologies

3.Training Program

4. Product Inspections

5. Certification of Materials

JWWA－QLP053
水道ＧＬＰ認定

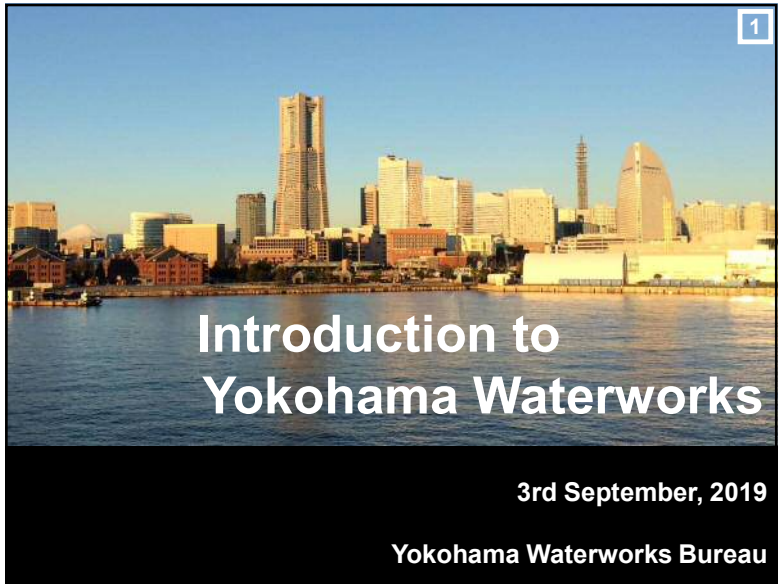
9.New Water Vision

Externally, internally environment changing

1.Decline of population, water demand, income.	2.Unexpected natural disaster
3.Increase of aged facilities	4.Changing at water resource

New Water Supply Vision
(2013 up to the present time)

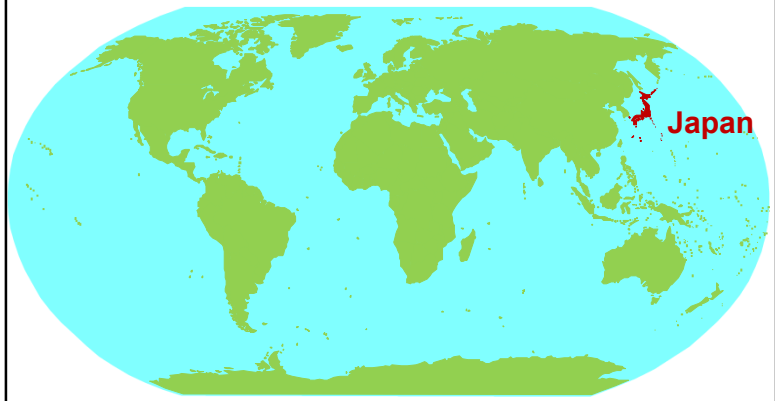
- **Sustainability**



1

Japan

2

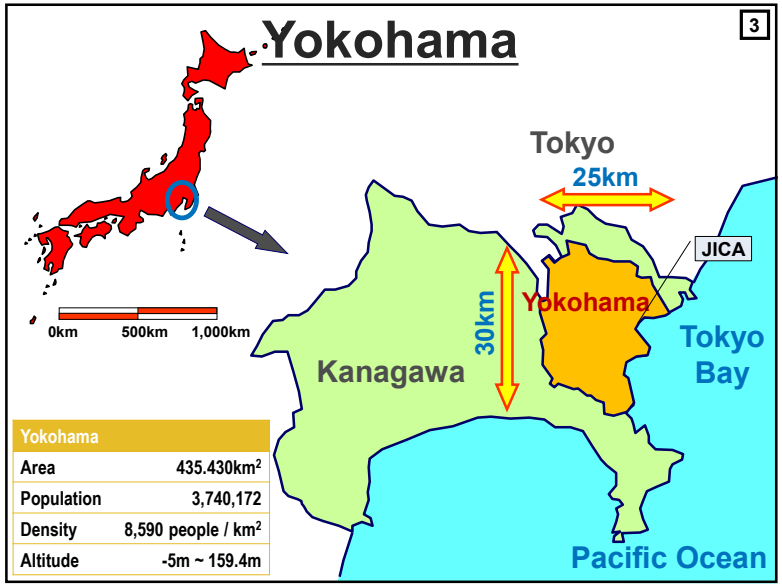


Capital: Tokyo
Area: 377,972km², Population: 126.2 mil.

2

Yokohama

3



Yokohama	
Area	435.430km²
Population	3,740,172
Density	8,590 people / km²
Altitude	-5m ~ 159.4m

3

Yokohama History - 1

4

1595: Small village of only 12 households

1858: Yokohama Port opened

1866: A Huge Fire occurred

1873: Water supply by wooden pipe failed

1887: Modern water supply, first in Japan

1923: Kanto Large Earthquake M7.9

1945: Air-attacks bombing of World War II

4

Yokohama History - 2

5

1960: Industrial water supply started

1964: Tokyo Olympic

1969: Yokohama + 3bodies established KWSA (bulk water supply authority)

1992: Highest water supply 1,607,000m^3/day

2002: Final game of FIFA World Cup

2011: the Great East Japan Earthquake M_w 9.0

5

Outline of Y.W.W.B.

6

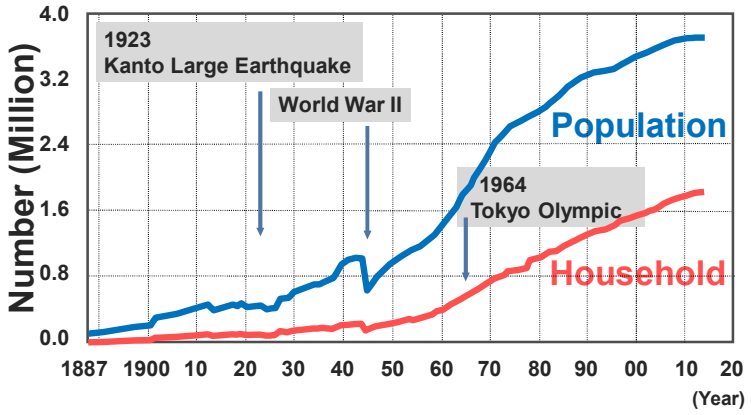
• Start of service	17/Oct/1887 (132Ys ago)
• Served population	3,731,661 (F.Y.2017)
• Connections	1,851,450 (F.Y.2017)
• Service rate	100.00 % (since 1988)
• Daily supply (average)	1,128,999 m^3 (F.Y.2017)
• Pipelines length	9,287.4 km (F.Y.2017)
• Fee collection rate	92.3 % (F.Y.2017)
• Leakage (NRW) rate	5.0 (7.7) % (F.Y.2017)

6

Population & Households

7

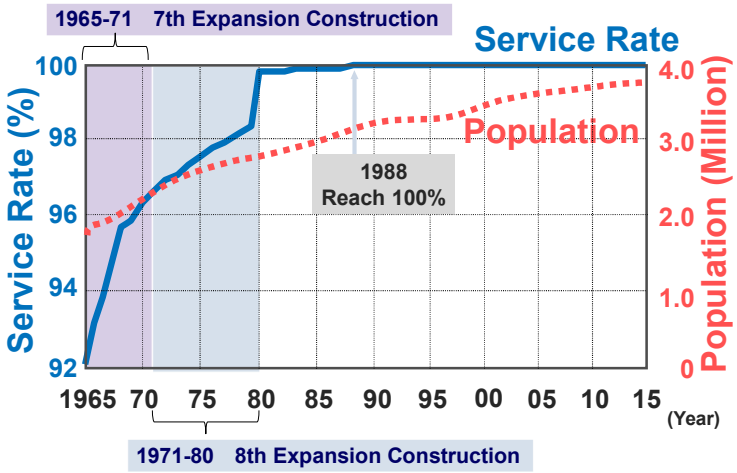
Change of Population & Households



7

History of Service Rate

8

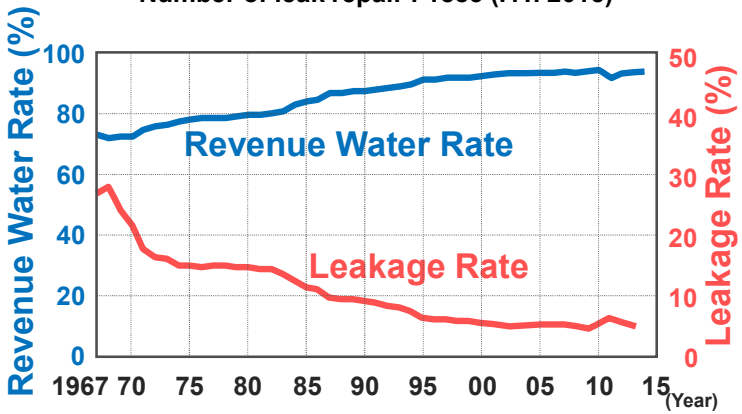


8

Leakage Rate

9

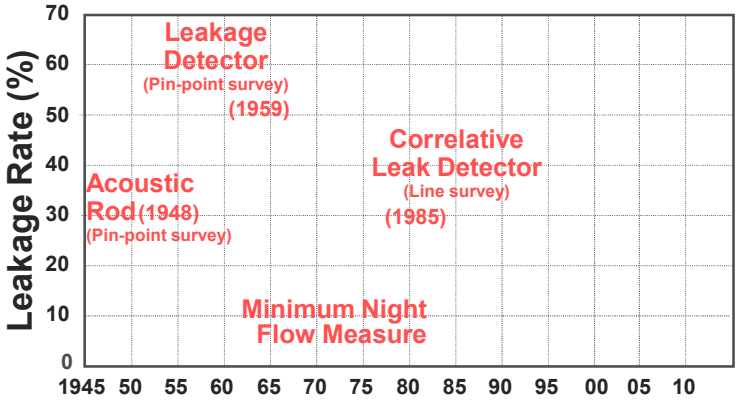
- Leakage rate : 5.6 % (F.Y. 2016)
- Number of leak repair : 1883 (F.Y. 2015)



History of Prevention Works

10

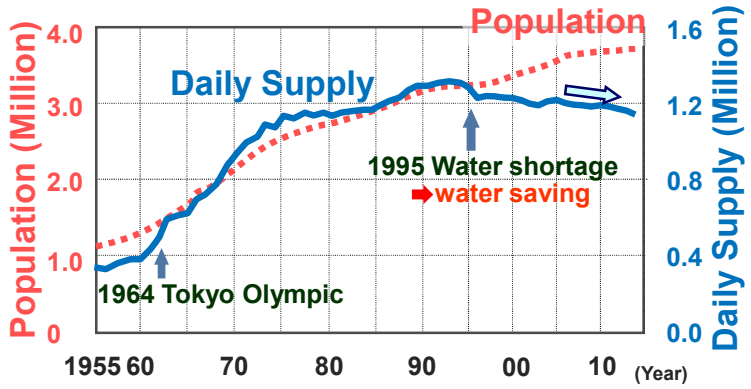
Leakage rate history of Yokohama



Daily Supply

13

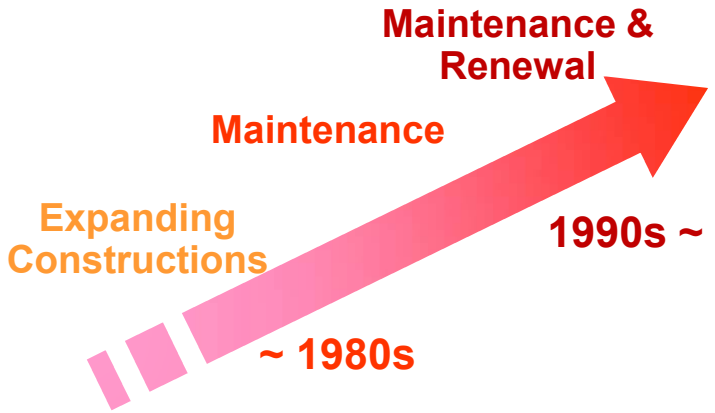
Change of Daily Supply Volume



Change of Policy

14

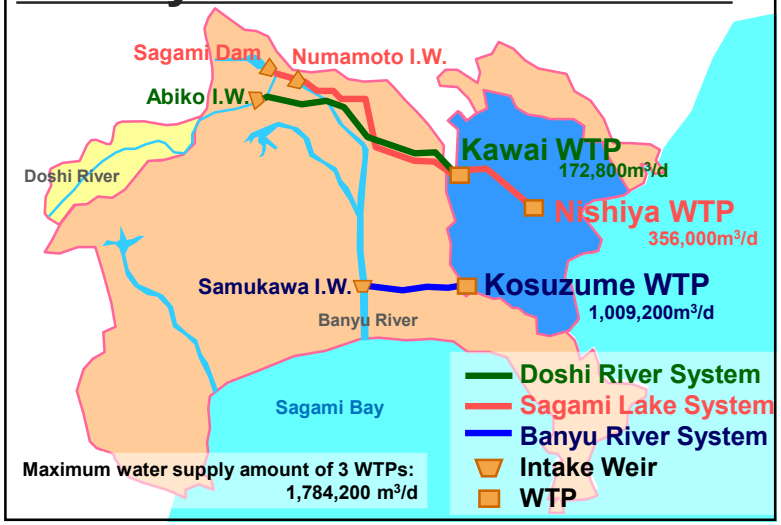
For Water Facility Management



- Conveyance Aqueduct : 92.6 km
- Distribution Pipes: 9,287.4 km

Facility of Intake & Treatment

17

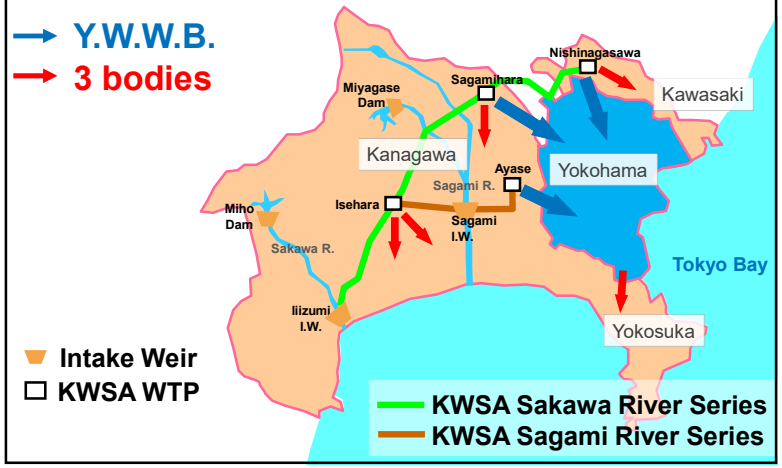


17

KWSA Bulk Water Supply

18

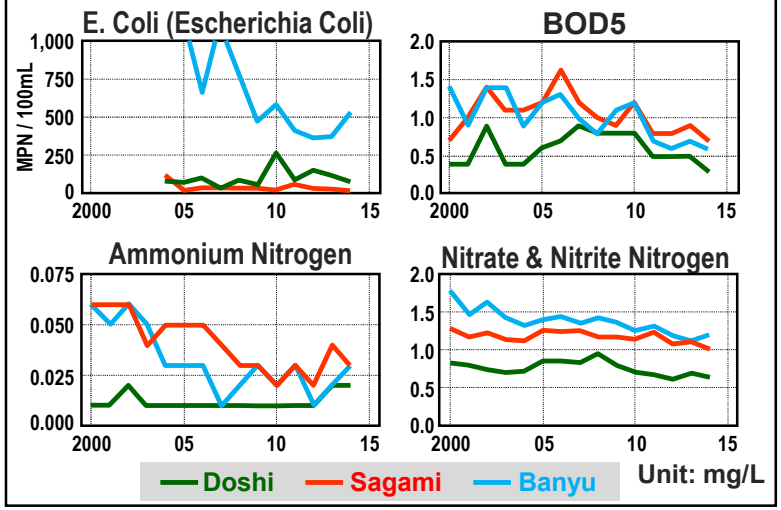
Kanagawa Water Supply Authority (1969~)



18

Quality of Water Source

19

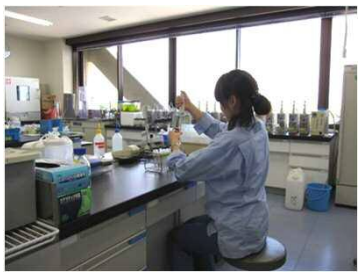


19

Control of Water Quality

20

- **ISO9001**
  all water treatment units
- **Water quality inspection**
  51 items : under the Waterworks Act
  Other items : own inspection standard



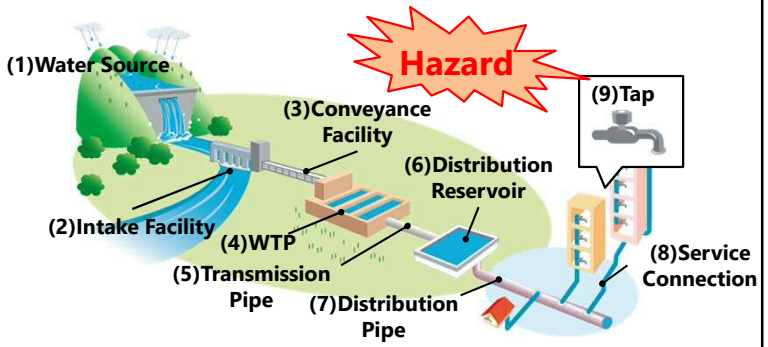
20

Control of Water Quality

21

- **Y.W.W.B. Water Safety Plan**

extraction, evaluation and management method of hazards in all water supply steps from intake to tap



* Applicable range of ISO9001: (2)Intake facility, (3)Conveyance facility, (4)WTP, (6)Distribution reservoir

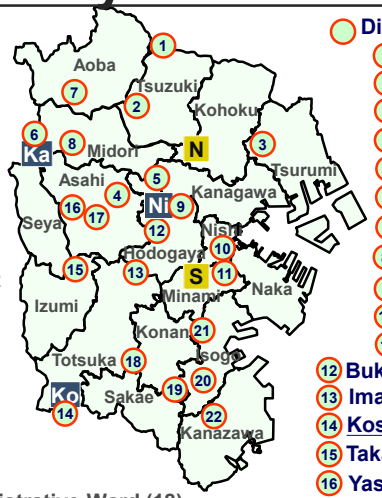
21

Facility of Distribution

22

WTP
Kawai
Nishiya
Kosuzume

Distribution Management Office
North
South



Administrative Ward (18)

Distribution Reservoir
1 Ushikubo
2 Kohoku
3 Tsurumi
4 Tsurugamine
5 Sugeta
6 Kawai
7 Onda
8 Miho
9 Nishiya
10 Nogeyama
11 Heiraku
12 Bukko
13 Imai
14 Kosuzume
15 Takatsuka
16 Yasashi
17 Nakao
18 Kaminagaya
19 Konandai
20 Mine
21 Isogo
22 Kanazawa

22

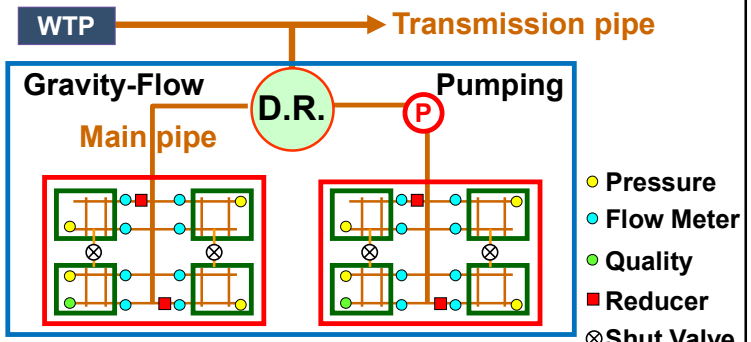
Concept of Block System

23

Large block: Distribution Reservoir Area (25)

Middle block: Gravity-Flow and Pumping Area (37)

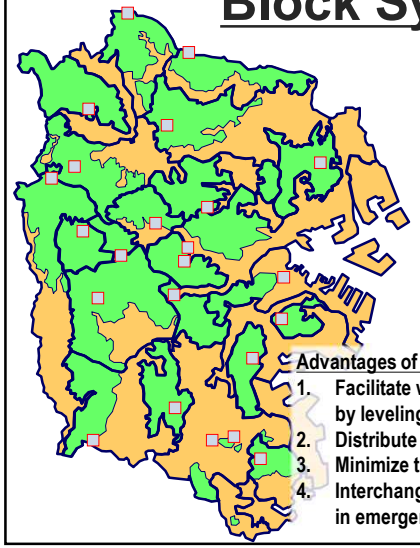
Small block: District Metered Area



23

Block System

24



Large Block
- Distribution Reservoir

Middle Block
- Pumping area
- Gravity flow area

Advantages of Block System
1. Facilitate water pressure management by leveling water pressure
2. Distribute water economically and efficiently
3. Minimize the impact range of a large leakage
4. Interchange water between blocks by main-pipes in emergency

24

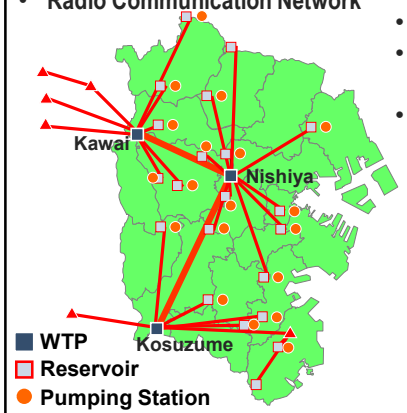
SCADA Monitoring / Mapping

25

SCADA

(Supervisory Control And Data Acquisition)

- Radio Communication Network

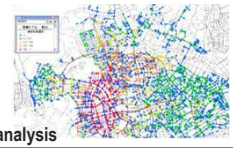


- WTP
- Reservoir
- Pumping Station
- Intake Office, etc

Mapping System

- Digital data for pipeline map
- Control Water distribution
- Exchange data with road administrators
- Provide data of laid pipelines

- Forecast of water suspension



- Pipeline network analysis

Water Tariff

26

(One household, for 2months, tax excluded)

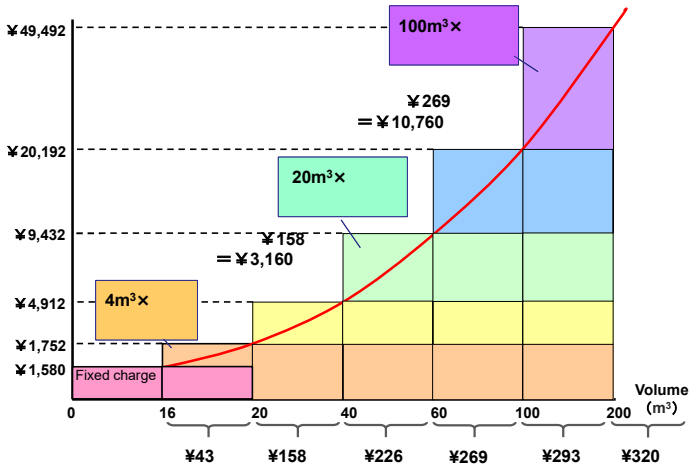
	Demand Class	Basic Rate	Metered Rate (JPY/m³)								
			0-16 m³	17-20 m³	21-40 m³	41-60 m³	61-100 m³	101-200 m³	201-600 m³	601-2000 m³	2001 m³-
By use	Domestic	1,580 yen	Within Basic rate	43	158	226	269	293	320		
	Business								320	369	409
	Public bath			42							

Progressive water rate system

- **Domestic:** use for daily living
- **Business:** use for other than daily living (ex. hotel, restaurant, factory, etc.)
- **Public Bath:** use in the general public bathing facilities

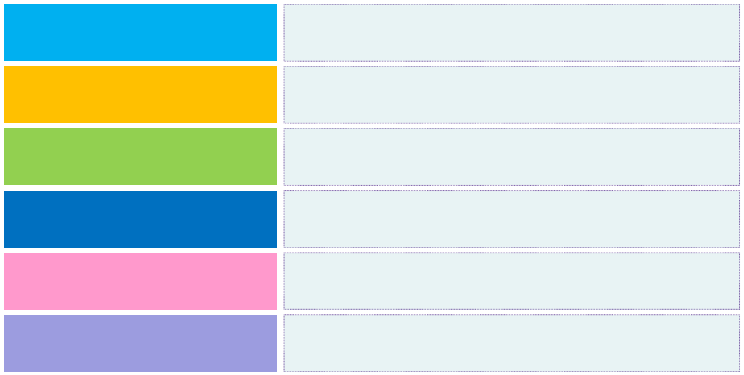
Progressive Water rate

27



Mid-Term Management Plan

(2016~2019)



1

Which is your WU now?

2

(Water Utility)

1. Water supply volume, enough or not?
   a) Lack of water supply volume, even now
   b) Present water supply volume; OK, but future (target year) volume; Lack
   c) Future OK too, future plan completed

Answer: _____

Data preparation to answer:
Served population (present & future) / Water treatment volume / Water supply hourly volume / Long-term business plan

2

Which is your WU now?

3

2. Distributed water quality, OK or not?
   a) From WTP to faucet; any place Not Good
   b) Test OK in WTP, but Not Good on faucet
      WHY? Lack of chemical agent injection, corroded pipe rehabilitation
   c) Test OK any place

Answer: _____

Data preparation to answer:
Examination results of water quality / Distribution diagram (map) of Residual Chlorine, Turbidity

3

Which is your WU now?

4

3. NRW rate & Leakage history, have or not?
   a) Lack of any history data
   b) NRW data; OK, but leakage team member, equipment data; Not Good
   c) Any data for the past 20 years; OK

Answer: _____

Data preparation to answer:
Number of leak detected / Equipment / Leak&Repair map / Leakage survey team list / IWA Water balance sheet

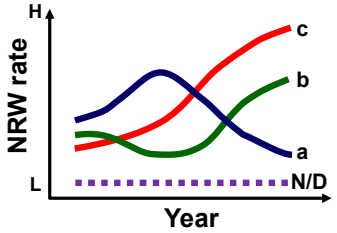
4

How is your WU's NRW rate?

5

Know yourself as well as your enemy!

1. Do you have your WU's NRW rate history in the last 20 years? ☐ Yes ☐ No
2. Do you know your WU's NRW rate, increasing or decreasing? Select a type from chart. Type: _____
3. What did you do the countermeasure of NRW rate reduction, last year?
4. How was that effect and result?



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5

IWA Water Balance Sheet

6

Distributed Water Volume Analysis

	Distributed Water Volume from WTP (a)+(b)	100.0%
Authorized consumption	(a) Revenue Water	[%]
	(1) Billed Metered Consumption	
	(2) Billed Unmetered Consumption	
	(b) Non-Revenue Water (NRW)	[%]
	(3) Unbilled Metered Consumption	
	(4) Unbilled Unmetered Consumption	
Water Losses	Apparent Losses	[%]
	(5) Unauthorized Consumption	
	(6) Meter Inaccuracies	
	Real Losses	[%]
	(7) Water Leakage, Overflow, Others	

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6

Water Balance Sheet of YWWB

7

YWWB Distributed Water Volume (2016)

	Distributed Water Volume from WTP (a)+(b)	100.0%
Authorized consumption	(a) Revenue Water	[91.8%]
	(1) Water charge (included Fire fighting)	91.8%
	(2) Other income (Break compensation)	+0.0%
	(b) Non-Revenue Water (NRW)	[8.2%]
	(3) Deduced consumption by settlement	0.2%
	(4) Used by YWWB	0.6%
Water Losses	Apparent Losses	[1.9%]
	(5) Illegal connection & Unknown	0.0%
	(6) Meter error (insensitiveness)	1.9%
	Real Losses	[5.5%]
	(7) Water Leakage, Overflow, Other	5.5%

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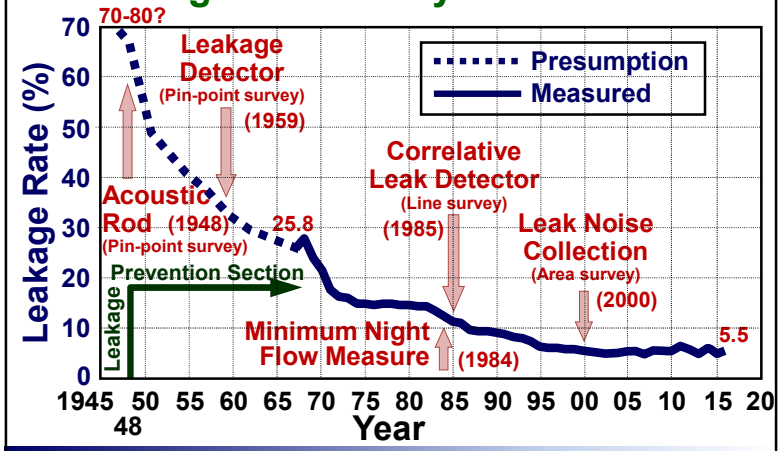
7

NRW rate of YWWB

8

Leakage rate history of Yokohama



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8

NRW rate of YWWB

9

Leakage rate history of Yokohama

1940 50 60 70 80 90 2000 10 20

1948 Acoustic Rod (Pin-point survey)

1959 Leakage Detector (Pin-point survey)

1984 Minimum Night Flow Measure

1985 Correlative Leak Detector (Line survey)

2000 Leak Noise Collection (Area survey)











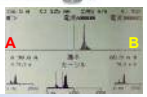

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9

NRW rate of YWWB

10

Pipe replacement & Leakage rate

Length of aging pipe replacement

10

→

← Underground area was submerged

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11

Water Balance Analysis

12

Yokohama Water Co., Ltd. / Yokohama Waterworks Bureau

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Water Volume Analysis

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Ex.1

Which item is the most important?

		100.0%
Distributed Water Volume from WTP / Well (a) + (b) High Measurement Accuracy	(a) Revenue Water	[%]
	(1) Billed Metered Consumption	%
	(2) Billed Unmetered Consumption	%
	(b) Non-Revenue Water (NRW)	[%]
	(3) Unbilled Metered Consumption	%
	(4) Unbilled Unmetered Consumption	%
	Apparent Losses	[%]
	(5) Unauthorized Consumption	%
	(6) Meter Inaccuracies	%
	Real Losses	[%]
	(7) Water Leakage, Other	%

Water Volume Analysis

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(a,b) Distributed Water/Revenue/NRW Volume

Is mother meter accuracy OK or Not? If this is not good, WU cannot calculate a correct NRW rate.

$$\text{\# NRW rate} = \frac{\text{Distributed volume} - \text{Revenue volume}}{\text{Distributed volume}} \times 100$$

\# Distributed volume = (a) Revenue + (b) NRW = 100%

Assuming that Revenue water volume is "60", if distributed water volume is different, 80 / 90, what happens NRW rate?

$$\text{NRW rate} = \frac{90 - 60}{90} = 33\% \Leftrightarrow \frac{80 - 60}{80} = 25\%$$

Water Volume Analysis

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(a,b) Distributed Water/Revenue/NRW Volume

Mother meter (Electromagnetic Flow Meter) accuracy check

a) Zero point check: When water (fluid) flow is stationary, confirm and adjust the zero point.

b) Confirmation of Fuse: 3 years (Recommended replacement cycle of regularly exchange)

c) Cleaning of inside of the measuring pipe of the detector

d) Life of product: around 10 years, need regular inspection and cleaning, replacement of parts

Water Volume Analysis

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(3) Unbilled Metered Consumption

Water Utility

When WU distributed the red water, dirty water after the pipe construction, its water passed through the water meter already, but customers cannot use its water. WU must reduce the price of its water from the water charge. Its water volume is calculated by Billing Section of WU.

(4) Unbilled Unmetered Consumption

When WU constructs pipeline, it needs to wash inside of pipeline before water supply. Its water is used/calculated by WU business. Its water is an effective water but non-revenue water.

Water Volume Analysis

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(5) Unauthorized Consumption

The Apparent Losses and Real Losses are classified as Water Losses. Value from (1) to (4) is the water volume that has already been calculated. Unauthorized consumption is mainly illegal connections. This and Real Losses are the water volume required by the final calculation.

To calculate this water volume, it needs to find how many illegal connections exist in the city, and to assume its average water consumption.

And to estimate average water volume of illegal use, it needs to calculate water consumption from family member, thereby, to calculate the average volume of total.

Water Volume Analysis

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(6) Meter Inaccuracies

The water volume due to meter inaccuracy is calculated by meter accuracy test.

By collecting the removed few hundred water meters, WU is able to understand the ratio of its water meter inaccuracies.

This examination needs long period of error test time and sustainable planning.

Removed Water Meters

Water Volume Analysis

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(7) Water Leakage, Overflow, Others

The water leakage volume cannot be accurately calculated. Invisible underground leakage is detected by the leak survey work, but does not grasp its leaked water volume.

Regarding calculation of its volume, distributed water volume minus above (1) ~ (6) equals Real Losses.

By long experiences of water supply operation, WU needs the water supply control so as not to overflow in distribution reservoir/tank.

Feature of NRW

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Features of NRW

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Ex.2

Feature of NRW in Developing WUs

1) Water facilities/equipment are aging, but WU does not improve and maintain them.
2) Weak pipes; ACP (Asbestos Cement Pipe), CIP (Cast Iron Pipe) are still used as distribution pipes, and GP (Galvanized Steel Pipe) is well used as service pipe.
3) WU does not supply water for 24 hours due to shortages of water resources and undeveloped water supply facilities/equipment (distribution reservoir, pump, control valve).
4) In the concrete paved road, water leakage is difficult to appear on the surface of road. Even as water leakage appeared, it may become the surface water leakage at location far from real leakage point.

Features of NRW

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Ex.2

Feature of NRW in Developing WUs

5) Water pressure is high in the flat terrain, and low in the large relief.
6) Enough staff to water leakage prevention measures division has not been assigned. Water leakage detectors are not prepared enough number.
7) Acoustic rods (Listening sticks) are used for the leakage detection, mainly. Water leak detectors are often remain unusable due to machine failure.
8) There are no water flow meter at outlet pipe of WTP and main trunk line. Or maintenance of those meters is not enough. It is difficult to measure the total distribution water volume.

Features of NRW

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Ex.2

Feature of NRW in Developing WUs

9) Since plumbing skill of contractors/WU plumbers do not have skill, it would induce leakage. (construction of PVC pipe in the rain, insufficient squeezing of bolt)
10) Since the pipe network drawings (map) have not been developed, it is not properly carried pipe maintenance work including the leakage survey work.
11) There are customers that refuse to pay the water charge. And there are meter readers that fill out deliberately the wrong consumption amount of water.
12) It is easy to connect illegal service pipe to distribution/service water pipe.

Features of NRW

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Ex.2

Feature of NRW in Developing WUs

Country/WU		1	2	3	4	5	6	7	8	9	10	11	12	R
1														
2														
3														
4														
5														
6														
7														
8														
9														
Total														

25

Measures for NRW Reduction

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Measures for NRW Reduction

NRW Reduction Measures by Stage

NRW Rate	Purposes	Countermeasures / Methods
35% ~	Reduction of surface leakage and overall apparent losses	All water meters survey by human wave tactics / Water meter replacement / Residents enlightenment
30% ~ 35%	Reduction of underground leakage and illegal connection	Development of exact pipe mapping book / Setting of DMA / Leakage survey training / Introduction of appropriate leakage survey equipment
25% ~ 30%	Prevention of leakage restoration	Start of aging pipe replacement construction work / Leakage prevention work
15% ~ 25%	Exhaustive of leakage prevention work	Review of leakage prevention work / Acceleration of aging pipe replacement construction work / Introduction of effective leakage survey
~ 15%	Finishing of leakage prevention work	Exhaustive of aging pipe replacement construction work / Rationalization of leakage prevention work

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Before Measures

1. Where leakage comes from?

1) Leakage Occurrence (Case of YWWB)

Leak place		2005	2016
Less than 50mm	Surface	6,454 (89.1%)	1,849 (85.2%)
	Underground	706 (9.8%)	238 (11.0%)
	Total	7,160 (98.9%)	2,087 (96.2%)
More than 75mm	Surface	82 (1.1%)	82 (3.8%)
	Underground	3 (0.0%)	0 (0.0%)
	Total	85 (1.1%)	82 (3.8%)
Total		7,245	2,169

50mm PVC

800mm SP

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Before Measures

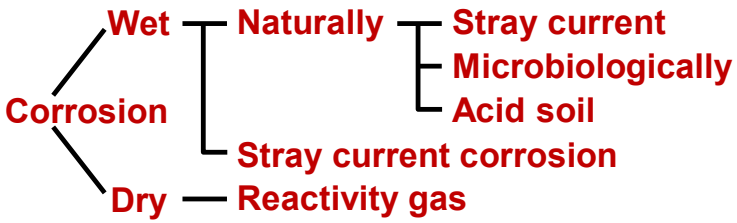
1. Where leakage comes from?

2) Leakage Occurrence Factor

Internal factor	External factor
◆ Defective material of pipe and joint	◆ Increase in road traffic load
◆ Strength fall by corrosion	◆ Land subsidence and embankment
◆ Aging deterioration of materials	◆ Difference between design and site
◆ Defectiveness of construction	◆ Occurrence of new soil contamination
◆ Deficiency of anti-corrosion	◆ Damage from other construction

Before Measures

1. Where leakage comes from?
 2) Leakage Occurrence Factor (Corrosion)
  Load and vibration of traffic
  Vibration by another construction
  Soil and Stray current corrosion



Before Measures

1. Where leakage comes from?
 3) Leakage Occurrence, where from
  (a) From corroded pipe
  (b) From electric corroded steel pipe
  (c) From bolts that have slacked around pipe joint
  (d) From packing of valve and fire hydrant
  (e) From gapped valve pedestal
  (f) From the place where the adhesive / glue is not painted inside fitting

Before Measures

1. Where leakage comes from?
 3) Leakage Occurrence, where from
  Collect its Liquid and Analyze

  Measurement of ...
   Residual Chlorine
   pH
   Electric Conductivity
   Water Temperature
   Trihalomethane

Before Measures

3) Leakage Occurrence, where from
 Residual Chlorine

Before Measures

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1. Where leakage comes from?

4) Leakage from Service Pipes (2004)

Kind of pipe	Discovery rate
Lead pipe (LP)	50%
Galvanized steel pipe (GP)	23%
Polyvinyl chloride lining steel pipe (VLP)	18%
Polyvinyl chloride pipe (PVC)	6%
Polyethylene pipe (PEP)	2%
High impact polyvinyl chloride pipe (HIVP)	1%
Stainless steel pipe (SUS)	0%

Measures for NRW Reduction

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1. Reduction from multilateral point of view

1) Measure of leakage prevention for pipes

(a) Promotion of Leakage survey & repair

a) Ensure the required number of leakage work staff

b) Development of appropriate leakage survey equipment and ensure the required number of leakage survey equipment

c) Setting of district of distribution management and leakage survey management

d) Understanding of leakage volume of each district of distribution management or leakage survey management (Measurement of Minimum Night Flow in DMA or management district)

e) Implementation of leakage survey and repair in city

Measures for NRW Reduction

35

2. Reduction from multilateral point of view

1) Measure of leakage prevention for pipes

(b) Promotion of pipe replacement

a) Promotion of pipe replacement plan by pipeline database, mapping system and statistical analysis

b) Proper management of high-strength pipe material, coupling, selection of proper pipe diameter

c) Implementation of replacement of distribution pipeline and replacement of associated water service pipe that branched from its pipeline

Measures for NRW Reduction

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2. Reduction from multilateral point of view

1) Measure of leakage prevention for pipes

(c) Promotion of equalization of distribution water pressure

a) Blocking of distribution district (Review of pipeline network / Introduction of water flow meter and water pressure gage)

b) Introduction of distribution reservoir/tank and pumping station

c) Adaptive control of transmission and distribution pump (Pump unit control / Revolving speed control)

Measures for NRW Reduction

2. Reduction from multilateral point of view

1) Measure of leakage prevention for pipes

(d) Improvement of technology for staff and contractor/subcontractor

a) Training of leakage detection skill for leakage survey staff

b) Training of plumbing skill for plumber

c) Training of improvement of technology and moral for construction supervisor

2) Measure of leakage prevention from water supply facility

(a) Leakage survey of every water supply facilities

(b) Promotion of leakage repair construction

Measures for NRW Reduction

3. NRW reduction of the apparent losses

1-1) General measure of illegal connection

(a) Promotion of educational activities of anti-illegal connection to customers

(b) Strengthening of penalties for violator of illegal connection

(c) Incentive scheme to staff who discovered illegal connection

(d) Improvement of illegal connection discovery techniques by water flow volume management

Measures for NRW Reduction

3. NRW reduction of the apparent losses

1-2) Cause of illegal connection

(a) Find exposed pipes, make a list

(b) Make "Exposed Pipe Map" from list

(c) Make a plan to bury the exposed pipe

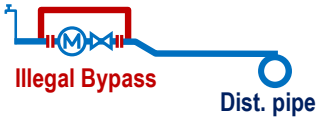
(d) When construction, to be able to find illegal connections

(e) Change Violator to New Customer

1-3) Definition

(a) Service pipe & Non meter

(b) Meter non-passing



(c) Put meter when reading

Measures for NRW Reduction

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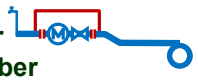
3. NRW reduction of the apparent losses

1-4) Detection (Related to alphabet of previous page)

(a) Confirmation of pipeline without meter
Check: Where surface pipeline terminal

(b) Confirmation of around water meter
Check: Traces of excavation / Small water consumption against family member



(c) Confirmation of meter joint
Check: Marking at the joint position

(d) Confirmation of meter body
Check: Sealing at around cover grass part of body

Measures for NRW Reduction

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3. NRW reduction of the apparent losses

1-5) Change from violator to customer

It must be understood to the violator that illegal connection is a true crime. By calculating period of time that have committed a crime, WU must claim damages. In accordance with the water ordinance of WU, it must do matter-of-fact procedure.

(a) Measures to the poor classes
(b) Mitigation, exemption, split-payment of fine payment
(c) Negotiations of payment
(d) Introduction of social security system

Measures for NRW Reduction

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3. NRW reduction of the apparent losses

1-6) Meter Reader's Chatting with Residents

Keep good relationship with Local Residents

Local Resident

Excuse me, there was a person who did illegally connection, and he was proud of it.

Meter Reader

Please let us know who is.

That is Mr. Aaaa's house. But please do not tell anyone what I said.

Thank you. It's okay. WU will keep secret of information providers.

Measures for NRW Reduction

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3. NRW reduction of the apparent losses

1-7) Meter Reading is Special Job in WU

(a) Meter Readers are the bridge between WU and customers.

(b) Short conversation between Meter Reader and customers may also provide hints for WU management improvement.

(c) WU might consider incentive as reward to motivate Meter Readers to perform such additional tasks.

Measures for NRW Reduction

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3. NRW reduction of the apparent losses

2-1) Measure of water meter reading error

(a) Improvement of water meter readers' moral
(b) Improvement of water meter readers' water meter reading skill
(c) Improvement of water meter setting place (Setting of water meter easy to watch)
(d) Strengthening of penalties for violation staff (Fill wrong water consumption intentionally)
(e) Incentive scheme to excellent water meter reader
(f) Study of introduction of remote meter reading system

Measures for NRW Reduction

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3. NRW reduction of the apparent losses

2-2) Meter Reading Quality Control

(a) Water meter is not one type. There are several kinds of type, Digital, Analog, Electron type.
(b) Meter Readers need the training of water volume reading from surface of water meter.
(c) There are lots water meters that their surface are so dirty. Water meter that the counter is not visible must be replaced immediately.

Glass breakage

Surface discoloration

Measures for NRW Reduction

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3. NRW reduction of the apparent losses

2-2) Meter Reading Quality Control

Digital Type Analog Type Electron Type

m^3 L

Read this water volume

Measures for NRW Reduction

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3. NRW reduction of the apparent losses

3) Measure of water meter inaccuracy

(a) Replacement of inferiority water meter
Disabled water meter / Aged water meter

(b) Selection of proper water meter diameter
Even if small flow rate water is passed through large diameter water meter, it can not be measured high accurately.

(c) Improvement of water meter setting location
Installing water meter horizontally

(d) In tap water without foreign substances, the aged water meter is easier to rotate than the new water meter.

Measures for NRW Reduction

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3. NRW reduction of the apparent losses

4) Defective water meter detection

Comparison of family size and water consumption

(a) If monthly water consumption is extremely low, it needs to suspect its water meter breakdown.

(b) If monthly water consumption for large family is low, it needs to suspect its water meter breakdown, too.

(c) However, in the case of family trip, monthly water consumption will be small. Attention is necessary.

Measures for NRW Reduction

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3. NRW reduction of the apparent losses

4) Defective Water Meter Detection

[a] Total family members (person)
[b] Meter reading interval day (day)
[c] Current month water consumption (L)

Name	Total family member [a]	Reading interval [b]	Water used [c] (m^3)	

→L)	9 (9,000)	10 (10,000)
Water consumption / capita / day	103	39

Measures for NRW Reduction

3. NRW reduction of the apparent losses

4) Defective Water Meter Detection

Name	Fam. Mem. (person)	[c] / [a] / [b] (LCD)
Bbbbb	9	16
Ccccc	3 (S)	48
Ddddd	6	78
Ggggg	8 (L)	83
Eeeee	7	113
Aaaaa	5 (M)	119
Fffff	9	176
Hhhh	6	182
Jjjj	4	183
Iiii	5 (M)	183

Sort by LCD and put small amount of water meter in the update list. After the survey team reconfirmed, defective water meter will be replaced, even if new meter.

Measures for NRW Reduction

4. NRW reduction of unbilled consumption

1) Measure of reduction of unbilled metered for public use

(a) Understanding of unbilled metered water consumption for public use (Water taps in vest-pocket park / Public toilet / Study of charging for public faucet, fire fighting water / Tolling in slum district)

By installing group that manages public faucets in barangay, and by sending invoice with cheap price setting, it is possible to secure the revenue amount.

(By sending invoice, water volume becomes revenue water volume.

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NRW Management

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NRW Management

1. Comprehensive reduction management

1-1) Real Losses: Leakage (Pipeline) Ex.3

Pipe Mapping: Creation of mapping ledger

DMA Setting: Design and build of DMA / Leakage management area

Minimum Night Flow Measure: Grasp of basic leakage volume and leakage distribution diagram

Leakage Detection: Use combination of the various water leakage detectors

Leakage Repair: Method of proper repair

Pipe Network Development: Blocking of distribution area / Pipe replacement

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NRW Management

1. Comprehensive reduction management

1-2) Real Losses: Leakage (Facility) Ex.3

Leakage Survey : Survey in distribution reservoir/tank and aqueduct bridge

Leakage Repair : Method of proper repair

Facility Development : Proper placement and operational administrative of pumping station and distribution reservoir/tank

2) Apparent Losses: Meter Reading Error

Water Meter Replacement : Improvement of setting place

Remote Meter Reading System : Designing

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NRW Management

1. Comprehensive reduction management

3) Apparent Losses: Meter Inaccuracy Ex.3

Investigation : Extraction of defective meter

Replacement : Correction of setting position

4) Apparent Losses: Illegal Connection

Detection : Survey of illegal connection

Notification & Persuasion : Negotiations with violators

Correction : Reconnection of illegal pipe and set water meter as customer

Penal Charge & Punishment : Collection of penal charge and application of punishment

NRW Management

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1. Comprehensive reduction management

5) Apparent Losses: Data Processing Error

Data Processing Error : Review of data processing procedure / Correction of programming errors

6) Unbilled Consumption

Public Use : Review of free water in public facilities

Water Utility Use : Decreasing by improvement of washing wastewater discharge

Ex.3

NRW Management

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1. Comprehensive reduction management

7) Basic Measures: Designing

Ex.3

Pipeline Development Plan : Extraction of pipe replacement route

Water Supply Control : Management of proper water pressure and flow volume

Setting of Proper NRW Rate : Calculation of cost-effectiveness of NRW measure

Improvement of Legal Systems : Strengthening penalties for crime / Excellent staff awards program / Qualification system / Training system

NRW Management

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1. Comprehensive reduction management

8) Basic Measures: Data Management

Ex.3

Data Collection/Record : Extraction of necessary data, collection and recording

Data Analysis : Hydraulic calculation / Prediction of NRW rate

Comprehensive Management System : GIS / Customer Relations / SCADA / Management Information System

9-1) Basic Measures: Training System

Training for Staff and Contractors : Technical training / Improvement of moral

NRW Management

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1. Comprehensive reduction management

9-2) Basic Measures: Residents Awareness Activities

Residents Enlightenment : Improvement of residents awareness through public relations, hearing and education

10) Basic Measures: Investigation, Research and Development

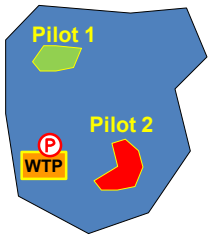
Investigation and R&D regarding NRW reduction

Ex.3

NRW Prevention Plan

NRW Prevention Plan

Create Pilot Area for Primary Reduction Work



Water supply area (City area)

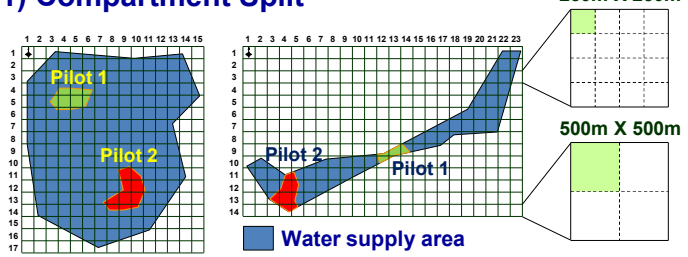
In Pilot area

(a) Development of pipeline network (Creation of pipe network map, Forming of DMA, Pipe replacement)
(b) Creation of NRW prevention plan
(c) Leakage survey (Minimum Night Flow Measurement: MNFM, Detection work) and repair
(d) Survey of illegal connection and correction
(e) Replacement of defective water meter
(f) Training for plumber and supervisor

NRW Prevention Plan

1. Leakage Survey

1) Compartment Split

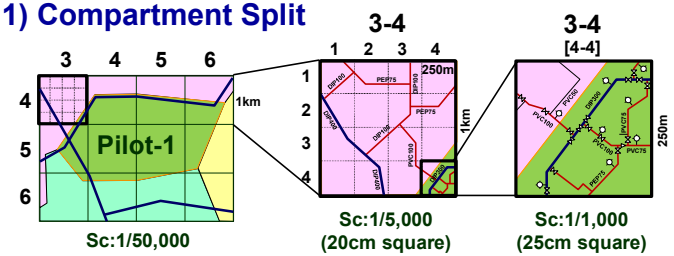


(a) Separable Pilot area by shut valves (like a DMA)
(b) Supply area is divided in 1km square as main mesh.
(c) Sub-mesh is divided by 250~500m in main mesh.
(d) North is always upward. (Supply area does not tilt.)

NRW Prevention Plan

1. Leakage Survey

1) Compartment Split



Transmission and distribution main pipe (DN 300mm ≤)

Distribution pipe and Distribution branch pipe

Pipe material & diameter, Fire hydrant, Valve, Other facility

NRW Prevention Plan

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1. Leakage Survey

2) Minimum Night Flow (MNF) Measurement

(a) "MNFM" is a method for estimation of leakage abundance that measures minimum water inlet volume in certain area for period of night.

(b) Measured MNF volume is "P Value (Probability)".

(c) There is contained certain water usage as household use by toilet, 24 hours water use in factory, and so on.

* MNF volume = Leakage + water usage

(d) If nobody uses any tap water, leakage volume defines MNF volume.

NRW Prevention Plan

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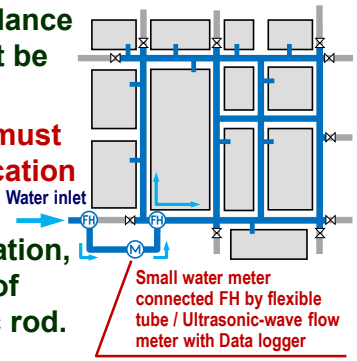
1. Leakage Survey

2) Minimum Night Flow (MNF) Measurement

(a) In order to accurately measure leakage abundance in compartment, it must be completely separated.

(b) In order to separate, it must confirm shut valves' location and condition.

(c) In order to confirm isolation, staffs hear leak sound of shut valves by acoustic rod.



NRW Prevention Plan

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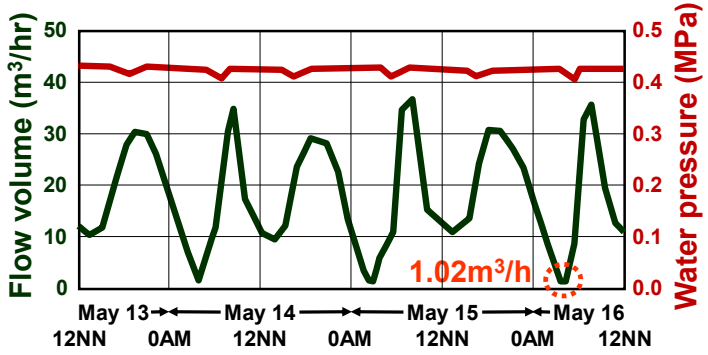
1. Leakage Survey

2) Minimum Night Flow (MNF) Measurement



NRW Prevention Plan

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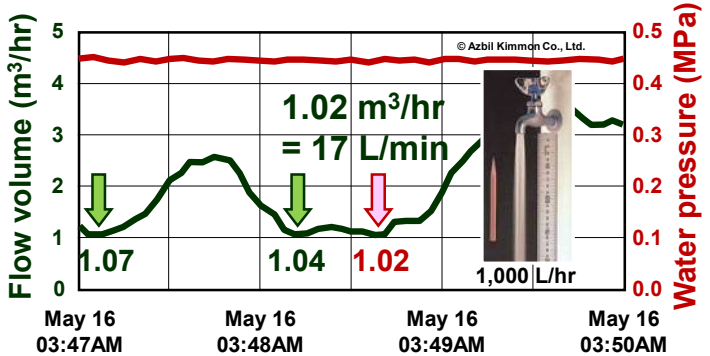
1. Leakage Survey

2) Minimum Night Flow (MNF) Measurement



NRW Prevention Plan

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1. Leakage Survey

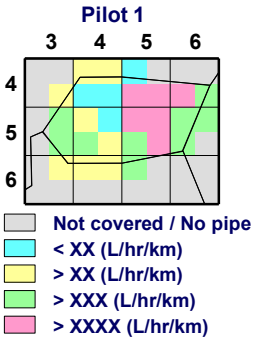
2) Minimum Night Flow (MNF) Measurement

(a) MNFM is carried out from midnight until around 4AM.

(b) MNF volume in urban areas is concentrated from 3-4AM.

(c) In order to non-dimensional, it is divided by surveyed pipe length.

(d) Colorize in mesh map according to water leakage abundance.



NRW Prevention Plan

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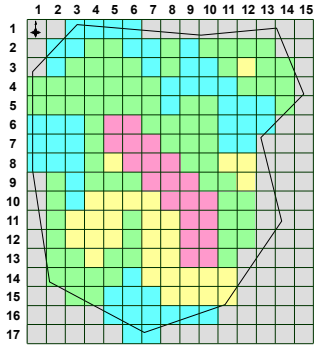
1. Leakage Survey

2) Minimum Night Flow (MNF) Measurement

(a) Final target is to make whole city map.

(b) Make survey plan and decide human resources input of leakage survey from this trend.

(c) It is possible to make water pressure map and residual chlorine map, too.



NRW Prevention Plan

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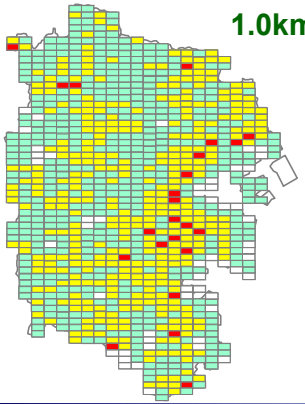
1. Leakage Survey

2) Minimum Night Flow (MNF) Measurement

1.0km X 0.5km Mesh 915 blocks



	Leakage Flow	Num.
	300 L/hr/km <	23
	< 300 L/hr/km	368
	< 50 L/hr/km	474
	Out of Search	50

Decide range by MWSI

NRW Prevention Plan

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1. Leakage Survey

3) Detection Machine / Survey Equipment

(a) By research plan on the basis of water leakage prevention planning, water leakage survey will be carried out.

(b) Make proper survey plan from water leakage abundance in research areas, WU's research staff and equipment as follows.

(1) Acoustic rod
(2) Leak detector (for iron pipes / plastic pipes)
(3) Leak checker
(4) Leak correlator
(5) Zone leak correlator
(6) Gas sensing leak detector

NRW Prevention Plan

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1. Leakage Survey

3) Detection Machine / Survey Equipment

(1) Acoustic rod is possible to understand presence or absence of water leakage near here.

NRW Prevention Plan

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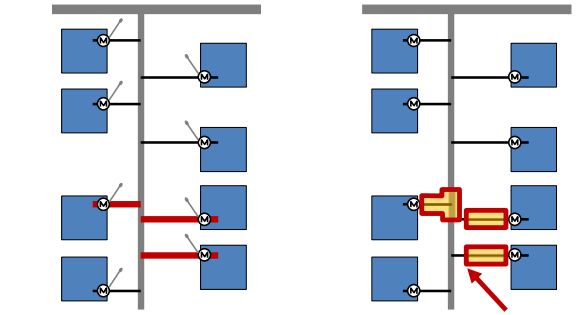
1. Leakage Survey

3) Detection Machine / Survey Equipment

(1) Acoustic Rod survey



Water service pipe that suspected water leakage nearby

After that, detail survey by Leak Detector around this area

NRW Prevention Plan

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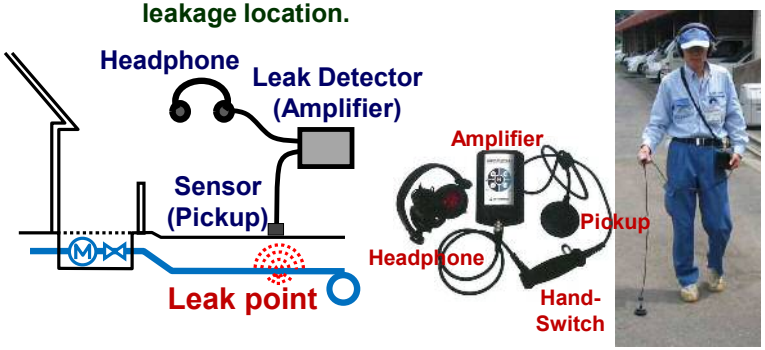
1. Leakage Survey

3) Detection Machine / Survey Equipment

(2-1) Leak detector is possible to understand pin-point leakage location.



NRW Prevention Plan

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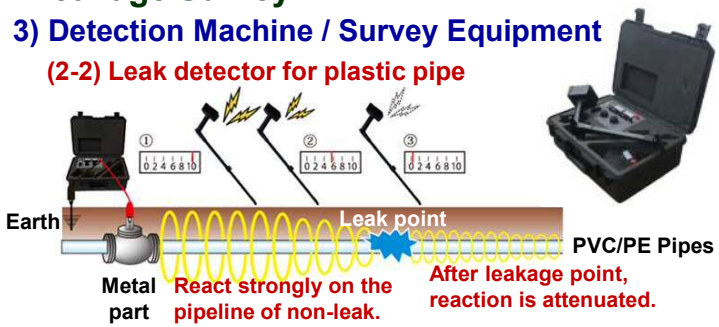
1. Leakage Survey

3) Detection Machine / Survey Equipment

(2-2) Leak detector for plastic pipe



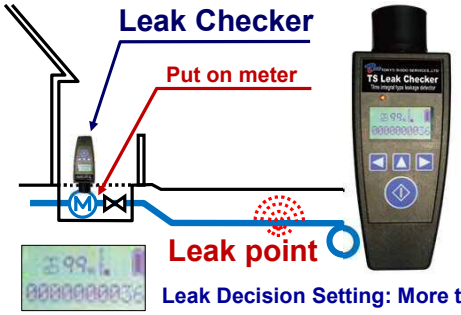
Easy detection of pipe line and leakage point of resin pipe by electromagnetic induction wave. However, it is difficult to catch above wave when there are lots of electric wires or customer's water pipes are nearby.

NRW Prevention Plan

1. Leakage Survey

3) Detection Machine / Survey Equipment

(3) Leak Checker (LC) is possible to understand water leakage suspicion in 20m when meter reading.



a) Clean off water meter surface
b) Set customer name / water meter number
c) Meter reader puts LC on the water meter
d) Push SCAN
e) After 5 seconds, “Pi Pi” alarm, remove it
f) Move to next

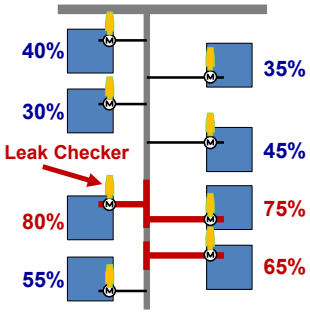
Leak Decision Setting: More than 60%

NRW Prevention Plan

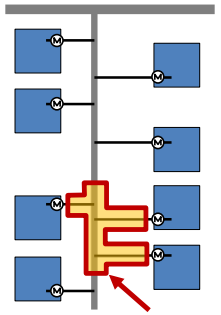
1. Leakage Survey

3) Detection Machine / Survey Equipment

(3) Leak Checker survey



Water service pipe that suspected water leakage nearby



After that, detail survey by Leak Detector around this area

Total connection: 16,094 (100%)

NRW Prevention Plan

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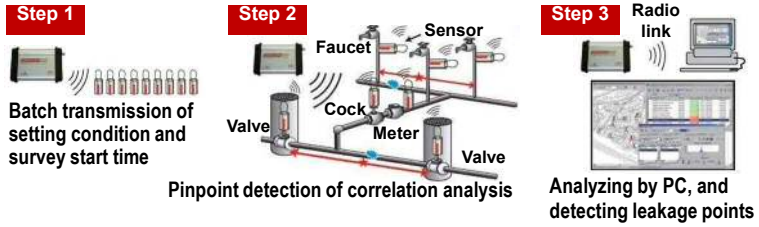
1. Leakage Survey

3) Detection Machine / Survey Equipment

(5) Zone leak correlator is called "Zone Scan". This detector is possible to find water leakages in pipeline network by multi sensors. Function of water leak detection is as same as leak correlator, it is possible to detect in multiple pipelines.



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NRW Prevention Plan

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1. Leakage Survey

3) Detection Machine / Survey Equipment

(6) Gas sensing leak detector

Mixed gas of Hydrogen (H_2:5%) and Nitrogen (N_2:95%) to infiltrate into the water pipe from water faucet or fire hydrant, and by the device to detect the leaked Hydrogen gas from water leakage point, it is possible to find the leakage point.

Detection mixed gas is safe and non-flammable gas that has been defined by ISO10156.

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NRW Prevention Plan

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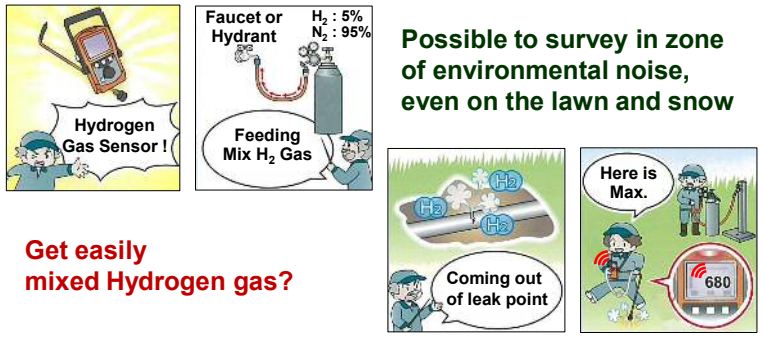
1. Leakage Survey

3) Detection Machine / Survey Equipment

(6) Gas sensing leak detector



Possible to survey in zone of environmental noise, even on the lawn and snow

Get easily mixed Hydrogen gas?

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NRW Prevention Plan

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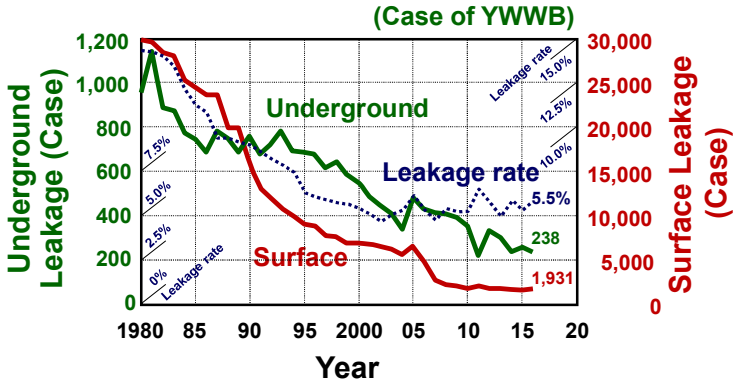
1. Leakage Survey

4) Detection / Repair History



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NRW Prevention Plan

2. Water Meter Reading Error

1) Easy Reading

Water meter is not one type. There are several kinds of type, Digital, Analog, Electron type. Next Page ...

Meter readers need the training of water volume reading from surface of water meter. Also, they should be able to calculate the addition and subtraction of numbers easily.

There are lots water meters that their surface is so dirty. Water meter that the number is not visible must be replaced immediately.

Glass breakage

Surface discoloration

NRW Prevention Plan

2. Water Meter Reading Error

1) Easy Reading

Digital Type | Analog Type | Electron Type

m^3 L

Read this water volume

NRW Prevention Plan

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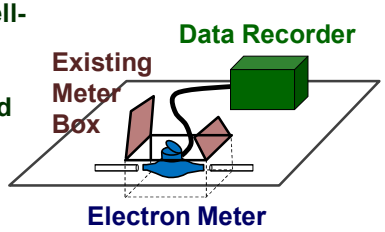
3. Water Meter Inaccuracies

1) Water Meter Accuracy Investigation

Meter Error Test

a) Selection of water meters by service use per year
b) Visit customer's house and remove existing meter
c) Set high accuracy electron meter and data recorder
d) Measure detail water consumption by electron meter
e) Find and analyze well-used range of water consumption by PC
f) Flow test by analyzed water flow ranges
g) Calculate its water meter's whole error



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NRW Prevention Plan

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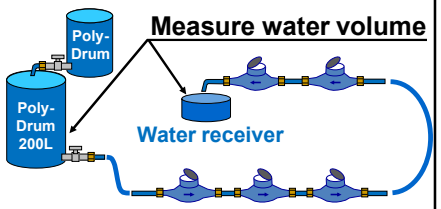
3. Water Meter Inaccuracies

1) Water Meter Accuracy Investigation

Meter Error Test

Meter Test Laboratory



If WU does not have such test laboratory, fabricate like above unit.

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NRW Prevention Plan

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Ex.5

3. Water Meter Inaccuracies

1) Water Meter Accuracy Investigation

Plot in next slide

Meter Error Test Flow Volume

Flow range (L/hr)		Central value (L/hr)		Consumption ratio (A)		Meter error (B)		Inaccuracy rate (C=A*B)	
~a1	[~40]	a1 / 1.5	[25]	L1	[0.018]	e1	[-9.1%]	L1*e1	[-0.164%]
a1~a2	[40~80]	(a1 + a2) / 2	[60]	L2	[0.034]	e2	[4.5%]	L2*e2	[0.153%]
a2~a3	[80~200]	(a2 + a3) / 2	[140]	L3	[0.062]	e3	[1.9%]	L3*e3	[0.118%]
a3~a4	[200~500]	(a3 + a4) / 2	[350]	L4	[0.210]	e4	[0.7%]	L4*e4	[0.147%]
a4~	[500~]	a4 * 1.5	[750]	L5	[0.676]	e5	[0.3%]	L5*e5	[0.203%]
Total		Test volume		1.000		4.6 years		Σ(Li*ei)	[0.457%]

0.46%

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NRW Prevention Plan

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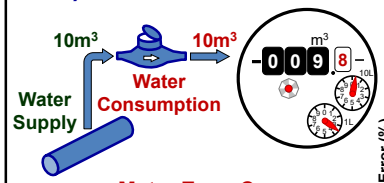
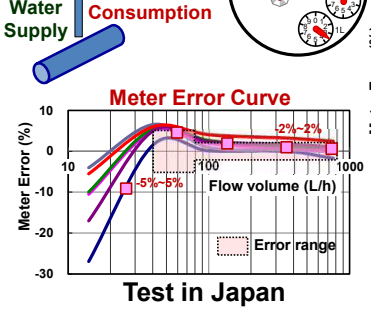
Ex.5

3. Water Meter Inaccuracies

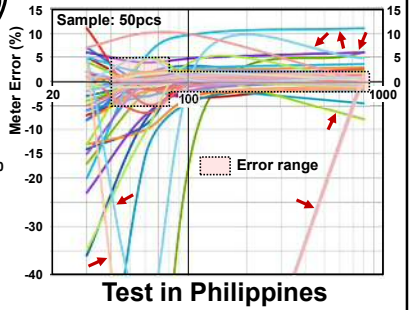
1) Water Meter Accuracy Investigation



$$NRW = \frac{9.8 - 10.0}{10.0} = -2.0\%$$



Test in Japan



Test in Philippines

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NRW Prevention Plan

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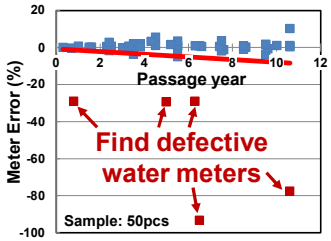
Ex.5

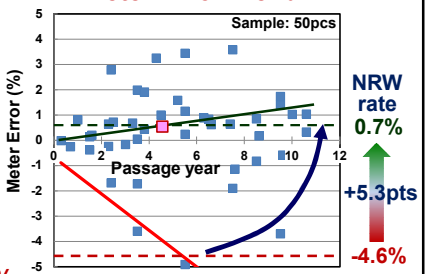
3. Water Meter Inaccuracies

1) Water Meter Accuracy Investigation

Meter Error Trend



Meter Error Trend



Error meter rate: 5/50 = 10%

If defective meters change new, Meter Error improves .

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NRW Prevention Plan

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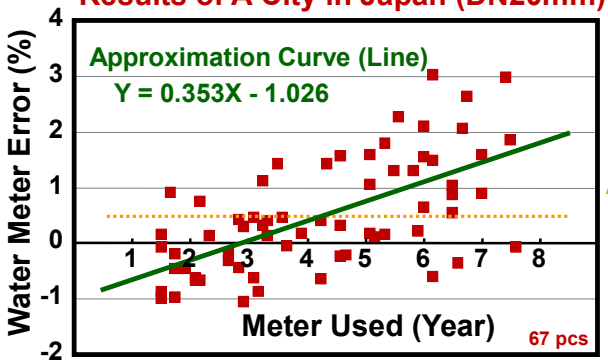
3. Water Meter Inaccuracies

1) Water Meter Accuracy Investigation

Results of A City in Japan (DN20mm)



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NRW Prevention Plan

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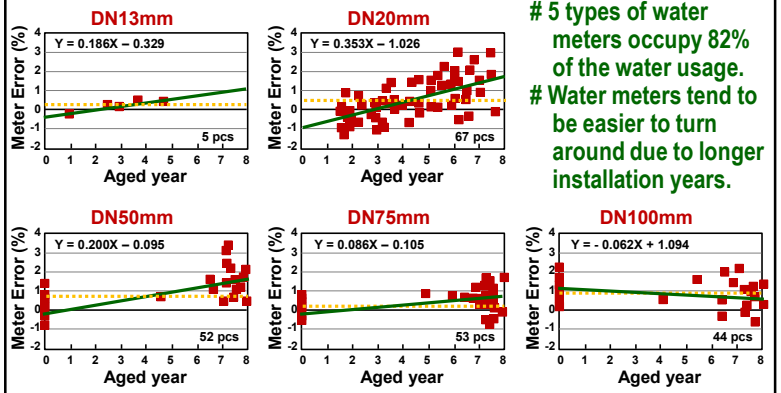
3. Water Meter Inaccuracies

1) Water Meter Accuracy Investigation



5 types of water meters occupy 82% of the water usage.

Water meters tend to be easier to turn around due to longer installation years.

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NRW Prevention Plan

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3. Water Meter Inaccuracies

1) Water Meter Accuracy Investigation

The number of removed test water meter and removal rate against the number of connection

Connection	Removed meter	Removal rate
< 500	220	> 44.0%
800	260	32.5%
1,000	280	28.0%
2,000	325	16.3%
3,000	345	11.5%
5,000	360	7.2%
10,000	370	3.7%
25,000	380	1.5%
50,000	385	0.8%
> 100,000	385	< 0.4%

Removal water meters (1~10 years after installation) are extracted averagely by regional and manufacturing company. By statistical theory, it is assumed that the population distribution is normal distribution. When the Tolerance: 5%, Trust rate: 95% (Normal distribution points: 1.96), Population ratio: 0.5, number of test meters for the number of connections are in the table.

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NRW Prevention Plan

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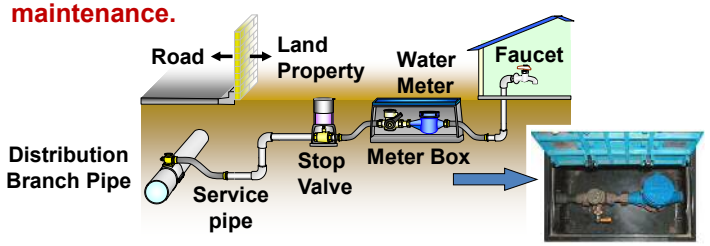
4. Water Meter Install

1) Replacement of Defective Meter / Setting

Water Meter is installed horizontally, in a site close to the boundary of road and house, in a place not interfering with the replacement meter and meter reading, in a well-drained location, and in a place with no hindrance to maintenance.



NRW Prevention Plan

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5. NRW Rate Monthly Evaluation

1) Pitfall of Monthly Evaluation

District	Previous	This Month	Interval	Amount	NRW
Input-1	09/16/2017	10/15/2017	29 d	122,899m³	
Area A			32.9 d	95,291m³	
A-0001	09/01/2017	10/02/2017	31 d	20m³	
…	…	…	…	…	
A-3894	09/03/2017	10/06/2017	34 d	17m³	
Area B			34.1 d	82,921m³	
B-0001	09/03/2017	10/06/2017	32 d	40m³	
…	…	…	…	…	
B-3211	09/18/2017	10/21/2017	34 d	23m³	
Total/Average in All Area			32.7 d	98,867m³	19.6%
Correction of Interval for NRW			1.126	87,680m³	28.7%

NRW Prevention Plan

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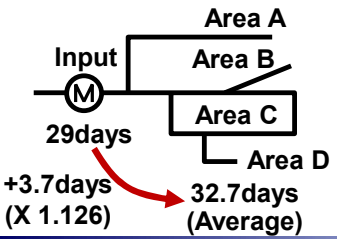
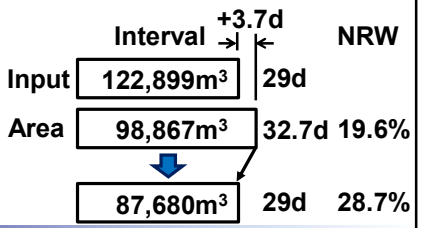
5. NRW Rate Monthly Evaluation

1) Pitfall of Monthly Evaluation

District	Previous	This Month	Interval	Amount	NRW
Input-1	09/16/2017	10/15/2017	29 d	122,899m³	
Total / Average in All Area			32.7 d	98,867m³	19.6%
Correction of Interval for NRW			1.126	87,680m³	28.7%





NRW Prevention Plan

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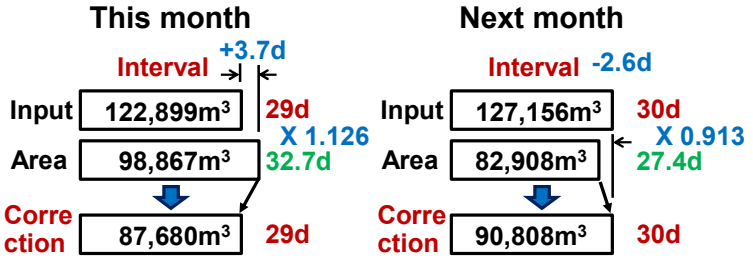
5. NRW Rate Monthly Evaluation

1) Pitfall of Monthly Evaluation



	Interval	NRW rate			Interval	NRW rate
Input	32.7 days	19.6%	⇔	Input	27.4 days	34.9%
Area	29 days	28.7%	⇔	Area	30 days	28.5%

NRW Prevention Plan

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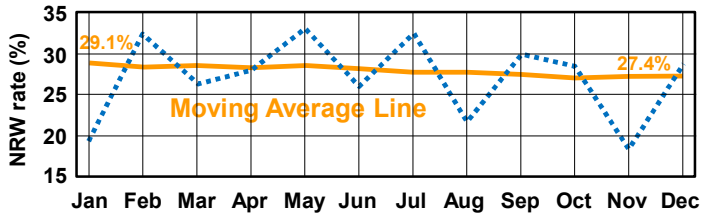
5. NRW Rate Monthly Evaluation

1) Pitfall of Monthly Evaluation

District	Previous	This Month	Interval	Amount	NRW
Input-1	09/16/2017	10/15/2017	29 d	122,899m³	
Total / Average in All Area			32.7 d	98,867m³	19.6%
Correction of Interval for NRW			1.126	87,680m³	28.7%



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NRW Prevention Plan

5. NRW Rate Monthly Evaluation

2) Evaluation Period

(1) Japan Water Works Association, evaluation period of NRW rate is assumed to be 1 year.

(2) When evaluating NRW rate every month, its error becomes large because integration period of flow rate is short.

(3) When integration period of flow rate is 1 year, above reading error is almost eliminated. At a minimum, period should take 3 ~ 6 months.

Meter Reading: 1 day delay/early	If 2 days
1day / 30day = 0.0333 = 3.33%	6.67%
1day / 61day = 0.0164 = 1.64%	3.28%
1day / 182day = 0.0549 = 0.55%	1.11%
1day / 365day = 0.0027 = 0.27%	0.55%

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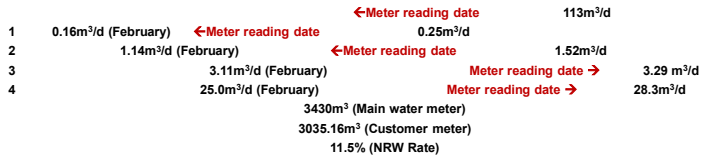
2) Evaluation Period



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Leak Noise Listening

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Leak Noise Listening

Exercise

1. Leak sound at Meter A
2. Leak sound at Meter B
3. Leak sound at Valve

Courtesy of FUJI TECOM INC.

111

Leak Noise Listening

Exercise

Noise that is similar to the leak noise

1. Transformer
2. Vending Machine
3. Sewage Flow

Noise that is mixed in the leak noise

1. Passing Car
2. Sewage Manhole
3. Noisy Factory

Courtesy of FUJI TECOM INC.

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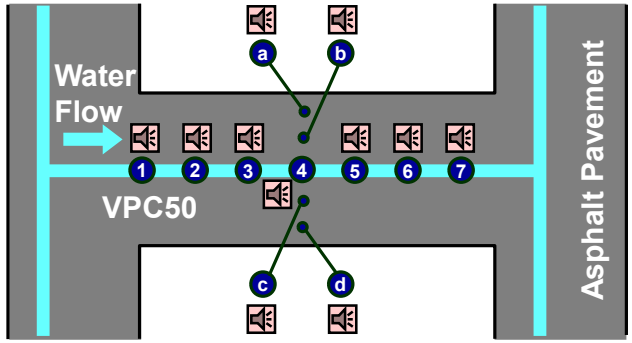
Leak Noise Listening

Exercise: Scene 1



Courtesy of FUJI TECOM INC.

Leak Noise Listening

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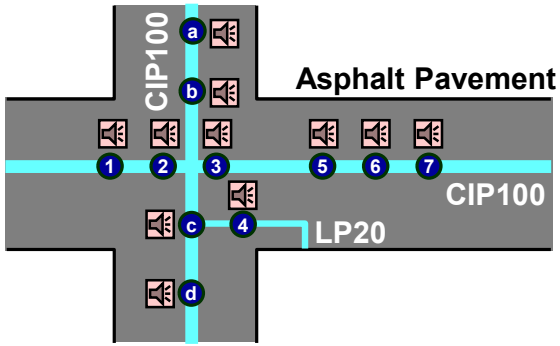
Exercise: Scene 2



Courtesy of FUJI TECOM INC.

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Leak Noise Listening

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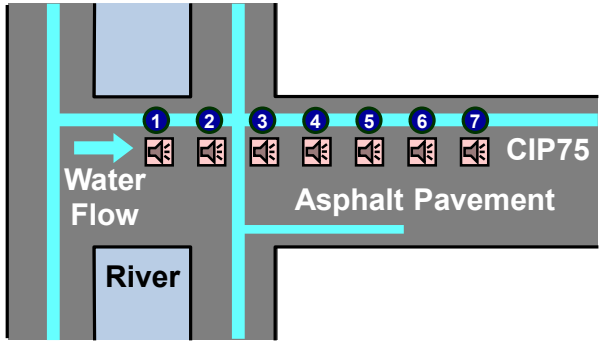
Exercise: Scene 3



Courtesy of FUJI TECOM INC.

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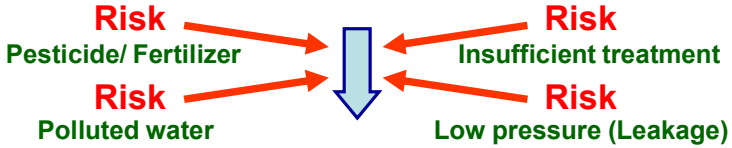
1

Water Supply Condition

2

The water supply in Japan, it secures safety water supply with maintenance and management of water supply system according to satisfy the water quality standard.



There are various risks, have accidents or damage caused taste and odor pollution.

2

More Safety Water Supply

3

Further enhance the safety water supply, to provide a good taste drinking water stable future with confidence, it is important to realize that an integrated water management from source to tap.

It needs to improve water quality management standard by integrated approach.

3

Actions of WHO

4

WHO (World Health Organization) introduced an idea of HACCP* had already established in food manufacturing field.

* Hazard Analysis and Critical Control Point

WHO has proposed WSP** (Water Safety Plan) that conducted risk assessment and management at every stage from water source to tap, and it is to build water system to ensure safe water supply.

** Guidelines for Drinking-Water Quality / 3rd Edition / 2004

4

Approach of MHLW

5

In May 2008, MHLW (Ministry of Health, Labour & Welfare) made a guideline of WSP. MHLW recommends water utilities formulate each WSP.

⇩

MHLW expects domestic water utilities use guideline and try to supply more fine and safety drinking water.

Japanese Water System

6

In Japan, it was done before developing guidelines for common sense ....

Water treatment
according to the raw water quality

Water supply network system
ensures proper pressure

Water quality tests
are carried out regularly

.... through these measures, has been supplying clean and safety drinking water.

Japanese Water System

7

Utilizing this guideline ....

refer to case study,

develop a plan for its water system,

better and more secure water supply.

It is hoped that such helps.

Specific Goals of WSP in Japan

8

WHO Guidelines for Drinking-Water Quality ...

(1) Decrease pollution of raw water as much as possible.

(2) Remove and reduce pollution matters in treatment process.

(3) Prevent pollution matters in process of distribution and service pipeline.

⇩

In order to achieve these ....

Specific Goals of WSP

9

Prevent pollution in water system ....

(1) Retain water supply capacity within target of water quality.

(2) Identify to control sources of pollution.

(3) Clarification of how to manage hazards.

(4) Establishment of monitoring system in water supply system.

(5) Timely implementation of necessary improvements.

(6) Validation of safety water supply

Expected effect of WSP

10

(1) Improvement of safety

In WSP, it is possible to confirm treatment system and disinfection effect in WTP, conduct water quality inspections, and grasp hazards of cause.

(2) Improvement of O&M

By hazard analysis, it defines a cause and priority of management. And, it makes efficiently.

(3) Technology inheritance

In WSP, it records of documents in technical phase of water quality, facility management and operation. It is useful of technology inheritance.

Expected effect against WSP

11

(4) Accountability to customers about safety water

Record of document and data of WSP is effective to explain safety water supply.

(5) Unification management

WSP can evaluate water supply system and grasp generally. It can be the unification and integration.

(6) Reinforcement of cooperation

Perspective of the whole hazard assessment and management, cooperation is needed in the supply area and water catchment area.

Valuation of WSP

12

Quality Management System: ISO9001

Certification in WTP has the effort, the stability test data accuracy, raising the awareness of staff. And it is enhanced the confidence of WSC.

Laboratory Capacity: ISO/IEC17025

Water quality certification in laboratory shows that the reliability of test results in a range of objective certification.

⇩

Evaluate the reliability of the individual elements constituting the water system.

Position of WSP

13

Water Safety Plan (WSP)

Water system is planned to continue to secure water supplies and the always reliable. From Water resource, purification, distribution to faucet, the comprehensive quality management system is to organize the overall management.

WSP

Resource

13

14

System assessment

Identify hazard
Set risk level

Monitoring of measures

Set Control Measures, Criteria & Monitoring
→This becomes operation management plan, later.

Employments of Plan

Response when deviated from standard, and emergency
Records of documents and data
Carry out validation & verification

Review

Improvement for PDCA cycle

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1. Assembling Team

16

Assembling Promotion Team ....

1) Who has knowledge of potential causes of hazard.
2) Who has responsibility and authority ensure safety water.
3) Who has knowledge of daily operation.

Position	Part / Responsibility
Manager	Leader / Supervisor
Facility	Extraction of potential causes of hazard at Resource, Intake, WTP, Transmission & Distribution & Service network / Hazard analysis / Set monitoring
Mechanic	
Water Quality	Extraction of potential causes of hazard about water quality / Hazard analysis / Set monitoring
O&M	Extraction of potential causes of hazard at WTP / Hazard analysis / Set monitoring

Yokohama Water Co., Ltd. / Yokohama Waterworks Bureau

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2. Grasp Water Supply System

17

(1) Outline of Water Supply System

Arrangement of water supply system outline from water resource to tap, confirmation of basic information of WTP as follow.

1) Business type (Water supply, Bulk supply)
2) Resource type (River, Underground water)
3) Feature of resource catchment area
4) Purification (Sedimentation & Filtration, Disinfection only)
5) Feature of distribution and service pipeline network
6) Feature of service area

2. Grasp Water Supply System

18

(2) System Flowchart

It is easy to grasp the existed harm in the whole water supply system from resource to faucet.

1) Simple chart with minimum information
2) Detail chart (all main river, branch river, main WTPs, sampling point for water inspection, monitoring device and point, waste water drainage)

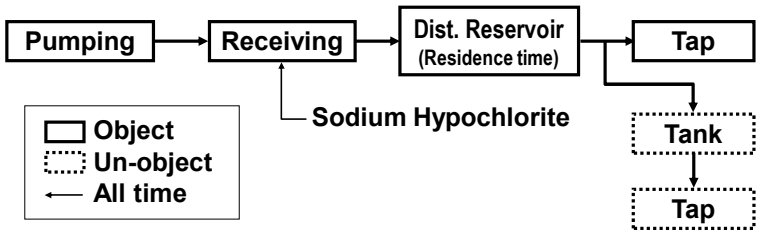
It is convenient to use the tools: "simple" and "detail" version. And it is important to confirm the contents by exploration.

2. Grasp Water Supply System

19

(2) System Flowchart [Simple]

1) Disinfection Only



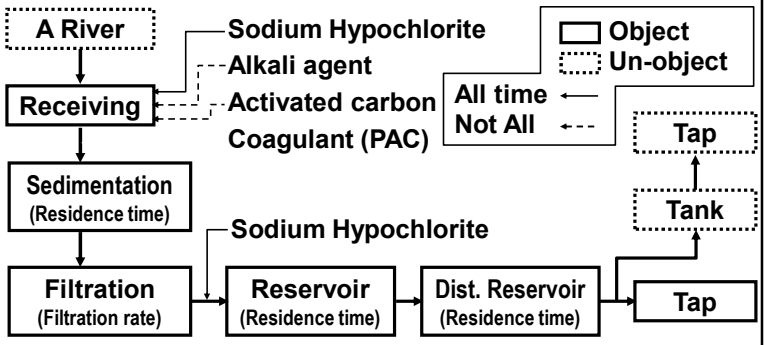
[Arrival time: X.X – X.X hours / Ave.: X.X hours]

2. Grasp Water Supply System

20

(2) System Flowchart [Simple]

2) River water + Sedimentation + Filtration



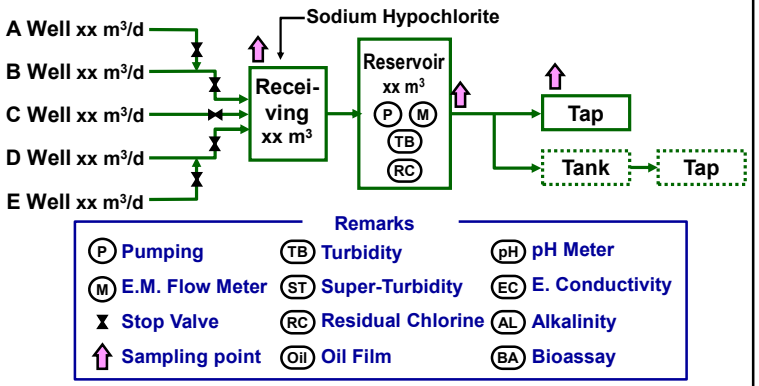
[Arrival time: X.X – X.X hours / Ave.: X.X hours]

2. Grasp Water Supply System

21

(3) System Flowchart [Detail]

1) Disinfection Only

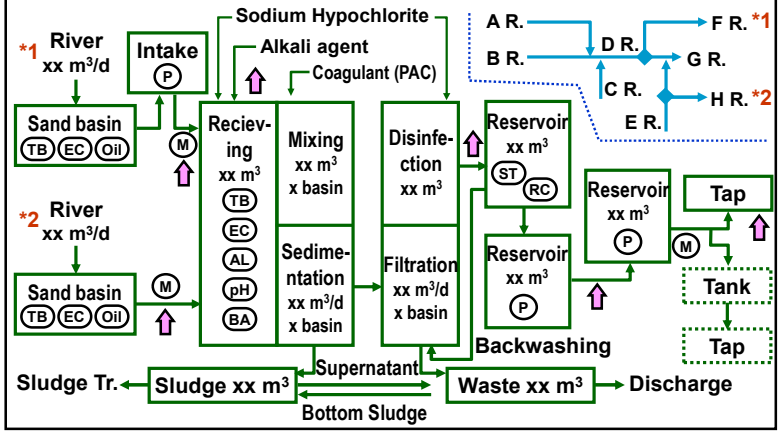


2. Grasp Water Supply System

22

(3) System Flowchart [Detail]

2) River water + Sedimentation + Filtration



2. Grasp Water Supply System

23

(4) Acquisition of information from source to tap

Need to obtain related information in order to extract hazards that exist in the water system .

1) Information of water resource and intake

The area of water resource is widespread and intake points locate long distance place. The information should be collected in cooperation with other water utilities involved.

Information

River water quality / Ground water quality / Water contaminated accident / Human wastes treatment / Waste treatment & disposal / Rive flow volume / Pesticide Usage / Livestock numbers / Livestock wastewater treatment / Waste water treatment

2. Grasp Water Supply System

24

(4) Acquisition of information from source to tap

1) Example of information at water resource

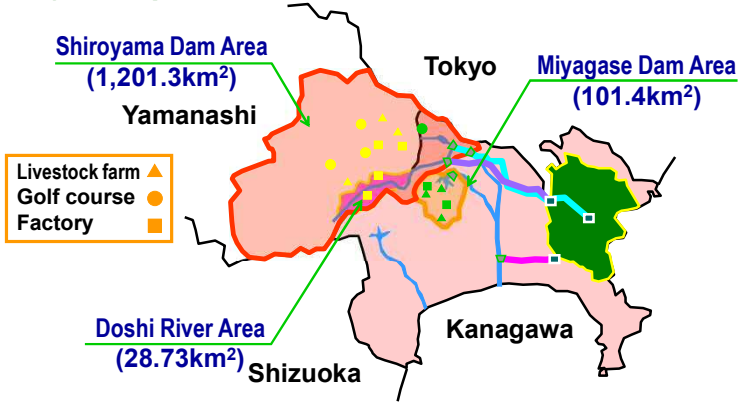
Industry Type		Data Item	Remarks
Wastewater treatment facilities	WWTP Human WT	Plant location, Drainage place, Treatment method, Treatment volume, Waste water quality	If there is no WWTP, research the domestic wastewater volume of each river basin.
Mining	Factory	Plant location, Drainage place, Type and volume of discharged pollutant, Treatment method, Wastewater quality	
Livestock	Number	Cattle, Pig	
	Drainage treatment	Farm location, Drainage place, Treatment method , Waste water quality	
Agriculture	Pesticide	Pesticide spraying duration & area, Fertilizer type	
Golf course	Pesticide	Location, Drainage place, Pesticide type, Spraying volume	
Other	Geological survey, Survey of wildlife habitat If water resource is groundwater source, to collect information on pollution sources in the range of about 1km radius of the well water.		

2. Grasp Water Supply System

25

(4) Acquisition of information from source to tap

1) Example of information at water resource



25

2. Grasp Water Supply System

26

(4) Acquisition of information from source to tap

2) Information from WTP to tap

Describe the data and spec of water supply facilities on supply system flow-chart. The information of distribution facilities should be make plotting data, and also maintenance frequency and item of monitoring machines.

River	Main / Branch stream name
Intake	Intake water volume
Sedimentation	Capacity / No. of basin / Residual time
Sand Filtration	Capacity / Area / Filtration rate (Max., Ave.)
Distribution Resv.	Capacity / Residual time

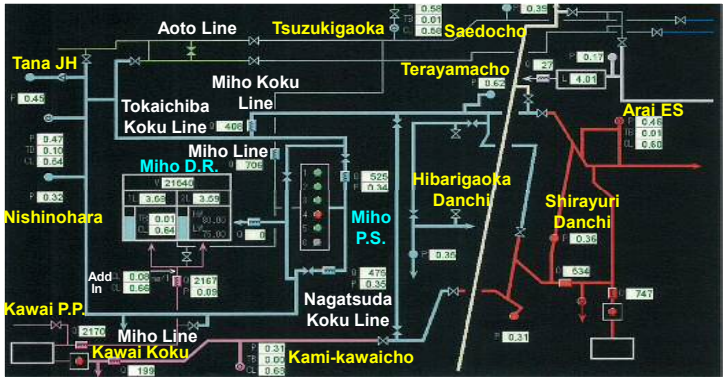
26

2. Grasp Water Supply System

27

(4) Acquisition of information from source to tap

2) Information from WTP to tap (Distribution map)



Yellow: Monitoring Terminal | White: Trans./Dist. Pipeline | Blue: Dist. Reservoir

27

2. Grasp Water Supply System

28

(4) Acquisition of information from source to tap

2) Information from WTP to tap (Maintenance)

Machine name		Contents of maintenance	Frequency
Turbidity Meter	Regular Maintenance	Analysis part check / Operation condition check / Exchange consumption articles / Loop confirm	1 / Year
	Cleaning Maintenance	Cleaning and Movement confirm / Zero point check / Cleaning device check	12 / Year
Residual Chlorine Meter	Regular Maintenance	Operation condition check / Exchange consumption articles / Loop confirm	1 / Year
	Cleaning Maintenance	Cleaning and Movement confirm / Zero point check / Cleaning device check	12 / Year
Electric Magnetic Flow Meter		Aspect check / Convertor quality check / Measure check / Voltage check / Isolation resistance / Device check / Loop confirm	1 / Year

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3. Hazard Analysis

29

(1) Identify Hazard

After collection of information of water supply system from water source to tap, select extraction of events causing harm including potential harm.

1) At resource and intake

Location		Types of Hazards
Catchment Area		PRTR substance / Oil / Pesticide / Chlorine resistant pathogenic organisms / Factory waste water
Resource	River	Water pollution due to construction and drought / High turbidity during rain / Water pollution caused by soil
	Well	Damage casing / Screen stoppage / High density of Chlorinated organic solvent
Intake facility		Corruption of intake weir / Blockage of the intake point
Conveyance facility		Car accident / Illegal dumping

3. Hazard Analysis

30

(1) Identify Hazard

2) From WTP to tap

Location		Types of Hazards
WTP	Receiving	Overdosing chlorine / Under dosing chlorine
	Sedimentation	Lack of floc settling / Sludge accumulation / Short-circuit current
	Filtration	Lack of washing / Turbidity disclosure
	Reservoir	Lack of Residual Chlorine / Coating separation
	Chemical	Concentration reduction of available Chlorine / Concentration elevation of Chloric Acid / Infusion device failure
	Monitoring	Clogging of Sampling pipe
Distri-bution	Reservoir	Lack of Residual Chlorine / Machine abnormality
	Pipeline	Abnormal pressure / Corrosion / Colored water
Service Pipeline		Cross-Connection / Lack of Residual Chlorine
Service Tank		Poison put / Corruption fly-screen

3. Hazard Analysis

31

(1) Identify Hazard

3) Water quality

Residual Chlorine # Water quality standards (50)
Water quality management items (exclude above)
Chlorine tolerant pathogenic organisms (Cryptosporidium, Giardia) # Another pathogenic organisms
Ammonium nitrogen # Oil # Aspect # Foreign object
Water temperature # Other

When considering the expected hazard caused events in each process is also useful information and analysis of water quality measurements.

3. Hazard Analysis

32

(1) Identify Hazard

Location	Types of Hazards
Lake	Domestic wastewater / Industrial wastewater / Pesticides from farms, drains to the river and lake / Easy access of animals / Presence of chemical-fluoride, cyanide
Infiltration Well	Location of septic tank around and upstream of source / Geology of area / Deterioration of well casing due to old age / Oil or Diesel spill from back up generators
Chlorination	Overdosing chlorine / Under dosing chlorine / No chlorine
Reservoirs	Rusted and missing inlet chambers covers / Presence of silt of mud sedimentation and other matters in the reservoir / Fittings or appurtenants that are not working properly / Damage during natural disasters
Distribution Systems	Leakages / Rusted, corroded old pipes / Fittings or appurtenants that are not working properly
Consumers	Illegal Connections / Services Damaged water meters / Low quality construction/installation Materials

3. Hazard Analysis

33

(2) Set Risk Levels

About extracted harm, to set the level of risk.

The risk level is set the following steps.

1) Specific of frequency of occurrence
2) Specific of influence the degree
3) Temporarily setting of risk level set by the matrix
4) Comparative validation of the risk level

3. Hazard Analysis

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(2) Set Risk Levels

1) Frequency of hazard

Categorizing the frequency of the potential hazards identified in categories as follows.

Class	Content	Frequency
A	Almost never	Once every 10 years or less
B	Rarely	Once every 3-10 years
C	Occasionally	Once every 1-3 years
D	Often	Once every few months
E	Frequently	Every month/week

3. Hazard Analysis

35

(2) Set Risk Levels

2) Severity of Damage

Categorizing class of the severity of damage as follows.

Class	Content	Explanation
a	Almost No	No effects observed
b	Requires Consideration	Unsatisfactory, but not serious enough for people to turn to other drinking water
c	Slightly Significant	Hinders in use and users turn to other drinking water
d	Significant	May affect health
e	Worst	May result in fatalities

3. Hazard Analysis

36

(2) Set Risk Levels

3) Setting Risk Levels by both categories

Set the risk levels of potential hazard from figures relating to frequency and scale of damage.

			Severity of Damage				
			Almost No	Little	Slightly	Significant	Worst
			a	b	c	d	e
Frequency of Hazard	Frequency (Every Mo.)	E	1	4	5	5	5
	Often (Few Month)	D	1	3	4	5	5
	Occasionally (1-3yrs)	C	1	1	3	4	5
	Rarely (3-10years)	B	1	1	2	3	4
	Almost Never (10Yrs)	A	1	1	1	2	3

3. Hazard Analysis

37

(2) Set Risk Levels

4) Comparing & Setting Risk Levels

Compare assigned risk levels and determine level of risk after adjusting for any deficiencies in the balance.

			Severity of Damage				
			Almost No	Little	Slightly	Significant	Worst
			a	b	c	d	e
Frequency of Hazard	Frequency (Every Mo.)	E	1	4	4	5	5
	Often (Few Month)	D	1	3	4	5	5
	Occasionally (1-3yrs)	C	1	1	3	4	5
	Rarely (3-10years)	B	1	1	2	3	5
	Almost Never (10Yrs)	A	1	1	1	2	5

3. Hazard Analysis

38

(2) Set Risk Levels

5) Setting the risk levels (WHO)

WHO evaluates by multiplication of 1 to 25.

			Severity of Damage				
			Almost No	Little	Slightly	Significant	Worst
			a/1	b/2	c/3	d/4	e/5
Frequency of Hazard	Almost (Every day)	E/5	5	10	15	20	25
	Likely (Every week)	D/4	4	8	12	16	20
	Moderate (E. month)	C/3	3	6	9	12	15
	Unlikely (Ev. year)	B/2	2	4	6	8	10
	Rare (Once 5years)	A/1	1	2	3	4	5

Urgent: 20-25 / high:12-16 / Medium: 5-10 / Low:1-4

3. Hazard Analysis

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Location		Hazard	Related Sub.	Freq.	Dmg.	R.L.
Catchment Area		Factory waste water	Trichloroethylene	E	d	5
		Household sewage	Nitrate Nitrogen	E	a	1
Water Source	Rivers	High turbidity	Pathogenic organ.	A	d	2
	Well	Damage casing / Screen stoppage	Gen. Bacteria, Escherichia coli	A	c	1
Intake		Gate trouble	Pathogenic organ.	A	b	1
Conveyance		Car accident	Oil	D	d	4
WTP	Sedimentation	Bad flock sedimentation	Turbidity	D	a	1
	Filtration	Lack of washing	Turbidity	B	c	3
	Reservoir	Lack of Resid. Chlorine	Res. Chlorine	A	a	1
	Chemical	Failure injection	Res. Chlorine	B	b	1
Distri-bution	Reservoir	Failure Monitoring	Res. Chlorine	C	b	1
	Pipe	Low water pressure	Water pressure	A	a	1
Service pipe		Lack of Resid. Chlorine	Res. Chlorine	A	d	4

4. Control Measures, Criteria

40

(1) Operational Monitoring & Control Parameters

1) Operational Monitoring

Control measures will prevent harm or management approach to mitigate the risk. Removed to reduce the harm: “Countermeasure“ / Proactively deal: “Prevention"

Location	Prevention	Countermeasure
Resource	Setting the wellhead protection area / Changes in drainage route / Water quality inspection / Wastewater quality testing /Sources of pollution load survey	Aeration of the reservoir
WTP	Intrusion alarm / Inspection and repair of equipment / Quality assurance of Chemical agent	Sedimentation and Filtration / Activate carbon / Ozonation / UV / Chlorination / pH control
Distribution & Service	Fly-screen / Introduction of quality standards of water pipes	Add Chlorination

4. Control Measures, Criteria

41

(1) Operational Monitoring & Control Parameters

2) Monitoring Method

Monitoring is carried out in order to verify that control measures are working. There are a variety of ways depending on the monitoring and management measures.

Category	Control Measure	Monitoring Methods
Prevention	Setting water resource conservation area / Water quality inspection / Check & repair facilities / fly-screen	On-site regularly check / Survey results check / On-site check when inspection and repair
Treatment	Aeration of the reservoir / Filtration / Activated carbon / Chlolination	Continuous measurement instrument / On-site regularly check / Manual analysis

4. Control Measures, Criteria

42

(1) Operational Monitoring & Control Parameters

3) Organizing the current control measures

To create a table that organizes the Related water quality, Risk Level, Management measures and monitoring method.

Monitoring Method	No.
None	0
On-site check	1
Implementation record	2
Manual analysis	3
Continuous measurement instrument (Alternative items)	4
Continuous measurement instrument (Direct items)	5

Monitoring instrument	Abbreviation
Bioassay	B
Residual Chlorine meter	R
Turbidity meter	T
Alkalinity meter	A
Conductance meter	E
Odor meter	D
pH meter	P
Chlorine requirement meter	C
Ultraviolet absorbance meter	U

4. Control Measures, Criteria

43

(1) Operational Monitoring & Control Parameters

	Location	Hazard	Water Quality Item	Frequency	Damage	Risk levels	Control	Class
1	Source	Factory Waste	Cyanogen	A	b	1	On	1
4	Source	Raw sewage	Gen. Bacteria	A	b	1	On	4
6	Source	Soil (usually)	Manganese	E	b	4	On	4
9	Source	Heavy rain	Turbidity	C	a	1	On	5
11	Mixing	Abnormal feeding	Gen. Bacteria	A	c	1	On	4
14	Filter	Abnormal feeding	Res. Chlorine	B	d	3	On	5
21	Filter	Lack washing	Turbidity	B	a	1	On	5
30	Dist. Re.	Unknown	Res. Chlorine	A	d	2	On	5

4. Control Measures, Criteria

44

(1) Operational Monitoring & Control Parameters

	Location	Hazard	Intake	Receiving	Mixing	Sedimentation	Fitlration	Distribution	Water supply
1	Source	Factory Waste	B					B	
4	Source	Raw sewage			Cl	R	R	R	Analyze
6	Source	Soil (usually)			Cl	R	R	R	
9	Source	Heavy rain		TAP	P	T	T		
11	Mixing	Abnormal feeding				R	R	R	Analyze
14	Filter	Abnormal feeding					R	R	Analyze
21	Filter	Lack washing					T		
30	Dist. Re.	Unknown						Analyze	Analyze

Check

Check

Check / Repair

4. Control Measures, Criteria

45

(2) Control measures and Monitoring methods

Based on the risk level, evaluate current control measures are appropriate to the caused hazard events.

R. Level	Control Measures
1	Once a year, to validate the effectiveness of control measures.
2	Once a year, to validate the effectiveness of control measures and data monitoring and processing.
3 – 4	To review the effectiveness of control measures and monitoring methods. If it is not proper, to introduce new measures promptly.
5	To review the effectiveness of control measures and monitoring methods, carefully. If it is not proper, to introduce new measures promptly.

5. Corrective Measures

46

(1) If deviate from the standard of management

If find deviations of the administrative process, determine the cause and correct. And assumed to deviate, set the value in advance.

1) Inspection of facilities and equipment
Check the movement of chemical dosing equipment, and monitoring equipment inspection

2) Enhanced water treatment
Increasing the sedimentation time / filtration slow down / Strengthen chemical dosing

3) Repair and Improvement
Drain pipe cleaning / repair of equipment of machines

4) Stop intake
Stop intake when high turbidity raw water

5) Contact the another agencies
Contact watershed stakeholders when raw water quality deterioration

5. Corrective Measures

47

(1) If deviate from the standard of management

Corresponding case of Residual Chlorine

Monitoring	Location	Monitoring Method	Standard of Conduct	Responses of Error
Sedimentation	To filtration	Res. Cl meter (Continuous)	0.5-1.0 mg/L	1)Checking the setting of sodium hypochlorite injection volume 2) Inspection of residual chlorine monitoring equipment 3) Inspection of sodium hypochlorite injection equipment
Filtration	To reservoir	Res. Cl meter (Continuous)	0.1-1.0 mg/L	
Treated water	Exit of reservoir	Res. Cl meter (Continuous)	0.4-1.0 mg/L	
Supply water	Faucet	Everyday	0.2mg/L-	

5. Corrective Measures

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(2) Responses of Emergency

Need to set the responses when significant deviations from the management standards and unforeseen emergency accident.

1) Emergency response policies, Procedures, Action plans

2) Responsibility and authority for emergency measures

3) Emergency communication system

4) Emergency water supply method

 # For emergencies, there is a need to conduct training on a regular basis to assume a variety of situations.

 # For communication system, assuming difficult to contact in holiday or at night.

5. Corrective Measures

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(3) Creating the Operation Management Manual

Operation and management of the system is performed in accordance with management criteria. If the emergency occurs, to ensure the safety of the water.

⇩

Need reflect the point of operation to the operational management manual, and to be able to see when daily O&M.

5. Corrective Measures

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Operation Sheet

1. Essential Term

1.1 Ordinary management

Control point	Content Management
Residual chlorine	0.55 – 0.65 mg/L
Injection rate setting	0.55 – 0.65 mg/L
Intake Weir level	More than 3.5m
Water volume at receiving well	12,000 - 20,000m³/h
Water level of reservoir	2.0 – 3.8m
Transmission volume	10,000 - 18,000m³/h
Injection Pump	Check working by sound
Integral power consumption	Check power consumption

1.2 Responding to deviance

1) Residual chlorine

Abnormal response of residual chlorine in water is corresponding with the manual sheet.

2) Water flow volume

See Figure No.X.

2. Emergency communication system

YYYY

→ Injection equipment repair

4)Increasing the injection volume

→ Reduction of water treatment

→ Improved methods of chemical storage

The corresponding since arrows is made through qualified technician.

6. Documents & Records

51

(1) Management of Documents

Documentation and Data-recording are needed in its application to everyday management and content review of WSP. Documentation about the entire water supply system / O&M / monitoring makes to ensure safety, and to enable technology inheritance.

⇩

About these documents, should decide how to establish, eliminate, browse, and distribute to staffs.

6. Documents & Records

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(2) Management of Records

1) Records of Operation and Monitoring

Quality: Raw water, Treatment, Distribution, Tap.
Volume: Intake, Distribution, Supply, Well.
Facility: Pumping Operation, Maintenance.
Chemical: Injection volume, Storage volume.
Drainage: Discharge volume, Sludge volume.
Other:

2) Emergency Report and Accident Report

 # Reports and records when deviated from administration standard and when abnormal.
 # Reports and records when accident.

6. Documents & Records

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(2) Management of Records

Date	Weather	High Voltage						
		Accumulated Power	Power Receiving	Frequency	Received Power	Received Current	Power Factor	Total Power
/		kWh	V	Hz	kW	A	%	kWh
Time	Temp.	Power Supply		Light Power Supply		Intake:Current		Transmission: Current	
		Volt.	Curr.	Volt.	Curr.	No.1	No.2	No.1	No.2
:	C	V	A	V	A	A	A	A	A

7. Validation & Verification

54

(1) Validation

For each element of the WSP, to confirm the validity from a technical perspective.

(2) Verification of the implementation

As method of verification, there is considered self-validating and independent (third party) verification. In case of self-validating, it needs to organize inspection team to verify.

⇩

Use the checklist on next page (sample), and the verification by the team.

7. Validation & Verification

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(3) Validation Check Sheet

Contents	Check Point	Results
Does result of water quality inspection report satisfy water quality standard?	Daily report of Residual Chlorine (Relation to quality standard, Satisfaction of quality standard)	G / NG
	Water quality inspection report	G / NG
Does control measuring carry out by rule?	Operation check record (Verification of records)	G / NG
Does monitoring carry out by rule?	Operation check record (Condition of daily records)	G / NG
When deviate from criteria, respond a prescribed activity?	Record the response measures	G / NG
Were the risks reduced by the above items?	Response measures records	G / NG
	Water quality test results records	G / NG
Was the record created in accordance with WSP?	Operational control inspection records	G / NG
	Water quality test results	G / NG
	Description of response measures records	G / NG

8. Review & Improvement

56

Check that the supplying water is always safe based on WSP, and make WSP improvements as needed.

⇩

Despite the water supply facilities change and management of water supply based on WSP, and in case of a failure, be sure to review the Water Safety Plan. At least once every 3 years to check, and to do the necessary revision of WSP.

8. Review & Improvement

57

To determine the adequacy of WSP. For verification, consider the following general information.

1) Changing circumstances over the water system

2) Results confirm the validity of WSP

3) Validation results of the implementation of WSP

4) Issues identified from the outside

5) The latest technical information

Training on WSP

58

1. Assembling Promotion Team
2. Grasp Water Supply System
3. Hazard Analysis (Identify Hazard, Set Risk Level)
4. Set Control Measures, Criteria & Monitoring
5. Set Corrective Measure
6. Management of Documents & Records
7. Carry out Validation & Verification

8. Review

Training on WSP

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1. Assembling Promotion Team

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Name	Position	Role / Responsibility

Training on WSP

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2. Grasp Water Supply System

17

(1) Outline of Water supply System

1) Business style

2) Water resource

3) Feature of resource

4) Treatment system

5) Distribution pipeline

6) Feature of Service area

Training on WSP

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2. Grasp Water Supply System

19-20

(2) System Flowchart (Simple type)

Training on WSP

62

2. Grasp Water Supply System

26

(3) Information from Resource to Tap

1) Resource & Intake

Location	Information

Training on WSP

63

2. Grasp Water Supply System

26

(3) Information from Resource to Tap

2) From WTP to Tap

Location	Information

Training on WSP

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3. Hazards Analysis

29-39

1) Hazards at Water Resource and Intake

Location	Hazard Events	Related substances / Control measure	Freq-uency	Dam-age	Risk level

Training on WSP

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3. Hazards Analysis

29-39

2) Hazards From WTP to Service Tap

Location	Hazard Events	Related substances / Control measure	Freq-uency	Dam-age	Risk level

65

Training on WSP

66

4. Control Measure

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2) Monitoring Method

Category	Control Measure	Monitoring Method

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Training on WSP

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4. Control Measure

43

Location	Hazard	Water Quality Item	Frequ ency	Dam age	Risk levels	Cont rol	Class

67

68

1

Outline

- Background
- Water resource forest management
- Combination of multiple measures
- Conclusions

2

Importance of Forest Protection

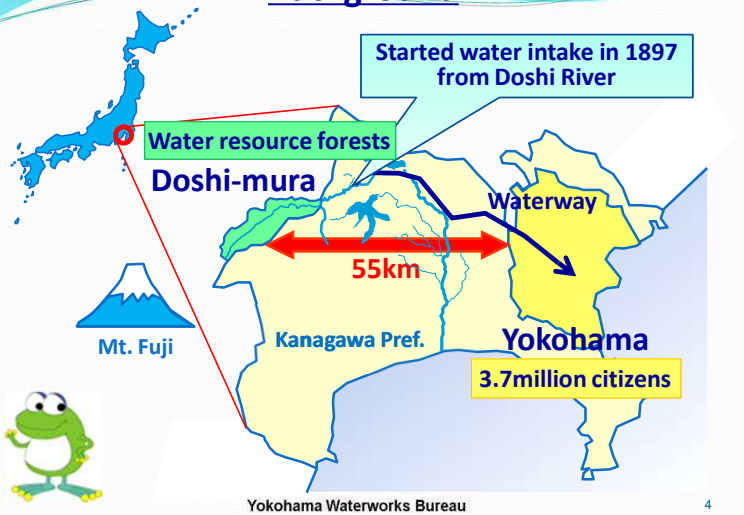
Water is supplied through part of water cycle.

Water cycle, a gift of nature to humans and living creatures is a significant natural cycle that is deeply related to human life.

Protecting and growing forests and fostering abundant water is essential for a healthy water cycle which should be passed on to future generation.

3

Background



4

Background

In early 20th Century

Yokohama was fully relying on water from Doshi River

59,000m³/day for 277,000 citizens

Degradation was occurring in water resource forests

Excessive fuel wood / charcoal production under common tenure arrangements

Water resource forests (2,780ha) purchased in 1916

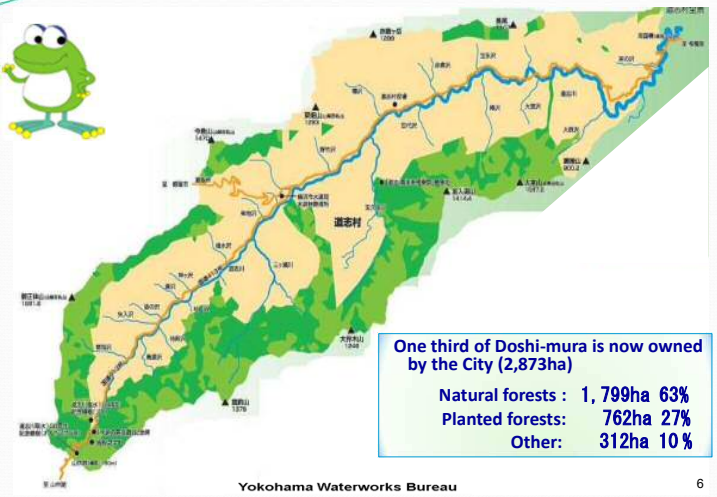
Spending 5.24% of city budget

Water resource forest Management Office established in 1917

Forest restoration work started in 1919

5

Water Resource Forest Management



One third of Doshi-mura is now owned by the City (2,873ha)

Natural forests :	1, 799ha	63%
Planted forests:	762ha	27%
Other:	312ha	10 %

6

Water Resource Forest Management

Designated as protection forests under Forest Act

Land conversion is prohibited and logging is restricted in order to sustain environmental services.

7

Water Resource Forest Management

Apply sylvicultural techniques to improve water conserving capability of water resource forests

Planted forests: Convert into mixed species forests through repeated thinning and natural regeneration

Natural forests: Maintain current state

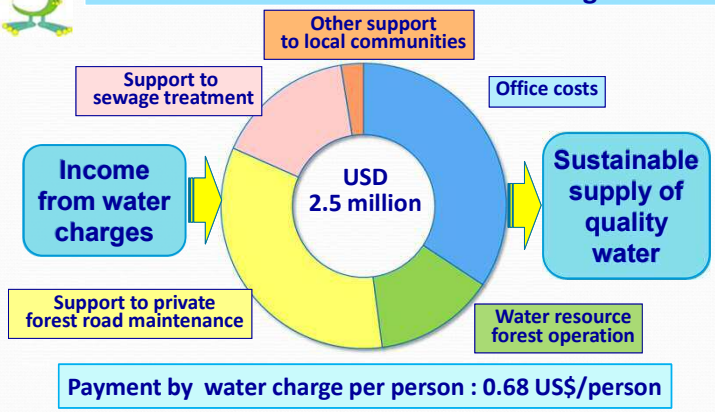
Unmanaged

Managed

8

Combination of multiple measures

Costs of water resource forest management



Payment by water charge per person : 0.68 US$/person

Yokohama Waterworks Bureau 9

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Combination of multiple measures

Support to private forest maintenance and awareness raising and involvement of citizens

Home of Water – Doshi Water Resource Forest Fund
- Donation from citizens and private companies
- Part of the sales of bottled water, "Hamakko-doshi"

Doshi Water Resource Forest Volunteer Programme
- Participants: about 17,000
- Treated area: 70ha

Yokohama Waterworks Bureau 10

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Combination of multiple measures

Support to local communities
- Private forest support
- Sewage treatment support
- Employment and contracts

Awareness raising
- Water resource forest Fund
- Forest tour and experiencing

Sustainable supply of quality water

Sustainable upstream forest management

Sustainable and predictable finance

Institutional and technical capacity
- Water resource forest Management Office
- Support to volunteer Programme

Legal framework
Use of water charges for managing water resource forests

Yokohama Waterworks Bureau 11

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Advise

Elements for successful PES
(Lessons learned from experience in 100 years)
- Legal and institutional framework
- Institutional and technical capacity
- Benefit sharing with local communities
- Awareness and support by beneficiaries

Sustainable delivery of benefits and payment

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Thank you for your attention!

Yokohama Waterworks Bureau

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TODAY's Contents

- Water Quality Management in YWWB
  - Organization
  - Water Quality Standard
  - Method and Frequency of Water Quality Inspection
  - Customer Service
  - Monitoring System and Trouble Shooting

2

2

Organization

3

3

Water Quality Division

4

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Water Quality Division

・Inspection Section（12 staff members）

- Water quality inspection（Water Source, WTP, Tap）

= Water Treatment Plant

・Water quality consultation section（9 staff members ）

- Responding to inquiries from customers
- Management of the automatic water quality analyzer

・ Water Quality Management Section（11 staff members）

- Research and study about Water quality
- Management of ISO9001 documents
- Laboratory tour guide

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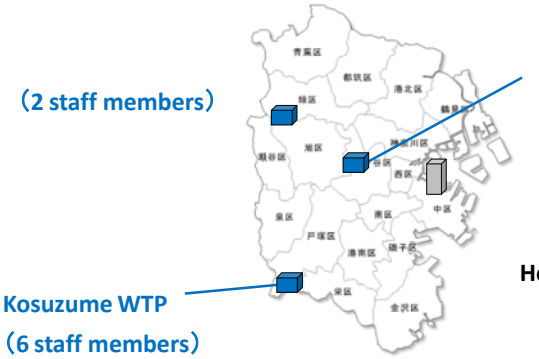
Other Divisions



WTP - Water quality inspection（Water Source, WTP）

- Research and study about Water quality

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6

Water Quality Standard

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Water quality Standard

Waterworks Act

✓Aims to improve the public health and the environment by providing water

・Clean ・Abundant ・Low cost

✓ Defines the legal requirement of drinking water quality management

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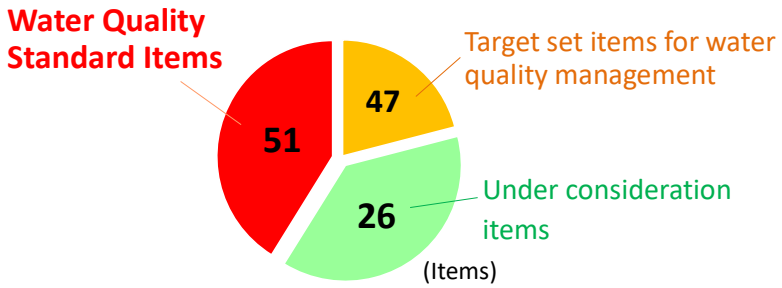
Water quality Standard

Water quality items



The number of water quality items that YWWB inspects is over 100

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ref. Water Quality Standard items

(mg/L)

No.	Category	Items	Standard Value	WHO guideline
1	Micro organism	Standard Plate Count	100 CFU/1 mL	-
2		E. coli	Not to be detected	Not to be detected
3	Inorganic substance	Cadmium	0.003	0.003
4		Mercury	0.0005	0.006
5		Selenium	0.01	0.04
6		Lead	0.01	0.01
7		Arsenic	0.01	0.01
8		Chromium (VI)	0.05	0.05
9		Nitrite nitrogen	0.04	3
10		Cyanide ion and Cyanogen chloride	0.01	-
11		Nitrate nitrogen and nitrite nitrogen	10	50 (NO_3^-), 3 (NO_2^-)
12		Fluoride	0.8	1.5
13		Boron	1.0	2.4
14	Organic substance	Carbon tetrachloride	0.002	0.004
15		1,4-dioxane	0.05	0.05
16		cis-1,2-Dichloroethylene and trans -1,2-Dichloroethylene	0.04	0.05
17		Dichloromethane	0.02	0.02
18		Tetrachloroethylene	0.01	0.04
19		Trichloroethylene	0.01	0.02
20		Benzene	0.01	0.01
21~31	Disinfection by-product		ellipsis	

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ref. Water Quality Standard items

(mg/L)

No.	Category	Items	Standard Value	WHO guideline
32	Inorganic substance	Zinc	1.0	-
33		Aluminum	0.2	-
34		Iron	0.3	-
35		Copper	1.0	2
36		Sodium	200	-
37		Manganese	0.05	-
38		Chloride ion	200	-
39		Calcium, Magnesium (Hardness)	300	-
40		Total residue	500	-
41	Organic substance	Anionic surface active agent	0.2	-
42		Geosmin	0.00001	-
43		2-Methylisobolneol (= 2MIB)	0.00001	-
44		Nonionic surface active agent	0.02	-
45		Phenols	0.005	-
46		Total Organic Carbon	3	-
47	Fundamental properties	pH Value	5.8~8.6	-
48		Taste	Not abnormal	-
49		Odor	Not abnormal	-
50		Color	5 TCU (=5 degree)	-
51		Turbidity	1.4 NTU (=2 degree)	-

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Water quality Standard

YWWB set original water quality target

項目	2-MIB	Mercury
Water quality standard : requirement at customers' taps	10 ng/L	0.5 µg/L
Original Target : stricter value than standard at reservoir of WTP so that never fail to satisfy standard at customers	2 ng/L	0.05 µg/L

- ✓ Normally, water quality do not exceed the target.
- ✓ Exceeding it means some malfunctions happen at WTP
  ⇒ We need to cope with the situation

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Method and Frequency of
water quality inspection

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Method and Frequency of Water Quality Inspection

Frequency of Water Quality Inspection

★every day　　★every week

★every month　　★4 times per year

➡ Carrying out them in cooperation between Water Quality Division and Three WTP

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Method and Frequency of Water Quality Inspection

★The items that we check every day

Points	Items (e.g.)
Raw water	Odor, Turbidity, pH
Treated water	Taste, Odor, Residual Chlorine, Turbidity, pH
Tap	Residual Chlorine, Turbidity, Color



Automatic water quality analyzer

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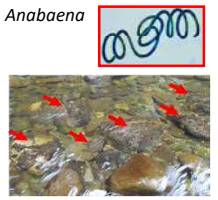
Method and Frequency of Water Quality Inspection

★The items that we check every week

Points	Items (e.g.)
Raw water	Microorganisms, TOC
Treated water	Color, TOC, Microorganisms Bacteriological examination, Musty Odor

Microorganisms

Anabaena



GC-MS

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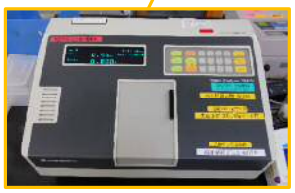
Method and Frequency of Water Quality Inspection

★The items that we check every month

Points	Items (e.g.)
Water source	pH, TOC, Turbidity, Musty odor
Raw water Treated water	Mn, Al, Na, Nitrogen(NH4+,NO2-,NO3-)
Tap	Taste, Odor, Residual Chlorine, pH, Turbidity Bacteriological examination





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Method and Frequency of Water Quality Inspection

★The items that we check 4 times per year

Points	Items (e.g.)
Raw water Treated water Tap	Cd, Pb, Cr, As, Fe, Mn, Na, Mg, Ca, Disinfection by-product


ICP-MS

IC

LC-MS

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Good Laboratory Practice

Good Laboratory Practice was set by JWWA

Japan Water Works Association

✓To ensure the inspection accuracy

✓To improve the inspection method

Major approach in YWWB

✓Preparation of SOP

Standard Operating Procedures

✓Controlling the inspection quality

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Good Laboratory Practice

✓**Preparation of SOP**

ex. Sampling water

Main Contents

- Type of sampling bottle
- Washing procedure of bottles
- Procedure of Water Sampling
- Transportation and Preserve Method of Water Sample etc.

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Good Laboratory Practice

✓**Preparation of SOP**

ex. Sampling water

- Aldehyde
- Haloacetic acid
- Metals
- Lead
- Inorganic materials, etc.

⇒ We use about 10 types of sampling bottles

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✓**Checking the inspection accuracy**

Internal Quality Control

✓ Check the variation of inspection of multiple times for the sample of known concentration performed under the same conditions.

External Quality Control

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⇒ **Set storage period and store properly**

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Customer Service

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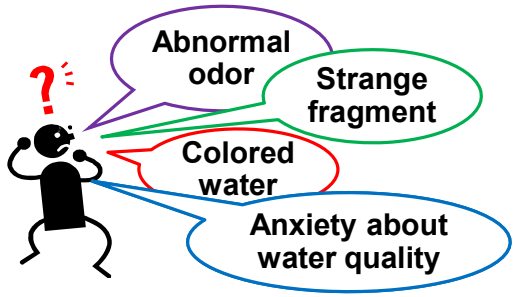
Customer Service

◆ Water quality inspection date on our Website

Customer Service

Inspection requested from customers

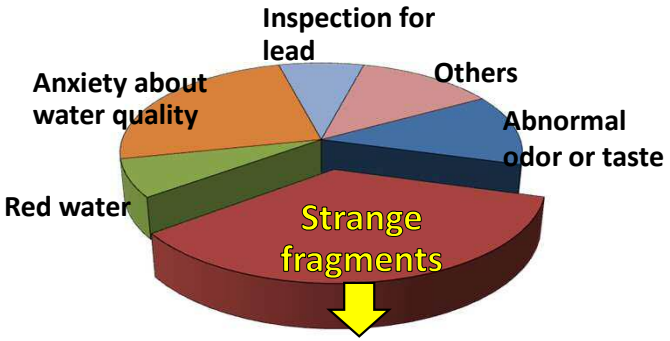


➡ **Water quality inspection service (2004~)**

Customer Service

Inspection requested from customers

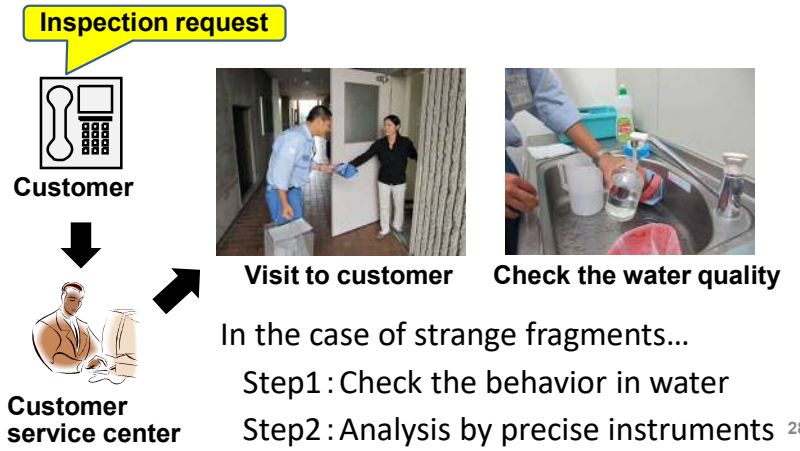
102 requests (2015)



We use precision equipment (EDS, FT-IR)

Customer Service

Flow of the inspection requested from customers

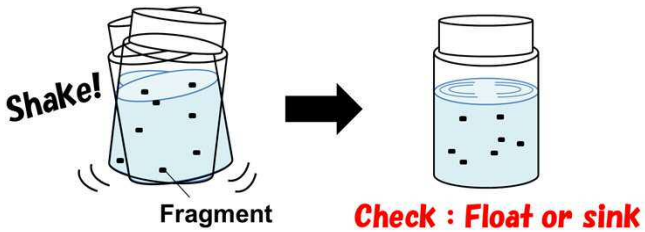


In the case of strange fragments…

Step1 : Check the behavior in water

Step2 : Analysis by precise instruments

Customer Service



Color	Behavior in water	The reason of the Fragment
Black	sink	Iron rust of water pipe
Black	float	Rubber of Packing

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Customer Service

(1)

(2)

Color	Behavior in water	The reason of the Fragment
Black	sink	Iron rust of water pipe
Black	float	Rubber of Packing

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Monitoring System
and Trouble Shooting

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Monitoring System and Trouble Shooting

(1) Monitoring Microorganisms in water resource

- Cryptosporidium
- Musty odor

(2) Trouble shooting of
Water pollution accident on water resource

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- It has chlorination resistant
- It cause diarrhea

  ⇒ Mass infection in Ogose city, 1996

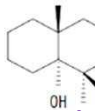
WTP - Control Turbidity of filtered water <0.14 NTU

Monitoring Microorganisms in water resource

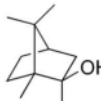
- **Musty odor**

Lake Sagami

Musty odor



geosmin



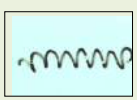
2-MIB

Monitoring Microorganisms in water resource

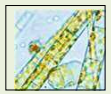
- Produce chemicals which make water awful

Fishy, Algal, etc.

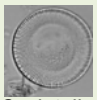
Nuisance Organism		Odor: Musty	Odor: Others	Coagulation inhibitation	Filter Clogging	Filter Leakage
Cyano-bacteria	***Anabaena***	○				
	Phormidium	○				
	Microcystis					
Diatom	***Aulacoseira***		○			
	Cyclotella		○			
	Skeletonema		○			
	Synedra acus					



Anabaena



Aulacoseira



Cyclotella

➡ Inject Activate Carbon

Monitoring Microorganisms in water resource

- Negative electric charge of microorganisms inhibit the effect of coagulant, Photosynthesis of them get pH higher etc.

Nuisance Organism		Odor: Musty	Odor: Others	Coagulation inhibitation	Filter	Filter
Cyano-bacteria	*Anabaena*	○				
	Phormidium	○				
	Microcystis			○		
Diatom	*Aulacoseira*		○			
	Cyclotella		○			
	Skeletonema		○	○		
	Synedra acus			○		

Microcystis

Synedra acus

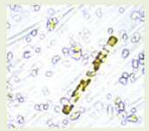
➡ Control Coagulant, pH etc.

Monitoring Microorganisms in water resource

- They deposit on the surface of the filtration sand then filtration flow gets worse

Nuisance Organism		Mus	Filter Clogging	Filter Leakage
Cyano-bacteria	*Anabaena*	C		
	Phormidium	C		
	Microcystis			○
Diatom	***Aulacoseira***		○	
	Cyclotella		○	○
	Skeletonema		○	
	Synedra acus		○	

Cyclotella



Skeletonema

➡ Control Coagulant, pH etc.

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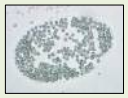
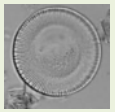
Monitoring Microorganisms in water resource

- Pass through the sand filter

Nuisance Organism		Odor: Musty	Odor: Other	Filter Leakage
Cyano-bacteria	*Anabaena*	○		
	Phormidium	○		
	Microcystis			○
Diatom	*Aulacoseira*		○	
	Cyclotella		○	○
	Skeletonema		○	
	Synedra acus			



Microcystis



Cyclotella

➡ Control Coagulant, Chlorine, pH etc.

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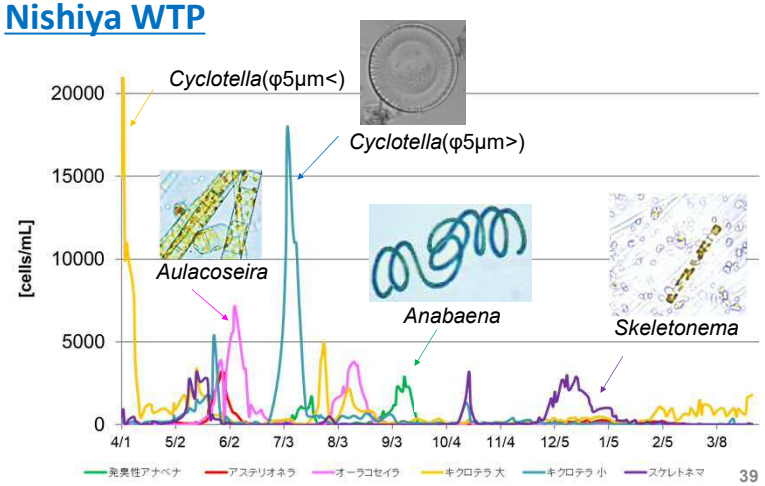
Monitoring Microorganisms in water resource

Nishiya WTP



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Trouble shooting of Water pollution accident

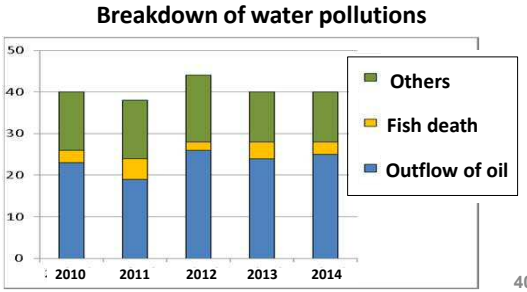
Major Causes of Water Pollution

(1) Outflow of Industrial wastewater

(2) Outflow of fuel oil by traffic or factory accidents

→ (3) fire extinguisher

Outflow of chemical to river



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Cooperation in Kanagawa

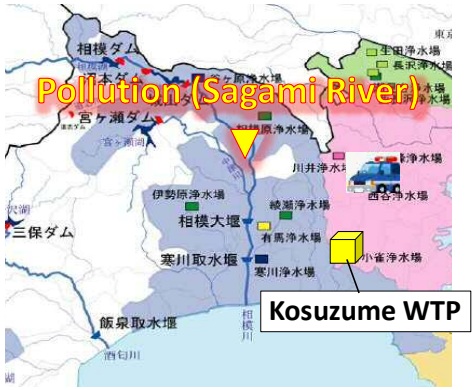
STEP1

On-site

- **Turbidity, Color**
- **pH, Odor,**
- **Hg, Cd, etc**

: Check the situation, inspect the water quality and taking measures in WTP

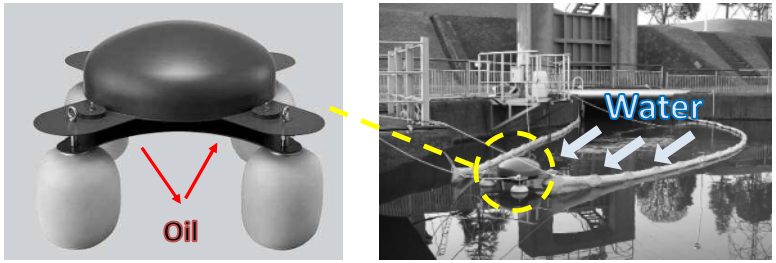
Cooperation in Kanagawa



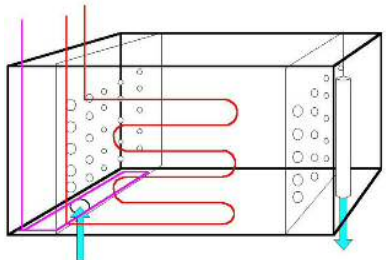
STEP3

@ intake point

⇒ Oil sensor



Electrical pulse censer



Normal hysterical **death**

Electrical Signal

Thank you for your kind attention

Our mascot

Hama-pyon

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Replacement of Deteriorated Pipes

2 July, 2019
Water Distribution Division,
Yokohama Waterworks Bureau

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CONTENTS

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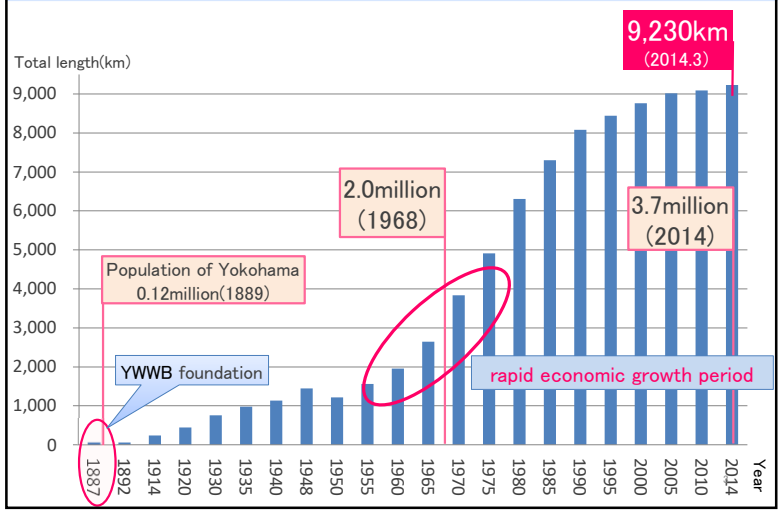
1. Background and necessity for the plan



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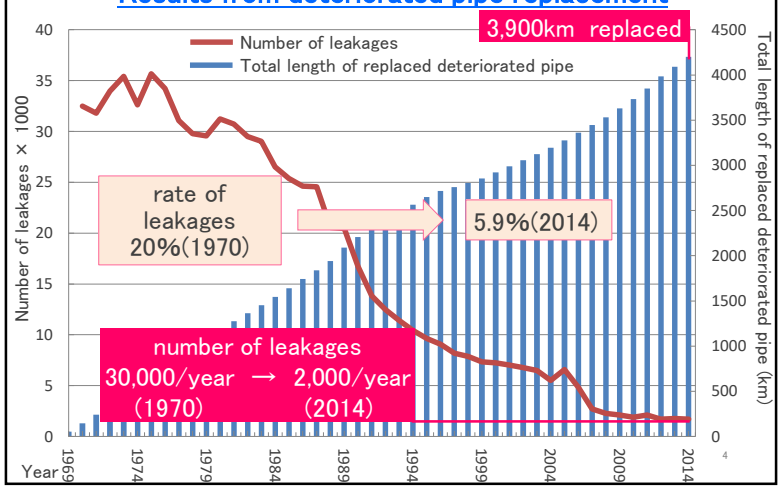
3

1. Background and necessity for the plan

Results from deteriorated pipe replacement



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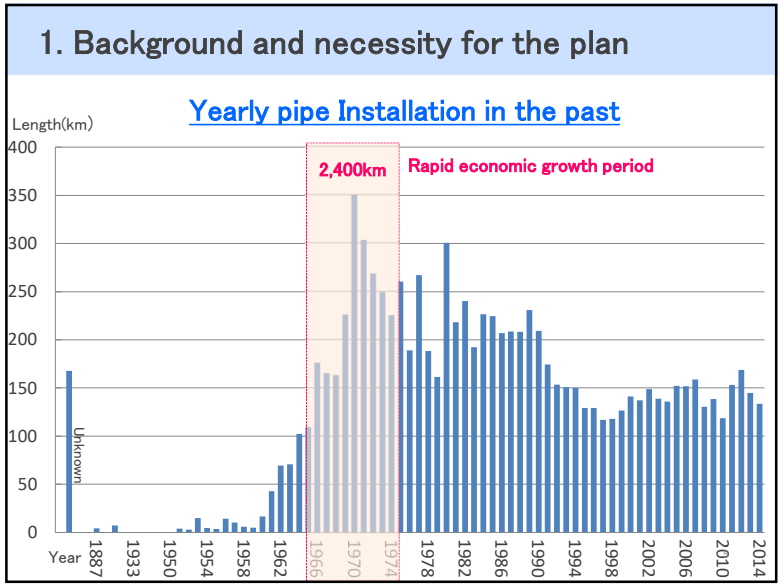
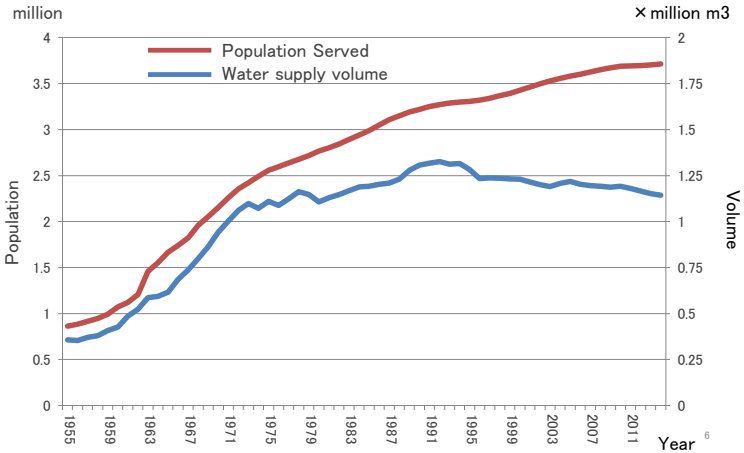
1. Background and necessity for the plan





2. To make an efficient and effective plan

Important to Grasp the Situation of Pipeline

✓

3 Procedure for making replacement plan

Leakage Occurrence Rate

Importance ＝ (Leakage Occurrence Rate)
＊(Affectability on Water Cutoff) ＊ (Recovery Time)

- **Prospect Damage by Earthquake**

Number of Damages on Pipeline ＝ (Adjustment by Pipe Materials)
＊(Adjustment by Pipe Diameter)
＊(Adjustment by Liquefaction Level)
＊(Standard Damage Rate)
＊(Pipe Length)

- **Route to Important Facilities on Earthquake**

3. Procedure for making replacement plan

Leakage Occurrence Rate in Pipe Materials

Material		Water leakage occurrence rate (case/100km/year)
DIP	Covered with polyethylene sleeve, earthquake-resistant	0.01
	Covered with polyethylene sleeve	0.23
	Not covered with polyethylene sleeve	0.58
SP	D≧700 (less than 40year)	0.22
	D≧700 (40year or older)	0.23
	D≦600 (less than 40year)	1.45
	D≦600 (40year or older)	6.76
CIP		2.51
HIVP	High impact Vinyl pipe	8.7
VLGP	Vinyl lining steel pipe (Covered with polyethylene sleeve)	2.0
	Vinyl lining steel pipe (Not covered with polyethylene sleeve)	20.1

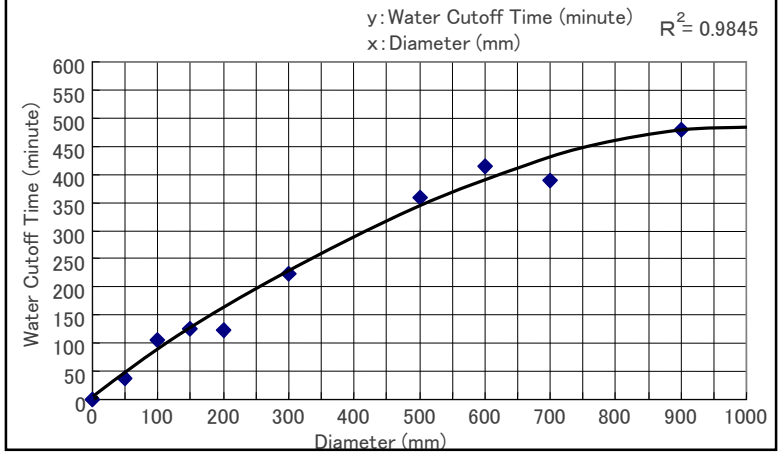
3. Procedure for making replacement plan

Affectability on Water Cutoff

D. (mm)	C. A.(m^2)	Q. (m^3/d)	Affectability
700	0.385	33,264.0	193
600	0.283	24,451.2	142
500	0.196	16,934.4	98
400	0.126	10,886.4	63
300	0.071	6,134.4	36
200	0.031	2,678.4	16
150	0.018	1,555.2	9
100	0.008	691.2	4
50	0.002	172.8	1

3. Procedure for making replacement plan

Water Cutoff Time by Diameter



D (mm)	Pipe Material & it's condition	Order of Importance	Group
＞ 400	CIP	4～14	A
	SP (＞ 40 years)	1～17	
	SP (≦ 40 years)	9～19	B
	DIP (Without Polyethylene Sleeve)	11～27	
100～300	SP (＞ 40 years)	12～38	C
＞ 400	DIP (With Polyethylene Sleeve)	17～33	D
100～300	CIP	21～46	E
≦ 50	VLGP (Without Polyethylene Sleeve)	41～	
100～300	SP (≦ 40 years)	26～49	
	DIP (Without Polyethylene Sleeve)	32～52	F
	DIP (With Polyethylene Sleeve)	36～55	
≦ 50	HIVP	47～	
	VLGP(With Polyethylene Sleeve)	53～	
＞ 100	DIP (With P.S. & Quake Resistant)	42～58	G

3. Instance of study procedure for making replacement plan in Yokohama

Risk of Damages by Earthquake

Pipe Material	Adjustment
DIP	0．3
DIP（Quake-Resistant）	0．0
CIP	1．0
HIVP	1．0
SP	0．3
ACP	2．5

17

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3. Procedure for making replacement plan

Comparison of Importance by Pipe Materials and Pipe Diameter

		≦ 50	75～300	≧ 400
	Number of Leakage by Earthquake	1,363	1,385	100
DIP	With new P.S. & Quake Resistant	—	G	G
	With Polyethylene Sleeve	—	F	D
	Without Polyethylene Sleeve	—	F	B
SP	≧ 700（≦ 40years）	—	—	B
	〃 （＞40years）	—	—	A
	≦ 600（≦ 40years）	—	E	—
	〃 （＞40years）	—	C	—
CIP		—	E	A
HIVP		F	—	—
VLGP	With Polyethylene Sleeve	F	—	—
	Without Polyethylene Sleeve	E	—	—

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3. Procedure for making replacement plan

Place Order of Ascending Priority for the Replacement

Priority by Pipe Materials & Diameter

		D≦φ50		φ75≦D≦φ300		φ400≦D	
		Seismic intensity 7	others	Seismic intensity 7	others	Seismic intensity 7	others
DIP	Covered with polyethylene sleeve, earthquake-resistant						
	Covered with polyethylene sleeve					9	10
	Not Covered with polyethylene sleeve					7	8
SP	D≧700 (less than 40year)					5	6
	D≧700 (40year or older)					**3**	**4**
	D≦600 (less than 40year)			5	6		
	D≦600 (40year or older)			**1**	**2**		
CIP				**3**	**4**	**1**	**2**
High impact Vinyl pipe		3	4				
Vinyl lining steel pipe (covered with polyethylene sleeve)							
Vinyl lining steel pipe (not covered with polyethylene sleeve)		**1**	**2**				

3. Procedure for making replacement plan

Comparison between 3 Draft Plans

Plans	Replacement Length	Replacement Cycle
Plan 1	100 km/y	90 years
Plan 2	120 km/y	75 years
Plan 3	150 km/y	60 years

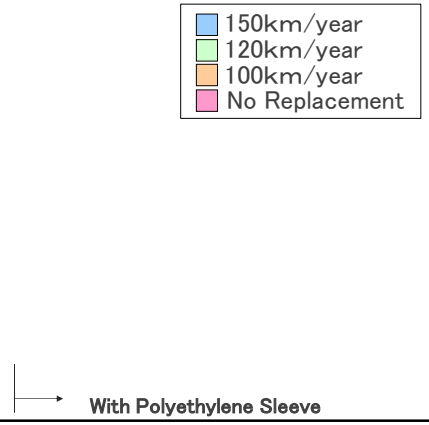
Plans	≦			

	Leakage (/y)		Water Cutoff Time (hr/y)	Number of Water Cutoff House (/y)	Aseismic rate for Important Route (%)
	Usual	Seismic condition			
No Replacement	180	2,848	3,883	17,584	0
Plan 1	11	629	369	2,479	100
Plan 2	7	155	207	1,390	100
Plan 3	4	54	177	965	100

3. Procedure for making replacement plan

Comparison between 3 Draft Plans

Existing Pipeline Length in Year 2060



3. Procedure for making replacement plan

5 Advice from Committee

(1) Decision of the Plan

- ✓ The committee desires to choose the best plan for customers.

(2) Accountability to Customers

- ✓ To explain effects to customers intelligibly.

(3) Attention Point (carrying the plan into action)

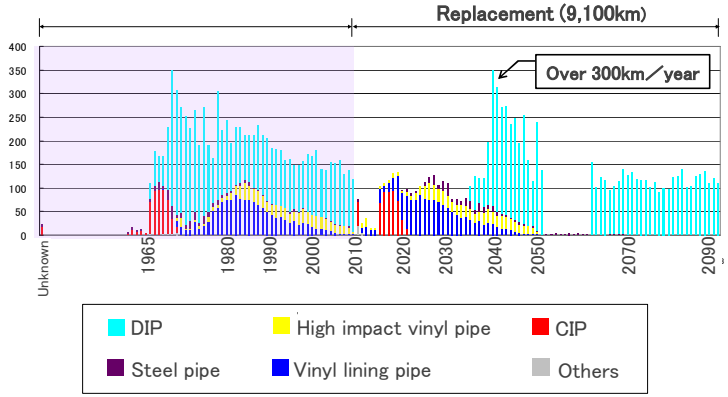
- ✓ It is necessary to inspect the view of the master plan
- ✓ It is necessary to confirm pipe condition such as corrosion or leakage in the route.
- ✓ It is necessary to confirm effects by pipe replacement

Expected durable year

Material	Assumption useful life
Vinyl lining steel pipe High impact Vinyl pipe	40 year
CIP	50 year
Steel pipe	60 year
DIP (not covered with polyethylene sleeve)	70 year
DIP (covered with polyethylene sleeve)	80 year

4. Current replacement works of deteriorated pipes

Replacement works estimate based on expected durable year



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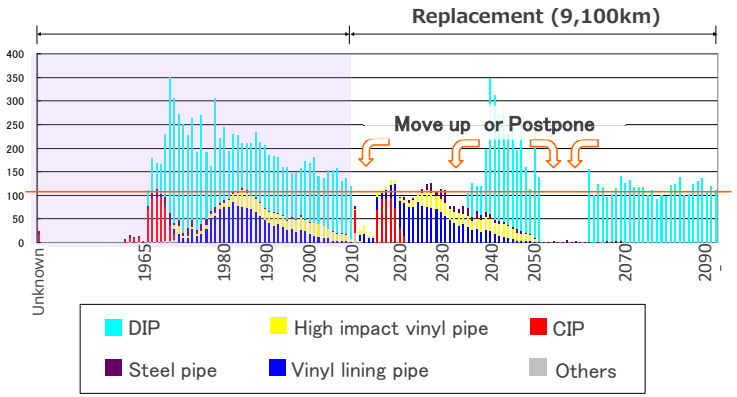
4. Current replacement works of deteriorated pipes

Equalizing annual aging pipes replacement



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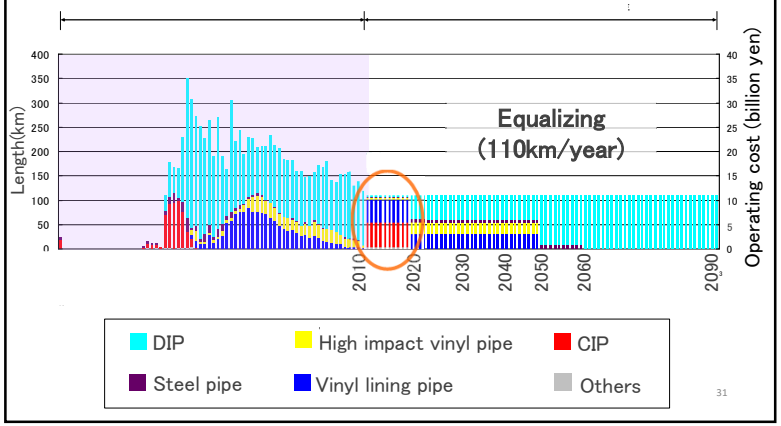
4. Current replacement works of deteriorated pipes

Expected effects of equalization



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Thank you for your attention

32

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Need for earthquake-resistant pipe

- Never predict when the earthquake is happened
- Frequent occurrence of the big earthquake

Aiming at earthquake-resistant pipe on the occasion of the deteriorated pipe replacement

33

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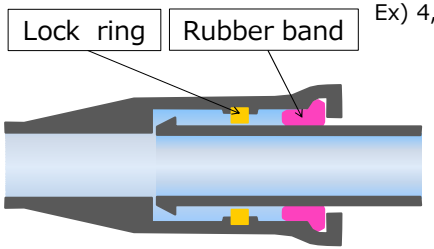
Structure of the earthquake-resistant pipe

Ductile cast iron pipe

- Slip-out preventive function…3DKN（D:Diameter）
- Elasticity of the joint…Over than 1% of Pipe length

Ex) 4,000mm ➔ 40mm



Steel pipe (mainly large-diameter)

- Joint … Welded joint

34

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Lifting ductile cast iron pipe of the earthquake-resistant

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Water Quality

ISO9001 and Water safety plan

- ISO9001
  - ➢3 WTP
  - ➢External audit annually
- WSP

“Water safety plan ver. Yokohama”

- ➢Water source management
- ➢Water purification management
- ➢Water distribution management
- ➢Water quality management

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Action Plan Formulation Practice

6 September 2019
Kozo HAYASHISHITA
Training Management and Curriculum Development
WASMIP II

WASMIP
For providing safe and quality drinking water to people

JICA

contact: hayashishita-k@yokohamawater.co.jp

Action Plan ---Remedy for improvement

- **a series of actions**
- **with member's responsibility and evaluation standard**
- **to raise the performance level**

1

Formulation Flow

1. Analyze the current situation
2. Set the goal
3. Identify necessary actions
4. Evaluate the result

2

Analyze the current situation (1)

What is the organization's problem?
(water quality, water supply, tariff collection, working environment…?)

- Examine the concrete facts as much as possible
- Exclude assumptions
  Avoid "It should be …"
- Analyze the background of the problem
- Use the KPI and checklist

3

Analyze the current situation (2)

- What has been done so far?

- What has been solved and what has not?
  What has been newly added?

- What risk will you face if you neglect those problems?

Set the goal (1)

1. Describe the goal concretely. Not abstractly!
   (e.g. water quality, supply hours, non revenue water rate reduction…?)
2. Why did you select the goal?

What has the priority to be solved?

Set the goal (2)

3. Is the goal realistic/achievable?

Specify
the quantitative
indicators.

What are the resources available to tackle the issues?

people

goods

money

Identify necessary actions

target level (outcome)

measure the gap

current level

What action(s) will be needed in order to reduce the gap?

What actions(s) will be possible considering the resources available

problem	actions (example)
water quality	increase chemical dosing
water supply	detect water leakage and repair
tariff collection	reduce nonpayment

Identify necessary actions (2)
Specify indicators quantitatively

Distinguish outcome, output and input.

suppose!

target level (outcome) | 10% reduction of NRW

in order to achieve outcome

what output is needed?

current level | introduction of more efficient collection system | 10% increase of tariff collection

in order to achieve output

what input is needed?

or

20% increase of inspection frequency and 20% increase of repair | 10% reduction of water leakage

output

prerequisite

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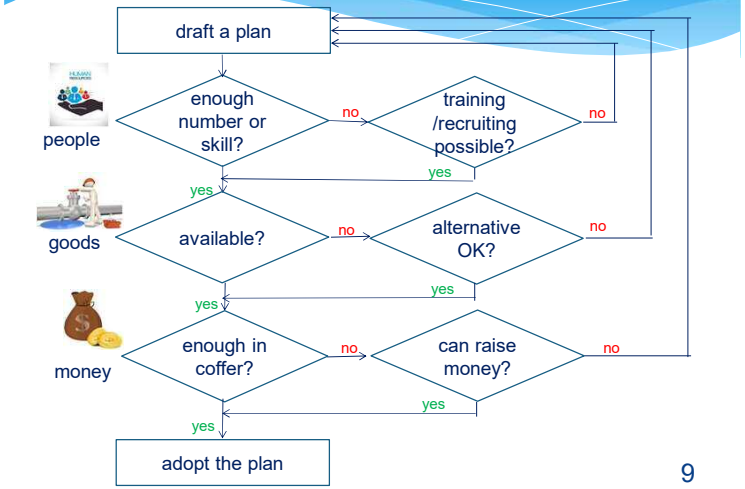
Elaborate a plan



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Action Plan Practice

Check necessary resources

resources	description	challenge	solution
human resources			
goods			
money			

10

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Action Plan Practice

Check necessary resources

This is just an example!

Example-1: Introduction of more efficient collection system

resources	description	challenge	solution
human resources	person who can handle the system	person doesn't have knowledge of computer	training or outsourcing
goods	purchase new system	high cost	shared use with other WUSCs
money	enough money to purchase new system and to enhance staff	impossible to afford the additional expense	aim the extra source such as subsidy

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Action Plan Practice

Check necessary resources *This is just an example!*

Example-2: Increase of inspection frequency and repair

resources	description	challenge	solution
 human resources	person who can detect water leakage and repair it	person doesn't have knowledge of computer	training or outsourcing
 goods	devices for leakage detection	devices are not available or cost is too high	reduce the number of device or choose cheaper ones
 money	enough money to purchase devices or to enhance workforce	impossible to afford the additional expense	aim the extra source such as subsidy

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12

Describe Requisites

Stipulate 4W and 1H

Until WHEN?

13

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Who's action plan?

You, as a trainer

- WUSC establishes Action Plan and implement it.
- No need to be perfect nor sophisticated

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In case no KPI are available…

keeping records established

This is also improvement !

no records

Inform them "the benefit of keeping records".

beginning of improvement

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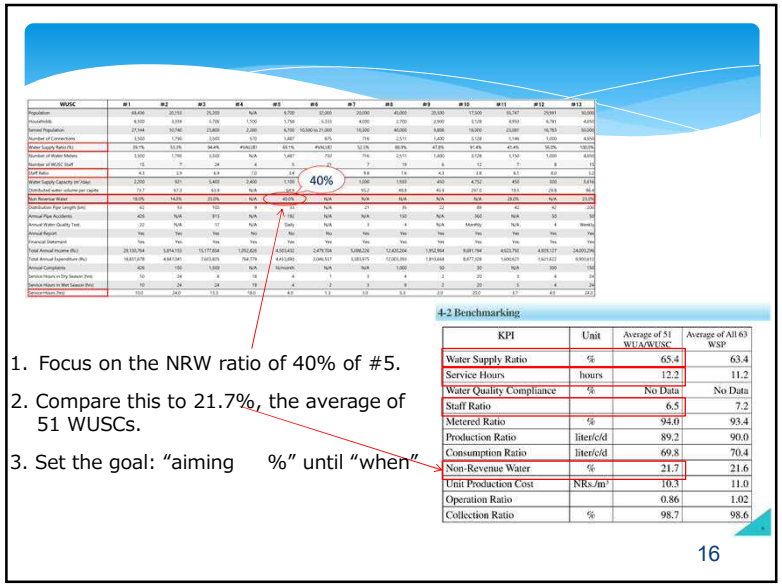
40%
1. Focus on the NRW ratio of 40% of #5.
2. Compare this to 21.7%, the average of 51 WUSCs.
3. Set the goal: "aiming %" until "when"
4-2 Benchmarking
KPI | Unit | Average of 51 WUA/WUSC | Average of All 63 WSP
Water Supply Ratio | % | 65.4 | 63.4
Service Hours | hours | 12.2 | 11.2
Water Quality Compliance | % | No Data | No Data
Staff Ratio | | 6.5 | 7.2
Metered Ratio | % | 94.0 | 93.4
Production Ratio | liter/c/d | 89.2 | 90.0
Consumption Ratio | liter/c/d | 69.8 | 70.4
Non-Revenue Water | % | 21.7 | 21.6
Unit Production Cost | NRs./m³ | 10.3 | 11.0
Operation Ratio | | 0.86 | 1.02
Collection Ratio | % | 98.7 | 98.6
16

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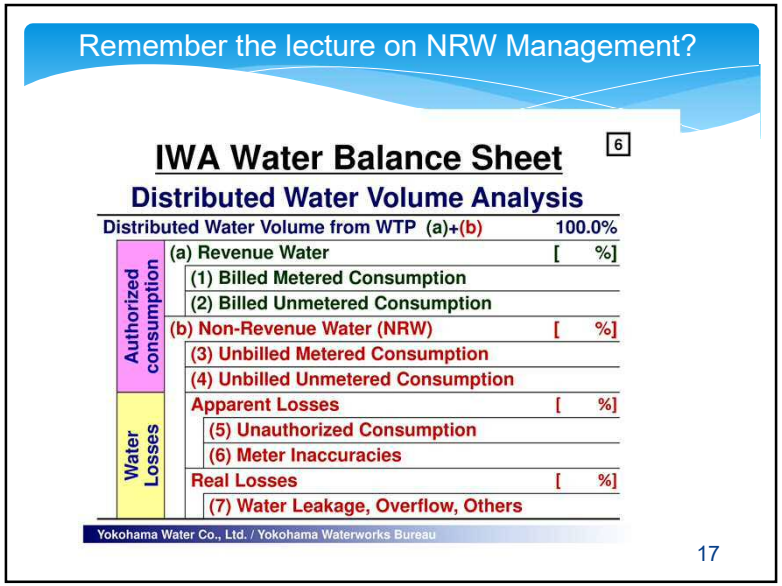
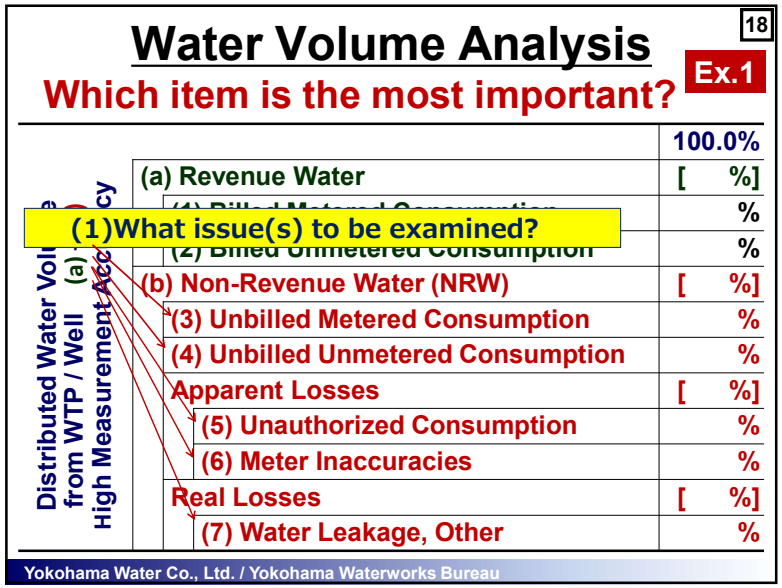
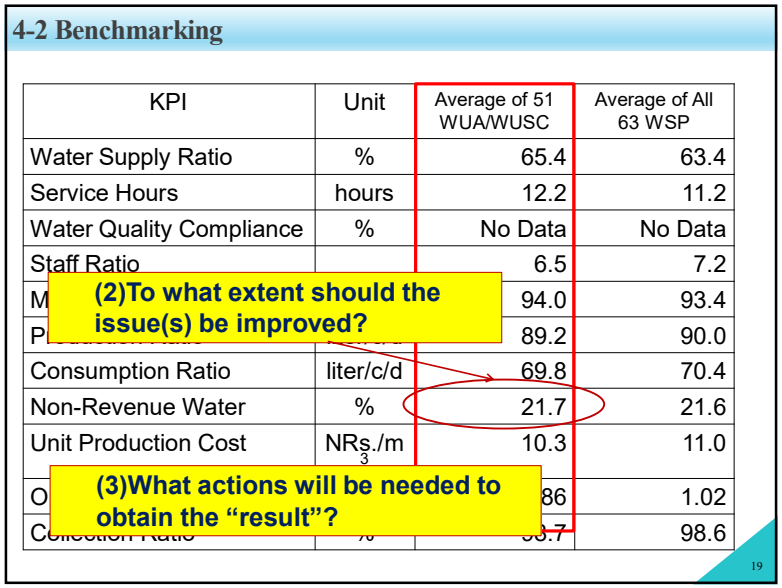

Remember the lecture on NRW Management?
IWA Water Balance Sheet
6
Distributed Water Volume Analysis
Distributed Water Volume from WTP (a)+(b) 100.0%
Authorized consumption
(a) Revenue Water [%]
(1) Billed Metered Consumption
(2) Billed Unmetered Consumption
(b) Non-Revenue Water (NRW) [%]
Water Losses
(3) Unbilled Metered Consumption
(4) Unbilled Unmetered Consumption
Apparent Losses [%]
(5) Unauthorized Consumption
(6) Meter Inaccuracies
Real Losses [%]
(7) Water Leakage, Overflow, Others
Yokohama Water Co., Ltd. / Yokohama Waterworks Bureau
17

17


Water Volume Analysis
18
Which item is the most important?
Ex.1
Distributed Water Volume from WTP / Well (a)
High Measurement Accuracy
100.0%
(a) Revenue Water [%]
(1)What issue(s) to be examined?
(b) Non-Revenue Water (NRW) [%]
(3) Unbilled Metered Consumption %
(4) Unbilled Unmetered Consumption %
Apparent Losses [%]
(5) Unauthorized Consumption %
(6) Meter Inaccuracies %
Real Losses [%]
(7) Water Leakage, Other %
Yokohama Water Co., Ltd. / Yokohama Waterworks Bureau
18

18


4-2 Benchmarking
KPI | Unit | Average of 51 WUA/WUSC | Average of All 63 WSP
Water Supply Ratio | % | 65.4 | 63.4
Service Hours | hours | 12.2 | 11.2
Water Quality Compliance | % | No Data | No Data
Staff Ratio | | 6.5 | 7.2
(2)To what extent should the issue(s) be improved?
Consumption Ratio | liter/c/d | 69.8 | 70.4
Non-Revenue Water | % | 21.7 | 21.6
Unit Production Cost | NRs./m3 | 10.3 | 11.0
(3)What actions will be needed to obtain the "result"?
1.02
98.6
19

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Action Plan Practice

1. Analyze the current situation
2. Set the goal

(1)Name of WUSC: #5

(2)KPI: Non-Revenue Water Ratio

(3)Current KPI: 40 %

(4)Target KPI: [ ] % in [ ]

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Action Plan Practice

3-1. Identify necessary actions

Choose issue(s) from 5 categories

(3)Unbilled Metered Consumption
(4)Unbilled Unmetered Consumption
(5)Unauthorized Consumption
(6)Meter Inaccuracies
(7)Water Leakage, Overflow, Others

(1)Issue(s) to be examined: (7)Water Leakage, Overflow, Others

(2)Output: (example) target: 25% in 5 years yearly reduction of 3% of Water Leakage

(3)Input: (after checking what are causes of water leakage,) establishment of leakage inspection/repair team

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Action Plan Practice

3-2. Identify necessary resources

resources	description	challenge	solution
 human resources			
 goods			
 money			

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Go through PDCA Cycle to improve continuously

Formulation

Implementation

Revision

Evaluation

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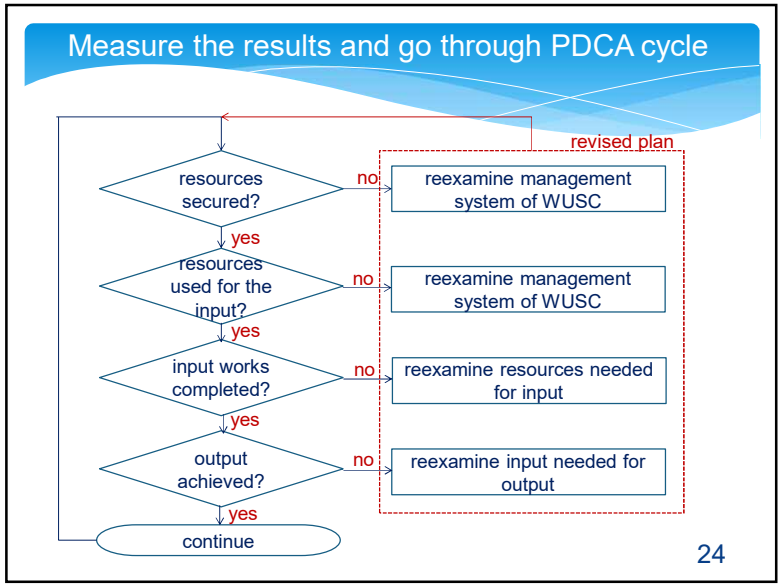
Measure the results and go through PDCA cycle
revised plan
resources secured?
no
reexamine management system of WUSC
yes
resources used for the input?
no
reexamine management system of WUSC
yes
input works completed?
no
reexamine resources needed for input
yes
output achieved?
no
reexamine input needed for output
yes
continue
24

Action Plan Practice

1. Analyze the current situation
2. Set the goal

(1)Name of WUSC: #5

(2)KPI: Non-Revenue Water Ratio

(3)Current KPI: 40 %

(4)Target KPI: [ ] % in [ ]

Action Plan Practice

3-1. Identify necessary actions

(1)Outcome: [ ] % reduction of Non-Revenue Water Ratio in [ ] years (annual reduction: [ ] %)

(2)Output: _____ (annually)

(3)Input: _____ (annually)

Action Plan Practice

3-2. Identify necessary resources

resources	description	challenge	solution
 human resources			
 goods			
 money			

Action Plan Practice

3-3. Who is responsible for what?

who?	what issue?	until when?	where?	how?

Water tariff system

Akiho Azuma, Kazuho Ino
Nakamura Waterworks Office

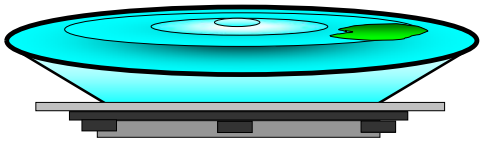

Table of Contents

◆ Water Tariff System

◆ Water Tariff System

1. Introduction
2. Current Water Tariff System
3. Problem of Current Water Tariff System
4. Water Tariff Reduction and Exemption

1. Introduction

Waterworks Operating Costs

While in general public services are funded by taxpayers, most costs related to the operations conducted by a water utility are funded by water tariff paid by utility customers.
This is known as the self-sufficiency system.
This system, recognized as a basic principle of municipal utility management, has been established to demonstrate corporate economies in promoting the public welfare, a role that a local public entity is expected to perform.

Water Tariffs are Determined By Law

- Local Public Enterprise Law

2 . Current Water Tariff System

Metered Rate Structure

■ **Metered rate structure**

Charge customers for their water consumption

	Metered rate structure	Flat-rate structure
merit	Equitable charge to all customers.	Easy to estimate revenue.
demerit	Difficult to estimate revenue.	Inequitable between lower usage customers and higher usage customers.

Progressive Water Tariffs by Use(1)

1. Progressive water Tariffs

➢The unit cost of metered tariff goes up along with increment of the water quantity consumed.

Use	Water volume levels	Per m^3	Formula
Home use	0 m^3 – 16 m^3		¥1,580 (minimum charge)
	17 m^3 – 20 m^3	¥43	¥43

Progressive Water Tariffs by Use (3)

Use	Basic Water Rate	Unit Cost 0 ~ 8㎥	9 ~ 10㎥	11 ~ 20㎥	21 ~ 30㎥	31 ~ 50㎥	51 ~ 100㎥	101 ~ 300㎥	301 ~ 1000㎥	1001㎥~
Home	1580	1580	43円	158円	226円	269円	293円	320円		
Business									369円	409円
Public bath			42円							

By use

Progressive water rates

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Mechanism

(-yen/m³)

Prime cost = Cost /Annual water quantity * Cost/m³

Compensation

Excessive amount over prime cost

Insufficient amount for prime cost

Basic water quantity

（単位：円/㎥）

400
350
300
250
200

1,000㎥

(Water quantity consumed)

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Comparison of Basic Water Tariff per 1 month

	Yokohama	Sapporo	Sendai	Saitama	Tokyo	Kawasaki	Niigata	Shizuoka	Hamamatsu	Nagoya
Basic water quantity	8	10	0	8	5	8	0	0	0	6
13㎜			580	890	860		880	380	648	625
20㎜	790	1,320	1,250	1,080	1,170	530	2,090	380	691.2	1,07
25㎜			1,900	1,750	1,460		3,240	620	777.6	0
										1.56

	Kyoto	Osaka	Sakai	Kobe	Okayama	Hiroshima	Kitakyusyu	Fukuoka	Kumamoto
Basic water quantity	5(10)	0	0	10	0	0	0	0	0
13㎜	920		650	880	670	760	680	850	972
20㎜	920	850	650	880	1,020	810	900	1,330	1,339.2
25㎜	1900		1,000	1,700	1,720	860	1,260	3,110	1825.2

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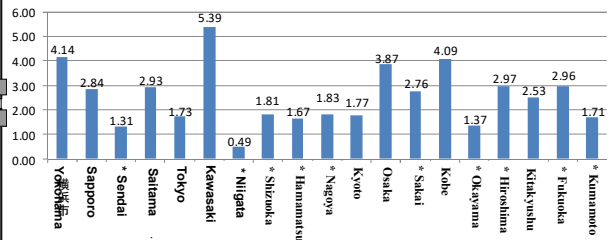
Comparison of tariff increasing level of major cities



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3. Problem of

Current Water Tariff

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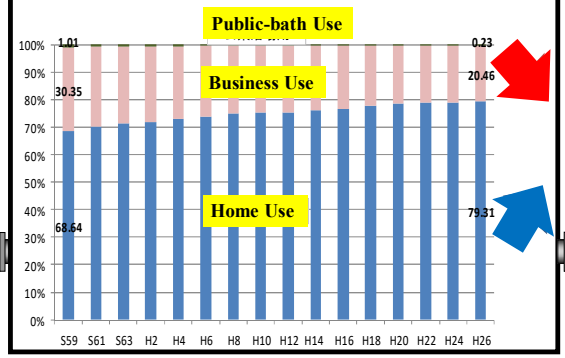
Current Status and Problem of Yokohama City

The ratio of home use (small-quantity users) is increasing, and that of the business use (large-quantity users) is decreasing.



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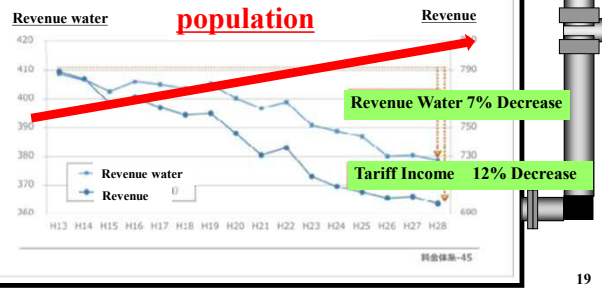
Water Tariff Trend

Decrease ratio of revenue exceeds that of revenue water.
→YWWB applies inclining rate structure in which the unit cost rise rapidly.
→Decrease in the amount of water consumption by higher usage customers.



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Price Revision

To deal with current situation, we are considering price revision.
We launched a committee for price revision (Including members of professors of university) .
Improvement of management efficiency and thorough explanation for customer are important to revise price.

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4. Water Tariff Reduction and Exemption

Water Tariff Reductions and Exemptions

- Personal welfare reduction/exemption (Holders of Type 1 or Type 2 physical disability handbooks)
- × Social welfa… reducti… exemptio…
- × Medica…

The amount subject to reduction and exemption is the minimum charge (1,580 yen).

The amount reduced or exempted is covered from the city's general budget.

Note: T… ligh… incl… cost… etc., an… tion of circumst… other cities and… riateness of costs borne by beneficiaries.

Water Tariff Reductions and Exemptions (Other)

- Reduction/exemption for households damaged by Great East Japan Earthquake (2011)
- Reduction/exemption for households damaged by Kumamoto Earthquake (2016)

System of Applying the Basic Number of Households

Ordinarily, a single water service installation is used by a single household. However, in some housing complexes and other facilities multiple households may use a single water service installation.

Rate comparison (water rates, tax excluded)

When a single household uses 16 m^3 per two-month period

For use by one household: 16 m^3 = 1,580 yen

For use by 10 households: 160 m^3

Processing Water-Leak Reductions and Exemptions (1)

In some cases, when water consumption has increased due to a water leak or similar cause, the user can have his or her water rate reduced or exempted in accordance with processing standards, by submitting a certificate of repairs (issued by the contractor or similar party).

Jan.	25 m³
Feb.	31 m³
Mar.	34 m³
Apr.	40 m³
May	44 m³
Jun.	50 m³
Jul.	58 m³
Aug.	63 m³
Oct.	55 m³
Nov.	51 m³
Dec.	43 m³
Jan.	92 m³

Grading of management responsibility (Date of applying for repairs)		Difficulty of discovery		Grading of leak volume Estimated leak volume/ estimated water use	
Prior to inspection or within six days following inspection	2	Easy	1	Less than double	0
Seven to 30 days following inspection	1	Difficult	2	Double to less than five times	1
31 or more days following inspection	0			Five or more times	2

Example of processing:
Meter read January 6; repairs requested January 9; repaired: toilet

- **Grading =**

Processing Water-Leak Reductions and Exemptions (2)

In some cases, when water consumption has increased due to a water leak or similar cause, the user can have his or her water rate reduced or exempted in accordance with processing standards, by submitting a certificate of repairs (issued by the contractor or similar party).

Jan.	16 m³
Feb.	18 m³
Mar.	20 m³
Apr.	22 m³
May	25 m³
Jun.	28 m³
Jul.	30 m³
Aug.	31 m³
Oct.	29 m³
Nov.	24 m³
Dec.	21 m³
Jan.	25 m³

Grading of management responsibility (Date of applying for repairs)		Difficulty of discovery		Grading of leak volume Estimated leak volume/ estimated water use	
Prior to inspection or within six days following inspection	2	Easy	1	Less than double	0
Seven to 30 days following inspection	1	Difficult	2	Double to less than five times	1
31 or more days following inspection	0			Five or more times	2

Example of processing:
Meter read January 6; repairs requested February 9; repaired: toilet

1. Meter Reading

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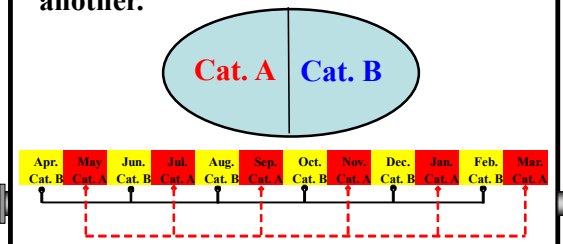
Meter-reading Area

Meter-reading is done in every two month. All areas are categorized into A and B and we read meters one after another.



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Monthly Meter Reading

While ordinarily meter reading is conducted every other month, for users such as businesses using large volumes of water (roughly 2,000 m^3 or more per month, on average), meter reading is conducted monthly as approved by the Waterworks Bureau.

Current and past heavy consumers of water:

Past: Kirin Brewery → Switched to industrial water system and groundwater use

Present: Landmark Tower

31

31

Regular Meter-reading Date

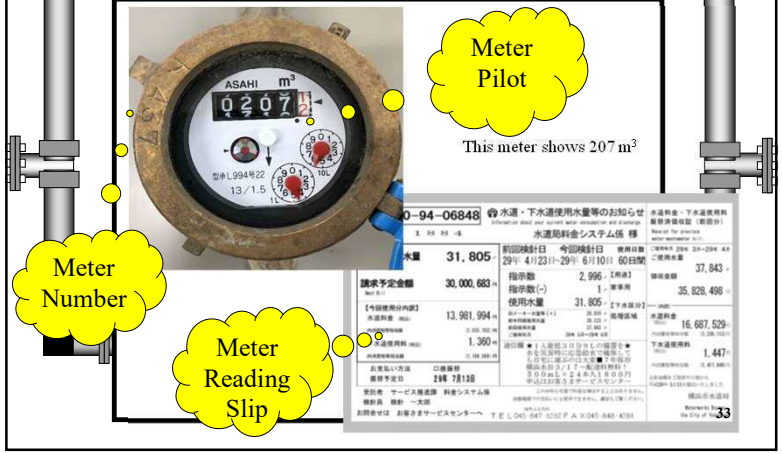
This refers to a fixed date every month or every other month, on which meter reading is planned for each a

Meter reading is conducted within five days of the date of the month on which the last meter reading was conducted.

32

32

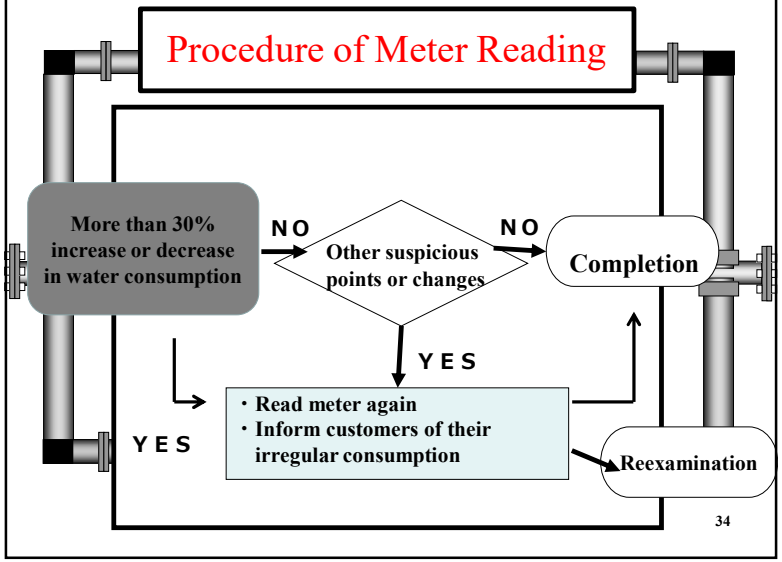
Water Meter, Meter Reading Slip



33

33

Procedure of Meter Reading



34

34

2. Settlement

35

35

Resettlement

This refers to results that need to be reexamined or otherwise addressed at a later date, such as meter readings that have increased or decreased greatly since the last meter reading or meters that could not be read because a vehicle or other obstacle was in the way.

36

36

Certified water volume

In principle, rates are based on meter volumes. However, in the following cases rates are based on certified water volume, subject to the user's approval.

1. When there is a problem with the meter
2. When water use is unclear due to a water leak or for other reasons
3. When the meter cannot be read due to an obstacle or for other reasons

Certification is conducted by certifying estimated water use, based on certain grounds for estimation, as the water consumption for the month.

37

37

Number of Cases of Certified Water Use (Reference)

Number of Cases of Certified Water Use in Fiscal 2006

Number of settlements: approximately 10 million → Number of settlements of certificated water use: 21,370 (0.21%)

Breakdown

Obstacle	Buried	Waste-water	Absent	Meter-related	Water leak	Other
1,447	121	18	798	423	12,681	5,890

38

38

3. Tariff Collection

39

39

Water Tariff Payment Methods

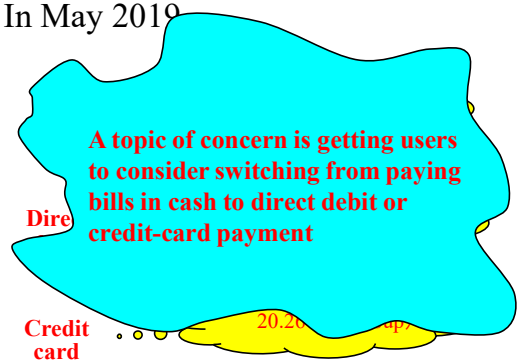
1. Payment in cash (within 20 days)
   Payable at banks, post offices, convenience stores, or LINE Pay
2. Direct debit
   Debited on the 13th or the 29th of the month following the month of meter reading
3. Payment by credit card
   Payable on the user's credit card's payment date
4. Other (group payment: in cash or by direct debit)
   Total billed at the end of the month

40

40

Breakdown by Payment Type

In May 2019



41

Receipts

Method of payment of water tarrif and sewer user charges.

Cash	→	**Bank, post office, convenience store**
Direct debit	→	**Bank, post office**
Credit card	→	**JCB**

Smartphone app payment
LINE Pay (1)

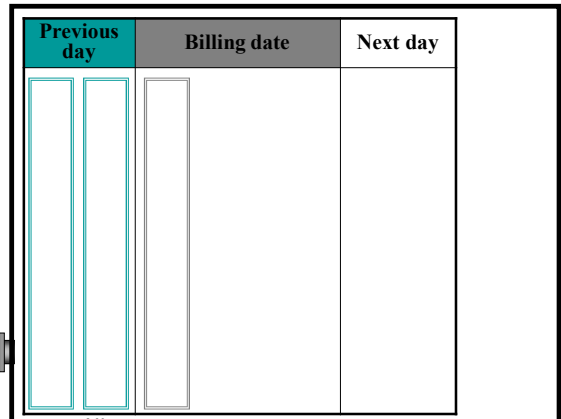
1. **LINE:** one of the most prevailing social networking service in Japan
2. **LINE Pay:** a cashless payment application provided by LINE, one of the most popular applications of this kind in Japan
3. **How LINE Pay works?**

1. Launch the app
2. Scan a bar code on payment slip by using bar code reader in the app
3. Check the displayed payment money and tap the screen for confirmation

LINE Pay (2)

	April	May	July
Payment Number	727	946	2,174
Average number per day	24.2	16.7	72.5
Maximum number per day	73	69	173

Flow Through Water Tariff Billing



Countermeasure for Unregistered Customers

Once in every month, we suspend water supply for unregistered customer by closing stop valve.

* Procedure

1 Find unregistered use of water in regular meter reading work

2 Post a paper three times which request calling to our customer service center

(In the final paper, we warn that we will stop water soon.)

No response

3 Suspend water supply (about one month after the meter reading day)

Thank you for your attention!

Aiming to be familiar to customers

Yokohama Waterworks Bureau
Nakamura Waterworks Office

水道局キャラクター「はまピョン」

1

In order to supply safe and secure water stably for a long time to come

2

Activity of feeling waterworks familiar

3

3

Activity of conveying YWWB'S history

4

Nishiya WTP at the time of its establishment

4

Activities of reflecting customers' voice to business

-

6

Workshops on meter reading and related matters for outsourcing contractors

- Demonstration of collaboration in meter reading with gas utility using wireless devices

Water consultation with collaboration with Private companies

-

Regional event

9

"Waterworks week" event in the front of the station

Repair of pipe leakage

Demonstration of repairing of water leakage

9

Regional event

10

"Waterworks week" event in the front of the station

Water Supply Control and Management using Distribution Model

Learn source of water with game

Observing microorganisms in the water source with a microscope

10

Regional event

11

Wards Festival

Assembling of water supply tools

Game which who can assemble water pipe puzzles first

11

Regional event

12

Wards Festival

Selling bottled water called "hamakko doushi" and disaster prevention

Target game with water pistols

Gift of badges

12

Regional event

13

130th anniversary of modern waterworks established

quoits

Target game with water pistols

13

Regional event

14

130th anniversary of modern waterworks established

Repair of pipe leakage

Children with great interest

14

Regional event

15

Character called “mi-zu” for Kikuna Water Plaza Festival “Mizu” means water in Japanes.

15

Acceptance of Junior high school students’ work experience

16

Water pressure experience

Meter reading experience

Repair of pipe leakage

16

Acceptance of internship for the university's students

17

17

"Good water" Knowledge test

18

certificate
(the front)

certificate
(the back)

18

Yokohama Waterworks Bureau
Nakamura Waterworks Office

1

1

Target of lecture Delivery on Waterworks

2

Target

…4th grade elementary students (9-10years old)

Elementary schools in Yokohama;352

4th grade ; 30,112

※FY2018Kanagawa Prefectural School Basic Survey statistical center

"Lecture Delivery on Waterworks"; 155times

(Exclude private school)

Nakamura waterworks office; 24times(FY2018)

3

Procedure of lecture Delivery on Waterworks

The explanation to principals

Mailing of recruitments guide to elementary schools

Application by teachers

Reception

Implementation

4

Lecture Delivery onWaterworks

Jobs in Yokohama Waterworks Bureau

水道局キャラクター
はすピョン

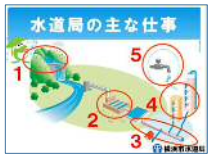
Yokohama Waterworks Bureau

5

Contents

6

1. Jobs in YWWB



7

2. Green forest's dam

8

3. Water Filtration experiment





9

Comprehensive Operation and Maintenance Contract for Water Supply at HAKONE Area

September 10, 2019

Hakone Water Partners Corporation

1

Contents

1. Business outline / Feature of HAKONE area
2. Water supply facilities
3. Feature of Hakone water business

   / SPC outline

2

1. Business outline / Feature of HAKONE area

3

Business outline

Contract	Comprehensive Operation and Maintenance Contract for Water Supply at HAKONE Area (2nd period)
Client	Public Enterprises Agency, Kanagawa Prefectural Government
Contractor	HAKONE Water Partners Corporation ** **SPC**: Special Purpose Company established for the purpose of the contract*
Period	April 2019 to March 2024 (5 years)
Contract sum	4.3 billion JPY (approx. 39 million USD @110/USD)
Scope of works	Taking over almost works operated by Kanagawa Prefectural Government in Hakone ** Operation and maintenance of facilities* ** Water quality control* ** Renewal of facilities and water pipes* ** Water leakage investigation, repairs* ** Water supply equipment inspection* ** Meter reading *Collection of water fee* ** Customer services* ** Natural disaster countermeasure *etc.*

Hakone Waterworks Center

4

5 Water supply area

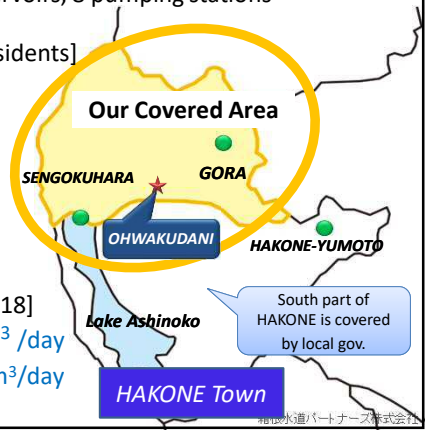
[Area] North part of Hakone Town
[Facilities]3 water sources, 2 water purification plants,
15 distribution reservoirs, 8 pumping stations

[Number of water distributed residents]
4,285 units in 2018

[Population served]
5,101 people in 2018

* Half of total population in Hakone Town

[Daily water supply volume in 2018]
Average supply 7,818 m³ /day
Maximum supply 11,122 m³/day



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5

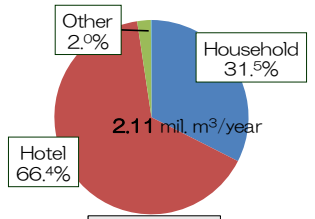
6 Feature of water supply in Hakone #1

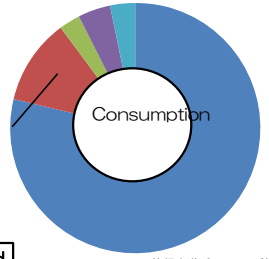
1. Water Quality

- All three water sources are spring water.
  (MIDONO, ITARI and SHINANOKI)
- Clear raw water, No turbidity except inflow of rainwater
  → Low risk to water quality

2. User

- The demand rate of hotels is high compared to general residential areas.





*2015 record

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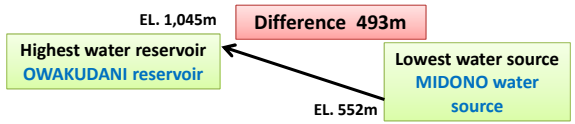
6

7 Feature of water supply in Hakone #2

- Mountain area, large elevation difference
- Interspersion of water supply point
  and small size distribution reservoirs (average 740m³)
  → Water distribution management is important



- One of Japan's leading tourist destinations
- Many tourists, many hotels with large-scale water use
  → Daily fluctuation, seasonal fluctuation is large

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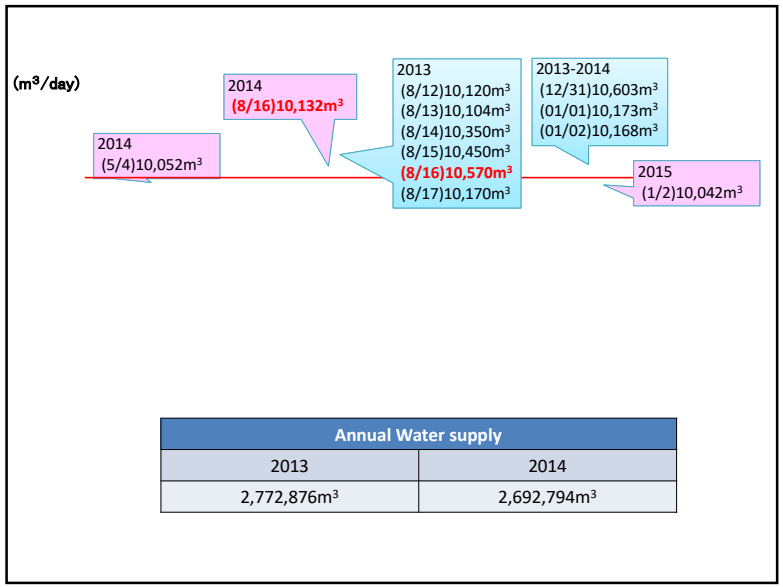
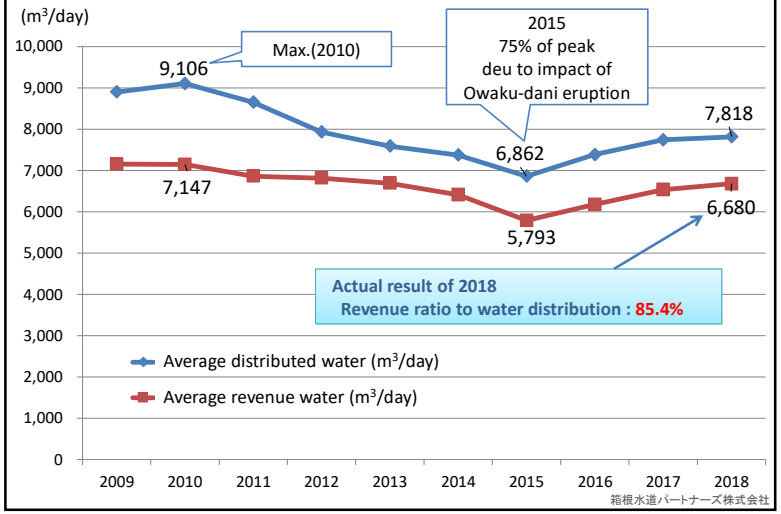
7



Annual Water supply	
2013	2014
2,772,876m³	2,692,794m³

8

9 Revenue ratio to water distribution



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9

10

2. Water supply facilities

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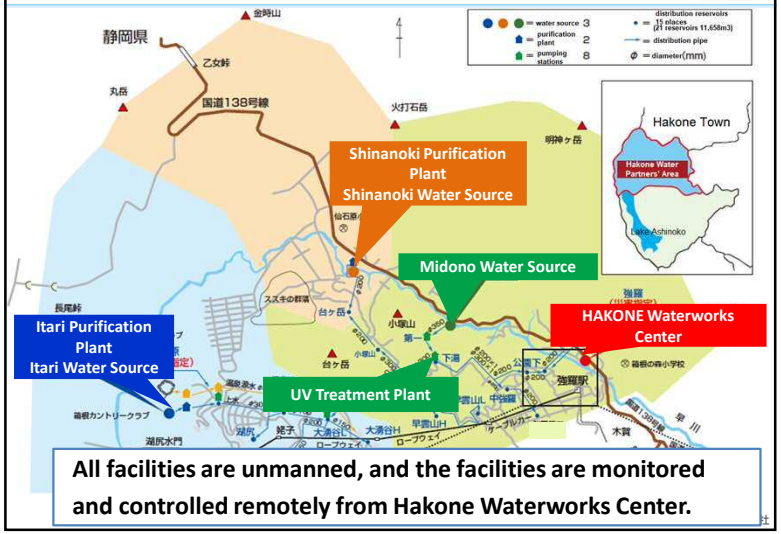
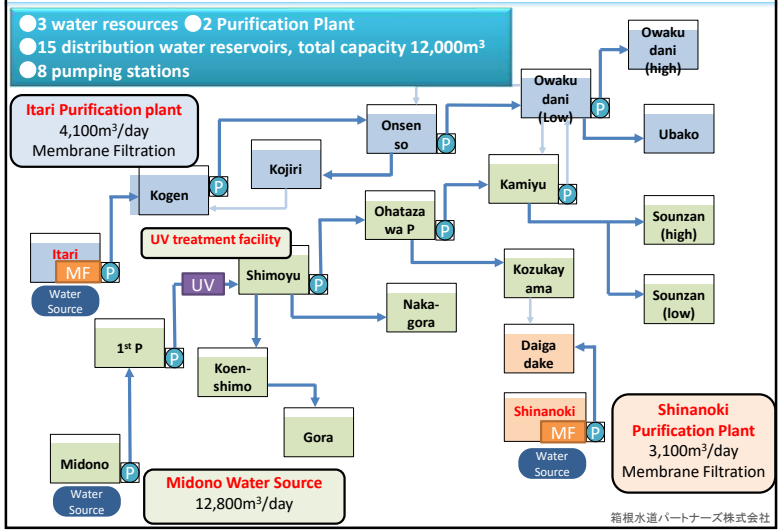
10

11 Overview of water supply area managed by HSP



11

12 Water distribution network



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13 Itari Purification Plant

Treatment capacity 4,100 m³/day

Membrane filtration water has been supplied since 2006.

- **Spring water source** — 8 sources
- **Water tank** — V=32.0m³, 2.5m x 3.2m x2.0mH x 2 tanks
- **Membrane filter** — Microfiltration membrane, Out-in hollow fiber (pore size 0.1μm), Effective area 1200m2, 50m2/module x 8pcs x 3 trains
  - ← Sodium hypochlorite
  - ← Calcium hydroxide (PH control)
- **Pump well** — Water pump 90 m³/h x 3 pumps
- **Kogen water reservoir**

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13

14 Shinanoki Purification Plant

Treatment capacity 3,100 m³/day

Membrane filtration water has been supplied since 2008.

- **Spring water source**
- **Basin**
- **Water Tank** — V=135.8 m³, 4.1m x 4.6m x3.6mH x 2 tanks
- **Membrane filter** — Microfiltration membrane, Out-in hollow fiber (pore size 0.1μm), Effective area 900m2, 50m2/module x 6pcs x 3 trains
  - ← Sodium hypochlorite
- **Pump well** — Water pump 120 m³/h x 2 pumps
- **Daigadake water reservoir**

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15 Midono water source, UV treatment facility

Treatment capacity 12,800 m³/day

UV treatment water has been supplied since 2010.

- **No.1 spring water source** → **Well**
- **No.2 spring water source** → **Well**
- → **Midono pump station pumping well**
- → **1st pump station pumping well**
- → **UV treatment at Shimoyu** — High-output, low-pressure UV lamp, UV irradiation : >10mJ/cm2 (for 95% of the amount of treated water), 6pcs/unit x 2 trains
- → **No.1 well**, **No.2 well**
- ← sodium hypochlorite
- → **Shimoyu water reservoir**

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16

3. Feature of Hakone water business / SPC outline

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16

17 Feature of Hakone Waterworks Business

First comprehensive undertaking contract to water supply in Japan

Operation and maintenance
Water quality control
Const. design, order, testing
Customer services
Meter reading, collecting fee
Water leakage investigation, repairs

First attempt in Japan

Operated by Private

Objective of Kanagawa Prefectural Government

To structure general Public-Private-Partnership model

➡ Good example that others are easy to introduce

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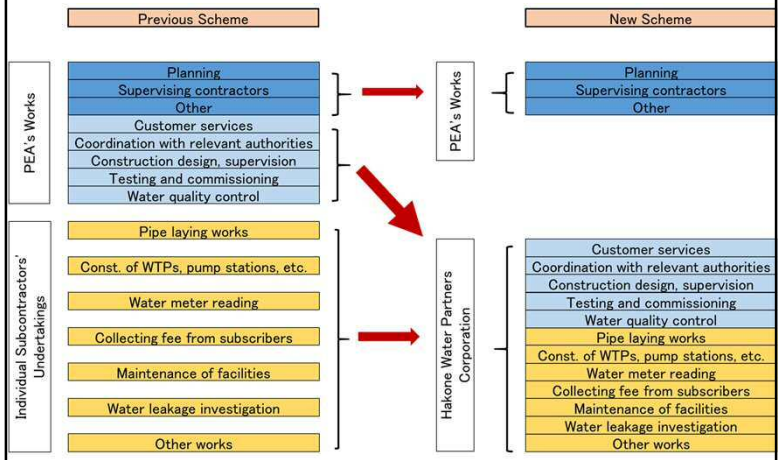
18 Comparison of conventional and new scheme



※PEA : Public Enterprises Agency, Kanagawa Prefectural Government

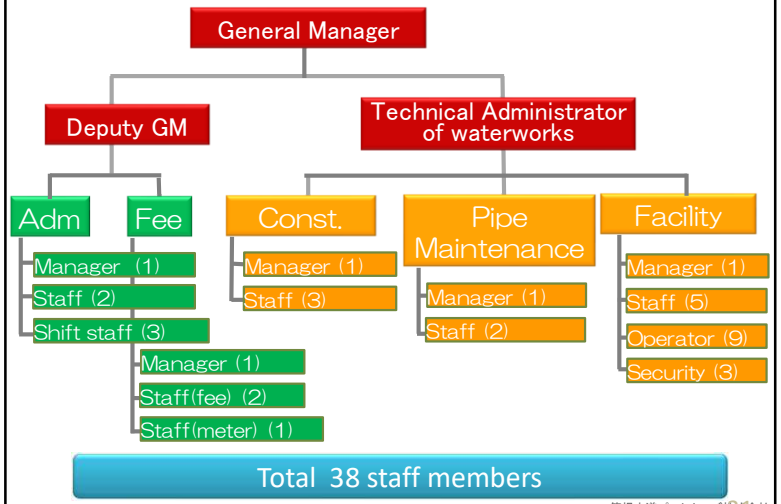
箱根水道パートナーズ株式会社

19 About Us

SPC

箱根水道パートナーズ株式会社

21 Organization of Hakone Water Partners



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22 Revenue structure

[Service purchase model]

Revenue as service fees instead of sales of water

Revenue expenditure		
Fixed cost	Staff, insurance, consumables etc.	Monthly flat rate
Variable cost	Electricity and chemicals	Set unit price and settle for water supply
Periodical repair cost	Inspection, maintenance, planned repair etc.	Payment upon completion
Emergency repair cost	Pipe leakage, Facility failure etc.	Implemented based on annual investment plan Payment upon completion
Capital expenditure		
Renewal and Improvement cost	Renewal of piping, pump station and electrical facilities Seismic retrofitting work for distribution reservoirs	Implemented based on annual investment plan Payment upon completion

23

4. Reference

箱根水道パートナーズ株式会社

24 (reference) Office

Central control panel

Office

箱根水道パートナーズ株式会社

25 （reference）Public relation

Public Relation activity

PR activities are also included in the contract.
（Photo: Summer festival）

'My name is Kappy!'
(Kanagawa's water supply PR mascot character)

CSR activity: Participating clean up activity around area

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Thank you for your attention

（ご清聴ありがとうございました）

箱根水道パートナーズ株式会社

11 September 2019

Water Supply in Zama City

Waterworks and Sewerage works Bureau of Zama City

Zama Mizu

Nutrition Facts
Per 100ml

Energy	0kcal
Protein	0g
Lipid	0g
Carbohydrates	0g
Na	0.7mg
Mg	3.8mg
Ca	1.0mg
K	0.16mg

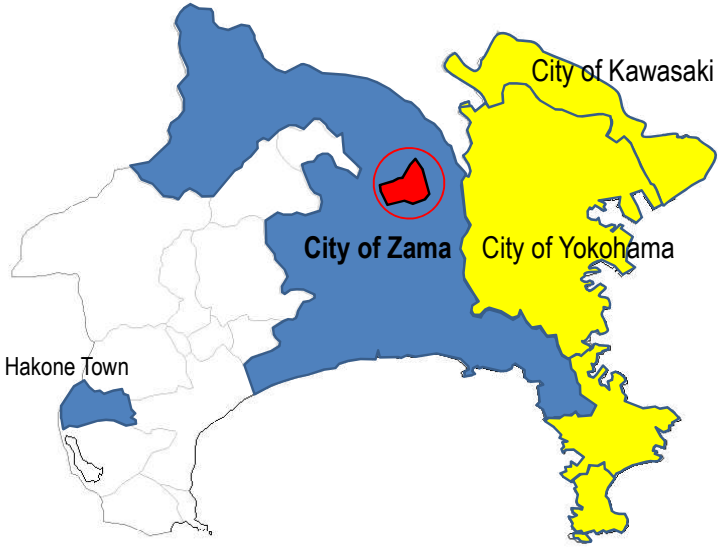
PH 7.8
Hardness 141mg/L

Zamarin

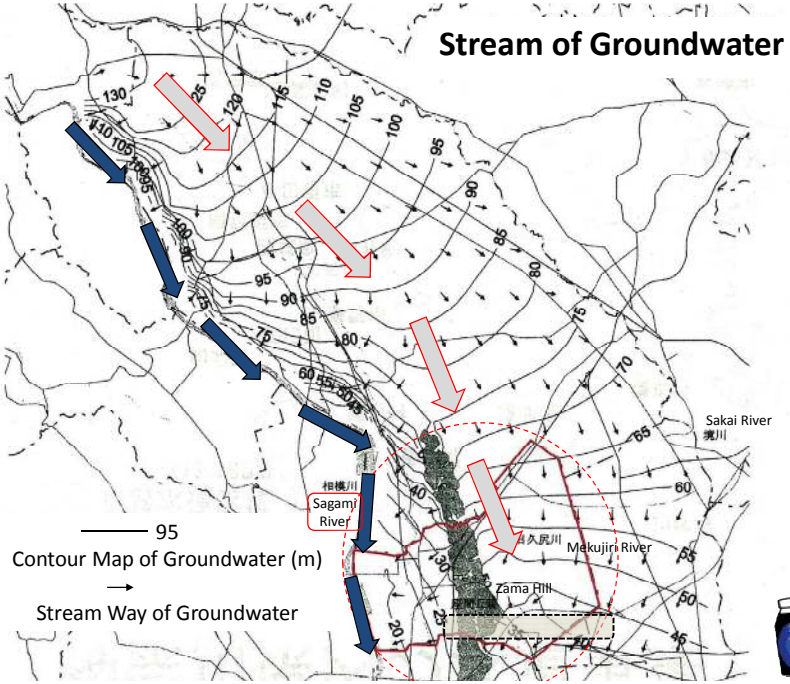
Mascot character of the Zama City.

Welcome To Zama City

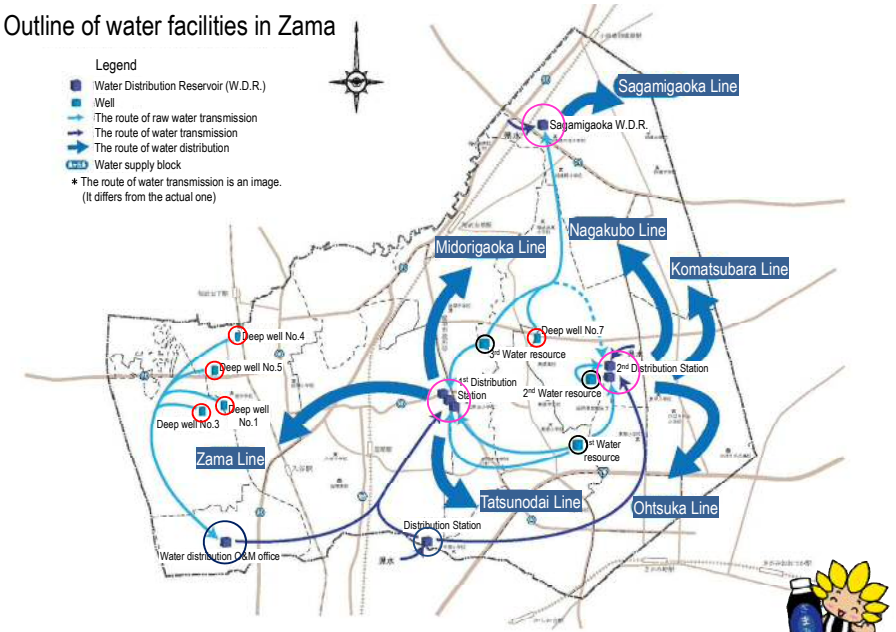
Water Supply in Kanagawa Prefecture



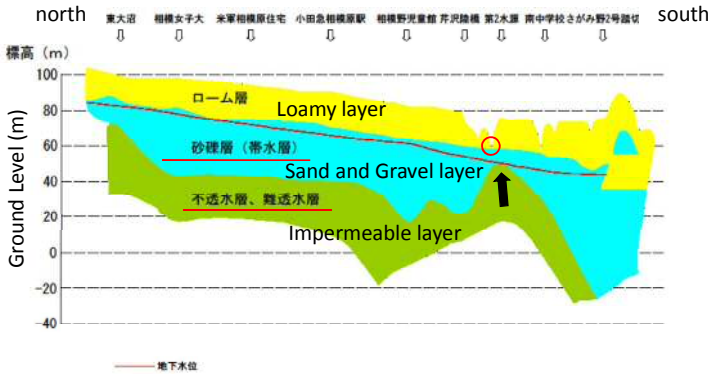
Stream of Groundwater



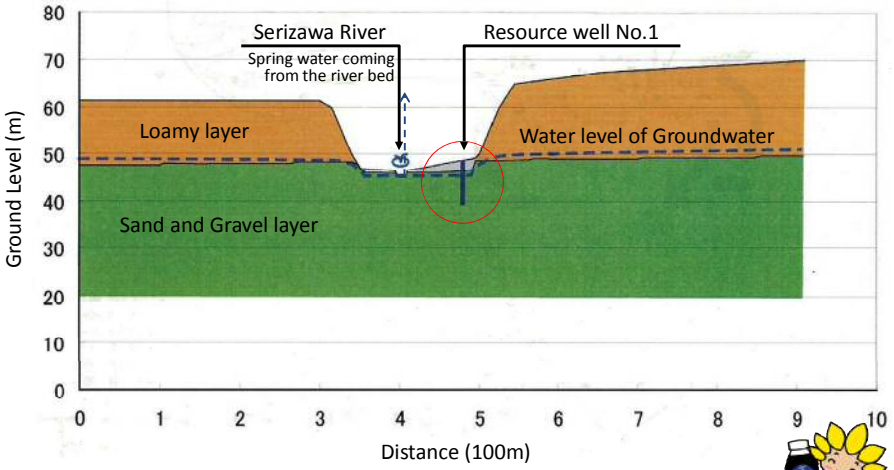
Outline of water facilities in Zama



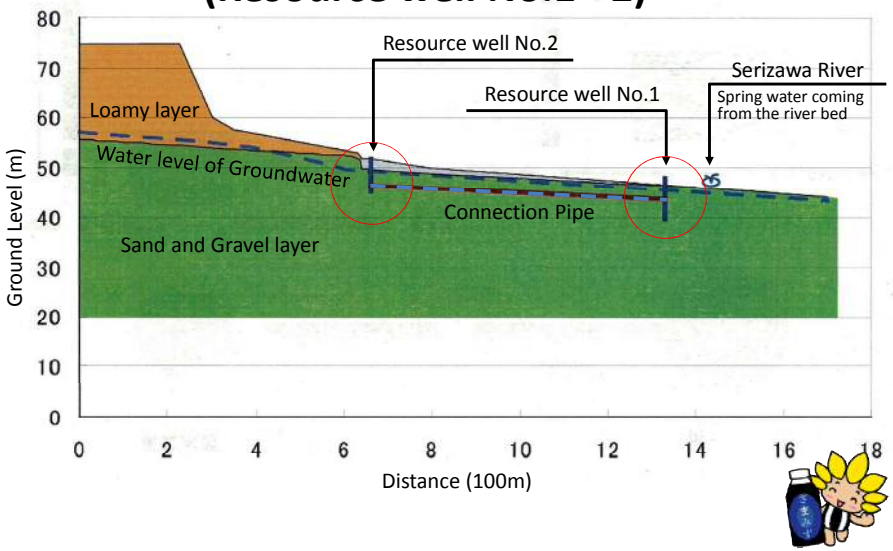
Cross Section Map (Zama City)



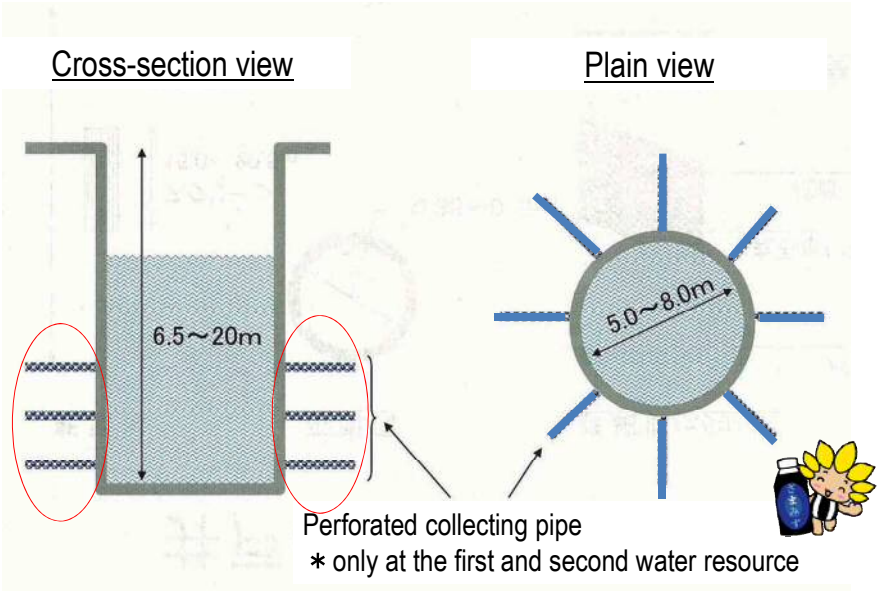
Cross Section Map (Resource well No.1)

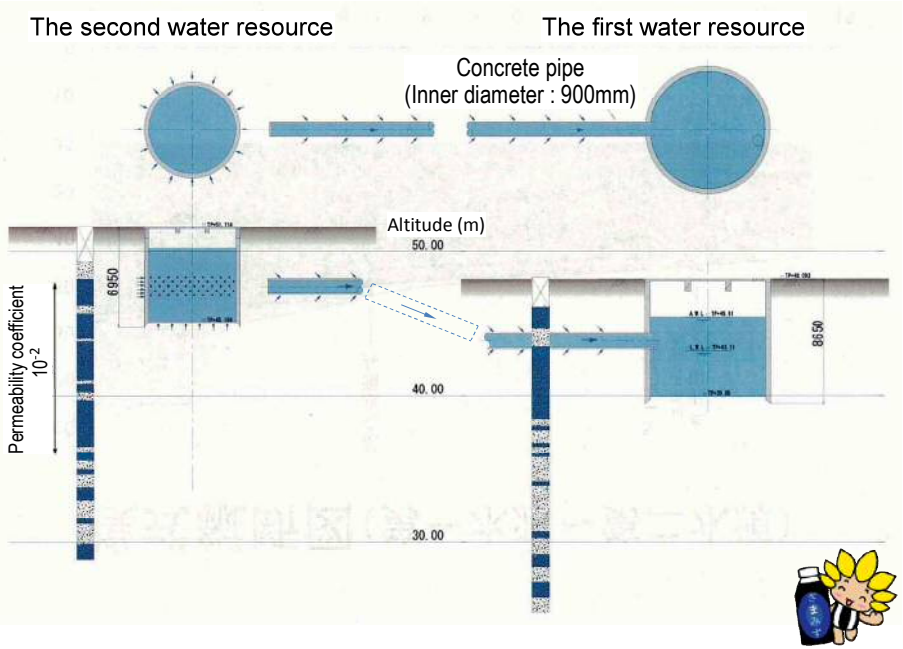


Cross Section Map (Resource well No.1 - 2)

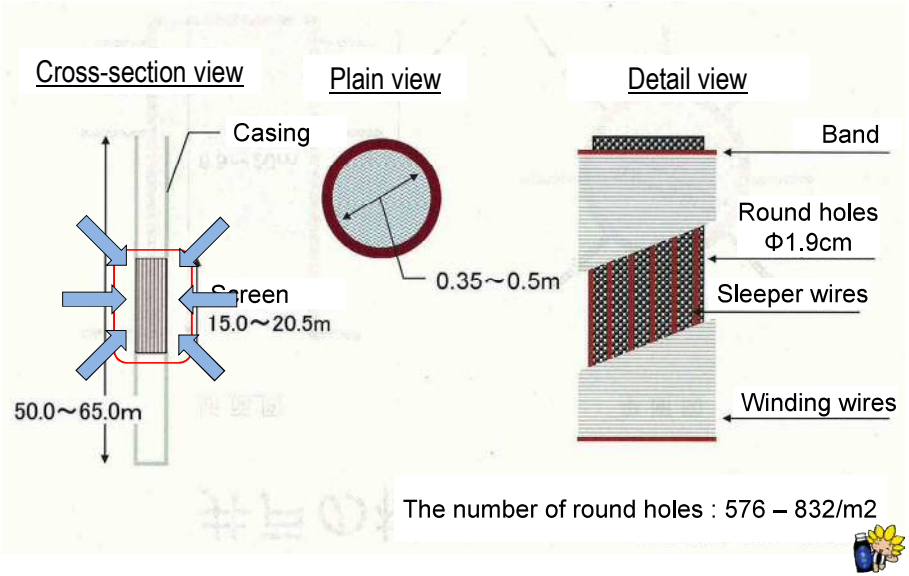


Structure of shallow well

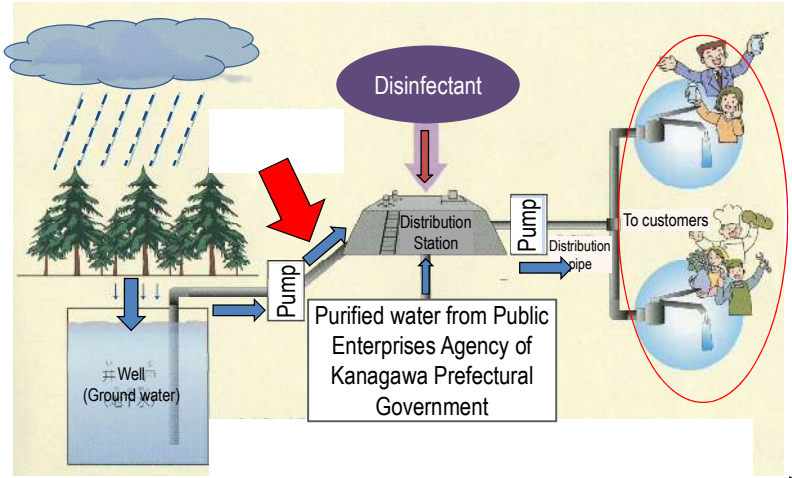




Structure of deep well

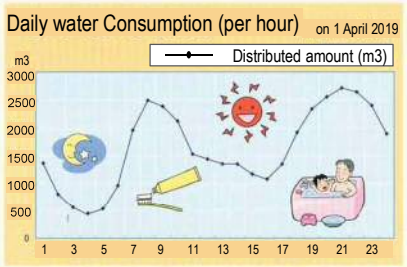


Water Supply in Zama City



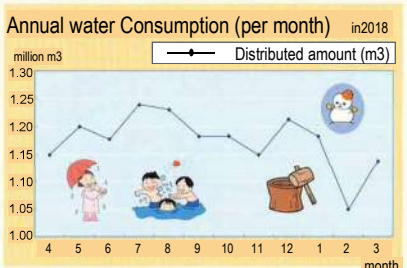
Distributed Amount

- Daily water consumption : around 35,000 m3
- Annual water consumption : around 1.3 million m3
- Average water consumption : around 270L/day/person



Water Quality

- Water quality Inspection : 51 items regularly (E. coli , Cadmium, Mercury, Trichloroethylene, e.t.c.)
- Disinfectant : Sodium Hypochlorite (around 0.4mg/L) Concentration of Residual Chlorine at a tap of household should be more than 0.1 mg/L



Thank you

The Remarkable Points of the Project -1

9

Merits of the membrane method

* Smaller space than rapid sand filtration method

➔ We could not stop the operation of exiting Kawai Purification Plant because we had to continue to supply water to 190,000 households, therefore we had to operate existing facilities even during the construction of new facilities.

* Effective utilization of the residual pressure after water conveyance

➔ The potential energy gained from gravity flow is utilized effectively for membrane treatment (refer to the next page).

* Clean and pure Raw water of Doshi River

➔By the preservation of water conservation forest for more than 100 years, clean and pure raw water, which is suitable for the membrane filtration system, is available.

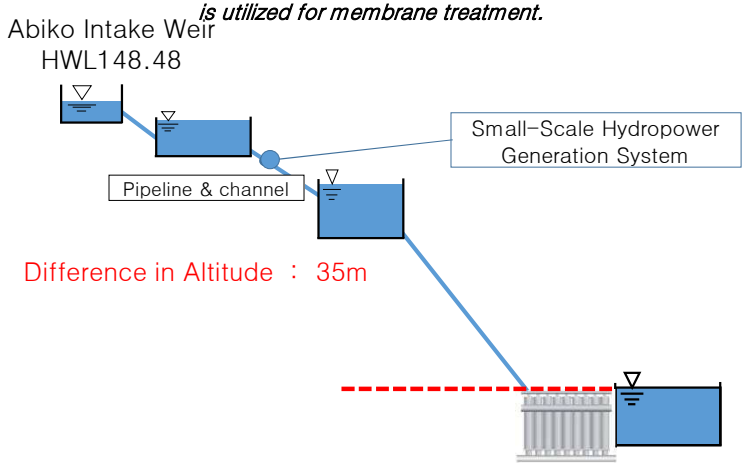
* Chemical injection volume reduction and the streamlining of operation

➔Reduction of chemical injection volume is expected, and the operation staff reduction enables to make "O & M" more effective.

9

10

The residual pressure after water conveyance from Doshi River system (Gravity Flow) is utilized for membrane treatment.



10

The Remarkable Points of the Project -2

Introduction of PFI

(1) Purpose of PFI

11

12

(2) BTO（Build Transfer Operate）

Business method	Construc -tion of the facility	Owner -ship	Opera -tion	Outline
PFI (BTO)	Private sector consortium	Public sector	Private sector	●The private sector consortium prepares funds to build facilities. ●The private sector transfers the ownership to public sector. ●The private sector operates based on risk-sharing by the contract. ●The private sector bears administrative cost by the revenue from service purchase.

Why BTO? The ownership transfer from private sector to the public entity is beneficial for cost saving in the following points:

1. Property tax deduction
2. Subsidy from the national Gov.

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2 OUTLINE OF THE PROJECT

Comprehensive outsourcing of the purification plant redevelopment and operation & maintenance services

13

(1) Outline of the project –1

	New facilities	Old facilities
Treatment cap.	172,800 m^3/d (Full volume of YWWB's water right on Dosh river)	106,400 m^3/d
Treatment method	Membrane filtration	Rapid sand filtration
Distribution Reservoir	(Construction) One D.R. Capacity:30,000m3	(Removal) Three D.R. Capacity: 10,100m3
Sludge treatment facility	(Construction) 1 wastewater basin and dewatering facilities	(Removal) 3 Wastewater basins , sludge basin

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(2) Outline of the project –2

* Project term for 25 years: April 1, 2009 – March 31, 2034

Design & Construction [1st stage]	April 1, 2009 ~ March 31, 2014 (Construction of new treatment facilities)
Construction [2nd stage]	April 1, 2014 ~ March 31, 2015 (Removal of existing treatment facilities)
O/M [20 y.]	April 1,2014 ~ March 31, 2034 (Operation of existing treatment facilities until the end of FY2013)

* Project cost: 27.7 bil. Yen (Consumption tax levied)
* VFM (value for money) : 6% (at contract)

15

(3) Required Function & Specification

* Capacity and main water quality data

Capacity	Water intake (max)	172,800m3/day
	Purified water (=production)	More than 171,070m3/day (Inflow to the distribution reservoir)
Water quality	Turbidity of filtered water	0.01 or less
	Residual chlorine at the outlet of the distribution reservoir	control target±0.05mg/l

* Aseismatic performance

	Required aseismic performance	
Civil engineering structures	Level 2 Importance rank A	The guideline on Aseismic work execution method for waterworks (Japan Water Works Association)
Building structures	Class Ⅱ	Standard for General Aseismic Plans for Government Facilities (Ministry of Land, Infrastructure, Transport and Tourism)

16

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3 IMPLEMENTATION OF THE PROJECT

Cooperating with the private sector to proceed with the redevelopment project

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Responsible area

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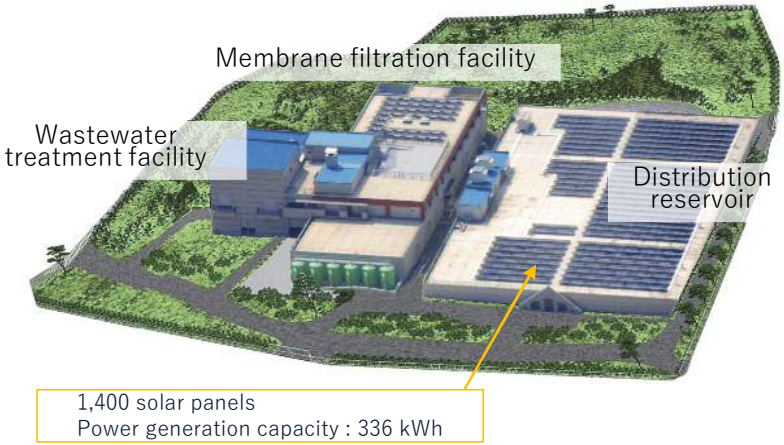
New P.P from bird's eye view



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4 THE EFFECT OF THE PROJECT

Establishment of "Eco Friendly Waterworks System"

20

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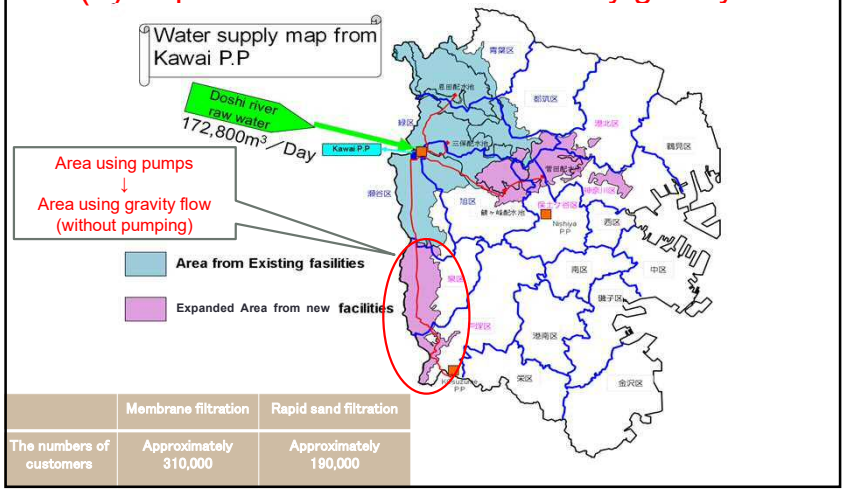
(1) Reduction of chemical injection volume and electric power consumption

	(Former facility) Rapid sand filtration method	(New facility) Membrane filtration method	reduction rate
Power consumption to purify raw water 1m3	0.040 kWh	0.022 kWh	62%
The amount of the coagulant to purify raw water 1m3	0.0315 L	0.0165 L	48%

25

(2) Expantion of distribution area by gravity flow



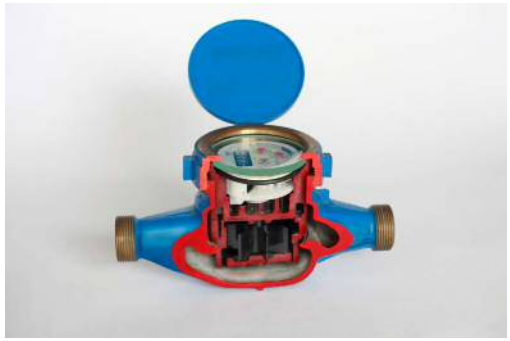
	Membrane filtration	Rapid sand filtration
The numbers of customers	Approximately 310,000	Approximately 190,000

*** Preservation of Water conservation forest for more than 100 years**

25

Thank you very much for the visit.
We hope that it would be useful for you.

Water Meter Maintenance



Water Meter Section
Water Supply Maintenance Division
Yokohama Waterworks Bureau

1

Today's Contents

1. Outline of water meter
2. Types and structures of water meter
3. Inspection of water meter
4. Water meter maintenance

2

1. Outline of water meter

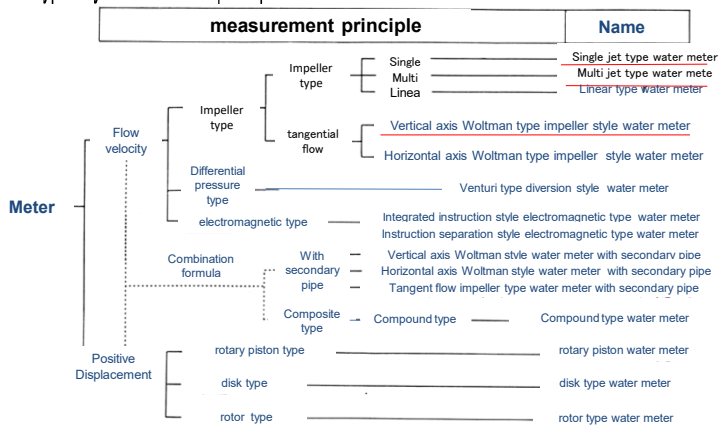
– Conditions as water meter –

【 Capability 】
1 Accurate measurement
2 Durable
3 Good sensitivity
4 Wide range of measurement
【Structure】
1 Simple, light and easy to handle
2 Less trouble and easy repair
3 Easy inspection
4 Low resistance and high water flow
【Cost】 【Hygiene】
Low cost harmless

3

2. Types and structures of water meter

Types by measurement principle



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Impeller type meter

- When a rotating impeller is placed in the liquid flow, the impeller rotates at a speed approximately proportional to the flow velocity.
- It is a meter that measures the amount of water passed from the rotational speed of this impeller, and small water meters almost use this style.

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Tangential flow vane wheel water meter

Impeller meters are divided into two types: tangential flow and axial flow.

1 **Tangential flow vane wheel**

Flowing water hits the surface of the impeller at right angles and flows straight as it is.

There are two types of tangential flow vane wheel: single jet type and multi jet type.

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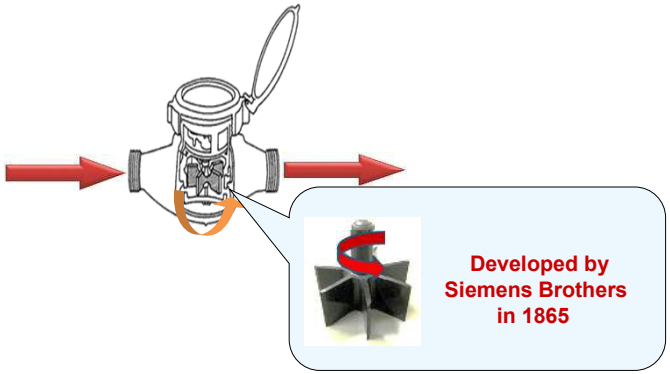
Methods of measurement

Tangential flow vane wheel



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(1) Tangential flow vane wheel

Single jet type water meter

Structure : Water flowing from the inlet provided in the lower case directly collides and rotates with the impeller.

In any impeller-type meter, the tip of the shaft (pivot) is a magnet, and when it moves, the upper gear rotates and is transmitted to the indicator mechanism, where it is measured.

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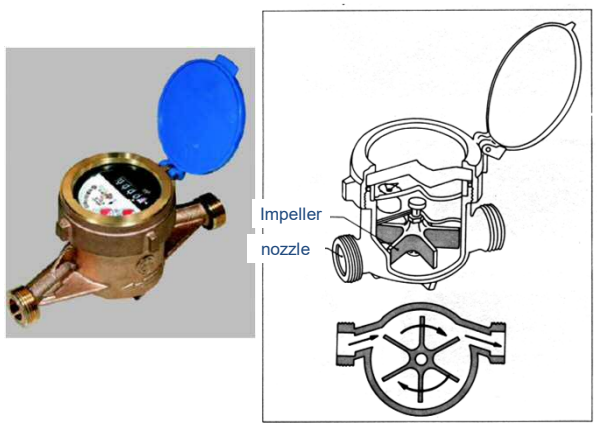
Single jet type water meter



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2) Multi jet type water meter

As single type, it is the same mechanism to measure by transmitting the rotation of the impeller, in addition, multi type has inner case between the impeller and the lower case.

The case has some nozzles and flowing water jetted from them makes the impeller rotate.

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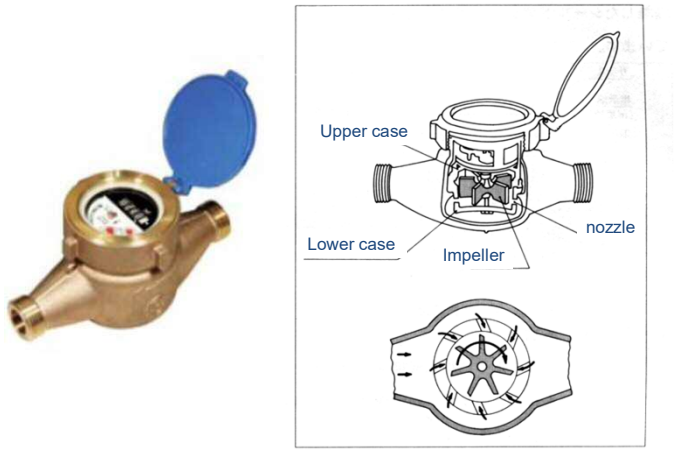
Multi jet type water meter



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(2) Vane wheel axis flow type

Since the flow of water passes parallel to the vane wheel axis, it is called an vane wheel axis flow type, and there are two types, a vertical type and a horizontal type.

This meter is also called the "Waltmann" meter.

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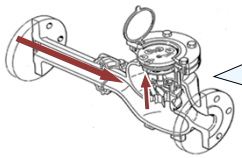
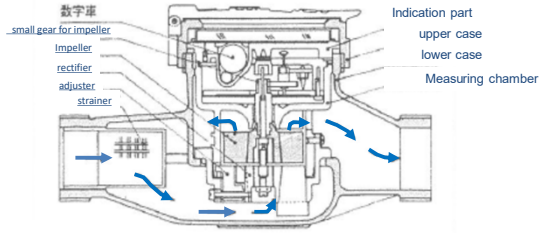
Methods of measurement

Vane wheel axis flow type



Spiral impeller

Around 1790, Reinhold－Woltmann invented a flow measurement impeller for rivers and waterways. In 1893, A.Thiem developed a water meter using Waltmann's technology.



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(1) Vertical vane wheel axis flow type

In this meter, an impeller with a lead angle is vertically installed in the measuring chamber, and the inflow water into the meter flows vertically upward and rotates the impeller through a rectifier and transmits it to the indicator and the impeller can be rotated lightly.

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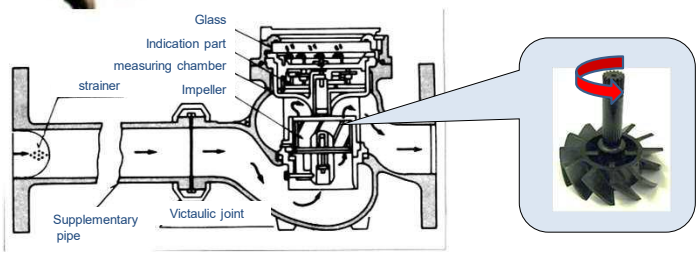
Vertical vane wheel axis flow type water



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(2) Horizontal vane wheel axis flow type

This meter is called “Horizontal type” because the impeller with lead is installed horizontally in the measuring tube.

The water that flows into the meter passes through the rectifier, rotates the impeller, and flows out without changing the direction.

The rotation of the impeller is transmitted to the indicator via the worm and worm wheel and measured.

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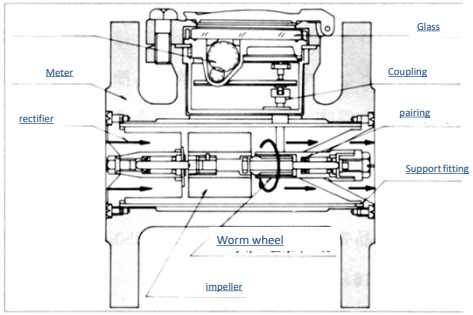
Horizontal vane wheel axis flow type water meter



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Electric-magnetic Flow

Since there is no mechanical drive in the measuring tube that blocks the water flow, the pressure loss is equivalent to the same length of pipe, and there is no failure caused by moving parts, making it ideal for continuous measurement of large flow rates.

As a structure, an electromagnet is created in the measuring tube, and when water passes through this magnetic field, an electromotive force is generated in proportion to the flow velocity, and this electromotive force is processed to display the flow rate.

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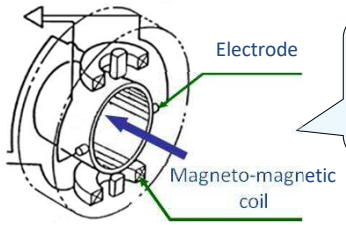
Methods of measurement

Electric-magnetic Flow



The measurement principle is "Fleming's rules"

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Electric-magnetic Flow

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Number of installation of meters

13	223,555	12.35
20	1,474,039	81.44
25	100,306	5.54
40	7,006	0.39
50	3,421	0.19
75	941	0.05
100	297	0.016
150	172	0.01
200	64	0.004
250	6	0.0003
300	0	0
Total	1,809,807	100

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＜ Display type ＞

Digital（Directly reading type）

Impeller type

Electric-magnetic Flow

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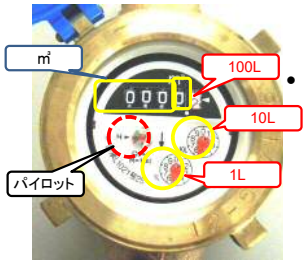
How to read

Digital “The direct reading method”



0.155m³

- The direct reading method is a way in which the indication amount is displayed with a rolling number wheel, and the number is read directly.
- In the photo on the right, the white letters at the top of the meter photo indicate the legislation meter (m³), the red letters on the right indicate 100 liters, the red needle indicates 10 liters, and 1 liter. In the case of photos, it is 0.155 cubic meters.

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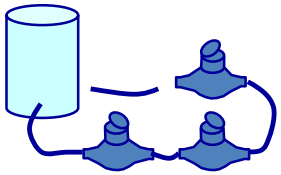
5. Inspection of water meter

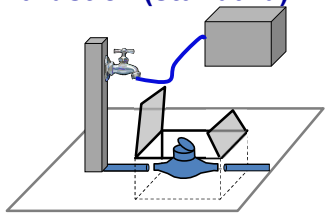
When a customer sends inquiries to the waterworks bureau about his/her water rate, we check an instrumental error of the water meter (water meter inspection), which the customer has doubts about, to relieve his/her feelings.

Standard Tank



(In the meter laboratory. of YWWB)

Yardstick (standard) meter

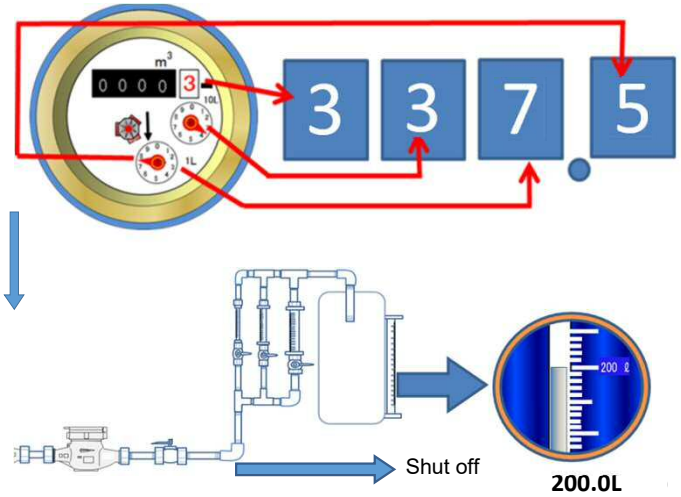


(At the customer's house)

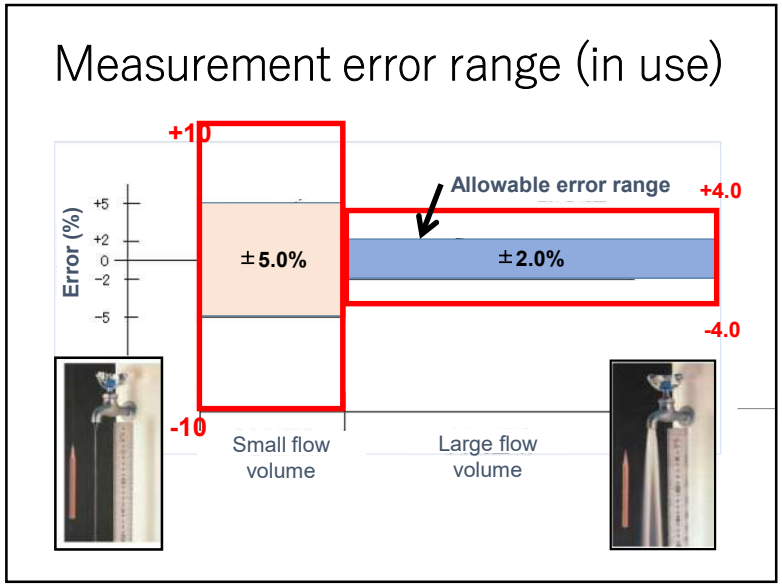
〈Yokohama Water Works Bureau〉

Work flow of the standard tank

1. Put meters on the standard tank table
2. Remove air from meters and pipelines
3. Determine a flow volume of water flow
4. Read a meter needle of target meter before water flow
5. Flow the determined flow volume (Confirm determined flow volume with the standard tank)
6. Read a meter needle of target meter after water flow
7. Check the difference in water volume between yardstick meter and target meter



Measurement error range (20mm)



Active Meter Inspection Passed Rate

FY	Tester	Passed	Passed Rate
2009	209	205	98.1%
2010	193	192	99.5%
2011	130	128	98.5%
2012	101	97	96.0%
2013	111	108	97.3%
2014	74	73	98.6%
2015	82	79	96.3%
2016	80	79	98.8%
2017	76	75	98.7%
2018	55	54	98.1%
Total	1,111	1,090	98.2%

Thank you for your attention.











YWWB Mascot
"Hama-pyon"

Water Leakage Survey

12th.Sep.2019
Water Leakage Management Section
Water Supply Division
Yokohama Waterworks Bureau

1

Contents

- Water Leakage Management Section
- History of leakage prevention
- Strategy of leakage prevention
- Leakage survey
- Leakage Sound and Pseudo Leakage Sound

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Water Leakage Management Section

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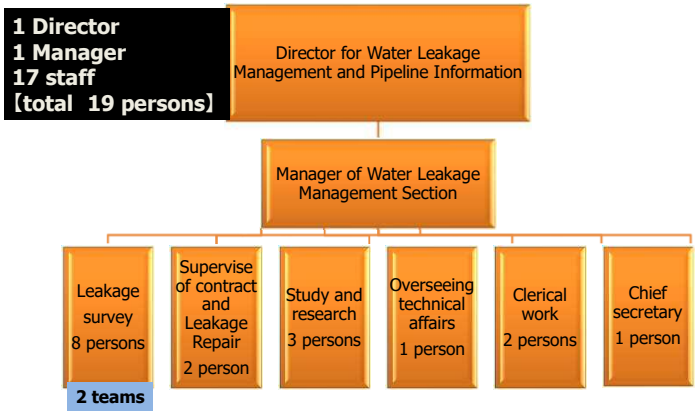
3

Water Leakage Management Section



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Main jobs on the Water Leakage Management Section

（leakage investigation all around of the city by YWWB and contractor）

Leakage Prevention History

- 1974
  Setting of survey blocks for leakage survey
  About 70 staff

- 1984
  Introduction of correlator
  About 75 staff

Leakage Prevention History

- 1992
  Entrustment of the construction on leakage repairs under the ground
- 2004
  The part of contracting out of premeditated leakage investigation duties
- 2011
  Abolition of planned listening work at night

Leakage Prevention History

- 2012
  Implementation of piers leakage survey
  Measure the flow rate of 11 piers in the city
- 2013
  Complete leakage surveys in all 18 wards of Yokohama in 3 years

Leakage Prevention History

- 2018
  Entrustment of planned leakage investigation work
  Directly managed:2 wards/ entrustment: 4 wards

- 2019
  Entrustment of planned leakage investigation work
  Directly managed:1 ward/ Entrustment: 5 wards

Strategy of leakage prevention

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Leakage Prevention in YWWB

	Items	Actions
Preventive measures	Preparation of leakage prevention	• Establishment of organization • Drawings/ledgers development • Mapping system development ➢ As-built, pipeline maps, ledgers
	Situation survey	• Analysis of distribution amount, leakage amount • Pressure/leakage measurement
	Research and improvement of pipe materials	• Materials of distribution and service pipe • Pipe joint • Valve, fire hydrant, etc.
	Technical development	• Leakage detection technology • Buried Pipe identify technology • Leakage detection equipment development

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Leakage Prevention in YWWB

	Items	Actions
Corrective Measures	Accident based	• Surface leakage repair (by maintenance section)
	Planned actions	• Early detection and repair of underground leakage (by water leakage management section)

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Leakage Prevention in YWWB

	Items	Actions
Preventative measures	Planning of water business	• Planning considering leakage prevention
	Design and construction of water facilities	• Earthquake-resistance, durability, corrosion-resistance, water tightness
	Pipe replacement	• Pipe replacement plan (1969-) • Service pipe improvement project in public road (2014-)
	Protection of pipelines	• Corrosion prevention measures (Polyethylene sleeve wrapping) • Damage prevention measures from other utilities (Pipe location notification sheet laying)
	Water pressure control	• Establishment of Water distribution blocks • Installation of PRV

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Water balance analysis in YWWB

F.Y. 2018

Distri-buted Water 100%	Revenue 92.2%	Billed metered consumption	92.2
		Billed unmetered consumption	+0.0
	Non-Revenue 7.8%	Unbilled metered consumption	0.3
		Unbilled unmetered consumption	0.4
		Unauthorized consumption	0.0
		Customer meter inaccuracies	1.9
		Leakage Water (assumed)	5.2

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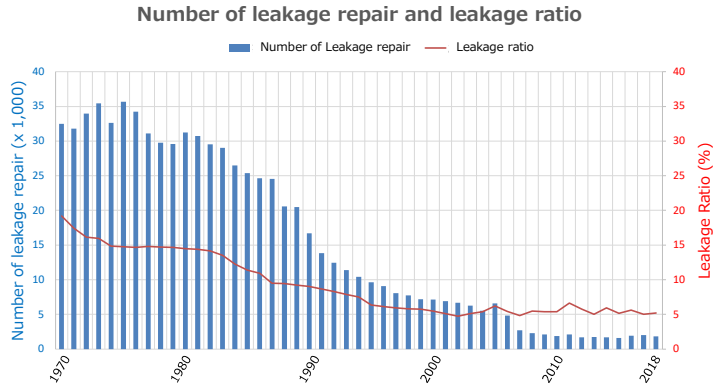
Trends in leakage repair and leakage ratio



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The amount of leakage prevented a year

Leakage amount(ℓ/min) × 60min × 24hours × 365days ÷ 2 ÷ 1000

＝The amount of leakage prevented a year (m^3 /year)

$$6,584 \times 60 \times 24 \times 365 \div 2 \div 1000$$

$$= \underline{1,730,275\ m^3}$$

The number of leakage repairs : **223 (FY2018)**

"The number of leakage found :**368" (FY2018)**

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Leakage Survey

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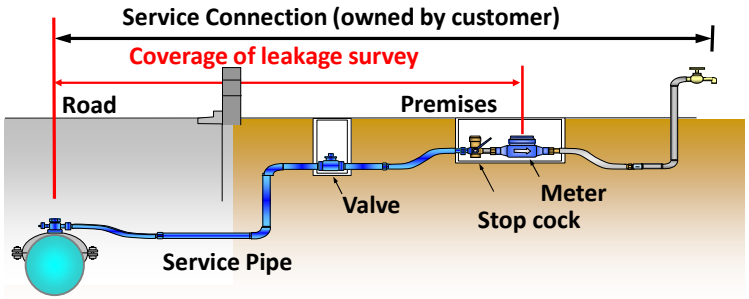
Coverage of leakage survey

For service pipe leakage survey

From ferrule to customer meter



Distribution pipe (owned by YWWB)

21

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Location of leakage

99%
from service pipes

1%
from distribution pipes

(FY2018)

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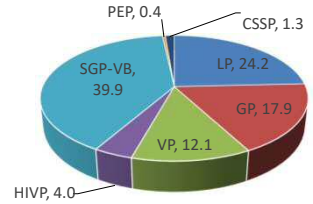
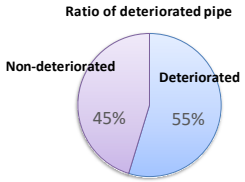
Category of Service pipe leakage

FY 2018

- **Lead pipe (LP) : 24.2%**
- **Galvanized steel pipe (GP) : 17.9%**
- **PVC pipe (VP) : 12.1%**
- **Polyethylene pipe (PEP) : 0.4%**
- **High impact vinyl pipe (HIVP) : 4.0%**
- **Un-plasticized poly-vinyl chloride lined steel pipe (SGP-VB) : 39.9%**
- **Corrugated Stainless Steel Pipe (CSSP) : 1.3%**





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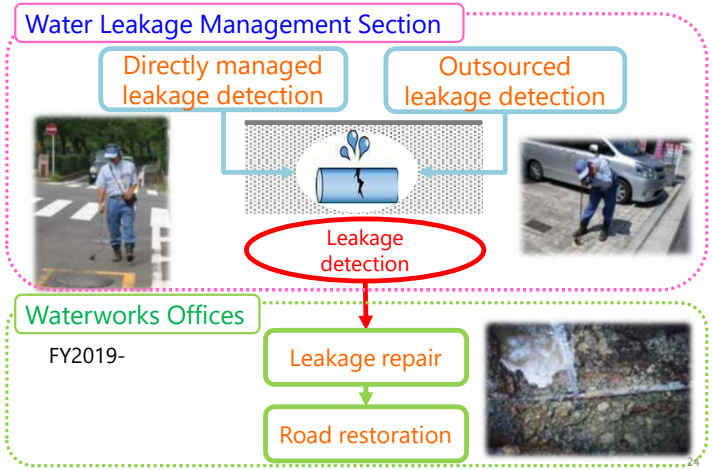
Leakage detection to repair



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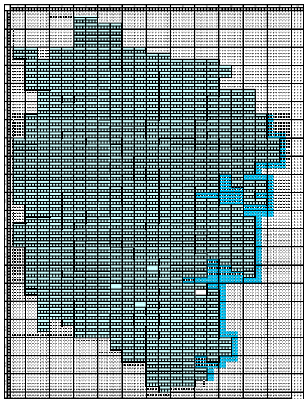
Survey block



- Divide whole city area into 915 blocks of 1 km by 0.5 km
- Every block is surveyed every 3 years.

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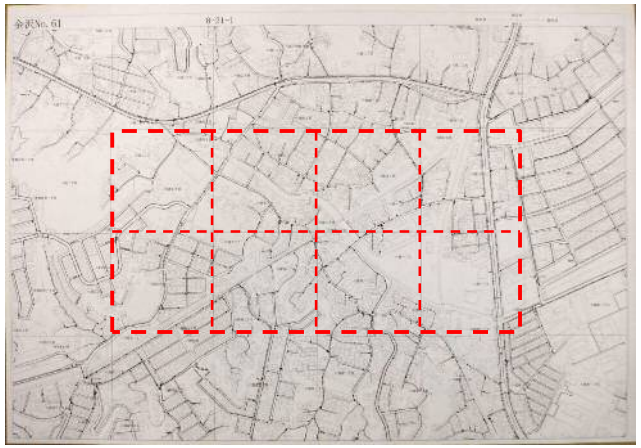
Survey map (1/2,600)



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Kind of leakage survey

Visual survey	Visual inspection for water leakage Judgment of residual chlorine and measurement by water quality section
Listening Survey	Investigation with acoustic rods and leak detectors
Correlative survey	Survey to confirm the location of water leakage
Sound pressure survey	Surface survey by multi-point correlation leakage detectors Collection and analysis of recorded data of water leakage sound

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Transmission of leakage sound

Conditions	Transmission Distance		Note
	Long	Short	
Diameter	Small	Large	A large diameter means less vibrations in the pipe
Material	CIP, SP	PVC, ACP	Vibrations in non-metallic pipes are less than that in metallic pipes
Leakage Volume	Large	Small	A small amount of water leakage has a small noise
Pressure	High	Low	A low water pressure has a small noise
Depth	Shallow	Deep	The sound of water leakage is weakened at greater depths
Ground density	Dense	Coarse	The sound of water leakage is weakened with rougher ground

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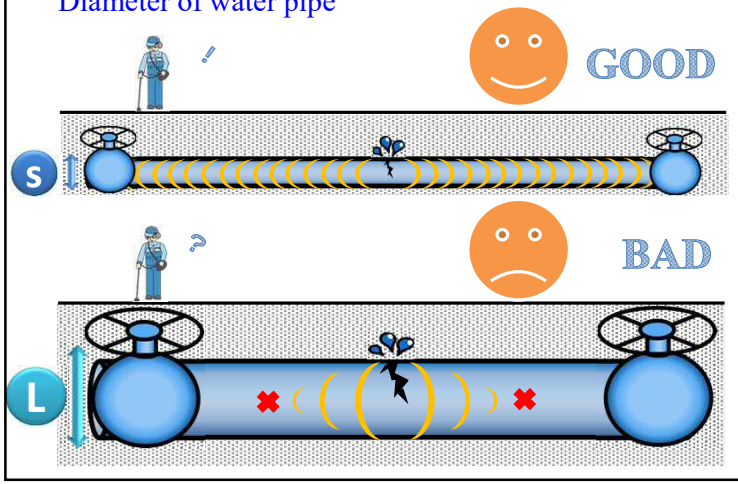
Propagation distance of leakage sound

Diameter of water pipe



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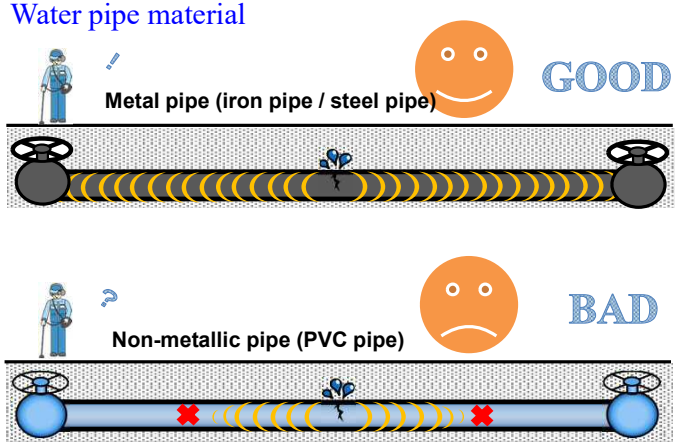
Propagation distance of leakage sound

Water pipe material



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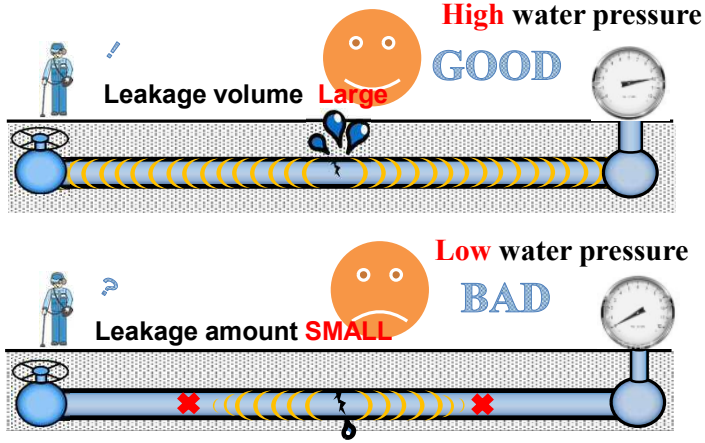
Propagation distance of leakage sound



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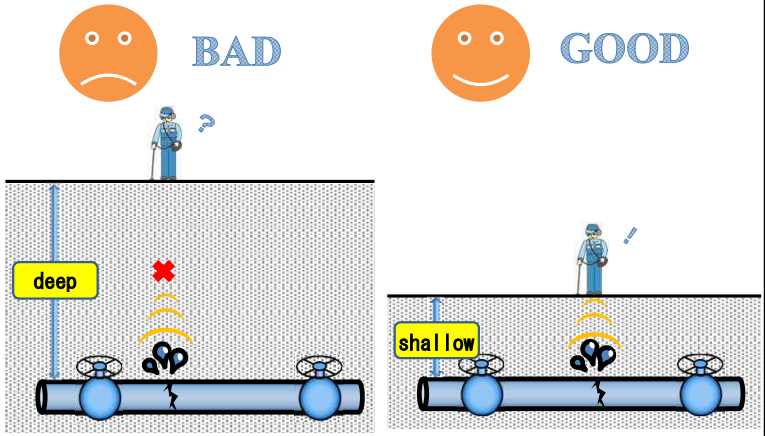
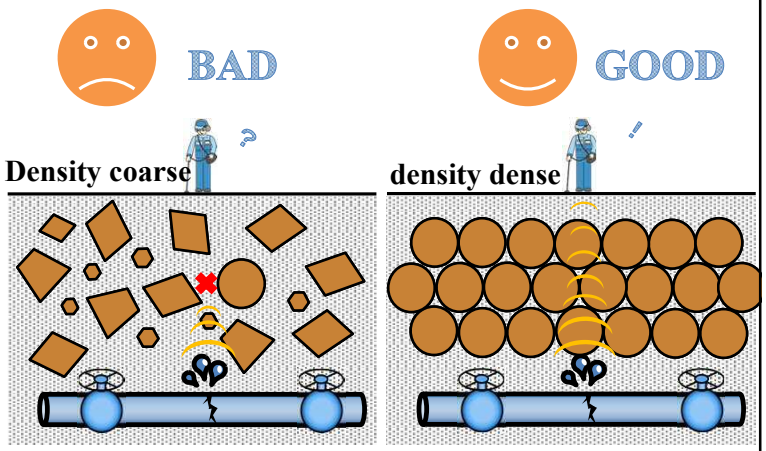
Propagation distance of leakage sound

Water pipe burial depth



32

Propagation distance of leakage sound



33

Leakage survey using acoustic rod

Touching the top of “acoustic rod” with meter/valve, catch the leakage noise directly with ear.

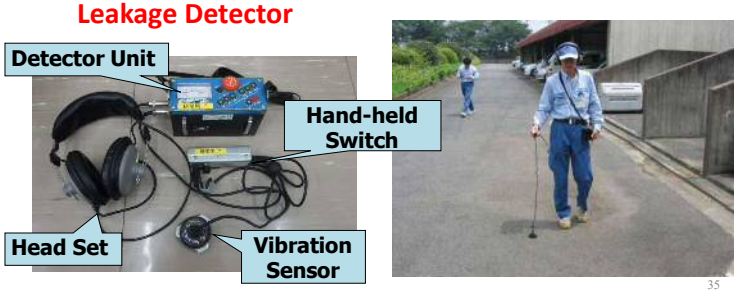
34

34

Road surface survey using leakage detector

Using leakage detector, catch the leakage sound of underground leakage of buried pipes along pipeline from road surface.

Leakage Detector



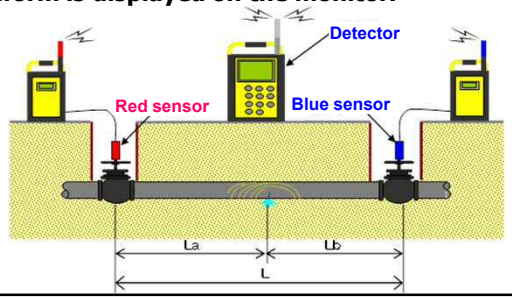
35

35

Correlative leakage detector

Since 1984 in Yokohama

Putting sensors at both ends of pipe interval with suspected water leakage. Entering data of pipe diameter, pipe type and length into the correlator. Then, the distance between the water leakage point and waveform is displayed on the monitor.



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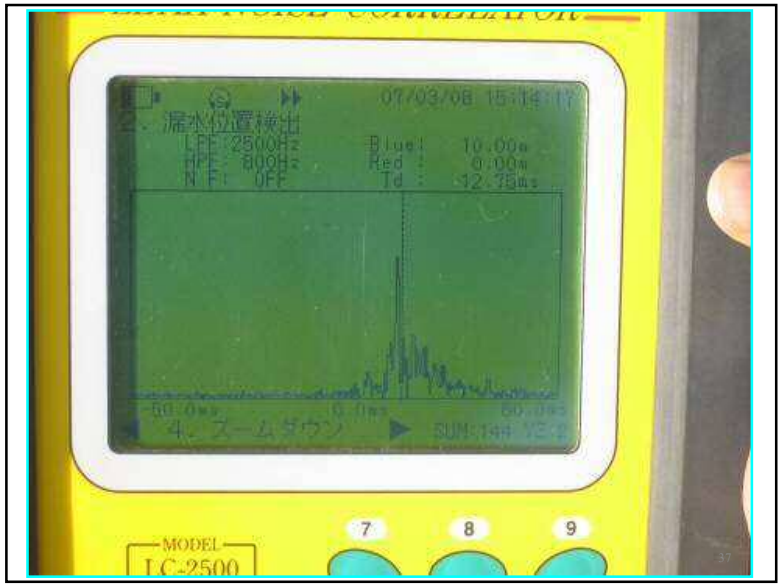
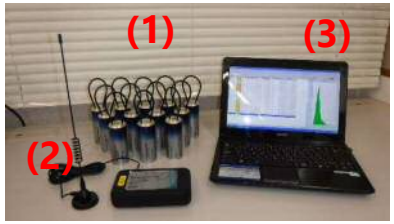


37

Sound Pressure Logger

(1)Logger: 40 pieces
(2)Com-link
(Transceiver between loggers and laptop)
(3)Laptop for analysis

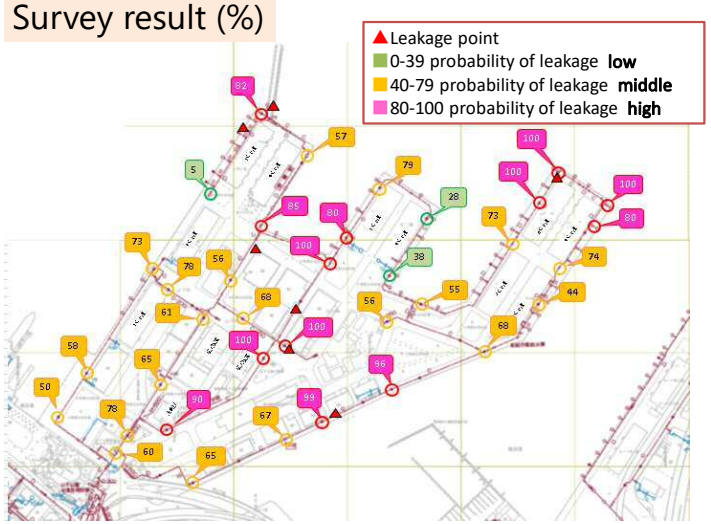


38

Installation of Loggers

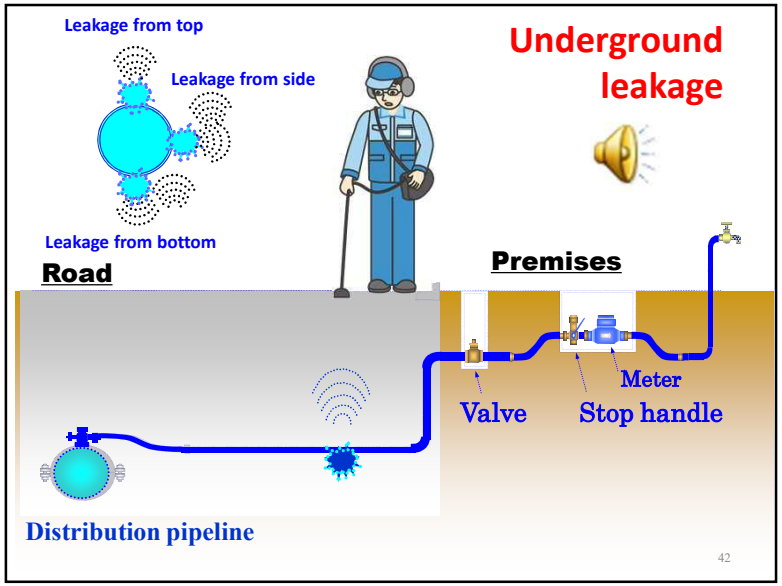
39

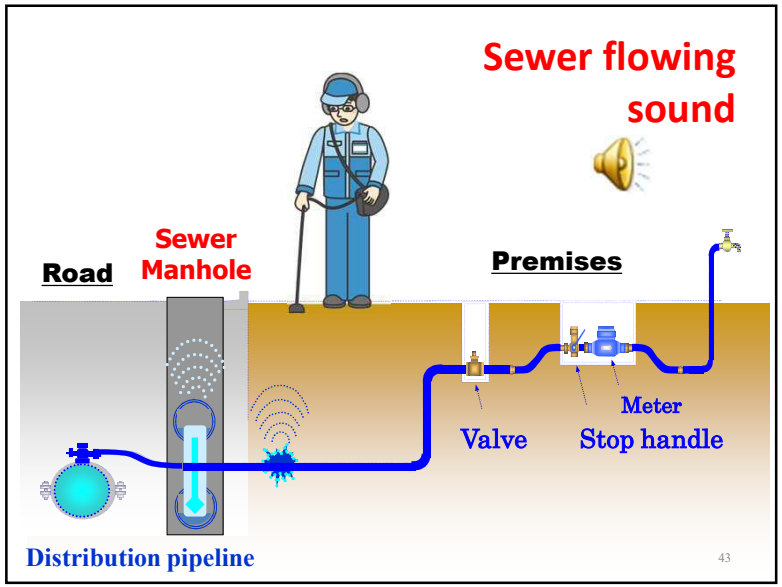
Survey result (%)

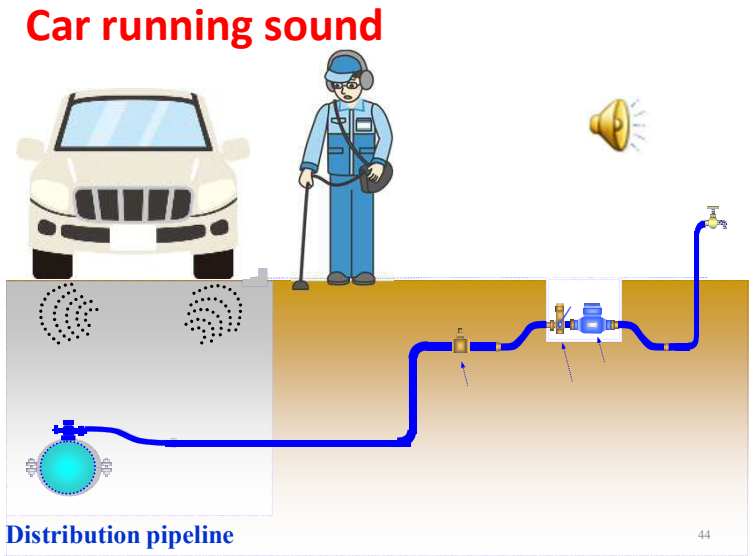


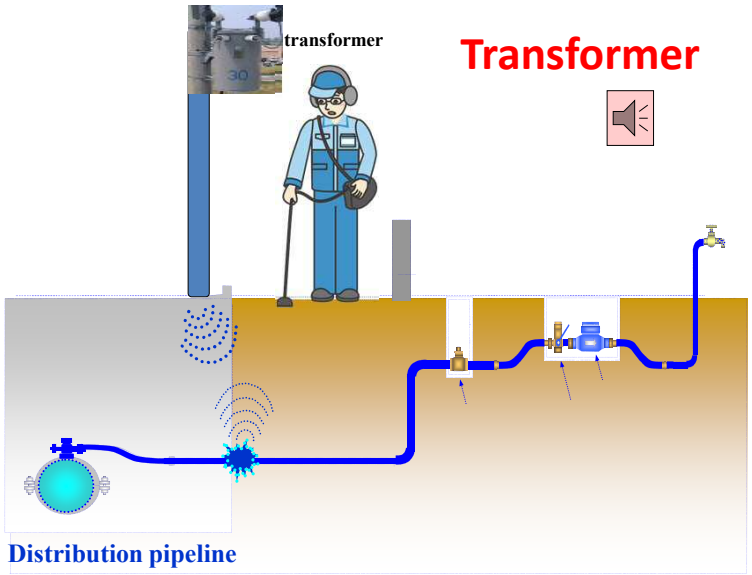
40

Leakage Sound
and
Pseudo Leakage Sound









45

Road

Premises

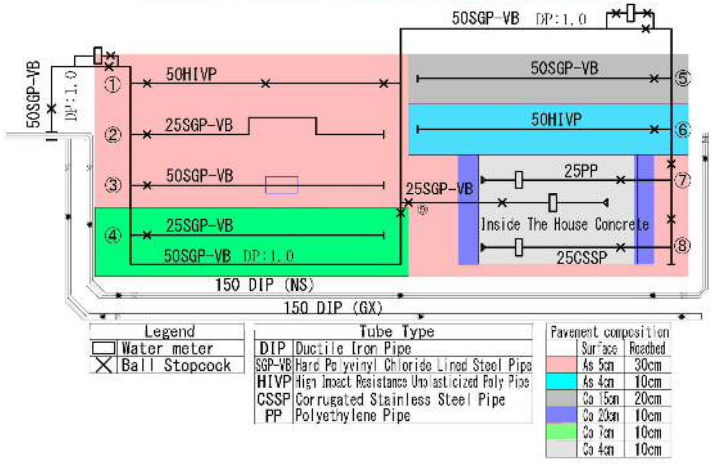
Meter

Valve Stop handle

46

Qestion

Training Yard for Leakage Survey



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Thank you for your attention.

Water Leakage management section

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Appendix 2.36

Training Implementation Guideline

WASMIP

For providing safe and quality drinking water to people

TRAINING IMPLEMENTATION GUIDELINE

Ver 1.1

February 2021

Department of Water Supply and Sewerage Management

National Water Supply and Sanitation Training Center

TABLE OF CONTENTS

Chapter 1 Introduction

This Training Implementation Guideline (hereinafter referred to as "Guideline") describes the administrative procedures of trainings for Water Users and Sanitation Committees (hereinafter referred to as "WUSC") in semi-urban towns by the Department of Water Supply and Sewerage Management (hereinafter referred to as "DWSSM"), and National Water Supply and Sanitation Training Center (hereinafter referred to as "NWSSTC") under DWSSM. Furthermore, it is expected that the Guideline shall be utilized not only to conduct the trainings for improvement of WUSC's capacity but also to enhance the interaction of trainings conducted by NWSSTC.

The following points shall be considered to plan/conduct trainings for WUSCs in semi-urban towns.

i) In order to learn basic knowledge and skills for sound management of water supply service through proper operation and maintenance (hereinafter referred to as "O&M"), lectures as "Basic Training" will be conducted.
ii) Lectures and trainings will be planned/conducted for WUSCs in semi-urban towns (not for large and small scale WUSCs).
iii) Training contents are focused on management and O&M of water supply facilities in WUSCs.
iv) The acquired knowledge and skills in the Basic Training will be applied by the WUSCs through the "On-site Training".
v) The goals of the On-site Training are 1) to understand the current condition of their water supply facilities, 2) to recover/improve its function, 3) to analyze the current management situation and 4) to make improvement plan by the WUSCs.
vi) Opportunity to share information and exchange opinions among the WUSCs will be provided in "Refresher Training/Observation and Interaction Workshop".
vii) Interaction among the participated WUSCs in the Refresher Training will be ensured through the above the trainings.

Chapter 2 Outline of Trainings Implemented by NWSSTC

This Guideline covers the following four trainings. The outline of these trainings is shown in the following table. These trainings shall be conducted by DWSSM/ NWSSTC/ FWSSMPs in accordance with the annual training plan prepared by NWSSTC.

i. Training of Trainers (ToT)
ii. Basic Training
iii. On-site Training
iv. Refresher Training / Observation and Interaction Workshop

Item	Contents	
Training of Trainers	Objective	✓ To enhance teaching skills and knowledge necessary for the Basic Training.

Item	Contents	
ToT		✓ To provide updates on syllabus and training materials. ✓ To share evaluation results and feedbacks from the previous training activities.
	Trainer	Trainers who experienced both ToT and Basic Training
	Trainee	Trainer candidates selected by DWSSM/NWSSTC
	Facilitator	NWSSTC
	Training Period	1 to 2 days (standard period)
	Outline	Key points of "Standard Operating Procedure (SOP)"*1 and "Management" as well as updates on syllabus and training materials are provided by lecture and exercise. Evaluation results and feedbacks from the previous training activities are shared.
	Goal	Teaching skills and necessary knowledge for the Basic Training are acquired. Trainers for the Basic Training are developed.
Supplemental ToT	Objective	✓ To enhance teaching skills and knowledge necessary for the On-site Training. ✓ To provide updates on syllabus and training materials. ✓ To share evaluation results and feedbacks from the previous training activities.
	Trainer	Engineers of FWSSMP (Federal Water Supply and Sewerage Management Project) who experienced both ToT and Basic Training
	Trainee	FWSSMP Engineers nominated by DWSSM/NWSSTC (Participants: Engineer/staff of MoPID (Ministry of Physical Infrastructure Development), WSSDO (Water Supply and Sanitation Division Office) and Local Government)
	Facilitator	NWSSTC
	Training Period	One day (standard period)
	Outline	Key points to conduct the On-site Training as well as updates on syllabus and training materials are provided by lecture and exercise. Evaluation results and feedbacks from the previous training activities are shared.
	Goal	Teaching skills and necessary knowledge for the On-site Training are acquired.
Basic Training	Objective	✓ To learn/understand "SOP" and "Management" for independent management of water supply facilities to provide safe drinking water to consumers stably and efficiently. ✓ To analyze the current management situation and make improvement plan from the viewpoint of stability, efficiency, safety and independence.
	Trainer	Trainers nominated by DWSSM/NWSSTC
	Trainee	Manager (1) and/or incase that manager position is vacant, key board member (1) and key technician (1) of the nominated WUSCs
	Sponsor	NWSSTC
	Training Period	4 days (standard period)
	Outline	Provide practical skills and knowledge for water supply management and O&M of facilities.

Item	Contents	
		✓ The management component will introduce/explain checklist for qualitative analysis, key performance indicators (KPIs) and benchmarking for quantitative analysis in order to prepare business plan. ✓ The O&M component will explain the SOPs of water supply facility, water quality management, distribution network, and water meters management in order to conduct preventive maintenance.
	Goal	WUSCs in semi-urban towns will be able to provide safe and sufficient water in sustainable, efficient, and accountable ways.
On-site Training	Objective	To practically learn how to apply the knowledge and skills acquired from the Basic Training.
	Trainer	Trainer(s) nominated by DWSSM/NWSSTC
	Trainee	Key board member, manager and key technician of the nominated WUSCs
	Facilitator	NWSSTC/ FWSSMP (Participants: Engineer/staff of MoPID, WSSDO and Local Government)
	Training Period	1 day for 1 WUSC (standard period)
	Outline	Check/confirm whether the actual activities of WUSCs are carried out in accordance with the SOP and management procedure which provided by the Basic Training. Necessary instruction, suggestion and advise will be provided by the trainer(s), and it will be shared among the WUSCs.
	Goal	WUSCs in semi-urban towns apply the knowledges and skills acquired from the Basic Training continuously.
Refresher Training/ Observation and Interaction Workshop	Objective	✓ To introduce new subjects/topics which are not covered by Basic Training. ✓ To obtain feedback on Basic Training and On-site Training. ✓ To share good practices & key issues of WUSCs in semi-urban towns. ✓ To learn proper O&M and management of water supply with model WUSC's[*2] introduction and visiting the facilities. ✓ To introduce policy and technology related to water sector ✓ To facilitate interaction among WUSCs in semi-urban towns and support organizations.
	Trainer	Chief and/or engineer of NWSSTC, chairperson of the model WUSC, guest speaker
	Trainee / Participant	Board members and manager of WUSCs near the model WUSC region, engineers/staffs of FWSSMP, MoPID, WSSDO, Local Government etc.
	Facilitator	NWSSTC and the model WUSC
	Training Period	1 to 2 days (standard period)
	Outline	NWSSTC shall select a model WUSC to conduct this training and to introduce the O&M and management as good practice to participated WUSCs. This training provides an opportunity for WUSCs in semi-urban towns to update and share their experience and good practices of O&M and management, and facilitate interaction among WUSCs, DWSSM, NWSSTC and other related organizations to incubate innovate ideas for improvement of water supply sector.
	Goal	The above objectives will be achieved.

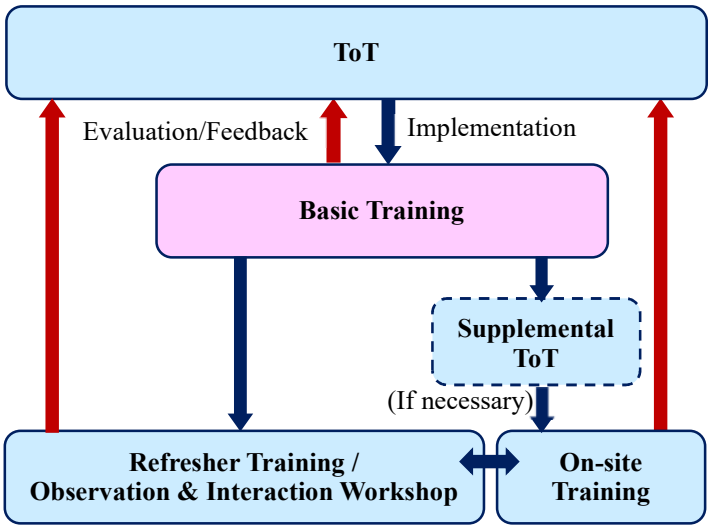
*1) "SOP" has developed for the following purposes:

- To introduce the standard O&M procedure of water supply facility for WUSCs in semi-urban towns.
- To provide safe and effective O&M procedure for WUSC staffs.
- To ensure the quality of O&M activities performed by different staffs.

*2) “Model WUSC” is considered to implement the best practices of community-based water supply management in semi-urban towns. DWSSM/NWSSTC are primarily responsible for selection and coordination with the model WUSC.

Basically, the above mentioned trainings are carried out in order to provide not only necessary knowledge and skill for sound management of water supply through proper O&M, but also required instruments/essential equipment to WUSCs in semi-urban towns. Furthermore, it is desirable that the WUSCs will utilize the acquired knowledge and skills from these trainings and publicize safe and reliable water supply to stakeholders including consumers.

The relationship of these four trainings is shown in the following figure.



Chapter 3 Procedure to Conduct Each Training

3.1 Common Procedure

3.1.1 Training Needs Assessment

(1) NWSSTC shall conduct a training needs assessment so as to optimize the training plan (hereinafter referred to as “Annual Plan”) and syllabus of the training for WUSCs in the semi-urban towns.

3.1.2 Formulation of Annual Plan and Securing Budget

(1) NWSSTC shall prepare the Annual Plan of the next fiscal year based on the results of training needs assessment and evaluation/feedback from the completed trainings.

(2) The Annual Plan shall include the following information:

- ✓ Name of training course

- ✓ Objectives
- ✓ Venue
- ✓ Target trainees (board member, manager, operator, plumber, meter reader, accountant etc.)
- ✓ Approximate number of trainees/participants
- ✓ Training period
- ✓ Budget/ Estimated cost

(3) NWSSTC shall request the necessary budget based on the Annual Plan to DWSSM.

(4) DWSSM shall secure the sufficient financial allocation to implement the Annual Plan in this fiscal year.

3.1.3 Formulation of Syllabus

(1) NWSSTC shall prepare the Syllabus of each training as specified in the approved Annual Plan.

(2) The Syllabus shall include the contents as shown in **Appendix-1**.

(3) The Syllabus shall be finalized at least two weeks before implementation of each training.

3.1.4 Assignment of Trainers/Guest Speakers

(1) NWSSTC shall prepare the list of trainer candidates for each training based on the Syllabus.

(2) DWSSM shall select the eligible trainer candidates in consideration of their availability, level of knowledge and experience, attitude and disciplines.

(3) If any guest speaker is required to implement the training, DWSSM/NWSSTC shall select the speakers among those who have appropriate level of knowledge and experience required to conduct the training.

(4) The list of trainer candidates shall be finalized at least two weeks before implementation of each training.

3.1.5 Development of Training Materials

(1) NWSSTC and the nominated trainers shall prepare the training materials.

(2) NWSSTC and the nominated trainers shall review the standard training materials and update them if necessary.

(3) If any new training material is required for the planned training, such training materials shall be prepared by the trainers/speakers who will conduct the training. NWSSTC shall support them.

(4) NWSSTC shall review the prepared training materials and finalize the materials at least two weeks before implementation of each training.

3.1.6 Selection of Trainees

(1) DWSSM/NWSSTC shall finalize the selection of the trainees of each training based on the Annual Plan and the Syllabus at least two weeks before implementation of each training.

3.1.7 Preparation before Training

(1) NWSSTC shall ensure the venue, accommodation and transportation etc. according to the Syllabus at least two weeks before implementation of each training.

(2) NWSSTC shall make a training schedule and send notification letters including necessary information (schedule, venue etc.) to all participants at least one week before implementation of each training.

(3) NWSSTC and/or the model WUSC shall prepare the following items before implementation of each training.

- ✓ Handout of training materials
- ✓ Stationery
- ✓ Necessary instruments/materials for the training
- ✓ Arrangement of the training place to accommodate participants
- ✓ Preparation of lunch and light meals

3.1.8 Implementation

(1) NWSSTC shall comprehensively manage and proceed the trainings according to the Syllabus and schedule.

(2) The nominated trainer shall conduct each part of training.

(3) NWSSTC shall support the training activities if necessary.

(4) NWSSTC shall prepare a training record by using the specified format and taking photo and/or video during the training.

(5) NWSSTC shall issue the certificates to the fully participated trainees at the closing session.

(6) NWSSTC shall allow necessary expenses to the participants in accordance with NWSSTC's norm.

3.1.9 Evaluation

(1) NWSSTC shall evaluate the training including the trainer's performance by using the specified format (questionnaire sheet is shown in **Appendix-2**).

3.1.10 Feedback

(1) NWSSTC shall obtain feedback from the trainees immediately after the training.

3.1.11 Reporting

(1) The trainer shall submit a brief report to NWSSTC immediately after the training by using the specified format as shown in **Appendix-2**.

(2) NWSSTC shall compile a report including the evaluation results, the analysis of feedback from trainees and the report from the trainers. The report shall be submitted to DWSSM within one month after implementation of the training.

3.2 Training of Trainers (ToT)

(1) Training programs shall be updated/revised based on the evaluation and feedback of the trainings implemented in the previous fiscal year.

(2) NWSSTC shall select candidate trainers from the related organizations and make a plan of ToT.

(3) NWSSTC shall conduct ToT to develop and recruit trainers.

3.3 Basic Training

(1) Training programs shall be updated/revised based on the evaluation and feedback of the trainings implemented in the previous fiscal year. However, under the COVID-19, the training shall be online.

(2) Basically, Basic Training shall be conducted at NWSSTC in Nagarkot.

(3) Manager of the nominated WUSCs shall be invited to Basic Training. However, in case that manager is absence or not designated, one board member and one key technician shall be invited.

(4) The maximum number of trainees shall be within forty considering the capacity of classroom of NWSSTC in Nagarkot and to be for thoughtful and scrupulous instruction.

(5) Each lecture shall be conducted by one trainer and one assistant. In case of practical training, one trainer shall manage within ten trainees, and backup trainers can assist trainees in the practical training session.

3.4 On-site Training

(1) Training programs shall be updated/revised based on the evaluation and feedback of the trainings conducted in the previous fiscal year.

(2) Basically, the On-site Training shall be conducted at WUSC sites.

(3) The trainer(s), key board member, manager and key technician of WUSCs shall check/confirm with management check sheet (refer to **Appendix-3**) whether actual activities of WUSC have been carried out in accordance with the SOPs and management procedure. The manager and/or key technician of WUSC shall explain actual O&M and management activity for the trainer(s). Necessary instruction, suggestion and advise will be provided by the trainer(s) according to the results, and it will be shared with the trainees.

3.5 Refresher Training / Observation and Interaction Workshop

(1) Training programs shall be updated/revised based on the evaluation and feedback of the trainings implemented in the previous fiscal year.

(2) Refresher Training / Observation and Interaction Workshop shall be conducted at model WUSCs as shown in the Annual Plan.

(3) Basically, a model WUSC shall be nominated for the training/workshop by NWSSTC, and the WUSC shall hold the training/workshop with NWSSTC and arrange the study tour such as visit of water treatment plant, intake sites, water distribution facilities and so on.

(4) Participants shall be the suburbs of the model WUSC.

3.6 Basic Training (Online Training)

3.6.1 WUSC with PC & Internet

(1) Confirming WUSCs whether they own a PV and can connect to an internet to attend the online training. In case that WUSCs are NOT in environment where they can take online lecture, see section 3.6.2.

(2) A trainer operates PowerPoint and video materials.

(3) In order to facilitate lectures, question and answers from participants will be held together after lecture.

(4) When some of WUSC participants are unfamiliar with Zoom (online application) operation, how to operate Zoom (microphone/ camera/ on & off) is explained before a lecture starts to prevent the turning on and making noise during the lecture.

(5) Because of online training, practical training such as clamp meter, insulation resistance meter and water quality test kit is not possible. Follow them in the On-site training.

3.6.2 WUSC without PC & Internet

(1) WUSC which does not have devices such as PC and internet connection needs to visit near conference room. Conference rooms shall be prepared by DWSSM/NWSSTC

(2) Projector to share lectures shall be setup by room owners and/or FWSSMPs.

(3) Trainers (DWSSM, NWSSTC and FWSSMPs) do not need to move to sites. Reduce the infection risks to COVID-19, and save the time and money.

(4) To confirm WUSCs locations in a map

(5) To find proper venue to conduct the training (convenient location to gather WUSCs)

(6) Alternative venues: WUSC, FWSSMP, WSSDO, public hall, hotel, etc.

(7) To arrange required equipment such as PC, projector and speaker

Appendix-1 Standard Syllabus

1. Standard Syllabus of ToT

(1) Objectives

- To enhance teaching skills and knowledge necessary for Basic Training and On-site Training.
- To share evaluation results and feedbacks from the previous training activities.
- To provide updates on syllabus and training materials.

(2) Method

Lecture and exercise

(3) Venue

NWSSTC in Nagarkot and/or DWSSM conference room

(4) Training Period

1 day or 2 days (depending on the volume of updates and number of participants)

(5) Trainer

Trainers who experienced both ToT and Basic Training

(6) Trainee

Trainer candidates selected by DWSSM/NWSSTC

(7) Modules

Class	Time	Session	Contents	Materials
Day 1				
Class 1	90 min.	Opening Session	* Opening Remark	N/A
			* Orientation and instruction to participants during training	N/A
			* Self introduction of participants	N/A
			* Objectives of TOT / Basic Training	Power Point
		Module 1: Introduction	* Lecture: Summary of Module 1	Power Point + Basic Info/Checklist (Excel)
Lunch	45 min.			
Class 2	90 min.	Module 2: Water Supply Facilities	* Lecture: Summary of Module 2	Power Point + Movies (10 min.)
		Module 3: Daily O&M	* Lecture: Summary of Module 3	Power Point + Movies (20 min.)
			* Exercise: Chlorination Dosing Calculation	Worksheet
Break	15 min.			
Class 3	90 min.	Module 4: Periodical O&M	* Lecture: Summary of Module 4	Power Point + Movies (25 min.)
Day 2				
Class 1	90 min.	Module 4: Periodical O&M (Cont'd)	* Exercise: Insulation Tester and Clamp Meters	Electrical panel, Insulation tester, Clamp meter
		Module 5: Water Quality Management	* Lecture: Summary of Module 5	Power Point + Movies (30 min.)
Break	15 min.			
Class 2	90 min.	Module 5: Water Quality Management (Cont'd)	* Exercise: Water Quality Test Kit	Water Quality Test Kit
		Module 6: Distribution Facilities	* Lecture: Summary of Module 6	Power Point + Movies (5 min.)
Lunch	45 min.			
Class 3	90 min.	Module 7: Analysis of Water Supply Management	* Lecture: Summary of Module 7	Exercise Sheet (Word)
		Module 8: Planning of Water Supply Management	* Lecture: Summary of Module 8	Power Point
Break	15 min.			
Class 4	90 min.	Closing Session	* Preparation for Basic Training	Power Point
			* Feedback from Participants	N/A
			* Certificates	Certificates

2. Standard Syllabus of Basic Training

(1) Objectives

- To learn/understand “Standard Operating Procedure (SOP)” and “Management” for independent management of water supply facilities to provide safe drinking water to consumers stably and efficiently.
- To analyze the current management situation and make improvement plan from the point of view of stability, efficiency, safety and independence.

(2) Method

Lecture, exercise, groupwork and discussion.

(3) Venue

NWSSTC in Nagarkot

(4) Training Period

approximately 4 days

(5) Trainer

Trainers nominated by DWSSM/NWSSTC

(6) Trainee

Manager or key board member and key technician of the nominated WUSCs

(7) Modules

Class	Time	Session	Contents	Materials
Day 1				
Class 1	90 min.	Opening Session	* Opening Remark	N/A
			* Orientation and instruction to participants during training	Power Point
			* Self introduction of participants	N/A
Break	15 min.			
Class 2	90 min.	Module 1: Introduction	* Lecture: 1-1. Water Users and Sanitation Committee	Power Point
			* Lecture: 1-2. Objectives of Water Supply Management	Checklist (Excel)
			* Exercise: 1-3. Filling in Basic Information and Checklist	Basic Information(Excel)
Lunch	45 min.			
Class 3	90 min.	Module 2: Water Supply Facilities	* Lecture: 2-1. Purpose and Category of Operation and Maintenance	Power Point
			* Movies: Overview of Water Supply Facilities	Movie (10 min.)
			* Lecture: 2-2. Outline of Water Supply Facilities	Power Point
Break	15 min.			
Class 4	90 min.	Module 2: Water Supply Facilities (Cont'd)	* Exercise: 2-3. Self Analysis of WUSC Facilities	Exercise Sheet (Word)
			* Lecture: Review of Day 1	N/A
Day 2				
Class 1	90 min.	Module 3: Daily O&M	* Lecture: 3-1. Purpose of Daily Inspection and Keeping Records	Power Point
			* Movies: Daily Inspections	Movie (20 min.)
			* Lecture: 3-2. Method of Daily Inspection and Trouble Shooting	Power Point
Break	15 min.			
Class 2	90 min.	Module 3: Daily O&M (Cont'd)	* Lecture: 3-3. How to keep Daily Operation / Inspection Record	Power Point
Lunch	45 min.			
Class 3	90 min.	Module 3: Daily O&M (Cont'd)	* Exercise: 3-4. Calculation of Chlorination Dosing	Exercise Sheet (Word)
			* Observation: User of Chlorination Unit	Chlorination Unit
Break	15 min.			
Class 4	90 min.	Module 4: Periodical O&M	* Lecture: 4-1. Purpose of Periodic Inspection	Power Point
			* Movies: Periodic Inspections	Movie (25 min.)
			* Lecture: Review of Day 2	

Class	Time	Session	Contents	Materials
Day 3				
Class 1	90 min.	Module 4: Periodical O&M (Cont'd)	* Lecture: 4-2. Method of Periodic Inspection	Power Point
			* Lecture: 4-3. How to keep Periodic Inspection Record	Power Point
Break	15 min.			
Class 2	90 min.	Module 4: Periodical O&M (Cont'd)	* Exercise: Insulation Tester and Clamp Meter	Electrical panel, Insulation tester, Clamp meter
Lunch	45 min.			
Class 3	90 min.	Module 5: Water Quality Management	* Lecture: 5-1. Scope of Water Quality Management	Power Point
			* Lecture: 5-2. Important Points on Water Quality Management	Power Point
			* Movies : Water Quality Test	Movie (30 min.)
			* Lecture: 5-3. Procedure of Water Quality Test	Power Point
Break	15 min.			
Class 4	90 min.	Module 5: Water Quality Management (Cont'd)	* Lecture: 5-4. Procedure of Water Quality Management	Power Point
			* Lecture: 5-5. Troubleshooting	Power Point
			* Lecture: Review of Day 3	
Day 4				
Class 1	90 min.	Module 5: Water Quality Management (Cont'd)	* Exercise 5-6. Water Quality Test	Water Quality Test Kit
Break	15 min.			
Class 2	90 min.	Module 6: Distribution and Water Meters	* Movies: Water Distribution Facility	Movie (5 min.)
			* Lecture: 6-1. Water Distribution Facility	Power Point
			* Lecture: 6-2. Water Meters	Power Point
Lunch	45 min.			
Class 3	90 min.	Module 7: Analysis of Water Supply Management	* Lecture: 7-1. Analysis Method	Power Point
			* Lecture: 7-2. Key Performance Indicator	Power Point
Break	15 min.			
Class 4	90 min.	Module 7: Analysis of Water Supply Management (Cont'd)	* Exercise: 7-3. Calculation of Key Performance Indicator	KPI Sheet (Excel)

Class	Time	Session	Contents	Materials
Day 5				
Class 1	90 min.	Module 7: Analysis of Water Supply Management (Cont'd)	* Exercise: 7-3. Finalizing KPI and Checklist	Checklist (Excel)
				KPI Sheet (Excel)
Break	15 min.			
Class 2	90 min.	Module 8: Planning of Water Supply Management	* Lecture: 8-1. Business Plan	Power Point
			* Exercise: Identify Priority Areas	KPI Sheet/ Checklist (Excel)
Lunch	45 min.			
Class 3	90 min.	Closing Session	* Feedback from Participants	Feedback forms
			* Closing Remarks	N/A
Break	15 min.			
Class 4	90 min.	Closing Session (Cont'd)	* Certificates	Certificates

3. Standard Syllabus of On-site Training

(1) Objectives

To practically learn how to apply the knowledge acquired from the Basic Training

(2) Method

Observation, inspection and providing necessary instruction/suggestion/advice

(3) Venue

WUSC's site

(4) Training Period

1 day (according to the site situation)

(5) Trainer

Trainer(s) nominated by DWSSM/NWSSTC

(6) Trainee

Board member, Manager and key technician of the nominated WUSCs

(7) Modules

1) Module 1: Water Treatment Plant (Water Supply Facility)

a) Standard Time: half to one day (according to the site situation)

b) Contents:

- Inspection of O&M procedure/activity for main facility/equipment
- Inspection of O&M records
- Inspection of inventory management for spare parts
- Providing necessary instruction, suggestion and advice

2) Module 2: Water Supply Management

a) Standard Time: half day

b) Contents:

- Collection of KPIs data
- Conduct of interview survey to board members and/or manager with the management check sheet
- Confirmation of the schematic flow diagrams (water supply system drawings)
- Detection of required essential equipment such as flow meter, chlorination unit, valve and so on
- Confirmation of essential equipment installations
- Inspection of water quality test record
- Inspection of distribution network maps
- Inspection of annual report including financial statements and internal audit
- Inspection of customer complaints register
- Providing necessary instruction, suggestion and advice

(8) Local Government engineers shall be invited to observe WUSC.

4. Standard Syllabus of Refresher Training / Observation and Interaction Workshop

(1) Objectives

- To introduce new subjects/topics which are not covered by the Basic Training
- To obtain feedback on the Basic Training and On-site Training
- To share good practices & key issues of among participated WUSCs in semi-urban towns
- To introduce policy and technology related to water sector
- To facilitate interaction among participated WUSCs in semi-urban towns and support organizations

(2) Method

Forum style

(3) Venue

Model WUSC meeting room or suitable places (hotel, hall etc.)

(4) Training Period

Basically 2 days (according to the number of training modules)

(5) Trainer

Chief and/or engineer of NWSSTC, chairperson /manager of the model WUSC, guest speaker

(6) Trainee / Participant

Board members and/or Manager of the invited WUSCs, engineers of FWSSMP, MoPID, WSSDO and Local Government etc.

(7) Modules

The modules shall be designed and developed according to the results of needs assessment, the evaluation and feedback of the trainings implemented in the previous fiscal year. The following examples shall be modified accordingly.

1) Example Module 1: Water Sector Policy

a) Objectives: To familiarize with recent movement of water sector policy and possible impacts on WUSC in semi-urban towns

b) Standard Time: within 60 minutes

c) Trainer: 1 guest speaker

2) Example Module 2: WASMIP-II Achievements and Lessons Learnt

a) Objectives: To share the achievements and best practices of WUSC in semi-urban towns which are benefited from WASMIP-II

b) Standard Time: within 60 minutes

c) Trainer: Chief of NWSSTC

Appendix-2 Training Evaluation Questionnaires

1. Evaluation Questionnaire for WUSCs

Every lecture					
S.N.	**Questions**				
1	How important was the training?	Less Important	Fair	Important	Very Important
2	Do you understand the lecture?	Poor	Fair	Good	Very Good
3	The training was useful on the basis of following items.	Poor	Fair	Good	Very Good
	Training Contents				
	Methodology				
	Presentation (speech, explanation, speed)				
	Training Materials				
4	How was the training conducted?	Not Good	Cannot Decide	Good	Excellent
5	Do you think what you learned in the training is useful in your business in your WUSC?				
A	Yes, it can be directly applied to work.				
B	It cannot be directly applied, but it can be adaptable to work.				
C	It cannot be directly applied or adapted, but it can be of reference to me.				
D	No, it was not useful at all.				
6	What subject/topic do you want to learn in this lecture?				

Last Session (After training on DAY-5)					
1	Time wise the training was	Long	Appropriate	Short	Too Short
2	Were the facilities during your stay good?	Don't Agree	Cannot Decide	Agree	Strongly Agree
	Accommodation				
	Food				
	Recreational				
3	Any comment				

2. Trainer Comment

Every Module, Trainer needs to answer the following

1. What is improvement points in the Powe Point material?

2. What is improvement points in the video material?

3. What is improvement points in the practice/exercise?

4. What subject/topic is additionally required in the text?

5. Revised/reexpress the Nepali words in the text

Page	Revised words	Re-expressed writings

6. Any comment to improve the Power Point and/or video materials

Appendix-3 Management Check Sheet for the On-site Training

WUSC Name: Survey Date:

Inspector Name: Respondent Name: (Position:)

Category	No	Item	Q	Descriptions	Yes	No	If No, Reason
Governance	1	Annual General Meeting	1	* WUSC holds an Annual General Meeting.			
			2	* The schedule of Annual General Meeting is notified to all users.			
			3	* Management Board member, attendance Rate of Annual General Meeting is high.			
			4	* WUSC invites MoPID or WSSDO or FWSSMP or Local Government (LG) in an Annual General Meeting.			
			5	* WUSC reports important decision of an Annual General Meeting to MoPID or WSSDO or FWSSMP or LG.			
				MoPID (Ministry of Physical Infrastructure Development), WSSDO (Water Supply and Sanitation Division Office)			
				FWSSMP (Federal Water Supply and Sewerage Management Project)			
	2	Election	6	* The members of Management Board are selected by election.			
			7	* The election is conducted regularly in a transparent way.			
			8	* The election is conducted with participation of all members of users committee.			
	3	Management Board	9	* Management Board holds regular meeting.			
			10	* The minutes of Management Board meeting are recorded.			
			11	* Management Board gives necessary instructions to Manager timely.			
	4	Sub Committees	12	* Sub-committees are established for key management areas. (e.g., Water Safety Plan, procurement)			
			13	* Each sub-committee holds meeting regularly.			
			14	* Each sub-committee makes decisions effectively.			
	5	Internal Audit	15	* Internal Audit Committee is established.			
			16	* Internal Audit Committee submits findings and recommendations to Management Board regularly.			
			17	* An improvement plan is implemented according to the recommendations by Internal Audit Committee.			
	6	Social Considerations	18	* WUSC has adapted a policy on Gender Equality and Social Inclusiveness.			
			19	* WUSC has adapted a policy on consideration for poor households.			
			20	* WUSC has adapted a policy on consideration for disabled people.			
	7	Goal Management	21	* WUSC has explicitly declared statements for its goal. (e.g., mission statement, vision)			
			22	* All staff know such mission statement or vision.			
	8	Mid-Term Plan	23	* WUSC has a mid-term management plan to detail the concept of mission statement or vision.			
			24	* The mid-term management plan includes rehabilitation and/or replacement of facilities.			
	9	Annual Report	25	* WUSC compiles and submits annual report timely.			
			26	* The annual report covers financial statements, auditors' report, and budget for the next fiscal year.			

Category	No	Item	Q	Descriptions	Yes	No	If No, Reason
Human Resources	10	Code of Conduct	27	* WUSC has stipulated Code of Conduct for staff.			
			28	* All staff recognize and comply with Code of Conduct.			
	11	Job Descriptions	29	* The duties of manager and each staff are explicitly described in job descriptions.			
			30	* The workload of manager and each staff are appropriate.			
			31	* The workload of manager and each staff are evenly distributed.			
	12	Staff Communications	32	* Staff reports their duties and problems regularly.			
			33	* Manager visits, monitors and advises staff regularly.			
			34	* Communication among staff to share problems is frequent.			
	13	Staff Appraisals	35	* WUSC conducts staff appraisals to objectively evaluate their performance of staff.			
			36	* Staff can receive incentives/acknowledgement for his/her good performance.			
	14	Motivation	37	* Staff have high motivation to work.			
			38	* Staff retention is high enough.			
	15	Knowledge and Skills	39	* The knowledge and skills required for manager and staff have been identified.			
			40	* Manager and Staff have sufficient knowledge and skills for their duties.			
			41	* Manager has sufficient management skills. (e.g., leadership, team building, time management)			
	16	Training	42	* Staff receive training to increase knowledge and skill for their duties.			
			43	* Training materials are archived for knowledge sharing among staff.			
			44	* WUSC conducts induction training for new staff.			
			45	* WUSC dispatch staffs to training in NWSSTC when they are invited.			
	17	Water Source	46	* Existing water sources can provide sufficient volume of water.			
			47	* Existing water sources can provide safe water.			
			48	* WUSC has a plan to increase new water resource (surface/groundwater).			
	18	Facility for Water Volume	49	* Water Treatment Plant has sufficient capacity to respond to water demand.			
			50	* WUSC has expansion and/or new Water Treatment Plant constructions.			
			51	* Service Hours is long enough to respond to water demand.			
			52	* Service Hours is same throughout rainy season and dry season.			
	19	Facility for Water Quality	53	* Water Treatment Plan has necessary facilities to improve water quality.			
			54	* Water Treatment Plant is backwashed and/or maintained in a timely manner.			
			55	* WUSC understands dosing amount of chlorine solution for using chlorination unit.			
			56	* Permissible turbid water (lower turbidity) is used in a water treatment plant.			

Category	No	Item	Q	Descriptions	Yes	No	If No, Reason
Facility	20	Measurement Equipment	57	* Water production facilities are equipped with meter and gauge for water volume and pressure.			
			58	* WUSC has toolkit to measure electric equipment. (i.e., insulation tester, clamp meter)			
			59	* WUSC has toolkit to measure water quality. (i.e., water quality test kit, turbidity meter)			
	21	Maintenance Equipment	60	* WUSC has toolkit for maintenance and repair of facilities.			
			61	* WUSC has cleaning tools for facilities.			
			62	* WUSC understands hoe to use the electrical devices (e.g., insulation continuity tester, digital clamp meter, earth tester)			
			63	* WUSC has safety tools and equipment.			
	22	Distribution Network	64	* WUSC maintains (develops and/or updates) a map of distribution network.			
			65	* Household connections are high enough.			
			66	* Metered Ratio for houses and commercial buildings is high enough.			
			67	* WUSC has valves or air valves or washout valves or fire hydrant in a distribution network.			
	23	Disaster management	68	* WUSC has disaster management plan.			
			69	* Facilities are resistant/protected to natural disaster.			
			70	* WUSC has an insurance for water supply facilities.			
	24	Power Supply	71	* Power supply is stable.			
			72	* WUSC has backup generator in case of power failure.			
	25	Lifetime of Facility	73	* The age of facilities and equipment is within their lifetime.			
			74	* Breakdown of facilities is not frequent.			
			75	WUSC has cleaned the Water Treatment Plant.			
	26	Office	76	* WUSC office is spacious enough as a working environment, and equipped with sufficient infrastructure.			
			77	* WUSC has laboratory for water quality test.			
			78	* WUSC has workshop and inventory stores for repair and maintenance.			
O&M Operation	27	Security and Safety	79	* Facilities have sufficient security.			
			80	* Staff wear items for securities during certain O&M (Operation and Maintenance) works. (e.g., helmet, mask, goggle, mask)			
	28	Utilization of Facilities	81	* Actual water production volume is close to water supply capacity.			
			82	* Production Ratio (supplied water per person) is at an appropriate level.			
			83	* WUSC has periodically scraped and washed the sand in slow sand filter (if any).			
			84	* WUSC has Schematic Flow Diagram (water supply system drawing).			
	29	Manuals	85	* WUSC has a SOP (Standard Operating Procedure) for all facilities.			
			86	* WUSC has manuals for equipment and use them.			
			87	* WUSC conducts operation and preventative maintenance as per instruction of SOP.			
	30	Water Quality	88	* WUSC understands how to use water quality test kits (e.g. ENPHO kit).			
			89	* WUSC understands proper sampling points in water supply systems.			
			90	* WUSC conducts daily water quality test for four test parameters. (pH, turbidity, Total Dissolved Solid, Free Residual Chlorine)			
			91	* WUSC sends samples to a laboratory for monthly or yearly water quality test.			
			92	* The result of water quality test is good (to meet the National Drinking Water Quality Standards).			
			93	* WUSC discloses report of water quality test results to the consumers.			

Category	No	Item	Q	Descriptions	Yes	No	If No, Reason
Operation and Maintenance	31	Water Leakage	94	* Case of water leakage is at an acceptable level.			
			95	* Water leakage is repaired within short time after a case is reported.			
			96	* WUSC has major fittings in stock for emergency water leakage maintenance.			
	32	Periodical Operations	97	* The annual plan of periodical maintenance is formulated.			
			98	* WUSC conducts operation and preventative maintenance as per instruction of SOP.			
			99	* WUSC records Periodical Operations in a record book.			
	33	Troubleshooting	100	* Immediate action is taken for the problems.			
			101	* There is NO out of order in the water supply facilities.			
			102	* NRW (Non-Revenue Water) is low enough.			
			103	* WUSC uses a domestic water meter calculation method of instrumental error when a consumer made claim on water meter error.			
			104	* WUSC records all the troubleshooting in a record book.			
	34	Inventory Management	105	* Spare parts are stocked orderly in a designated space or shelf.			
			106	* Spare parts are replenished timely in case of out of stock.			
			107	* Quantity of spare parts are counted and recorded regularly.			
	35	Office	108	* Water treatment facilities and water source are cleaned regularly.			
			109	* WUSC office is cleaned and tidied regularly.			
			110	* WUSC has a computer to record and analyze data.			
Information	36	Operation Record	111	* Flow meters are read and recorded daily, and water meters for domestic are read and recorded monthly.			
			112	* Manager checks the operation and inspection records regularly.			
			113	* Result of water quality test is recorded and disclosed to the public daily.			
	37	ICT	114	* WUSC has a computerized system. (e.g., billing, accounting, Management Information System)			
			115	* Staff have sufficient knowledge and skills to operate computer systems.			
			116	* Security measures are implemented to protect data. (e.g., data backup, password protection)			
	38	Document Management	117	* Important documents are filed and stored orderly.			
			118	* Documents are regularly checked by Manager for inspection.			
			119	* Documents are regularly checked by Internal Audit Committee for audit.			
	39	Water Tariff	120	* Current level of water tariff can cover operating cost.			
			121	* Current level of water tariff is at an affordable level.			
			122	* Surcharges are applied for delayed payment, and it works effectively to improve Collection Ratio.			
	40	Cost Management	123	* Unit Production Cost (NPR/m^3) is controlled at an appropriate level.			

Category	No	Item	Q	Descriptions	Yes	No	If No, Reason
Finance	41	Tariff Collection	124	* Schedule of meter reading and billing is fixed.			
			125	* WUSC is making an effort that uncollected bills of water tariff are minimal.			
	42	Accounting	126	* All financial transactions are recorded timely.			
			127	* Cash on hand is checked and stored in a lockable safe daily.			
			128	* Balance of deposits in all bank accounts is checked at least monthly.			
	43	Procurement	129	* Procurement is always authorized by relevant sub-committee.			
			130	* Suppliers can provide equipment and consumables necessary for operation and maintenance for water supply timely.			
	44	Financial Analysis	131	* WUSC produces trial balance (amount of money) regularly at least quarterly.			
			132	* The financial status is reported to the Manager and Management Board regularly at least quarterly.			
Communications	45	Customers Management	133	* WUSC responds to claim and requests from customers timely.			
			134	* All claims from customers are recorded.			
			135	* Customer satisfaction is high for water service.			
	46	Information Disclosure	136	* The result of water supply operations including water quality test is disclosed daily.			
			137	* The annual report is shared with stakeholders (WUSC member, consumers, local government, WSSDO or FWSSMP, etc.).			
	47	Public Awareness	138	* WUSC has developed or obtained necessary items for awareness program.			
			139	* WUSC conducts awareness programs regularly. (e.g., water conservation, tariff, sanitation)			
	48	Online Services	140	* WUSC utilizes Internet/mobile for communications with customers. (e.g., e-mail, messenger, Social Network System)			
	49	Government	141	* WUSC understands national level laws, regulations and policy on water sector.			
			142	* WUSC communicates with Federal Government (DWSSM/NWSSTC).			
			143	* WUSC communicates with Provincial or Local Government regularly for operation and maintenance.			
	50	WUSC Network	144	* WUSC interacts with other WUSCs regularly.			
			145	* WUSC organizes yearly observation tour to visit other WUSCs.			

Surveyor Name with Organization and Position

WUSC Responsible Person Name:

Signature

Signature

Appendix 2.40

Minutes of Meetings on Amendment of R/D

MINUTES OF MEETINGS
BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY
AND
MINISTRY OF WATER SUPPLY AND SANITATION FOR
CAPACITY DEVELOPMENT PROJECT FOR THE IMPROVEMENT OF WATER SUPPLY MANAGEMENT IN SEMI-URBAN AREAS (WASMIP-II)

The Japan International Cooperation Agency (hereinafter referred to as "JICA"), and the Ministry of Water Supply and Sanitation (The then Ministry of Urban Development) (hereinafter referred to as "MoWSS") hereby agree the Record of Discussion (hereinafter referred to as "R/D") on the Capacity Development Project for the Improvement of Water Supply Management in Semi-Urban Areas (hereinafter referred to as "the Project") signed on 22 December 2015 shall be amended as attached hereto.

Kathmandu, 2 April 2018

Mr. Jun Sakuma
Chief Representative,
JICA Nepal Office,
Japan International Cooperation Agency,
Japan

Mr. Anil Bhadra Khanal
Joint Secretary,
Ministry of Water Supply and Sanitation,
The Federal Democratic Republic of Nepal

Mr. Tej Raj Bhatta
Director General,
Department of Water Supply and Sewerage,
Ministry of Water Supply and Sanitation,
The Federal Democratic Republic of Nepal

Annex 1: Amendment of Record of Discussion
Annex 2: Main Points Discussed
Annex 3: Project Design Matrix
Annex 4: Plan of Operation
Annex 5: Record of Discussions (signed on 22 December 2015)

AMENDMENT OF RECORD OF DISCUSSION

1. The Reason of Amendment

Despite the fact that local government has prime responsibility to provide basic water supply services at local level as stipulated in the Nepal's new constitution, technical support from central or provincial level especially for semi urban / urban water supply utility is unavoidable at current situation. In this regard, the role of Department of Water Supply and Sewerage (hereinafter referred to as "DWSS") to provide technical support to Water Users and Sanitation Committee (hereinafter referred to as "WUSC") is deemed inevitable. Therefore, JICA will continue concrete support through the Project on DWSS to strengthen the support mechanism for WUSCs in semi-urban towns. However, since the local level governance is changing drastically, the Project needs to be adjusted to the new situation.

2. The outline of Amendment

According to the revision of the project concept, R/D shall be amended as follows:

Present R/D	Amended R/D
Background (final paragraph)	
The goal of current Capacity Development Project was to replicate these Management model and Support Model in other WUSCs across the country	The goal of the project was to update Management & Support model (as WASMIP model) so as to increase its versatility, and enhance the capacity of DWSS and NWSSTC for supporting WUSC in semi-urban towns across the country through implementation of updated model in a progressive way. *"Technical Support Mechanism" as part of Support Model is implemented in the Project.
Overall Goal	
Supporting mechanisms for WUSCs of semi-urban towns* by DWSS/NWSSTC/RMSO/WSSDO is established. (* Towns with population of over 5000 except those covered by ADB's STWSSSP projects)	Continuous support to WUSCs in semi-urban towns is provided by DWSS and NWSSTC.
Project Purpose	

Supporting mechanism for target WUSCs by DWSS/NWSSTC/RMSO/WSSDO is established	Support to the WUSCs in semi-urban towns is provided and strengthened by DWSS and NWSSTC using government and non-government organizations' personnel. (*)
Outputs	
(1) Support & Management Model (WASMIP Models) established in WASMIP I is reviewed/updated and its implementation modality is established, contributing in finalization of PDM/PO. (2) Training Capacity of National Water Supply and Sanitation Training Center (NWSSTC) is strengthened. (3) Human resource development and capacity enhancement system for target RMSO/WSSDO is established. (4) Training system for target WUSCs by DWSS/NWSSTC/RMSO/WSSDO is established. (5) Monitoring System based on Performance Indicators (PIs) of target WUSCs are established in DWSS	(1) Baseline survey and capacity assessment of DWSS, NWSSTC, RMSO, WSSDO and the target WUSC are conducted, and project implementation plan is finalized. (2) Supporting capacity of DWSS regarding O&M and management for WUSCs in semi-urban towns is strengthened. (3) Implementing capacity of NWSSTC regarding the training for WUSCs in semi-urban towns is strengthened.
PDM, Objectively Verifiable Indicators	
<For Overall Goal> 1. More than XX% of target WUSCs adopt the business plan, SOPs and financial plan based on WASMIP Models. 2. More than XX% of target WUSC are annually monitored by DWSS. **<For Project Purpose>** 1. More than XX% of target WUSC adopt the business plan, SOPs and financial plan based on WASMIP Models.	**<For Overall Goal>** 1. The trainings are continuously implemented by NWSSTC on the Management Model for WUSCs in semi-urban towns. 2. The contents of the Management Model are utilized for the management of water supply of WUSCs in semi-urban towns. **<For Project Purpose>** 1. The revision process and sections of DWSS responsible for the Management Model and Technical

2. More than XX% of target WUSC are annually monitored by DWSS.	Support Mechanism for WUSCs in semi-urban towns are identified. 2. The sections of DWSS responsible for the training on the Management Model for WUSCs in semi-urban towns and revision process of training implementation guideline are identified. 3. More than 15 trainers, who are able to carry out the training on the Management Model for WUSCs in semi-urban towns, are developed. From this trainer batch, at least six must be employees of RMSO or WSSDO. 4. Capacity assessment results of trainers on the Management Model for target WUSCs in semi-urban towns are improved compared to the baseline. 5. The final version of the Management Model, training implementation guideline, training plan, and training curriculums for WUSCs in semi-urban towns are officially approved/ authorized by DWSS.
<For Output 1> 1.1 Various WASMIP Models for type of water supply condition (water source, treatment method, etc.) are developed. 1.2 Revised PDM and PO **<For Output 2>** 2.1 NWSSTC has standardized training curriculum for water supply. 2.2 NWSSTC adopts/implements standardized SOPs and manual based on updated WASMIP Models. 2.3 Training implementation guideline is	**<For Output 1>** 1.1 Results of the baseline survey and capacity assessment in DWSS, NWSSTC, RMSO, WSSDO and target WUSCs are shared with counterpart. 1.2 Project Design Matrix (PDM) and Plan of Operation (PO) are finalized. **<For Output 2>** 2.1 The Management/Support Model for WUSCs in semi-urban towns formulated during phase-I project is revised in the context of the actual

adopted by NWSSTC **<For Output 3>** 3.1 Target WSSDOs have annual plans for training, monitoring as such. 3.2 Target WSSDOs & RMSOs receive training and OJTs from NWSSTC and deliver it to WUSCs. **<For Output 4>** 4.1 More than XX% of pilot WUSCs adopt the business plan, SOPs and financial plan based on WASMIP Models. **<For Output 5>** 5.1 Annual Monitory and Evaluation record/report of DWSS for target WUSCs are established. 5.2 Reward system/record of best performing WUSCs is established.	situation of WUSCs in semi-urban towns. 2.2 Design manual of specifications on rehabilitation works for target WUSCs in semi-urban towns are shared in the annual progress review meeting of WSSDO. 2.3 Rehabilitation works are carried out in more than 50 target WUSCs in semi-urban towns. **<For Output 3>** 3.1 Training implementation guideline, training plan, training curriculums and training materials for WUSCs in semi-urban towns are formulated. 3.2 The Management Model for WUSCs in semi-urban towns is utilized in trainings in NWSSTC. 3.3 More than 80% of target WUSCs attend the Basic Training on the Management Model. 3.4 Monitoring and evaluation of more than 80% of target WUSCs are carried out.
Other than above	
Other contents are amended as attached Project Design Matrix (hereinafter referred to as "PDM") and Plan of Operation (hereinafter referred to as "PO").	

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

MAIN POINTS DISCUSSED

1. **Definition of WUSCs in semi-urban towns**

Both sides agreed on the definition of "semi-urban towns" as the towns with design population of 5,000 to 40,000), which is stipulated in "Nepal Water Supply, Sanitation and Hygiene Sector Development Plan (2016-2030)".

2. **Necessary support for WUSCs in semi-urban towns**

Both sides discussed the necessary support for WUSCs in semi-urban towns and DWSS emphasized that financial, technical, hardware supports were indispensable. JICA explained that the Project would continue concrete support to strengthen technical capacity of DWSS for supporting WUSCs in semi-urban towns. Both sides confirmed financial support (i.e., training implementation, rehabilitation works as well as hardware support (i.e., rehabilitation works) required for WUSCs in semi-urban towns would be taken care by DWSS.

3. **DWSS's Models to support WUSCs**

DWSS informed that DWSS is promoting/institutionalizing three models to support for effective management of WUSCs namely a) Management Model, b) Support Model, and c) Smart Water Management Model. Management Model and Support Model are outputs of WASMIP I namely WASMIP Model, and DWSS has been trying to institutionalize them.

JICA explained that the findings obtained during the field surveys of the Project revealed that WASMIP Model needs to focus more on WUSCs in semi-urban towns, and therefore the Project has been revising WASMIP Model to increase the versatility and to be institutionalized in DWSS.

JICA further explained that the Project focuses on a) Management Model and part of b) Support Model, and supports to c) Smart Water Management Model are out of scope of the Project.

4. **Definition of Management Model**

Both sides agreed that the definition of "Management Model" as a general term of DWSS's various guidelines for proper management of water supply works by WUSCs in semi-urban towns. Management Model is planned to consist of two modules, "Standard Operation Procedures (hereinafter referred to as "SOP")" and "Management Manuals" (*) which are revised from "Management Model of WASMIP-I" and required to be institutionalized.

(*) SOPs consist of a) Water Quality Management, b) Water Treatment Plant O&M, c) Water Distribution Facilities O&M and d) Water Meter Management. Management Manuals consist of a) Operational & Analysis and b) Business Planning.

5. **Definition of Support Model**

Both sides agreed that the definition of "Support Model" as a general term of DWSS's various support mechanisms for WUSCs. DWSS informed that Support Model should not be confined to trainings and include different types of support such as capacity building, business planning, financial, technical, hardware support, support for system efficiency etc.

Both sides agreed that the Project would largely focus on capacity development part through the following "Technical Support Mechanism" as part of Support Model. Both sides also agreed that other components of Support Model such as financial and hardware support needed by the WUSC would be taken care by DWSS.

6. **Technical Support Mechanism to WUSCs in semi-urban towns**

Both sides confirmed that a "Technical Support Mechanism" as part of Support Model would be implemented through DWSS/National Water Supply and Sanitation Training Center (hereinafter referred to as "NWSSTC") to support improving operation and maintenance (hereinafter referred to as "O&M") and management of WUSCs in semi-urban towns. The Technical Support Mechanism intends to directly support WUSCs in semi-urban towns through NWSSTC, utilizing local resources such as Regional Monitoring and Supervision Office (hereinafter referred to as "RMSO") and Water Supply and Sanitation Division Office (hereinafter referred to as "WSSDO"). The Project will provide technical support for DWSS/NWSSTC especially about planning and implementing the Technical Support Mechanism.

The tentative Technical Support Mechanism by way of training implementation to be supported by the Project is described in the table below.

Contents	Objectives	Target Groups (Trainees)
Training of Trainers (ToT)	Improve teaching skills as trainers necessary for conducting basic training and on-site training	MoWSS/DWSS/NWSSTC/RMSO/WSSDO Engineers (***)
Basic Training	Increase technical and management knowledge on O&M of water supply systems at WUSCs in semi-urban	-Chairperson, Manager, Operators, Technicians and Members of Internal Audit

	towns	Committee of WUSCs -RMSO/ WSSDO's Engineers (candidates of ToT trainees)
On-site Training(*)	-Practically learn how to apply the knowledge obtained in the Basic Training -Provide necessary advisory on O&M of water supply system to DWSS	WUSC staff members who participated in Basic Training
Refresher Training (**)	-Obtain new knowledge which is not covered by the Basic Training -Share good practices and key issues at WUSCs in semi-urban towns	Chairperson and Manager of WUSCs who participated in Basic Training and On-site Training

(*) The On-site Training can be utilized for DWSS/NWSSTC to monitor whether the WUSCs applies the knowledge obtained in the Basic Training.

(**) The Refresher Training can be utilized for DWSS/NWSSTC to obtain feedback from the WUSCs regarding the implementation of technical and management skills trained in the Basic Training and On-site Training.

7. **Budget allocation to implement the "Technical Support Mechanism"**

JICA appreciated the DWSS's efforts for securing the counterpart fund and implementing various activities including trainings in NWSSTC and rehabilitation works in target WUSCs. Considering the sustainability of Technical Support Mechanism implemented during the Project, JICA requested the continuous supports of DWSS to allocate budget for NWSSTC not only from counterpart fund but also based on the annual budget plan of DWSS/NWSSTC in the future. DWSS agreed on it.

8. **Amendment of associated organizations' names corresponding with federal restructuring in Nepal**

Both sides took a note that the above amendment considers the transitional situation of the country in terms of federal restructuring. It is expected that names and roles of organizations (such as WSSDO, RMSO, NWSSTC, etc.) could be changed in new governmental set up with three tiers of government (local, provincial and federal). Necessary amendment would be considered after finalization of working modality under new federal set up.

END

Project Design Matrix

Project Title: Capacity Development Project for the Improvement of Water Supply Management in Semi-Urban Areas (WASMIP-II)
Implementing Agencies: Department of Water Supply and Sewerage (DWSS) and National Water Supply and Sanitation Training Centre (NWSSTC)
Target Group: DWSS, NWSSTC, RMSO, WSSDO and Target Water Users and Sanitation Committee (WUSC) (*1)
Period of Project: Five years from initial assignment of JICA expert(s) in Nepal
Project Site: Nagarkot (Location of NWSSTC), Kathmandu, Location of Target WUSC (*2)

Version 2.0
Dated 14 March 2018

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal					
Continuous support to WUSCs in semi-urban towns is provided by DWSS and NWSSTC.	1. The trainings are continuously implemented by NWSSTC on the Management Model for WUSCs in semi-urban towns. 2. The contents of the Management Model are utilized for the management of water supply of WUSCs in semi-urban towns.	1. NWSSTC Annual Report, Interview with related persons 2. DWSS Annual Report, Interview with related persons			
Project Purpose					
Support to the WUSCs in semi-urban towns is provided and strengthened by DWSS and NWSSTC using government and non-government organizations' personnel (*3)	1. The revision process and sections of DWSS responsible for the Management Model and Technical Support Mechanism for WUSCs in semi-urban towns are identified. 2. The sections of DWSS responsible for the training on the Management Model for WUSCs in semi-urban towns and revision process of training implementation guideline are identified. 3. More than 15 trainers, who are able to carry out the training on the Management Model for WUSCs in semi-urban towns, are developed. From this trainer batch, at least six must be employees of RMSO or WSSDO. 4. Capacity assessment results of trainers on the Management Model for target WUSCs in semi-urban towns are improved compared to the baseline. 5. The final version of the Management Model, training implementation guideline, training plan, and training curriculums for WUSCs in semi-urban towns are officially approved/authorized by DWSS.	1. Management Model and Training Implementation Guideline, Interview with related persons 2. Training Implementation Guideline, Interview with related persons 3. List of Trainers 4. Result of Capacity Assessment (by Self evaluation) 5. Approval documentation by DWSS	1. Budget for NWSSTC is ensured as previous years 2. There is no major changes for involving of the jurisdiction to WUSCs in semi-urban towns by DWSS and NWSSTC		

Outputs (1) Baseline survey and capacity assessment of DWSS, NWSSTC, RMSO, WSSDO and the target WUSCs are conducted, and project implementation plan is finalized.	1.1 Results of the baseline survey and capacity assessment in DWSS, NWSSTC, RMSO, WSSDO and target WUSCs are shared with counterpart. 1.2 Project Design Matrix (PDM) and Plan of Operation (PO) are finalized.	1. Minutes of Meetings 2. PDM and PO			
(2) Supporting capacity of DWSS regarding O&M and management for WUSCs in semi-urban towns is strengthened.	2.1 The Management Model / Support Model for WUSCs in semi-urban towns formulated during phase-I project is revised in the context of the actual situation of WUSCs in semi-urban towns. 2.2 Design manual of specifications on rehabilitation works for target WUSCs in semi-urban towns are shared in the annual progress review meeting of WSSDO. 2.3 Rehabilitation works are carried out in more than 50 target WUSCs in semi-urban towns.	1. Management model 2. Minutes of review meeting, Interview with related persons 3. DWSS Annual Report			
(3) Implementing capacity of NWSSTC regarding the training for WUSCs in semi-urban towns is strengthened.	3.1 Training implementation guideline, training plan, training curriculums and training materials for WUSCs in semi-urban towns are formulated. 3.2 The Management Model for WUSCs in semi-urban towns is utilized in trainings in NWSSTC. 3.3 More than 80% of target WUSCs attend the Basic Training on the Management Model. 3.4 Monitoring and Evaluation of more than 80% of target WUSCs are carried out.	1. Training implementation guideline, training plan, training curriculums and training materials 2. NWSSTC Annual Report, Interview with related persons 3. NWSSTC Annual Report 4. NWSSTC Annual Report			

Activities	Inputs		Important Assumption
	The Japanese Side	The Nepalese Side	
1.1 Conduct a baseline survey and technical, financial, management and organizational capacity assessment of DWSS, RMSO, NWSSTC, WSSDO and the target WUSCs. 1.2 Conduct a situation analysis surrounding water supply sector in semi-urban towns including legislation and development plans. 1.3 Analyze the supporting mechanism for WUSCs by DWSS, NWSSTC, RMSO and WSSDO. 1.4 Coordinate and consult with the Third Small Town Project and Sector Efficiency Improvement Unit (SEIU) on support for WUSCs in semi-urban towns. 1.5 Revise PDM and PO reflecting the result of aforementioned activities.	(1) Japanese Experts/Consultants ・Chief Advisor / Water Supply Management Policy (1) ・Deputy Chief Advisor / Water Supply Management Policy (2) ・Monitoring and Evaluation ・Management (organizational, financial, business planning) ・Water quality control and monitoring ・O&M of water treatment plants and distribution facilities ・O&M of electro-mechanical equipment ・Training Management / Curriculum Development ・Project Coordinator / Assistant for Water Supply Management Policy	(1) Assignment of C/P Unit at DWSS and officials (2) Running Expenses - Mobilization cost of DWSS personnel - Cost for facility rehabilitation -Procurement cost for water quality test kit and Electrical equipment (3) Office space - Office space in DWSS, NWSSTC (4) Other Support - Costs of customs clearance, domestic transportation, storage and installation of equipment provided by JICA as per the Agreement on Technical Cooperation signed on 3 September 2003	1. No significant change in organizational structure of DWSS is occurred.
			Pre-Conditions
2.1 Study the monitoring and management evaluation indicators suited on the current condition of WUSCs in semi-urban towns, and revise the Management Model for enhancing the usability of the model for WUSCs in semi-urban towns by DWSS. 2.2 Plan necessary rehabilitation works for some of target WUSCs in semi-urban towns by DWSS. 2.3 Conduct necessary rehabilitation works for some of target WUSCs in semi-urban towns by DWSS. 2.4 Prepare a design manual of specifications on rehabilitation works for target WUSCs in semi-urban towns by DWSS. 2.5 Identify and document the section of departments responsible for training implementation for WUSCs in semi-urban towns by DWSS. 2.6 Formulate an outline of the Training of Trainers (ToT) regarding the Basic Training and On-site Training and instruct NWSSTC to implement the training by DWSS. 2.7 Formulate an outline of the Basic Training for the WUSCs in semi-urban towns and instruct NWSSTC to implement the training by DWSS. 2.8 Formulate an outline of the On-site Training for the WUSCs in semi-urban towns and instruct NWSSTC to implement the training by DWSS. 2.9 Formulate an outline of the Refresher Training for the WUSCs in semi-urban towns and instruct NWSSTC to implement the training by DWSS. 2.10 Evaluate the above-mentioned trainings conducted by NWSSTC, and reflect its results on the training on the Management Model for WUSCs in semi urban towns in following years by DWSS. 2.11 Allocate a budget for NWSSTC to implement the above-mentioned trainings by DWSS. 2.12 Re-update the Management Model for WUSCs in semi-urban towns upon receiving feedbacks from Output 3.	(2) Training programs ・Program in Japan (3) Equipment ・Training supporting kits and materials ・Ultra sonic flowmeter ・Electrical equipment		<Issues and countermeasures>

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

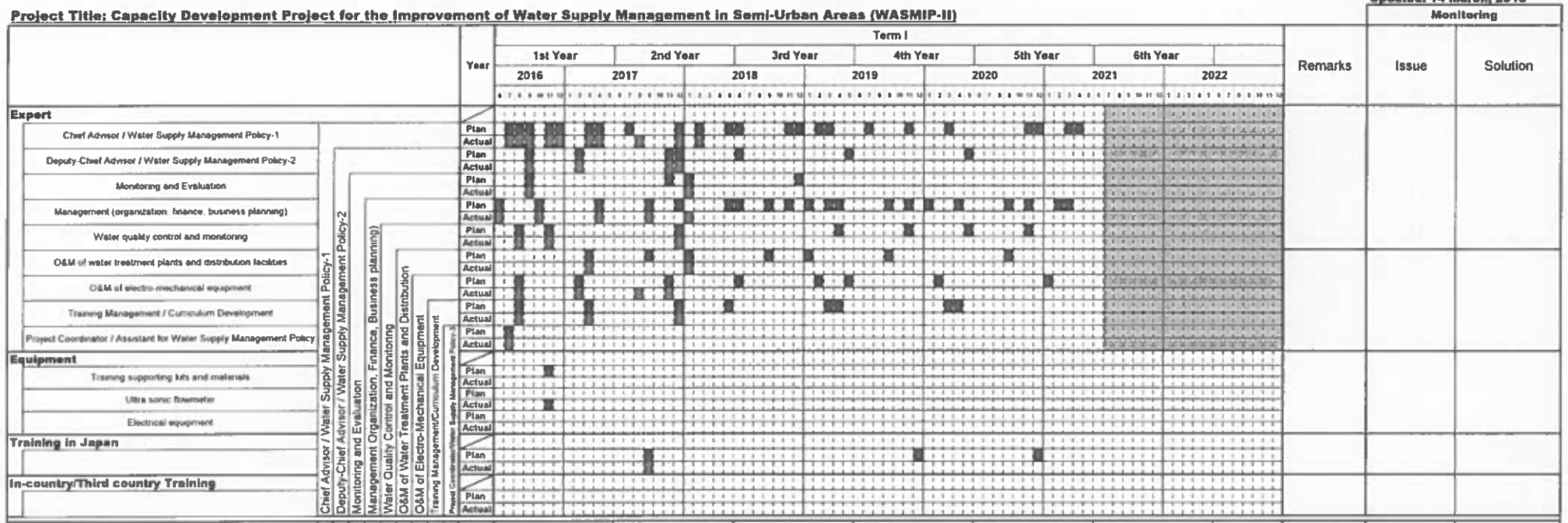
(*1) Target WUSC consist of Target A WUSC (for the revision of Management Model formulated in phase I) and Target B WUSC (for the revision of Management Model revised in phase II)
(*2) Target A WUSC: Gulariya, Beljhundi, Pragatinagar, Ramgram, Shankarnagar, Besisahar, Amlekhgunj, Karmaiya, Manthali, Chautara, Dhulabari, Gauradaha, Mangadh (13 WUSC)
Target B WUSC: Rajapur, Gulariya II, Kusumba/Sanoshree, Naulapur, Tripur, Bharatpur, Chaughera, Jhakredhunga, Rajahar, Gaidakot, Agauli, Devdaha, Anandban, Sainamaina, Sauraha-Farsatikar, Sundarbazar, Bhotewodar, Lasunekhola, Nijgadh, Simara, Kolhabi, Jitpur, Dumarbana, Bharatgunj, Dhaikebar, Hariyon, Barhathwa, Ishworpur, Ramechhap, Pakarwas, Scheme II, Melamchi, Barahbise, Urlabari, Pathari-Sanichare municipality, Jamunagachi, Rangeli municipality, Tankisinuwari, Itahara, Madhumalla, Pichhra, Sorabhag (Karsiya), Bayerban, Katahari, Jhorahat, Shani-Arjun, Shivasatachhi, Prithvinagar (Gaurisankar), Garamani, Topgachhi-1, Topgachhi-2, Topgachhi-3, Juropani, Chandragadhi-1, Chandragadhi-2 (55 WUSC)
(*3) Government and non-government organizations consist of RMSO, WSSDO, NGOs, academic institutions, and so on.
(*4) The contents of Basic Training are a) Water Quality Management, b) Water Treatment Plant O&M, c) Distribution Network O&M, d) Water Meter Management, e) Management Manuals

Annex 4

[Draft] Tentative Plan of Operation

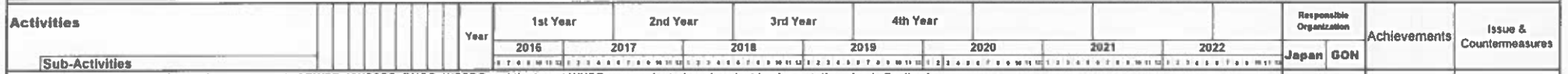
Version 2.0
Dated: 22 December, 2015
Updated: 14 March, 2018

Project Title: Capacity Development Project for the Improvement of Water Supply Management in Semi-Urban Areas (WASMIP-II)



Remarks	Monitoring: Issue	Monitoring: Solution

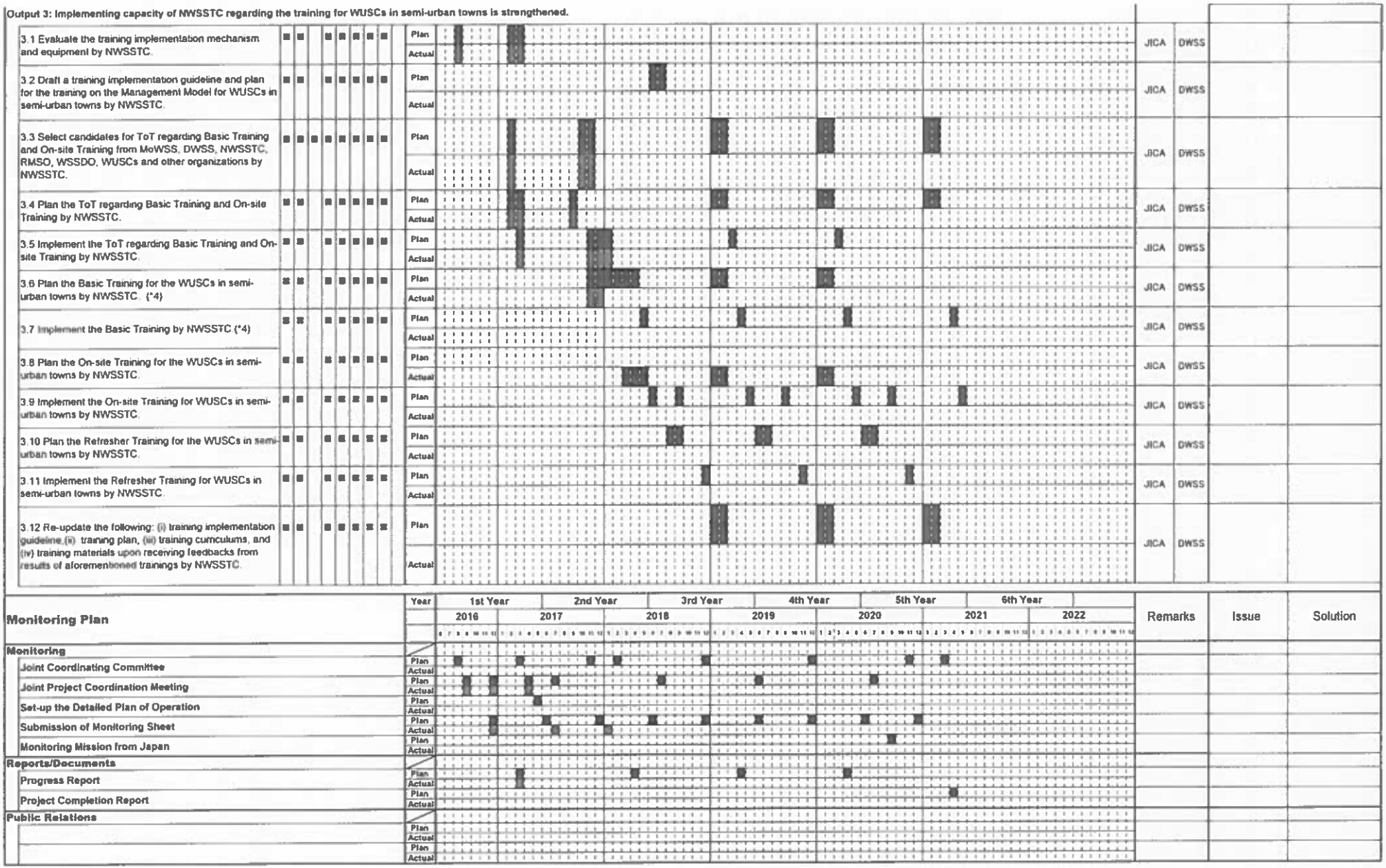
Activities



Sub-Activities	Responsible Organization: Japan	Responsible Organization: GON	Achievements	Issue & Countermeasures
Output 1:Baseline survey and capacity assessment of DWSS, NWSSTC, RMSO, WSSDO and the target WUSC are conducted, and project implementation plan is finalized.				
1.1 Conduct a baseline survey and technical, financial, management and organizational capacity assessment of DWSS, RMSO, NWSSTC, WSSDO and the target WUSCs.	JICA	DWSS		
1.2 Conduct a situation analysis surrounding water supply sector in semi-urban towns including legislation and development plans.	JICA	DWSS		
1.3 Analyze the supporting mechanism for WUSCs by DWSS, NWSSTC, RMSO and WSSDO.	JICA	DWSS		
1.4 Coordinate and consult with the Third Small Town Project and Sector Efficiency Improvement Unit (SEIU) on support for WUSCs in semi-urban towns.	JICA	DWSS		
1.5 Revise PDM and PO reflecting the result of aforementioned activities.	JICA	DWSS		

Output 2: Supporting capacity of DWSS regarding O&M and management for WUSCs in semi-urban towns is strengthened.

2.1 Study the monitoring and management evaluation indicators suited on the current condition of WUSCs in semi-urban towns, and revise the Management Model for enhancing the usability of the model for WUSCs in semi-urban towns by DWSS.	Plan	JICA	DWSS	
	Actual			
2.2 Plan necessary rehabilitation works for some of target WUSCs in semi-urban towns by DWSS.	Plan	JICA	DWSS	
	Actual			
2.3 Conduct necessary rehabilitation works for some of target WUSCs in semi-urban towns by DWSS.	Plan	JICA	DWSS	
	Actual			
2.4 Prepare a design manual of specifications on rehabilitation works for target WUSCs in semi-urban towns by DWSS.	Plan	JICA	DWSS	
	Actual			
2.5 Identify and document the section of departments responsible for training implementation for WUSCs in semi-urban towns by DWSS.	Plan	JICA	DWSS	
	Actual			
2.6 Formulate an outline of the Training of Trainers (ToT) regarding the Basic Training and On-site Training and instruct NWSSTC to implement the training by DWSS.	Plan	JICA	DWSS	
	Actual			
2.7 Formulate an outline of the Basic Training for the WUSCs in semi-urban towns and instruct NWSSTC to implement the training by DWSS.	Plan	JICA	DWSS	
	Actual			
2.8 Formulate an outline of the On-site Training for the WUSCs in semi-urban towns and instruct NWSSTC to implement the training by DWSS.	Plan	JICA	DWSS	
	Actual			
2.9 Formulate an outline of the Refresher Training for the WUSCs in semi-urban towns and instruct NWSSTC to implement the training by DWSS.	Plan	JICA	DWSS	
	Actual			
2.10 Evaluate the above-mentioned trainings conducted by NWSSTC, and reflect its results on the training on the Management Model for WUSCs in semi-urban towns in following years by DWSS.	Plan	JICA	DWSS	
	Actual			
2.11 Allocate a budget for NWSSTC to implement the above-mentioned trainings by DWSS.	Plan	JICA	DWSS	
	Actual			
2.12 Re-update the management model for WUSCs in semi-urban towns upon receiving feedbacks from Output 3.	Plan	JICA	DWSS	
	Actual			


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

Monitoring Plan
Year
1st Year
2nd Year
3rd Year
4th Year
5th Year
6th Year
2016
2017
2018
2019
2020
2021
2022
Remarks
Issue
Solution
Monitoring
Joint Coordinating Committee
Joint Project Coordination Meeting
Set-up the Detailed Plan of Operation
Submission of Monitoring Sheet
Monitoring Mission from Japan
Reports/Documents
Progress Report
Project Completion Report
Public Relations
Plan
Actual

RECORD OF DISCUSSIONS

ON

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

IN

FEDERAL DEMOCRATIC REPUBLIC OF NEPAL

AGREED UPON BETWEEN

MINISTRY OF URBAN DEVELOPMENT

AND

JAPAN INTERNATIONAL COOPERATION AGENCY

Kathmandu, 22 December 2015

Mr. Tsutomu Shimizu
Chief Representative
JICA Nepal Office

Mr. Nawal Kishor Mishra
Joint Secretary,
Ministry of Urban Development, Nepal

Mr. Ram Chandra Devkota
Director General
Department of Water Supply and Sewerage
Ministry of Urban Development, Nepal

Appendix 1

PROJECT DESCRIPTION

Both parties confirmed that there are some updates in the Project Description in the minutes of meetings for Preparatory Survey on the Project signed on October 6th, 2015 (Appendix 3).

I. BACKGROUND

The Government of Nepal has set the goal of achieving universal access to basic drinking water and sanitation by 2017. According to Approach Paper to the Thirteenth Plan (2013/14-2015/16), 85 percent of the population has access to basic drinking water services and 62 percent has access to basic sanitation by 2013. The Three Year Plan, in line with the government's set target of universal coverage by 2017, has set a target of increasing basic drinking water and sanitation services to 93 percent of the population by the end of Plan period. Current coverage figures in water supply and sanitation indicate that Nepal has already achieved MDG targets set for 2015.

The Department of Water Supply and Sewerage database shows that more than 43,000 number of water supply schemes/systems have already been constructed across the country through government's own internal resources and with assistance from a variety of multilateral and bilateral donors. These schemes/systems include very small in rural area to relatively large in semi-urban and urban areas. Notwithstanding who ever implemented the system management and operation responsibility of the system has been transferred to local Water Users and Sanitation Committees (WUSCs).

In rural areas, technologically most of the water supply systems are small and simple and beneficiaries are served mainly through public or community tap stands. Management and operation of the systems is comparatively simple. In semi-urban areas, most of the systems are relatively large and include water treatment plant with electro-mechanical equipment. The consumers are served through private household connections. WUSCs have to supply adequate quantity of water to the consumers, look after quality of water, collect tariff from consumers, and manage human as well as financial resources to keep system in good condition. For efficient management and to keep system in good operational condition, WUSC personals as well as WUSC staff must have sufficient technical and management knowledge, skills and capacity.

DWSS, as a matter of fact, has been more engaged in the implementation of the project. A very little attention has been given to the software part of the operation and management of water supply systems such as capacity improvement of WUSCs. Considering the situation, JICA in 2008 initiated a project for capacity development on water supply in semi-urban areas in Nepal. Dhulabari, Gauradaha and Mangadh WUSCs and WSSDOs of Jhapa and Morang districts in Eastern Region were selected for capacity improvements.

1.2 Conduct necessary rehabilitation works for pilot WUSCs based on capacity assessment result.

1.3 Implement Support Models & Management Model in pilot WUSCs and associated WSSDOs and review, modify the models as necessitates.

1.4 Update job description of related staff of DWSS for implementation of Operation Directives and its guidelines.

1.5 Elaborate supporting mechanism for WUSC by DWSS, NWSSTC, RMSO, WSSDO including cascaded ToT mechanism.

1.6 Revise PDM/PO reflecting the result of aforementioned activities.

1.7 Coordinate and consult with Third Small Town Project and SEIU for finalizing and institutionalization of WASMIP Models.

1.8 Review and revise WASMIP Models and cascaded ToT mechanism upon the feedback from Output 2, 3 and 4.

2.1 Conduct capacity assessment of NWSSTC and needs survey to WSSDOs on NWSSTC's training

2.2 Identify needful areas to conduct ToT for NWSSTC officials and conduct trainings

2.3 Update Business Plan of NWSSTC

2.4 Standardize the training curriculum and materials on the basis of training need assessment

2.5 Review and develop training curriculum, training materials, manuals etc for human resource development and capacity enhancement of DWSS/WUSCs and relevant WASH stakeholders

2.6 List of necessary laboratory equipment is developed.

2.7 Develop Training Implementation Guideline

3.1 Information collection of target WSSDOs

3.2 Facilitate NWSSTC to conduct trainings/OJTs for RMSOs, WSSDOs and Service Regulation and Rehabilitation Unit (C/P Unit) including DWSS laboratories.

3.3 Evaluate outcome of training for WSSDOs and Improve the Training Implementation Guideline reflecting the feedbacks from

- Support for Rehabilitation of infrastructure of some water supply utilities and NWSSTC to provide practical training
- Training/Learning Visit program abroad for WUSC personnel

In case of importation, the machinery, equipment and other materials under II-6 (1) (c) above will become the property of the Nepal Government upon being delivered C.I.F. (cost, insurance and freight) to the Nepal Government authorities concerned at the ports and/or airports of disembarkation.

Input other than indicated above will be determined through mutual consultations between JICA and MoUD/ DWSS during the implementation of the Project, as necessary.

(2) Input by MoUD/DWSS

MoUD/DWSS will take necessary measures to provide at its own expense:

(a) Services of MoUD/DWSS's counterpart personnel and administrative personnel as referred to in II-7;
(b) Suitable office space with necessary equipment;
(c) Supply or replacement of machinery, equipment, instruments, vehicles, tools, spare parts and any other materials necessary for the implementation of the Project other than the equipment provided by JICA;
(d) Information as well as support in obtaining medical service;
(e) Credentials or identification cards;
(f) Available data (including maps and photographs) and information related to the Project;
(g) Running expenses necessary for the implementation of the Project;
(h) Expenses necessary for transportation within Nepal of the equipment referred to in II-5 (1) as well as for the installation, operation and maintenance thereof; and
(i) Necessary facilities to the JICA experts for the remittance as well as utilization of the funds introduced into Nepal from Japan in connection with the implementation of the Project

7. Implementation Structure

The project organization chart is given in the Annex III. The roles and assignments of relevant organizations are as follows:

(1) MoUD/DWSS
(a) Project Director
Deputy Director General, DWSS
(b) Project Manager
Chief, NWSSTC

1. MoUD/DWSS and GoN will take necessary measures to:

(1) ensure that the technologies and knowledge acquired by the Nepal nationals as a result of Japanese technical cooperation contributes to the economic and social development of Nepal, and that the knowledge and experience acquired by the personnel of Nepal from technical training as well as the equipment provided by JICA will be utilized effectively in the implementation of the Project; and

(2) grant privileges, exemptions, official VISAs and benefits to the JICA experts referred to in II-7 above and their families, which are no less favorable than those granted to experts and members of the missions and their families of third countries or international organizations performing similar missions in Nepal.

Other privileges, exemptions, official VISA and benefits will be provided in accordance with the Agreement on Technical Cooperation signed on 3 September 2003 between the GoJ and GoN.

IV. MONITORING AND EVALUATION

JICA and the MoUD/DWSS will jointly and regularly monitor the progress of the Project through the Monitoring Sheets based on the Project Design Matrix (PDM) and Plan of Operation (PO). The Monitoring Sheets will be reviewed every six (6) months.
Also, Project Completion Report will be drawn up one (1) month before the termination of the Project.

JICA will conduct the following evaluations and surveys to verify sustainability and impact of the Project. The MoUD/DWSS is required to provide necessary support for them.
1. Ex-post evaluation three (3) years after the project completion, in principle
2. Follow-up surveys on necessity basis

V. PROMOTION OF PUBLIC SUPPORT

For the purpose of promoting support for the Project, MoUD/DWSS will take appropriate measures to make the Project widely known to the people of Nepal.

VI. Misconduct

If JICA receives information related to suspected corrupt or fraudulent practices in the implementation of the Project, MoUD/DWSS and relevant organizations will provide JICA with such information as JICA may reasonably request, including information related to any concerned official of the government and/or

Project Design Matrix

Project Title: Capacity Development Project for the Improvement of Water Supply Management in Semi-Urban Areas (WASMIP-II)

Implementing Agency: Department of Water Supply and Sewerage (DWSS)

Target Group: DWSS, NWSSTC, WSSDOs and Water Supply Utilities (WUSCs)

Period of Project: Five years from initial assignment of JICA expert(s) in Nepal

Project Site: **Model Site:**

Version 1.2
Dated 22 December 2015

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal					
Supporting mechanisms for WUSCs of semi-urban towns* by DWSS/NWSSTC/RMSO/WSSDO is established. (* Towns with population of over 5000 except those covered by ADB's STWSSSP projects)	1. More than XX% of target WUSCs adopt the business plan, SOPs and financial plan based on WASMIP models. 2. More than XX% of target WUSC are annually monitored by DWSS.	1. Statistics Reports of MOUD (5 years plan, National Management Information Project (NMIP) date etc)			
Project Purpose					
Supporting mechanism for target WUSCs by DWSS/NWSSTC/RMSO/WSSDO is established.	1. More than XX% of target WUSC adopt the business plan, SOPs and financial plan based on WASMIP models. 2. More than XX% of target WUSC are annually monitored by DWSS.	1. DWSS Annual Report 2. NWSSTC Annual Report 3.NMIP Report/Data Book etc	Coordination with Third Small Town Project is timely and regularly conducted.		
Outputs					
(1) Support & Management Model (WASMIP Models) established in WASMIP I is reviewed/updated and its implementation modality is established, contributing in finalization of PDM/PO	1.1 Various WASMIP Models for type of water supply condition (water source, treatment method, etc.) are developed. 1.2 Revised PDM and PO	1. Updated documents of WASMIP model such as SOPs, training materials and concept papers of WASMIP model.	1. Adequate human resource and necessary budget should be allocated by DWSS and NWSSTC. 2.Drastic change in DWSS's institutional structure does not occur. 3. Water utilities does not need major rehabilitation. 4. Necessary budget for improvement and expansion of selected water utilities is allocated by DWSS. 5. DWSS must allocate necessary budget to implement OD and Guidelines.		
(2) Training Capacity of National Water Supply and Sanitation Training Center (NWSSTC) is strengthened.	2.1 NWSSTC has standardized training curriculum for water supply. 2.2 NWSSTC adopts/implements standardized SOPs and manual based on updated WASMIP models. 2.3 Training implementation guideline is adopted by NWSSTC	1. NWSSTC Annual Report 2.NWSSTC's website 3. Training Implementation Guideline of NWSSTC			
(3) Human resource development and capacity enhancement system for target WSSDO is established.	3.1 Target WSSDOs have annual plans for training, monitoring as such. 3.2 Target WSSDOs & RMSOs receive training and OJTs from NWSSTC and deliver it to WUSCs.	1.RMSOs/ WSSDO's annual program and budget			
(4) Training system for target WUSCs by DWSS/NWSSTC/RMSO/WSSDO is established.	4.1 More than XX% of pilot WUSCs adopt the business plan, SOPs and financial plan based on WASMIP models.	1. Water Utilities' Annual Report 2. Water Utilities' Business Plan			
(5) Monitoring System based on Performance Indicators (PIs) of target WUSCs are established in DWSS	5.1 Annual Monitory and Evaluation record/report of DWSS for target WUSCs are established. 5.2 Reward system/record of best performing WUSCs is established.	1. DWSS M&E reports/records 2. Media coverage, WUSCs annual report			

Annex II

Tentative Plan of Operation

Version 1.1

Dated 22 December 2015

Project Title:

Inputs	Year	1st Year				2nd Year				3rd Year				4th Year				5th Year				Remarks	Monitoring	
		I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV		Issue	Solution
Expert																								
Chief Advisor / Water Supply Management Policy	Plan																							
	Actual																							
Monitoring and Evaluation	Plan																							
	Actual																							
Management (organization, finance, business planning)	Plan																							
	Actual																							
Water quality control and monitoring	Plan																							
	Actual																							
O&M of water treatment plants and distribution facilities	Plan																							
	Actual																							
O&M of electro-mechanical equipment	Plan																							
	Actual																							
Training Management / Curriculum Development	Plan																							
	Actual																							
Project Coordinator	Plan																							
	Actual																							
Equipment	Plan																							
	Actual																							
Vehicles and motorcycles	Plan																							
	Actual																							
Generators and inverters	Plan																							
	Actual																							
Training supporting kits and materials	Plan																							
	Actual																							
Training in Japan	Plan																							
	Actual																							
In-country/Third country Training	Plan																							
	Actual																							

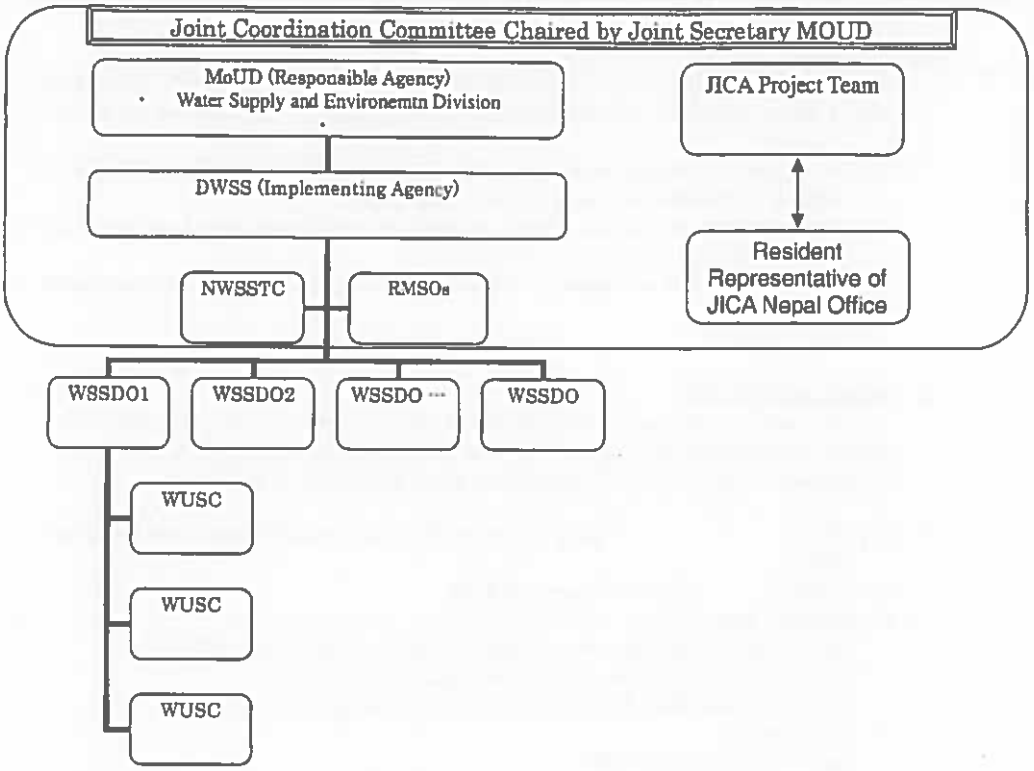
To be determined upon the completion of Project Design Phase in the 1st Year.

Chief Advisor / Water Supply Management
Monitoring and Evaluation
Management (organization, finance, business planning)
Water quality control and monitoring
O&M of water treatment plants and distribution
O&M of electro-mechanical equipment
Training Management / Curriculum Development
Project Coordinator

Activities / Sub-Activities	Year	1st Year				2nd Year				3rd Year				4th Year				5th Year				Responsible Organization		Achievements	Issue & Countermeasures
		I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	Japan	GON		
Output 1: Support & Management Model (WASMIP Models) established in WASMIP I is reviewed/updated and its implementation modality is established, contributing in finalization of PDM/PO.																									
1.1 Conduct baseline survey and capacity assessment (technical, financial, management and organizational) of DWSS, RMSO, NWSSTC as well as pilot WUSCs.	Plan	■																							
	Actual																								
1.2 Conduct necessary rehabilitation works for pilot and some of the target WUSCs based on capacity assessment result.	Plan		■	■	■																				
	Actual																								
1.3 Implement Support Models & Management Model in pilot WUSCs and associated WSSDOs and review, modify the models as necessities.	Plan					■	■	■	■	■	■	■	■												
	Actual																								
1.4 Update job description of related staff of DWSS for implementation of Operation Directives and its	Plan									■	■	■	■												
	Actual																								
1.5 Elaborate supporting mechanism for WUSC by DWSS, NWSSTC, RMSO, WSSDO including cascaded ToT mechanism.	Plan													■	■	■	■								
	Actual																								
1.6 Revise PDM/PO reflecting the result of aforementioned activities.	Plan																■								
	Actual																								
1.7 Coordinate and consult with Third Small Town Project and SEIU for finalizing and institutionalization of WASMIP Models.	Plan																■								
	Actual																								
1.8 Review and revise WASMIP Models and cascaded ToT mechanism upon the feedback from Output 2, 3 and	Plan																	■	■	■	■				
	Actual																								
Output 2: Training Capacity of National Water Supply and Sanitation Training Center (NWSSTC) is strengthened.																									
2.1 Conduct capacity assessment of NWSSTC and survey to RMSOs/ WSSDOs on NWSSTC's	Plan																								
	Actual																								
2.2 Identify needful areas to conduct T.T for NWSSTC officials and conduct trainings.	Plan																								
	Actual																								
. Update Business Plan of NWSSTC.	Plan																								
	Actual																								
2.4 Standardize the training curriculum and materials on the basis of training need assessment.	Plan																								
	Actual																								

Annex III

Project Organization Chart



Appendix 2

MAIN POINTS DISCUSSED

1. Based on the previous experience of WASMIP I that faced communication and coordination problem due to intermittent arrival of the Japanese experts, Nepali side strongly recommended that one local expert having expertise on water and environment engineering must be coordinating the project from central to community level from initial phase of the Project. It would ensure facilitation of project activities from central, regional, district to local/community level.

2. Both sides agreed that Travel and Daily Allowance (TADA) and/or other necessary allowances for government officials will be borne by Nepali side. On the other hand, TADA for WUSC members for OJTs, trainings and workshops will be the responsibility of the Project till project completion.

3. However, it was also agreed that in order to sustain the training and capacity building activities DWSS/NWSSTC must allocate budget for trainings by themselves. It was understood that after the Project institutionalized the system of training in NWSSTC, the training activities will be systematized or regularized from NWSSTC's own resources. It would sustain the training and capacity development activities in a long run.

4. The contents of this Project described in PDM and PO shall be finalized by step-wise approach; namely, the Expert Team will conduct baseline survey on the capacity of related organizations in the first year of the Project, and finalize the PDM and PO upon the result of this baseline survey.

Appendix 2.41

1st JCC Presentation Material in February 2018

The Capacity Development Project for the Improvement of Water Supply Management in Semi-urban Areas in Nepal

WASMIP-II

1st Joint Coordinating Committee Meeting

February 28, 2018

Chief Advisor

Satoru Oniki

1

1. Objectives of the 1st JCC

1. To explain the outline of elaborated Project
2. To approve Project Design Matrix (PDM) and Plan of Operation (PO)

2

2. Project Duration

For providing safe and quality drinking water to people

Water Supply Management Improvement Project

Technical Cooperation Project (JICA)

WASMIP-I : January 2010 – September 2013

WASMIP-II: July 2016 – May 2021

3

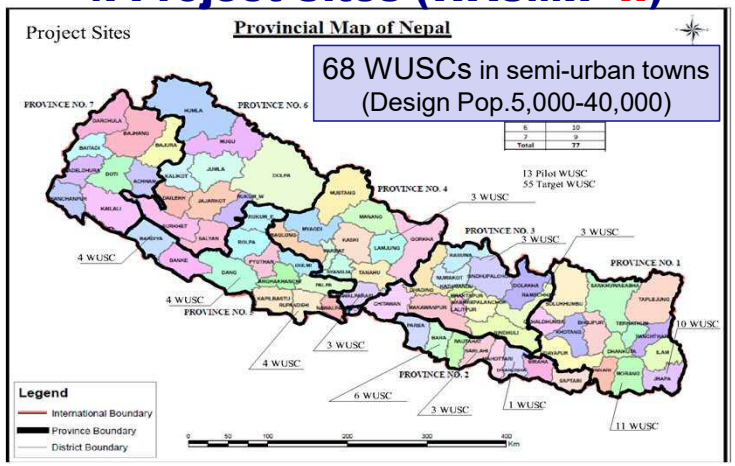
3. Project Purpose

Support to the WUSCs in semi-urban towns is provided and strengthened by DWSS and NWSSTC using government and non-government organizations' personnel(*)

(*) RMSO, WSSDO, NGOs, academic institutions, etc.

4

4. Project Sites (WASMIP-II)



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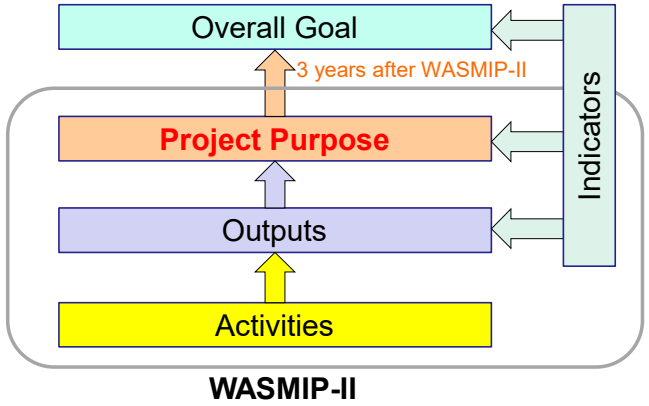
5. PDM Structure



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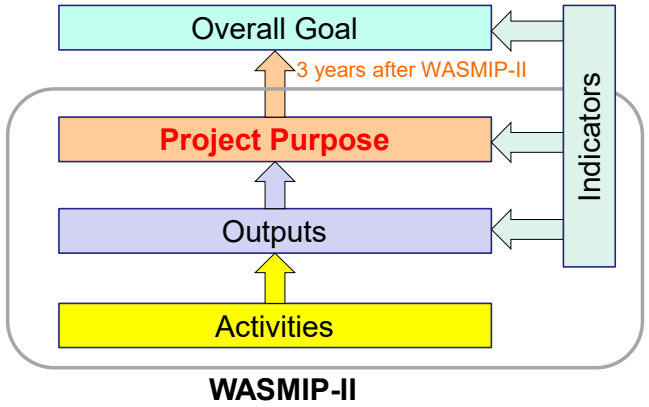
6. Overall Goal

Continuous support to WUSCs in semi-urban towns is provided by DWSS and NWSSTC

7

5. PDM Structure



8

3. Project Purpose

Support to the WUSCs in semi-urban towns is provided and strengthened by DWSS and NWSSTC using government and non-government organizations' personnel(*)

(*) RMSO, WSSDO, NGOs, academic institutions, etc.

7. Outputs

Output-1

Baseline survey and capacity assessment of DWSS, NWSSTC, RMSO, WSSDO and the target WUSCs are conducted, and project implementation plan is finalized.

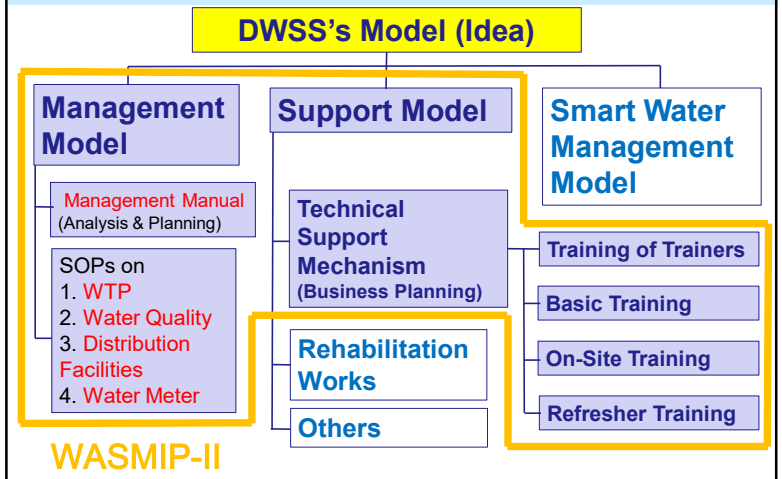
Output-2

Supporting capacity of DWSS regarding O&M and management for WUSCs in semi-urban towns is strengthened.

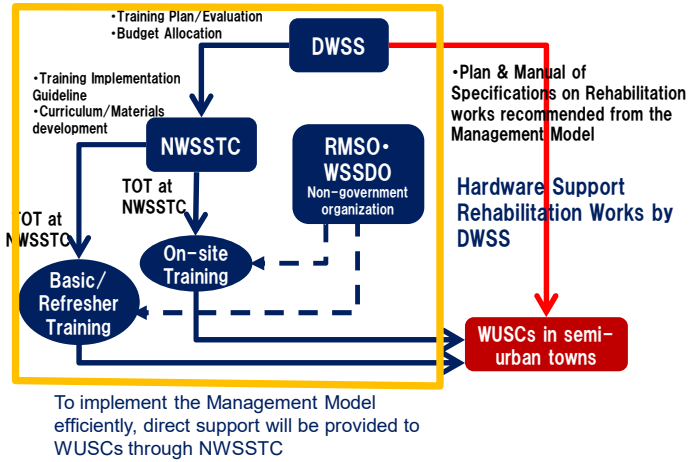
Output-3

Implementing capacity of NWSSTC regarding the training for WUSCs in semi-urban towns is strengthened.

8. Model to Support WUSCs



9. Technical Support Mechanism



10. Rehabilitation Works

WASMIP

Technical Support Mechanism

1. Baseline Survey with PIs & Check lists
2. Indicator Analysis & Problem Detection
3. Determination of Score of Works (Specifications)
   - Facility assessment by baseline survey
   - Need analysis and specification
   - Recommendation for hardware support
4. Rehabilitation Works ← DWSS
5. Recovery of Water Supply System

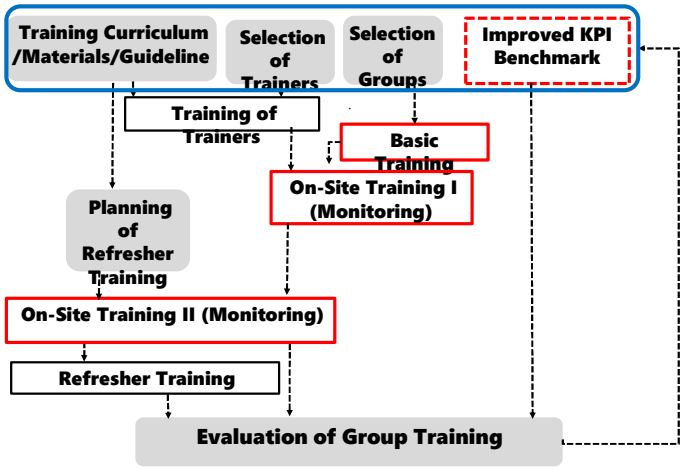
Sound O&M, Management in WUSC

Management Model

13

11. Technical Support Mechanism

WASMIP



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12. Training Schedule

WASMIP

WASMIP-II

2018 : 1st Training (13 WUSCs)

2019 : 2nd Training (27 WUSCs)

2020 : 3rd Training (28 WUSCs)

2021~ : Other WUSCs in semi-urban towns

15

WASMIP

13. Discussion

1. Technical Support Mechanism
2. Others

16

Thank you very much for your attention

WASMIP-II

Appendix 2.42

Minutes of Meetings in the 2nd JCC

MINUTES OF MEETINGS
BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY
AND
MINISTRY OF WATER SUPPLY
CAPACITY DEVELOPMENT PROJECT FOR THE IMPROVEMENT OF WATER SUPPLY MANAGEMENT IN SEMI-URBAN AREAS (WASMIP-II)

The Second Joint Coordinating Committee Meeting (hereinafter referred to as "JCC") on the Capacity Development Project for the Improvement of Water Supply Management in Semi-Urban Areas (hereinafter referred to as "the Project") was held on the 26th of August, 2019 with both the Nepali and Japanese sides.

As a result of discussion in the JCC, both sides agreed the actions to be taken until the end of the Project.

Kathmandu, 26 August 2019

Dr. Kozo Nagami
Senior Representative,
JICA Nepal Office,
Japan International Cooperation Agency,
Japan

Mr. Chandra Bahadur K. C.
Joint Secretary,
Ministry of Water Supply,
The Federal Democratic Republic of Nepal

Mr. Satoru Oniki
Chief Advisor, JICA Expert
Capacity Development Project for the Improvement of Water Supply Management in Semi-Urban Areas

Mr. Sunil Kumar Das
Director General,
Department of Water Supply and Sewerage Management,
Ministry of Water Supply,
The Federal Democratic Republic of Nepal

AMENDMENT OF PROJECT DESIGN MATRIX

1. The Reason of Amendment

In the past, Water Users and Sanitation Committees (hereinafter referred to as "WUSC") received technical support on the construction and rehabilitation of water supply facilities as well as training of their staff from the Department of Water Supply and Sewerage (hereinafter referred to as "DWSS") and its affiliated Regional Monitoring and Supervision Offices (hereinafter referred to as "RMSOs") and Water Supply and Sanitation Division Offices (hereinafter referred to as "WSSDOs"). Accordingly, the technical support mechanism of the Project consisted of these organizations.

After the transition to the Federal System in 2017, DWSS was renamed the Department of Water Supply and Sewerage Management (hereinafter referred to as "DWSSM"). RMSOs and WSSDOs were dissolved while 15 Federal Water Supply and Sewerage Management Projects (hereinafter referred to as "FWSSMPs") were newly established as branches of DWSSM". The main function of FWSSMPs is the implementation of large-scale water supply facility construction or co-finance projects etc., including the WUSCs in the semi-urban towns.

At the provincial government level, the Ministry of Physical Infrastructure Development (hereinafter referred to as "MoPID") has become responsible for water supply, and 3 to 5 Water Supply and Sanitation Division Offices were established at each province as the affiliated organizations of MoPID. The small-scale water supply facility construction projects were transferred to provincial and/or local governments.

In consideration of the impact derived from the transition to federal systems, Japan International Cooperation Agency (hereinafter referred to as "JICA") will continue to provide technical assistance through the Project to strengthen the support mechanism of DWSSM for WUSC in semi-urban towns. The target groups specified in the Project Design Matrix (hereinafter referred to as "PDM") are modified in accordance with the transition to Federal system. Refer to Appendix-1 for details.

MAIN POINTS DISCUSSED

1. Change of Technical Support Mechanism in DWSSM

The meeting confirmed the change of technical support mechanism in DWSSM after the transition to federal systems in 2017.

The technical support mechanism was consisted of DWSS and its affiliated organizations (RMSOs and WSSDOs) when the Project started in 2016. After the transition to the federal system in 2017, the affiliated organizations were dissolved while 15 FWSSMPs were established to carry out the water supply and sanitation projects undertaken by DWSSM.

The meeting confirmed that DWSSM is responsible for providing essential equipment (hardware support), and training programs to the target WUSCs in semi-urban towns during the Project. The essential equipment includes flowmeter, valves, chlorination equipment, water quality test kit, and the training programs consist of operation and maintenance (hereinafter referred to as "O&M") of facilities and water supply management. Refer to Appendix-2 for details.

2. Supports on Construction and Operation & Maintenance for Water Supply and Sanitation by Each Level of Government

The meeting confirmed the decision on responsible entities for the construction projects for water supply and sanitation.

Each construction project for water supply and sanitation has been classified into either federal, provincial, or local government according to the defined design population.

The meeting also confirmed that the responsibilities for O&M of water supply and sanitation has been delegated to the provincial and local government after the transition to the federal system. In this regard, the Project will conduct the survey at the pilot areas to analyze the support mechanism of the province and local governments to WUSCs and explore the necessity of capacity development on technical support at provincial and local level. Refer to Appendix-3 for details.

3. WASMIP-II Training Implementation Plan

The meeting agreed on the proposed schedule and target entities of training conducted in the Project as detailed in Appendix-4.

The duration of the Project is five-years from June 2016. By August 21, 2019, the Project implemented some training program, such as Training of Trainers (hereinafter referred to as "ToT"), Basic training, and Refresher training. The primary recipients of ToT are personnel of DWSSM, National Water Supply and Sanitation Training Center (hereinafter referred to as "NWSSTC") and FWSSMPs, while other training programs benefit WUSCs in semi-urban towns.

4. Effective Utilization of the Trainers

The meeting discussed effective and sustainable ways to implement training programs.

It is essential to engage trainers for sustainable implementation of Basic training in the future. DWSSM and NWSSTC have gradually collected information about the profile of candidates of trainers through the implementation of ToT.

The meeting agreed that it is necessary to organize such information sophisticatedly; to recognize/certify the trainers officially and ensure active engagement of trainers according to the training plan. DWSSM will create a roster/database of trainers and coordinate with province and local governments for its utilization as necessary.

5. Clarifications of Responsibility of DWSSM

The meeting discussed the responsibility of maintenance-repair of water supply systems within DWSSM.

The draft version of the job description of DWSSM indicates "to conduct necessary action for the maintenance-repair and ensure the sustainability of water supply and sanitation systems" as one of the responsibilities of DWSSM. It is necessary to clarify how such action to be coordinated at local level. The meeting agreed that there is expected to clarify the responsible section to carry out this role and approve the draft job description within this fiscal year (2076/77).

The meeting also clarified the Section of Electromechanical and Hydrogeological will provide the technical advisory to WUSCs in semi-urban towns for maintenance and repair, while WUSCs need to procure equipment necessary for maintenance and small scale repair from the budget sources other than DWSSM, for example, provincial or local government, and self-financed.

6. Engagement of FWSSMP for Capacity Development of WUSCs in semi-urban towns

The meeting discussed how to utilize human resources of FWSSMPs for capacity

development of WUSCs in semi-urban towns in an effective and sustainable way.

The draft WaSH Bill stipulates "monitoring of water supply and sanitation projects" as one of the roles of the Federal Government. In this regard, FWSSMPs have an obligation to visit WUSCs in semi-urban towns for the supervision of the construction of water supply and sanitation projects.

The meeting agreed to utilize the opportunities of their visits to WUSCs not only for the supervision of construction projects but also for the capacity development on O&M of facilities as well as water supply management. It is recommended to prepare timeline for such visit in annual basis.

The meeting also confirmed that DWSSM plans to employ inspectors at FWSSMPs. The meeting agreed to elaborate a plan to utilize the inspectors for capacity development of WUSCs in semi-urban towns after the Project.

7. Budget Support to WUSCs in the Future

The meeting discussed the budget for the essential equipment as well as the training programs after the Project.

The meeting discussed the budget for O&M equipment should be sought with the provincial and local governments by WUSCs after the Project. Meanwhile DWSSM will continue to provide the budget for capacity development of WUSCs in semi-urban towns after the Project.

Project Design Matrix

Project Title: Capacity Development Project for the Improvement of Water Supply Management in Semi-Urban Areas (WASMP-II)
Implementing Agencies: Department of Water Supply and Sewerage Management (DWSSM) and National Water Supply and Sanitation Training Centre (NWSSTC)
Target Group: DWSSM, NWSSTC, FWSSMP and Target Water Users and Sanitation Committee (WUSC) (*1)
Period of Project: Five years from initial assignment of JICA expert(s) in Nepal
Project Site: Nagarkot (Location of NWSSTC), Kathmandu, Location of Target WUSC (*2)

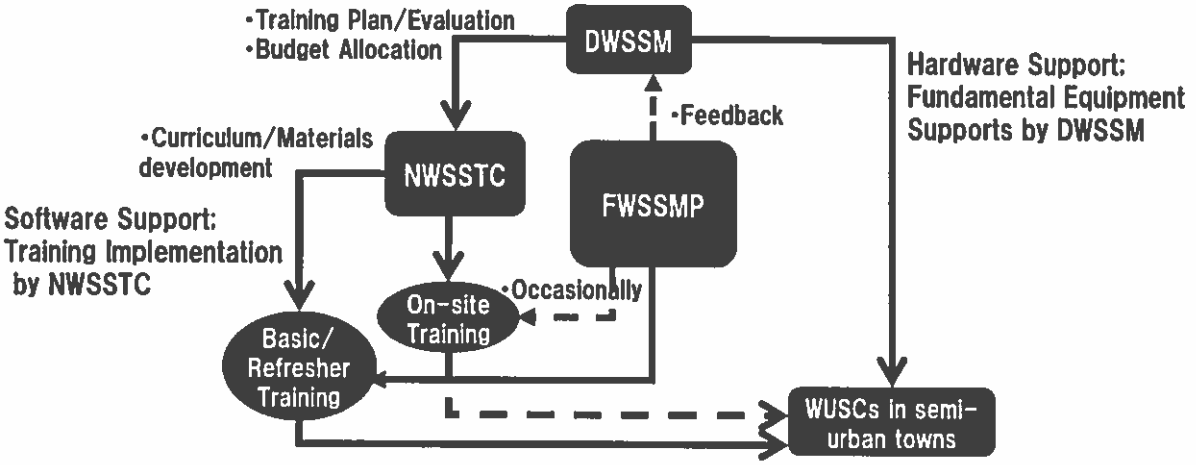
Version 3.0
Dated 26 August 2019

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal					
Continuous support to WUSCs in semi-urban towns is provided by DWSSM and NWSSTC.	1. The trainings are continuously implemented by NWSSTC on the Management Model for WUSCs in semi-urban towns. 2. The contents of the Management Model are utilized for the management of water supply of WUSCs in semi-urban towns.	1. NWSSTC Annual Report, Interview with related persons 2. DWSSM Annual Report, Interview with related persons			
Project Purpose					
Support to the WUSCs in semi-urban towns is provided and strengthened by DWSSM and NWSSTC using government and non-government organizations' personnel (*3)	1. The revision process and sections of DWSSM responsible for the Management Model and Technical Support Mechanism for WUSCs in semi-urban towns are identified. 2. The sections of DWSSM responsible for the training on the Management Model for WUSCs in semi-urban towns and revision process of training implementation guideline are identified. 3. More than 15 trainers, who are able to carry out the training on the Management Model for WUSCs in semi-urban towns, are developed. From this trainer batch, at least six must be employees of FWSSMP. 4. Capacity assessment results of trainers on the Management Model for target WUSCs in semi-urban towns are improved compared to the baseline. 5. The final version of the Management Model, training implementation guideline, training plan, and training curriculums for WUSCs in semi-urban towns are officially approved authorized by DWSSM.	1. Management Model and Training Implementation Guideline, Interview with related persons 2. Training Implementation Guideline, Interview with related persons 3. List of Trainers 4. Result of Capacity Assessment (by Self-evaluation) 5. Approval documentation by DWSSM	1. Budget for NWSSTC is ensured as previous year 2. There is no major changes for involving of the jurisdiction to WUSCs in semi-urban towns by DWSSM and NWSSTC		
Outputs					
(1) Baseline survey and capacity assessment of DWSSM, NWSSTC, FWSSMP and the target WUSCs are conducted, and project implementation plan is finalized.	1.1 Results of the baseline survey and capacity assessment in DWSSM, NWSSTC, FWSSMP and target WUSCs are shared with counterpart. 1.2 Project Design Matrix (PDM) and Plan of Operation (PO) are finalized.	1. Minutes of Meetings 2. PDM and PO			
(2) Supporting capacity of DWSSM regarding O&M and management for WUSCs in semi-urban towns is strengthened.	2.1 The Management Model / Support Model for WUSCs in semi-urban towns formulated during phase-I project is revised in the context of the actual situation of WUSCs in semi-urban towns. 2.2 Design manual of specifications on rehabilitation works for target WUSCs in semi-urban towns are shared in annual progress review meeting of FWSSMP. (*5) 2.3 Rehabilitation works are carried out in more than 50 target WUSCs in semi-urban towns (*5)	1. Management model 2. Minutes of review meeting, Interview with related persons 3. DWSSM Annual Report			
(3) Implementing capacity of NWSSTC regarding the training for WUSCs in semi-urban towns is strengthened.	3.1 Training implementation guideline, training plan, training curriculums and training materials for WUSCs in semi-urban towns are formulated. 3.2 The Management Model for WUSCs in semi-urban towns is utilized in trainings in NWSSTC. 3.3 More than 80% of target WUSCs attend the Basic Training on the Management Model. 3.4 Monitoring and Evaluation of more than 80% of target WUSCs are carried out.	1. Training implementation guideline, training plan, training curriculums and training materials 2. NWSSTC Annual Report, Interview with related persons 3. NWSSTC Annual Report 4. NWSSTC Annual Report			

Activities	Inputs		Important Assumption
	The Japanese Side	The Nepalese Side	
1.1 Conduct a baseline survey and technical, financial, management and organizational capacity assessment of DWSSM, FWSSMP, NWSSTC, and the target WUSCs. 1.2 Conduct a situation analysis surrounding water supply sector in semi-urban towns including legislation and development plans 1.3 Analyze the supporting mechanism for WUSCs by DWSSM, NWSSTC and FWSSMP 1.4 Coordinate and consult with the Third Small Town Project and Sector Efficiency Improvement Unit (SEIU) on support for WUSCs in semi-urban towns 1.5 Revise PDM and PO reflecting the result of aforementioned activities.	(1) Japanese Experts/Consultants ・Chief Advisor / Water Supply Management Policy (1) ・Deputy Chief Advisor / Water Supply Management Policy (2) ・Monitoring and Evaluation ・Management (organizational, financial, business planning) ・Water quality control and monitoring ・O&M of water treatment plants and distribution facilities ・O&M of electro-mechanical equipment ・Training Management / Curriculum Development ・Project Coordinator / Assistant for Water Supply Management Policy (2) Training programs ・Program in Japan (3) Equipment ・Training supporting kits and materials ・Ultra sonic flowmeter ・Electrical equipment	(1) Assignment of C/P Unit at DWSSM and officials (2) Running Expenses ・Mobilization cost of DWSSM personnel ・Cost for facility rehabilitation ・Procurement cost for water quality test kit and Electrical equipment (3) Office space ・Office space in DWSSM, NWSSTC (4) Other Support ・Costs of customs clearance, domestic transportation, storage and installation of equipment provided by JICA as per the Agreement on Technical Cooperation signed on 3 September 2003	1. No significant change in organizational structure of DWSSM is occurred. **Pre-Conditions** <Issues and countermeasures>
2.1 Study the monitoring and management evaluation indicators suited on the current condition of WUSCs in semi-urban towns, and revise the Management Model for enhancing the usability of the model for WUSCs in semi-urban towns by DWSSM. 2.2 Plan necessary rehabilitation works for some of target WUSCs in semi-urban towns by DWSSM (*5) 2.3 Conduct necessary rehabilitation works for some of target WUSCs in semi-urban towns by DWSSM (*5) 2.4 Prepare a design manual of specifications on rehabilitation works for target WUSCs in semi-urban towns by DWSSM (*5) 2.5 Identify and document the section of departments responsible for training implementation for WUSCs in semi-urban towns by DWSSM. 2.6 Formulate an outline of the Training of Trainers (ToT) regarding the Basic Training and On-site Training and instruct NWSSTC to implement the training by DWSSM 2.7 Formulate an outline of the Basic Training for the WUSCs in semi-urban towns and instruct NWSSTC to implement the training by DWSSM 2.8 Formulate an outline of the On-site Training for the WUSCs in semi-urban towns and instruct NWSSTC to implement the training by DWSSM 2.9 Formulate an outline of the Refresher Training for the WUSCs in semi-urban towns and instruct NWSSTC to implement the training by DWSSM 2.10 Evaluate the above-mentioned trainings conducted by NWSSTC, and reflect its results on the training on the Management Model for WUSCs in semi-urban towns in following years by DWSSM. 2.11 Allocate a budget for NWSSTC to implement the above-mentioned trainings by DWSSM 2.12 Re-update the Management Model for WUSCs in semi-urban towns upon receiving feedbacks from Output 3.			
3.1 Evaluate the training implementation mechanism and equipment by NWSSTC. 3.2 Draft a training implementation guideline and a plan for the training on the Management Model for WUSCs in semi-urban towns by NWSSTC. 3.3 Select candidates for ToT regarding the training on the Management Model for WUSCs in semi-urban towns from MoWS, DWSSM, NWSSTC, FWSSMP, WUSCs and other organizations by NWSSTC 3.4 Plan the ToT regarding Basic Training and On-site Training by NWSSTC 3.5 Implement the ToT regarding Basic Training and On-site Training by NWSSTC 3.6 Plan the Basic Training for the WUSCs in semi-urban towns by NWSSTC (*4) 3.7 Implement the Basic Training by NWSSTC (*4) 3.8 Plan the On-site Training for the WUSCs in semi-urban towns by NWSSTC. 3.9 Implement the On-site Training for WUSCs in semi-urban towns by NWSSTC. 3.10 Plan the Refresher Training for the WUSCs in semi-urban towns by NWSSTC 3.11 Implement the Refresher Training for WUSCs in semi-urban towns by NWSSTC. 3.12 Re-update the following (i) training implementation guideline,(ii) training plan, (iii) training curriculums, and (iv) training materials upon receiving feedbacks from results of aforementioned trainings by NWSSTC			

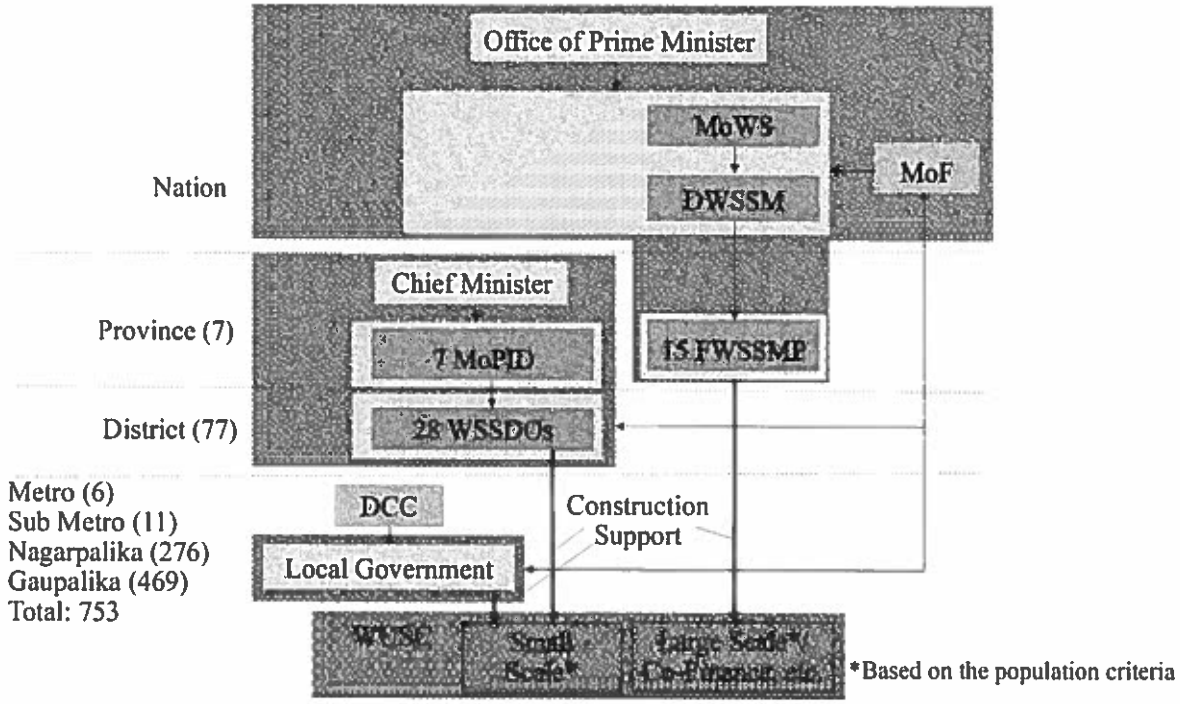
(*1) Target WUSC consist of Target A WUSC (for the revision of Management Model formulated in phase I) and Target B WUSC (for the revision of Management Model revised in phase II)
(*2) Target A WUSC: Gulariya, Belhundi, Pragatinagar, Ramgram, Shankarnagar, Besisahar, Amlekhgunj, Karmaiya, Manthali, Chautara, Dhulabari, Gauradaha, Mangadh (13 WUSC)
Target B WUSC: Rajapur, Gulariya II, Kusumba Sanoshree, Naulapur, Tripur, Bharatpur, Chaughera, Jhakredhunga, Rajahar, Gadakot, Agauli, Devdaha, Anandban, Sanamaina, Sauraha-Farsatikar, Sundarbazar, Bhotewodar, Lasunekhola, Nijgadh, Simara, Kolhabi, Jitpur, Dumarbana, Bharatgunj, Dharkebar, Hariyon, Barhathwa, Ishworpur, Ramechhap, Pakarwas, Scheme II, Melamchi, Barahbise, Uriabari, Pathari-Sanischare municipality, Jamunagachi, Rangeli municipality, Tankisuwari, Itahara, Madhumalla, Pichhra, Sorabhag (Karsiya), Bayarban, Katahari, Jhorahat, Shani-Arjun, Shivasatachhi, Prithvinagar (Gaunsankar), Garamani, Topgachhi-1, Topgachhi-2, Topgachhi-3, Juropani, Chandragadhi-1, Chandragadhi-2 (55 WUSC)
(*3) Government and non-government organizations consist of FWSSMP, NGOs, academic institutions, and so on.
(*4) The contents of Basic Training are a) Water Quality Management, b) Water Treatment Plant O&M, c) Distribution Network O&M, d) Water Meter Management, e) Management Manuals
(*5) Rehabilitation works are to provide WUSCs in semi-urban towns for equipment in order to recovery the function of water supply facilities.

Appendix-2 Technical Support Mechanism in DWSSM



To implement the Management Model efficiently, direct support will be provided to WUSCs through NWSSTC

Appendix-3 Construction Projects for WUSCs by Each Level of Government

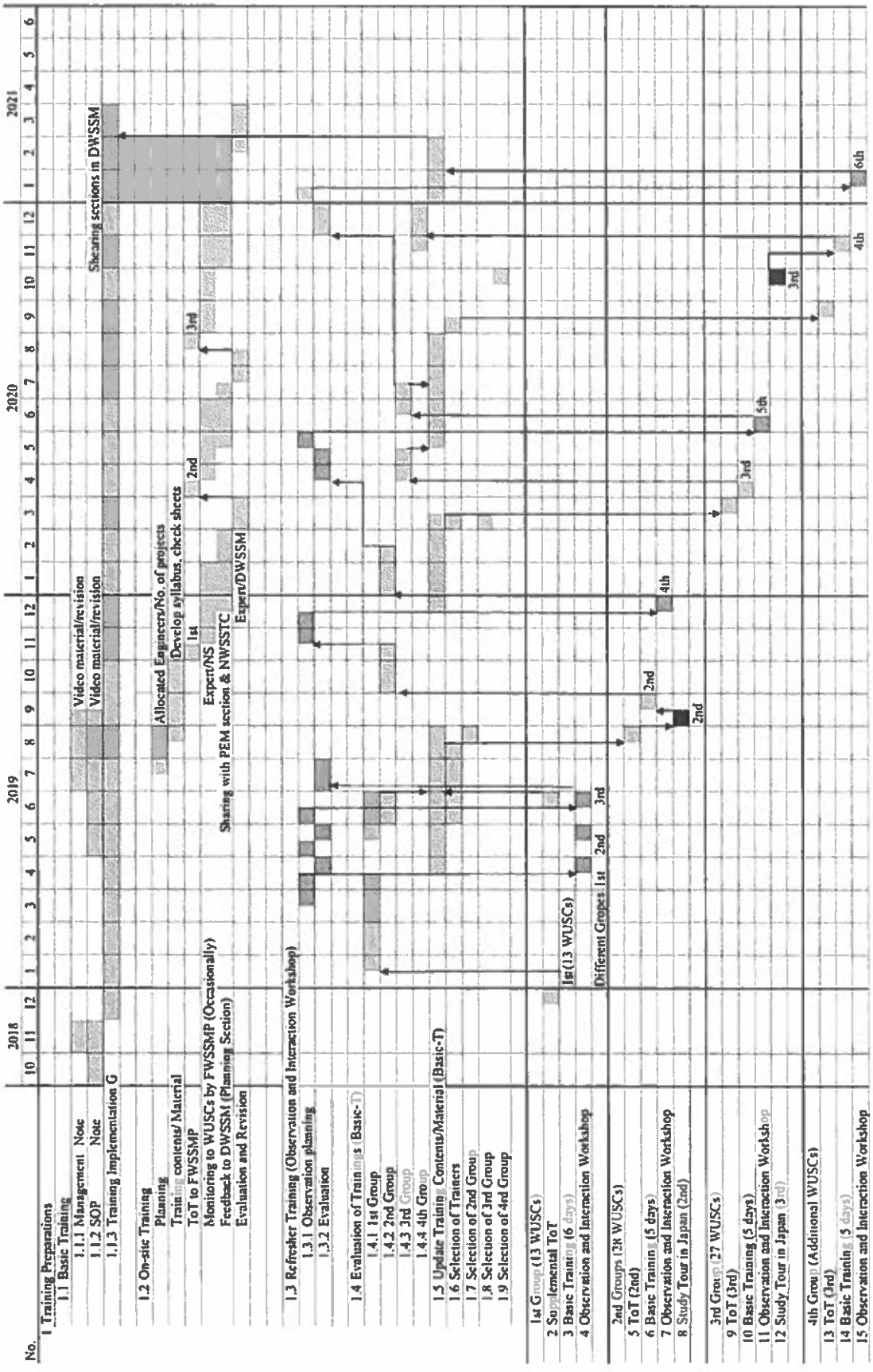


The criteria of the construction projects

Area	Federal	Provincial	Local
Mountainous	More than 1,000	500 – 1,000	Up to 500
Hill	More than 5,000	3,000 – 5,000	Up to 3,000
Plain	More than 15,000	5,000 – 15,000	Up to 5,000

Source: Budget and Program FY 2076/77

Appendix-4 Training Implementation Schedule (Tentative)



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Appendix 2.43

2nd JCC Presentation Material by DWSSM in August 2019

WASMIP
For providing safe and quality drinking water to people

The Capacity Development Project for the Improvement of Water Supply Management in Semi-Urban Areas In Nepal

Activities/Achievements of WASMIP-II

August 26, 2019

Kabindra Bikram Karki
Project Manager
WASMIP-II

1

1

1. Project Purpose

Overall Goal: Continuous support to WUSCs in semi-urban towns is provided by DWSSM/NWSSTC.

Project Purpose : **Support to the WUSCs in semi-urban towns is provided and strengthened by DWSSM / NWSSTC.**

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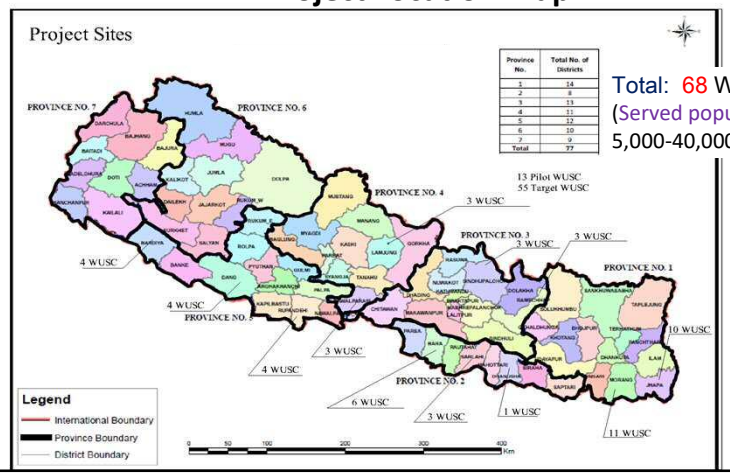
2. Project Location Map



Total: 68 WUSCs
(Served population: 5,000-40,000)

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3

3. Project Outputs

Outputs:

1. Baseline survey and capacity assessment of DWSSM, NWSSTC, and the target WUSCs have been completed, and project implementation plan finalized.
2. Supporting capacity of DWSSM regarding O&M and management for WUSCs in semi-urban towns is strengthened.
3. Implementing capacity of NWSSTC regarding the training for WUSCs in semi-urban towns is strengthened.

Project Duration: July 2016 - May 2021 (5 years)

4

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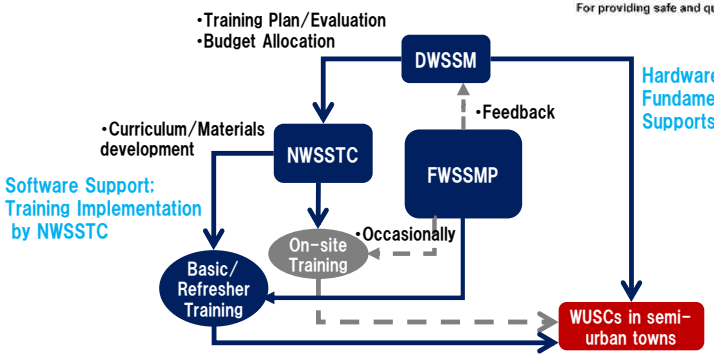
4. Technical Support Mechanism



To implement the Management Model efficiently, direct support will be provided to WUSCs through NWSSTC

5

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5. Training Contents

Training	Objectives	Methods/Contents
Training of Trainers	Understanding Basic training contents, key points, teaching skills	Method: Lecture by Japanese experts, implementation of simulation lectures by Nepali trainees Management model (business management, Standard Operating Procedures on water supply facility O&M)
Basic Training	Knowledge, skills and management on water supply business	Method: Lecturer, Practice, GW Management: KPI, Check list SOP: WTP, WQ, Distribution, WM, troubleshooting, recording
On-site Training	Applying knowledge to sites	Method: Confirmation WUSC's O&M with check lists KPI data, accounting record O&M record, inventory management, spare parts
Refresher Training	Feedback from Back & On-site Training, Good practice & key issues	Observation and Interaction Workshop Presentation by trainers & discussion with WUSCs

6

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6. Activities of WASMIP-II
(October 2018 to May 2019)

DWSSM reformed and budget was released

1. Training of Trainers (Dec 27 – 28, 2018)
2. Basic Training (Dec 30, 2018 – Jan 4, 2019)
3. 1st Observation and Interaction Workshop (Apr 24 – 25, 2019)
4. 2nd Observation and Interaction Workshop (May 18 – 19, 2019)
5. 3rd Observation and Interaction Workshop (Jun 27 – 28, 2019)

7

7

6.1 Training of Trainers (ToT)

1. Objectives: Cultivating/developing trainers from DWSSM not outsourcing
2. Date: 27th to 28th Dec, 2018 (2 days)
3. Venue: NWSSTC, Nagarkot
4. Participants: 13 participants (MoWS, DWSSM, Federal office, MoPID, WSSDO, Freelance)
5. Training contents, Method: Japanese Experts instructed the candidate trainers the key points of Management and SOPs.

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8

6.1 Syllabus of Basic Training

WASMIP — For providing safe and quality drinking water to people

		Session 1 0900-1030	Session 2 1100-1230	Session 3 1330-1500	Session 4 1530-1700
Day 1	Management	**Orientation**	**Module 1** Management Model	**Module 2** Operational Performance	**Module 3** Financial Performance
Day 2	Management	**Module 4** Business Analysis			**Module 5** Business Planning
Day 3	Operation and Maintenance	**Module 6** Standard Operation Procedures	**Module 7** Intake Facility	**Module 8** Water Treatment Plant (Facility)	
Day 4	Operation and Maintenance	**Module 9** Water Treatment Plant (M&E Equipment)		**Module 10** Water Quality Management	
Day 5	Operation and Maintenance	**Module 11** Distribution Facility	**Module 12** Water Meter		**Module 13-1,2** Repair Work, Report of Inspection Result
Day 6	Operation and Maintenance	**Module 14** Application of Standard Operation Procedures		**Closing**	

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6.1 Training of Trainers (2)




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6.2 Basic Training (1)

WASMIP — For providing safe and quality drinking water to people

1) Objectives:
- ✓ Sound management and proper O&M in water supply services
- ✓ Chairperson, board member, manager from one WUSC
- ✓ Board member's understanding management and O&M importance
- ✓ They have a decision to dispatch staffs.

2) Date: 2018/12/30 to 2019-1-4 (6 days)

3) Venue: NWSSTC, Nagarkot

11

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6.2 Basic Training (2)

WASMIP — For providing safe and quality drinking water to people

4) Number of Participants
- ✓ 10 WUSCs (28 trainees) participated

5) 10 trainers from DWSSM/NWSSTC, MoWS

6) Trainees' Comments
- ✓ More than 90% of participants agreed about 1) contents, 2) procedure, 3) training team, 4) materials

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6.2 Basic Training

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6.3 Observation and Interaction Workshop (1)

For providing safe and quality drinking water to people

1. Objectives
   a. To observe water supply facility in the model WUSC as good practice.
   b. To observe O&M, record keeping, water quality test and disclose.
   c. To facilitate interaction and discussion among DWSSM/NWSSTC and WUSCs.
   d. To recognize the gaps between the model WUSC and other WUSCs
   e. To lecture WUSCs by NWSSTC

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6.3 Observation and Interaction Workshop (2)

For providing safe and quality drinking water to people

	Venue (WUSC)	Nos of WUSCs	Participants
1st	Pragatinagar	14	83
2nd	Dhulabari	24	77
3rd	Amlekhgunj	20	73

15

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6.4 Observation and Interaction Workshop

For providing safe and quality drinking water to people

Good Practices	Challenges
1) Regular meter reading 2) Quick repair pipelines 3) Preparing a water tariff for economic difficulties 4) Storing spare parts 5) Installing power generator 6) Daily chlorine dosing 7) Regular inspection and monitoring of facilities 8) Regular water quality test 9) Customer complain management 10)Regular board meeting 11)Preparing annual audit report 12)Regular communication with consumers	1) Pipe destruction by road constructions 2) Accumulation of budget for construction and O&M 3) Increasing water supply volume 4) Water treatment in high turbidity 5) Water leakage from aged pipes 6) High electricity bills 7) Scaling inside pipe 8) Water resource development

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6.3 1st Observation and Interaction Workshop

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6.3 2nd Observation and Interaction Workshop

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7. Achievements of Trainings

WASMIP JICA
For providing safe and quality drinking water to people

S.N	DWSSM/NWSSTC	WUSCs
1	Improvement of training skills(teaching, facilitation) of trainers.	Opportunity with DWSSM and other WUSCs identifying problems and solution.
2	Increasing number of trainers in fields of O&M and management on water supply system.	Recognizing importance of O&M and financial records and KPIS.
3	Systematic training on overall (O&M and management) water supply system	Identifying correct O&M procedures (e.g: operation of sedimentation tank) in site.
4	Opportunity to visit and give lecture at the site and visualize O&M of WUSCs.	Obtained essential equipment such as flowmeter, chlorine dosing, water quality test kit for proper O&M and safe water supply from DWSSM.
5	Identifying roles of WUSCS as stipulated by government policies, rules and regulation regarding water supply service.	

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WASMIP JICA
For providing safe and quality drinking water to people

8. Procured Equipment for Water Supply System in WUSCs (1)

Since the beginning of WASMIP-II, DWSSM has procured and provided 68 WUSCs with following equipment:

1. Flow meters
2. Chlorination units
3. Water quality test kits
4. Valves, pressure gage, safety goods, etc.

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For providing safe and quality drinking water to people

8. Procured Equipment for Water Supply System in WUSCs (2)

	Fiscal Year	Rehabilitation Works (Hardware Support)	Trainings (Software Support)
1	2073/74	15 million	2.5 million
2	2074/75	50 million 24 million (5 RMSOs)	2.5 million (NWSSTC)
3	2075/76	10 million	2.5 million
4	2076/77	20 million	4.0 million

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For providing safe and quality drinking water to people

9. Capacity Level of WUSCs

Level	Situation	Cause
1	NO Installation of Equipment	NO understanding of equipment importance/ proper positions, NO fittings/ Insufficient budget
2	Installation but NO Record	NO understanding of record importance
3	Keep recording, but NO Analysis	NO understanding of data analysis, how to analyze data
4	Analyzing data and Detect/ Preventive Errors	Next stage: securing budget, human resources

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For providing safe and quality drinking water to people

10. DWSSM/NWSSTC Activities

In WASMIP-II

1) DWSSM has secured the budgets for the management model (Management & SOPs) implementation and technical support mechanism for 68 target WUSCs in semi-urban areas.

2) DWSSM has procured and provided the fundamental equipment such as flowmeter, chlorination unit, water quality test kits so on for 68 target WUSCs in semi-urban areas.

3) NWSSTC has conducted the Basic trainings to 68 target WUSCs, and also conducted the Observation and Interaction Workshop 3 times in Province No.1, No.2, and Gandaki.

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For providing safe and quality drinking water to people

11. Discussion (in DWSSM/ NWSSTC)

1) Identification of sections of DWSSM responsible for the management model and technical support mechanism for the target WUSCs

2) Securing human resources (Trainers/Monitors) and training implementation (ToT, Basic, On-site, Refresher)

3) Follow-up of rehabilitation works (Procurement, Delivery, Installation, Application)

4) Securing Budget for trainings & rehabilitation works after WASMIP-II

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Appendix 2.44

2nd JCC Presentation Material by WASMIP Team in August 2019

The Capacity Development Project for the Improvement of Water Supply Management in Semi-urban Areas in Nepal
WASMIP-II

2nd Joint Coordinating Committee Meeting

August 26, 2019

Chief Advisor

Satoru Oniki

1

1

Discussion in DWSSM/ NWSSTC

1) Identification of sections of DWSSM responsible for the management model and technical support mechanism for the target WUSCs

2) Securing human resources (Trainers/Monitors) and training implementation (ToT, Basic, On-site, Refresher)

3) Follow-up of rehabilitation works (Procurement, Delivery, Installation, Application)

4) Securing Budget for trainings & rehabilitation works after WASMIP-II

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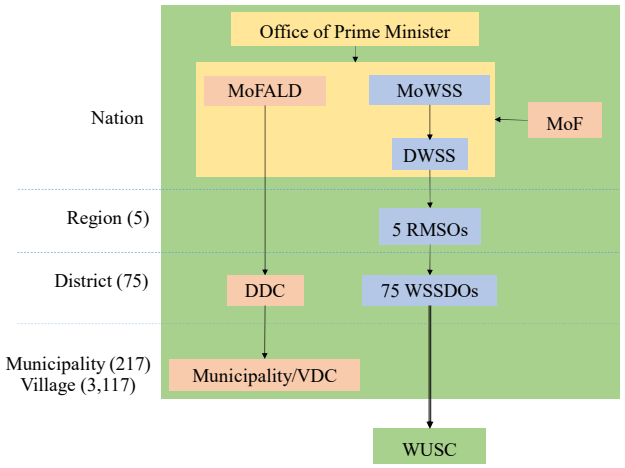
1. Federal Transition (Before)



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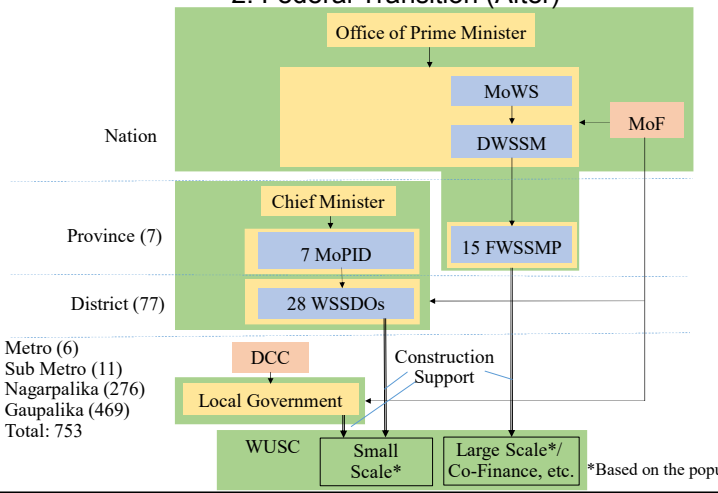
2. Federal Transition (After)



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3. Support Mechanism for WUSCs (Construction)

(1) Construction of Water Supply Facilities

a. FWSSMP (15 offices) was newly established as subsidiaries of DWSSM to implement federal level projects (construction projects).

b. The criteria of the projects are showed as below;

Area	Federal	Provincial	Local
Mountainous	More than 1,000	500 – 1,000	Up to 500
Hill	More than 5,000	3,000 – 5,000	Up to 3,000
Plain	More than 15,000	5,000 – 15,000	Up to 5,000

Source: Budget and Program FY 2076/77

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4. Support Mechanism for WUSCs (Monitoring) (1)

Section 8. Roles and Responsibilities of Water Supply and Sanitation

A. Responsibilities of Nepal Government (MoWS, DWSSM, FWSSMP)

1) Large Project on National level related to water supply and sanitation
2) Foreign Assistance Project and Co-Finance Projects
3) Projects providing access of water supply and sanitation to the specified population of specified area
4) Projects related to more than one province
5) Multipurpose wastewater treatment and management that requires large capital investment
6) Projects that transfers water from one resource to another area
7) Monitoring of water supply and sanitation projects

Source: "Draft WaSH Bill" prepared by MoWS

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4. Support Mechanism for WUSCs (Monitoring) (2)

Section 8. Roles and Responsibilities of Water Supply and Sanitation

B. Roles and Responsibilities of Provincial Government (MoPID, WSSDO)

1) Basic production, treatment and distribution of potable water in provincial level
2) Projects providing access of water supply and sanitation to the specified population of specified area
3) Wastewater management and treatment
4) Projects related to more than one local bodies within a province

Source: "Draft WaSH Bill" prepared by MoWS

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4. Support Mechanism for WUSCs (Monitoring) (3)

Section 8. Roles and Responsibilities of Water Supply and Sanitation

C. Roles and Responsibilities of Local Government

1) Water supply service and its monitoring in local level
2) Raising awareness on sanitation
3) Rural water supply and sanitation service
4) Operating wastewater management system
5) Projects providing access of water supply and sanitation to the specified population of specified area
6) Maintenance and rehabilitation work of water supply and sanitation projects that are operating in local level

Source: "Draft WaSH Bill" prepared by MoWS

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4. Engagement of FWSSMP for Capacity Development of WUSCs in semi-urban towns

1. Local Government
   - Lack of engineer or no posting
   - Lack of capacity for maintenance or monitoring or rehabilitation work supervision

2. DWSSM

- FWSSMPs have an obligation to visit WUSCs for the supervision of the construction of water supply and sanitation projects.
- To utilize the opportunities for their visits to WUSCs for the capacity development on O&M of facilities and management.

3. WASMIP team

- Survey at pilot areas to analyze support mechanism by provincial/local governments, necessity of capacity development

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5. Clarification of Responsibility of DWSSM

- The draft version of the job description of DWSSM;

"to conduct necessary action for the maintenance – repair and ensure the sustainability of water supply and sanitation systems "

- It is necessary to clarify how such action to be coordinated at local level.

- To clarify the responsible section to carry out this role and approve the draft job description within this fiscal year (2076/77).

➢ Proposed section is "Electromechanical and Hydrogeological"

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Discussion in DWSSM/ NWSSTC

1) Identification of sections of DWSSM responsible for the management model and technical support mechanism for the target WUSCs

2) Securing human resources (Trainers/Monitors) and training implementation (ToT, Basic, On-site, Refresher)

3) Follow-up of rehabilitation works (Procurement, Delivery, Installation, Application)

4) Securing Budget for trainings & rehabilitation works after WASMIP-II

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6. Effective Utilization of the Trainers

- Engaging trainers for sustainable implementation of Basic training in the future.
- DWSSM/NWSSTC have collected information about the profile of candidates of trainers through the ToT.

- To organize trainer information
  - ➢ To recognize/certify the trainers
  - ➢ To ensure active engagement of trainers according to training plan.
- DWSSM will create a roster/database of trainers

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Discussion in DWSSM/ NWSSTC

1) Identification of sections of DWSSM responsible for the management model and technical support mechanism for the target WUSCs

2) Securing human resources (Trainers/Monitors) and training implementation (ToT, Basic, On-site, Refresher)

3) Follow-up of rehabilitation works (Procurement, Delivery, Installation, Application)

4) Securing Budget for trainings & rehabilitation works after WASMIP-II

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7. Essential Equipment Installed in WUSCs

- Procure essential equipment has not installed in WUSC sites.
- It is necessary to install the equipment in order to make the trainings effectively.

- To explain WUSCs about the importance of the equipment installation in the trainings.

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Discussion in DWSSM/ NWSSTC

1) Identification of sections of DWSSM responsible for the management model and technical support mechanism for the target WUSCs

2) Securing human resources (Trainers/Monitors) and training implementation (ToT, Basic, On-site, Refresher)

3) Follow-up of rehabilitation works (Procurement, Delivery, Installation, Application)

4) Securing Budget for trainings & rehabilitation works after WASMIP-II

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8. Budget Support to WUSCs in the Future

1. Budget for O&M equipment should be sought with the provincial and local government by WUSCs after WASMIP-II.

2. DWSSM will continue to provide the budget for capacity development of WUSCs in semi-urban towns after WASMIP-II.

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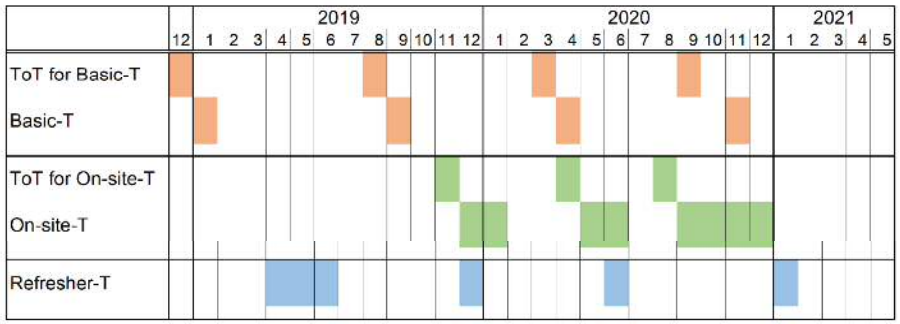
9. Training Implementation Schedule (Tentative)



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WASMIP-II Slogan

Preventive maintenance is like a
"Bishwakarma puja"
पुर्व-मर्मत भनेको विश्वकर्मा पुजा जस्तै नै हो ।

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Thank you for your Attention

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Appendix 2.45

3rd JCC Minutes of Meeting of Terminal Evaluation in October 2021

MINUTES OF MEETING ON
THE JOINT TERMINAL EVALUATON MEETING
FOR
CAPACITY DEVELOPMENT PROJECT FOR THE IMPROVEMENT OF WATER SUPPLY MANAGEMENT IN SEMI-URBAN AREAS (WASMIP-2)

The Joint Terminal Evaluation Team (hereinafter referred to as "the Team"), organized by Japan International Cooperation Agency (hereinafter referred to as "JICA") , headed by Dr. OGATA Ryuji started survey for the purpose of conducting the terminal evaluation on the technical cooperation project, namely "the Capacity Development Project for the Improvement of Water Supply Management in Semi-Urban Areas (WASMIP-2) "the Project".

As a result of the intensive study and analysis of the activities and achievement of the project, the Team prepared the Joint Terminal Evaluation Report (hereinafter referred to as "the Report") attached hereto and presented it at the Joint Terminal Evaluation Meeting held on October 6. 2021.

After discussions in respect of recommendations and issues for implementation of the Project during and after the Project period, the 3rd JCC approved the contents of the Report and the respective representative of the Nepal side and the Japan side agreed to the matters referred to the documents attached hereto.

The parties acknowledge and agree that this Minutes of Meetings may be executed by electronic signature, which is considered as an original signature for all purposes and has the same force and effect as an original signature. "Electronic signature" includes faxed versions of an original signature or electronically scanned and transmitted version (e.g., via pdf) of an original signature.

Kathmandu, October 6th, 2021

Dr. OGATA Ryuji Leader JICA Terminal Evaluation Team Japan	Ms. Meena Shrestha Joint Secretary, Water Supply and Environment Division, Ministry of Water Supply Nepal	Mr. Surya Raj Kadel Deputy Director General, Department of Water Supply and Sewerage Management Nepal

THE ATTACHED DOCUMENT

1. Joint Terminal Evaluation of the Project

The Team presented the results of the joint terminal evaluation at the Joint Terminal Evaluation Meeting, and Nepal side and Japan side approved the Report as attached.

(End)

Attachment: Joint Terminal Evaluation Report

Joint Terminal Evaluation Report

on

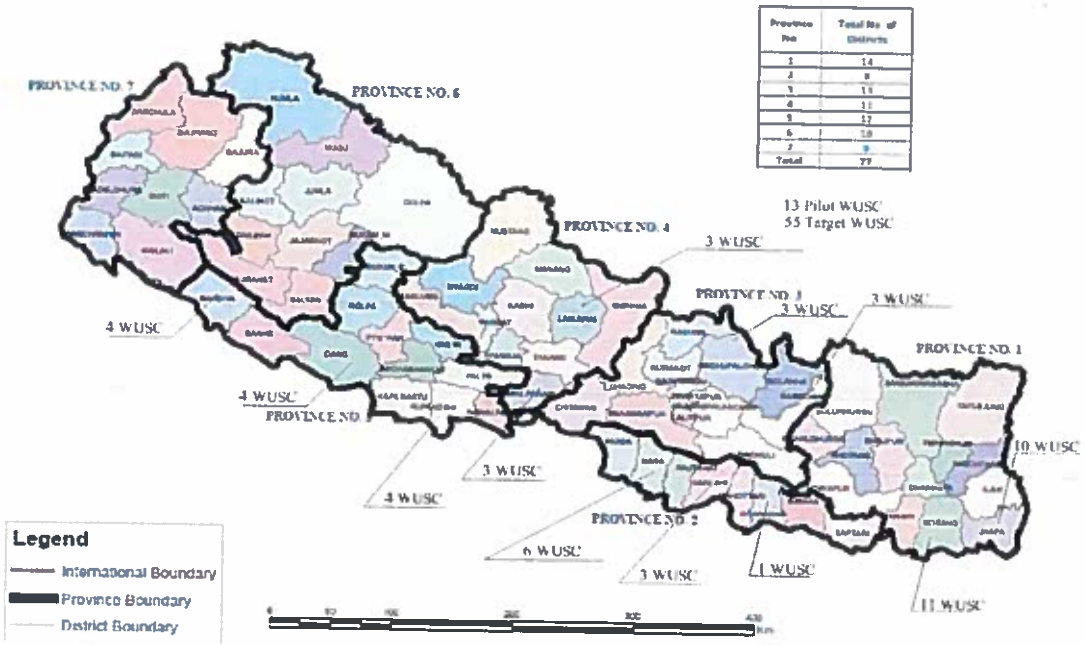
Capacity Development Project for the Improvement of Water Supply Management in Semi-Urban Areas

October 6, 2021

Table of Contents

ANNEX

Project Map


PROVINCE NO. 7
PROVINCE NO. 6
PROVINCE NO. 4
PROVINCE NO. 5
PROVINCE NO. 1
PROVINCE NO. 2
13 Pilot WUSC
55 Target WUSC
3 WUSC
3 WUSC
3 WUSC
4 WUSC
4 WUSC
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4 WUSC
6 WUSC
3 WUSC
1 WUSC
11 WUSC
Legend
International Boundary
Province Boundary
District Boundary

Abbreviation and Acronym

ADB	Asian Development Bank
DG	Director General
DDG	Deputy Director General
DWSS	Department of Water Supply and Sewerage
DWSSM	Department of Water Supply and Sewerage Management
FWSSMP	Federal Water Supply and Sewerage Management Project
ISSAU	Institutional Support and Service Advisory Unit
JCC	Joint Coordination Committee
JICA	Japan International Cooperation Agency
JPCM	Joint Project Coordination Meeting
KPI	Key Performance Indicator
LGA	Local Government Act
MoPID	Ministry of Physical Infrastructure Development
MOU	Memorandum of Understanding
MoWS	Ministry of Water Supply
NWaSH MIS	National Water Sanitation and Hygiene Management Information System
NWSSTC	National Water Supply and Sanitation Training Center
O&M	Operation and Maintenance
PDM	Project Design Matrix
PO	Plan of Operation
RMSO	Regional Monitoring and Supervision Office
SOPs	Standard Operation Procedures
SSPWS	Small Towns Water Supply and Sanitation Sector Project on Water Supply
ToT	Training of Trainers
WSSDO	Water Supply and Sanitation Division Office
WUSC	Water Users and Sanitation Committees

Chapter 1. Introduction

1.1. Background

In Nepal, more than 40,000 water supply schemes/systems have already been constructed in semi-urban towns and rural areas across the country through government's own internal resources and with assistance from a variety of multilateral and bilateral development partners. Notwithstanding whoever implemented the system, operation and maintenance (hereinafter referred to as "O&M") responsibility of the system has been transferred to local Water Users and Sanitation Committees (hereinafter referred to as "WUSCs"). In semi-urban towns, most of the systems are relatively large and included water treatment plant with electro-mechanical equipment. The consumers are served through private household connections. WUSCs have to supply adequate quantity of water to the consumers, look after quality of water, collect tariff from consumers, and manage human as well as financial resources to keep system in good condition.

Meanwhile, the Department of Water Supply and Sewage (hereinafter referred to as "DWSS"), the predecessor of the Department of Water Supply and Sewage Management (hereinafter referred to as "DWSSM"), had been more engaged in the construction of facilities. A very little attention had been given to the software part of O&M of water supply systems such as capacity improvement of WUSCs. Considering the situation, JICA in 2008 implemented "The Project for Capacity Development on Water Supply in Semi-urban Areas in Nepal". Dhulabari, Gauradaha and Mangadh WUSCs and Water Supply and Sanitation Division Offices (hereinafter referred to as "WSSDOs") of Jhapa and Morang districts in Eastern Region were selected for capacity improvements. The project developed a Small and Medium-Sized Water Supply Management Model for WUSCs to improve their management and a Small and Medium Sized Water Supply Support Model to establish technical support mechanism of DWSS to WUSCs.

With this background, the Government of Nepal and Japan International Cooperation Agency (hereinafter referred to as "JICA") agreed to implement the "Capacity Development Project for the Improvement of Water Supply Management in Semi-Urban Areas" (hereinafter referred to as the "Project") to replicate these Management model and Support Model in other WUSCs across the country.

1.2. Project Overview

The outline of the Project is shown in the following table.

Project Name	Capacity Development Project for the Improvement of Water Supply Management in Semi-Urban Areas
Target Areas	68 WUSCs in Nepal
Project Period	June 2016 – March 2022
Implementing Agency	Department of Water Supply and Sewage Management (DWSSM)
Overall Goal	Continuous support to WUSCs in semi-urban towns is provided by DWSSM and National Water Supply and Sanitation Training Center (NWSSTC)
Project Purpose	Support to the WUSCs in semi-urban towns is provided and strengthened by DWSSM and NWSSTC using government and non-government organizations' personnel.
Outputs	1. Baseline survey and capacity assessment of DWSSM, NWSSTC, Federal Water Supply and Sewerage Management Project (FWSSMP), and the target WUSCs are conducted, and project implementation plan is finalized. 2. Supporting capacity of DWSSM regarding Operation and Maintenance (O&M) and management for WUSCs in semi-urban towns is strengthened. 3. Implementing capacity of NWSSTC regarding the training for WUSCs in semi-urban towns is strengthened.

1.3. Objectives of the Joint Terminal Evaluation

The objectives of the joint terminal evaluation are as follows:

(1) To review and confirm the progress and performance of project activities, implementation process, and achievement of goals and outputs to date based on the Project Design Matrix (hereinafter referred to as the "PDM") (ANNEX 1) and Plan of Operation (hereinafter referred to as "PO") (ANNEX 2), in order to verify whether the project is being implemented smoothly and effectively,

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

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

1.4. Schedule of the Joint Terminal Evaluation

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

1.5. Members of the Joint Terminal Evaluation Team

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

<Japanese side>

Name	Title	Assigned task

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

<Nepalese side>

Name	Title
Dr. Rajit Ojha	Section Chief, National Management of Information Project/Institutional Support and Service Advisory Unit, DWSSM

Chapter 2. Method of Evaluation

2.1. Framework of the Terminal Evaluation

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

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

2.2. Steps of the Terminal Evaluation

The joint terminal evaluation took the following steps:

(1) Review of the Project reports and documents,

(2) Making an evaluation plan by developing an evaluation grid to clarify the data and information to be collected, data collection methods and data sources,

(3) Preparing and distributing questionnaires to the stakeholders based on the evaluation grid,

(4) Conducting interviews with the stakeholders, and

(5) Evaluating the Project based on the five evaluation criteria.

Chapter 3. Project Achievement

3.1. Inputs

3.1.1 Japanese side

(1) Experts

A total of 14 experts (a total of 77.65 Man Months) were assigned to the Project as of 31 August 2021. The table below shows the number of experts and their dispatched field.

Details are shown in ANNEX 3.

Field	Number of experts
Chief Advisor/Water Supply Management Policy-1	1
Deputy-Chief Advisor/Water Supply Management Policy-2	2
Monitoring and Evaluation	2
Management (organization, finance, business planning)	2
Water quality control and monitoring/O&M of water sources/O&M of water treatment plants-2	1
O&M of water treatment plants -1	1
O&M of electro-mechanical equipment	2
Training Management/Curriculum Development	1
Project Coordinator /Assistant for Water Supply Management Policy	2
Total (Accumulated number of experts)	14

Note: (1) In case the number of experts is 2, there was a replacement of personnel. (2) Some experts were assigned in more than one field, therefore, the total number of experts differs from the accumulated number of experts from each field.

(2) Equipment provided by Japan

Equipment provided by Japan is photocopy machines, PCs, and an ultrasonic flowmeter. Additionally, equipment and consumables were provided to WUSCs in response to COVID-19 such as hand wash systems, water quality test kits, chlorination unis, portable toilets, and bleaching powders. Details are listed in ANNEX 4.

(3) Counterpart training in Japan

In total, 19 individuals took part in the counterpart training in Japan.

- 1st training in September 2017: Four (4) counterparts from Ministry of Water Supply (hereinafter referred to as "MoWS") and DWSSM took part.
- 2nd training in September 2019: 12 counterparts from MoWS, DWSSM, and FWSSMP took part.

Details are listed in ANNEX 5.

(4) Operational expenses by Japan

Operational expenses from June 2016 to August 2021 are 33,663,000 yen.

3.1.2 Nepalese side

(1) Counterparts

A total of 110 personnel were assigned from MoWS, DWSSM, NWSSTC, FWSSMP, and the target WUSCs. Details are listed in ANNEX 6.

(2) Land and facilities

Project office space was provided in the DWSSM by the Nepalese side, including utilities.

(3) Operational expenses by Nepal

(Unit: thousand NPR)

	2073/74 (2016/17)	2074/75 (2017/18)	2075/76 (2018/19)	2076/77 (2019/20)	2077/78 (2020/21)	2078/79 (2021/22)
Rehabilitation of WUSC facilities						
Allocated budget	15,000	50,000 24,000 (5RMSOs)	10,000	20,000	15,000	n.a.
Actual disbursement	2,543	20,000	9,000	3,000	0	This year
Training (NWSSTC)						
Allocated budget	2,500	2,500	2,500	4,000	6,000	6,000
Actual disbursement	391	2,244	1,589	1,547	2,319	This year

3.2. Outputs

The achievement level of each indicator for the Outputs at the time of the terminal evaluation is shown below. Almost all indicators for the Outputs have been achieved. Some of the highlights of the Outputs among others include (1) incorporating the concept of "preventive maintenance" in the training to extend the service life of the facilities and reduce the costs, (2) well-balanced combination of soft-ware support (training) and hard-ware support (equipment necessary for recovering the basic function of WUSCs, (3) focus on developing materials including SOPs, videos, and simplified SOPs and others which are available in Nepali for the use of any WUSCs as well as local governments.

Output 1 : Baseline survey and capacity assessment of DWSSM, NWSSTC, FWSSMP, and the target WUSCs are conducted, and project implementation plan is finalized.	
Indicators	Achievement level
1.1 Results of the baseline survey and capacity assessment in DWSSM, NWSSTC, FWSSMP, and target	1.1 Achieved – Baseline surveys were conducted for DWSSM, NWSSTC, and Target-A WUSCs (13) in April 2017 and for Target-B WUSCs (55) in December 2017.

WUSCs are shared with counterparts.	- Baseline surveys were conducted for 49 local governments, 5 Ministry of Physical Infrastructure Development (MoPIDs), 10 WSSDOs,and 7 FWSSMPs (total 71 institutions/organizations) - Basic data to calculate Key Performance Indicators (KPIs) were collected from 61 WUSCs. 5 WUSCs have no data, as they do not operate water supply facilities. Collecting information of remaining 2 WUSCs through telephone interviews have been impossible so far.
1.2 Project Design Matrix (PDM) and Plan of Operation (PO) are finalized.	1.2 Achieved The latest versions were approved in Munities of Meeting of 18 June, 2020 (Supports for COVID-19 measures were added)

Output 2 : Supporting capacity of DWSSM regarding O&M and management for WUSCs in semi-urban towns is strengthened.	
Indicators	Achievement level
2.1 The Management Model/Support Model for WUSCs in semiurban towns formulated during phase-I project is revised in the context of the actual situation of WUSCs in semi-urban towns.	2.1 Achieved Management Model/Support Model has been continuously re-updated receiving feedback from Output-3. <Deliverables and Materials> - Video materials (51 videos) for the Basic training - Handy-type Standard Operation Procedures (SOPs) were finalized (April 2021) - Finalized SOPs were submitted to DWSSM (May 2021) - Nepalese versions of SOPs and PowerPoint slides were being revised.
2.2 Design manual of specifications on rehabilitation works for target WUSCs in semi-urban towns are shared in annual progress review meeting of FWSSMP.	2.2 Partially achieved - Design manual was finalized and submitted to DWSSM. - Due to the COVID-19 pandemic situation, the duration of annual progress review was shortened from 3 days to a single day. Though short information was given in the NWSSTC progress presentation on the 'Design manual of specifications on rehabilitation works, a copy of the manual along with the SOPs will be shared with FWSSMPs shortly. Also, these documents are being prepared for submission to departmental approval.
2.3 Rehabilitation works are carried out in more than 50 target WUSCs in semi-urban towns.	Achieved. Rehabilitation works (Procuring and installing equipment necessary to recover the basic function of WUSCs) for 68 target WUSCs were completed. As a result, WUSCs have recovered their basic functions of grasping the water production volume and chlorination. <Items> Flowmeter, Chlorination unit, Pressure gauge, Water quality test kit, Electric Devices (digital clamp meter, insulation continuity tester, earth tester), Safety tools (mask, glove, goggles), Aeration filter media

Output 3: Implementing capacity of NWSSTC regarding the training for WUSCs in semi-urban towns is strengthened.	
Indicators	Achievement Level
3.1 Training	3.1 Achieved

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

3.3. Project Purpose

The achievement level of indicators for the Project Purpose at the time of the terminal evaluation is shown below. The prospects for achieving the Project Purpose are high, as four of five indicators were achieved at the time of terminal evaluation. As for indicator 5, "The final version of the Management Model, training implementation guideline, training plan, and training curriculums for WUSCs in semi-urban towns are officially approved/authorized by DWSSM.", DWSSM is committed to authorizing the Management Model and related documents after due process, and in addition, MoWS is willing to authorize them to distribute them nationally (the provincial governments and local governments) for the utilization of the documents at each level of governments.

Project Purpose: Support to the WUSCs in semi-urban towns is provided and strengthened by DWSSM and NWSSTC using government and non-government organizations' personnel.	
Indicators	Achievement level
1. The revision process and	Achieved

<table>
<tr><td>sections of DWSSM responsible for the Management Model and Technical Support Mechanism for WUSCs in semi-urban towns are identified.</td><td>1. DWSSM confirmed that mainly the Planning, Monitoring, and Evaluation Section and NWSSTC will be responsible for the revision.
Part of it goes to ISSAU. ISSAU in consultation with NWSSTC is working on developing a support and management model to backstopping the WUSCs. The work is close to each other and joint planning is needed. The Management Model is expected to be revised/integrated under the framework in the future. Department is changing the name of the sections and TOR as well in coming future.

2. Though the job description of DWSSM has been a draft since 2018, the job description of those sections are as follows:
<NWSSTC>
Job description NWSSTC including "Work for the capacity development, promotion of innovation, and technological development of stakeholders and service providers of water supply and sanitation sector, and "Develop necessary manuals, online courses and information management system for training" among others is relevant to the Project.
<Planning Monitoring and Evaluation Section>
Provide necessary technical assistance to concerned parties or bodies to collect and update data related to drinking water and sanitation.</td></tr>
<tr><td>2. The sections of DWSSM responsible for the training on the Management Model for WUSCs in semi-urban towns and revision process of training implementation guideline are identified.</td><td><u>Achieved</u>
- Though the job description of DWSSM including NWSSTC has been still a draft since 2018, job description NWSSTC includes "Work for the capacity development, promotion of innovation, and technological development of stakeholders and service providers of water supply and sanitation sector", "Develop necessary manuals, online courses and information management system for training" among others are relevant to the Project.
- DWSSM and NWSSTC confirmed that NWSSTC has been and will be responsible. And Business plan of NWSSTC is being prepared by ISSAU.</td></tr>
<tr><td>3. More than 15 trainers, who can carry out the training on the Management Model for WUSCs in semi-urban towns, are developed. From this trainer batch, at least six must be employees of FWSSMP.</td><td><u>Achieved</u>
- 70 trainers were trained. Among them,17 persons are from DWSSM/NWSSTC/MoWS, 19 are from FWSSMP.</td></tr>
<tr><td>4. Capacity assessment results of trainers on the Management Model for target WUSCs in semi-urban towns are improved compared to the baseline</td><td><u>Achieved</u>
The results of the capacity assessment (self-assessment) on General skills (self-management, communication, achievement, process, logic, information) and Specific skills (water supply system, O&M of water treatment plant, construction and O&M of network, financial management, and public relation) improved

Average of 70 trainers<table><tr><td></td><td>Pre</td><td>Post</td></tr><tr><td>General skills</td><td>3.54</td><td>3.94</td></tr></table></td></tr>
</table>

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

3.4. Overall Goal

The Overall Goal is generally expected to be achieved within three to five years after the project's completion as a result of project activities. At the time of the terminal evaluation, the Project Purpose is likely to be achieved by the end of the project period. There seems to be a strong logical consequence between the indicators for the Project Purpose and indicator 1 of the Overall Goal. Therefore, the prospect for achieving indicator 1 would be high. On the other hand, to what extent indicator 2 is achieved is dependent on each target WUSC. Key Performance Indicators (hereinafter referred to as "KPI") of the target WUSCs have been generally improving. and good cases have been observed, where chairpersons took leadership to practice the learning from the training/support from the Project. For example, WUSCs started keeping the related record including water production volume/supply volume and following Standard Operation Procedures (hereinafter referred to as "SOPs"), which they did not practice before the Project. However, whether all the target WUSCs can practice without support/monitoring is not clear.

Continuous support to WUSCs in semi-urban towns is provided by DWSSM and NWSSTC.	
Indicators	Prospects for achievement
1. The trainings are continuously implemented by NWSSTC on the Management Model for WUSCs in semi-urban towns.	At the time of terminal evaluation, it is expected that the indicator is achieved after the completion of the project. 70 trainers were trained under the ToT of the project. However, the number of trainers who actually can serve as trainers for the Basic Training is limited (around 34-36 individuals from DWSSM/NWSSTC/MoWS/FWSSMP), as many are retired/promoted/transferred. So, whether or not securing a sufficient number of trainers is an issue. As for the onsite training, 19 individuals of FWSSMPs are expected to continue facilitating, however, considering the limited number of staff and the volume of

	their duties, it might be difficult for them to conduct onsite training.
2. The contents of the Management Model are utilized for the management of the water supply of WUSCs in semi-urban towns.	Although some improvement in performance (KPI) of the target WUSCs has been observed, there are differences among the WUSCs. Average of Production Ratio increased. However, other KPI, where external benchmarks are available, averages did not reach the benchmarks and variances are big among WUSCs. Comparing to the status of 2013-14, Non-Revenue Water (NRW) improved and performance of Production Ratio is good. On the other hand, Water Supply Ratio, Operation Ratio and Collection Ratio worsened. Continuous support (taking part in Basic Training/On-site Training) might be needed. Nonetheless, grasping the figures and keeping records show the progress of WUSCs. As mentioned above, data deficiency rate significantly improved, as a result of Onsite training/Refresher training.

Chapter 4. Implementation Process

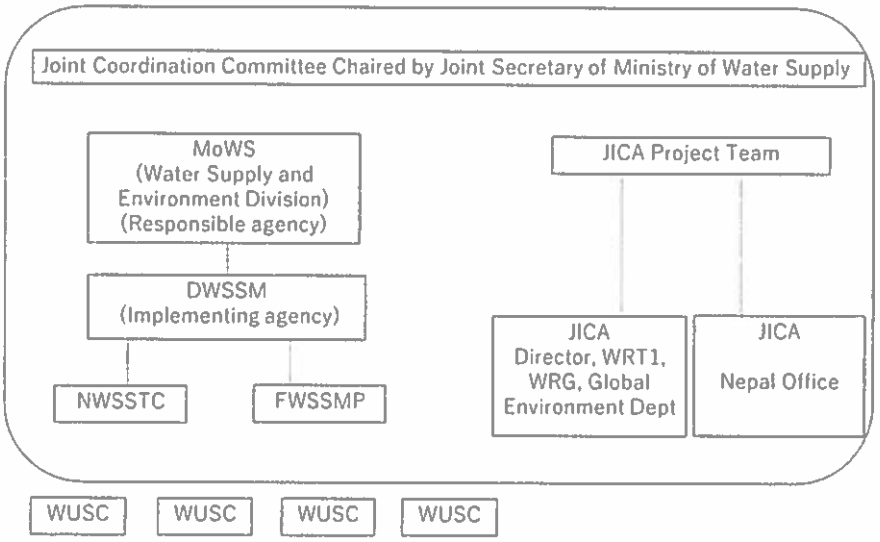
4.1. Progress of Activities

The project period was extended for 10 months, as the activities were suspended from May to August 2017, due to the change in the organizational structure of the counterpart agencies following the transition to federalism. Also, the travel bans due to the COVID-19 pandemic affected the project period. Nonetheless, the activities under PDM (ANNEX 1) and PO (ANNEX 2) have been mostly completed and the rest of the activities are expected to be completed by the end of the project. The remaining activities are as follows:

Activities	Status
3.4 Plan the ToT regarding Basic Training and On-site Training by NWSSTC. 3.5 Implement the ToT regarding Basic Training and On-site Training by NWSSTC.	One more ToT course is planned. However, counterparts and the Japanese side agreed that a sufficient number of ToT courses have been conducted. So, it was regarded as "completed".
3.6 Plan the Basic Training for the WUSCs in semi-urban towns by NWSSTC. 3.7 Implement the Basic Training by NWSSTC	One more Basic Training course is to be conducted.
3.8 Plan the On-site Training for the WUSCs in semi-urban towns by NWSSTC. 3.9 Implement the On-site Training for WUSCs in semi-urban towns by NWSSTC.	One more On-site Training course is to be conducted.
3.10 Plan the Refresher Training for the WUSCs in semi-urban towns by NWSSTC. 3.11 Implement the Refresher Training for WUSCs in semi-urban towns by NWSSTC.	As the government has banned mass gatherings due to COVID-19, it may be difficult to conduct Refresher Training.

4.2. Implementation Structure

The following chart shows the implementation structure of the Project.



4.3. JCC Meetings

Joint Coordination Committee (hereinafter referred to as "JCC") meetings were planned to be held at least once a year. At the time of terminal evaluation, there were three JCC meetings were held as follows, including the 3rd JCC to be held at the end of this terminal evaluation.

- 1st: February 2018: Revised PDM and PO were approved.
- 2nd: August 2019: Revised PDM and PO were approved.
- 3rd: October 6, 2021: JCC on joint terminal evaluation report

Although the 3rd JCC was originally planned to be held in February 2021 to approve the extension of the project period, it was impossible to coordinate the schedule. However, the Project Director, the Project Manager, and the Japanese Project Team discussed through an online meeting and the extension was approved (and later R/D was officially signed.)

The Project plans to hold a final meeting on January – February 2022 to discuss and agree on the post Project activities.

4.4. Monitoring

Joint Project Coordination Meeting (hereinafter referred to as "JPCM") has been held regularly to discuss the progress of the Project including the Project Purpose, activities, and future works needed. Information has been shared among the various sections of DWSSM. JPCM was held when some significant progress has been observed, or before the Chief Advisor temporarily leaves Nepal and whenever necessary.

The project team reported the progress of the report regularly to JICA through a monthly report, monitoring sheet, and annual progress report.

4.5. Communication

As stated above, JPCM has been held whenever the stakeholders think necessary. Both the Nepalese side and the project team consider JPCM has been functioning well. Both sides regard communication and information sharing has been sufficient through JPCM, weekly meetings, and reporting progress.

Reporting progress, achievements, and challenges to the Director General (hereinafter referred to as "DG") and Deputy Director General (hereinafter referred to as "DDG") of DWSSM at JPCM prompted their understanding and commitment to the Project.

4.6. Technology Transfer and Capacity Development

Before the project implementation, NWSSTC had been conducting training for WUSC, however; the Project identified their challenges in (1) revision of training materials, (2) increase in the number of lecturers, (3) improvement of teaching methods, and (4) providing lectures in the same quality. The Project has responded to (1) develop teaching materials that meet the current needs, (2) increase the number of lecturers through ToT, (3) conduct ToT and participate in training, and (4) create and distribute handy-type SOPs and develop video material which made it possible to provide lectures "anytime, anywhere, anyone". Thus, it can be said that NWSSTC has secured lecturers with knowledge and skills, understands the nature and purpose of various training programs, and can conduct training adequately. Through those measures as well as taking part in the advanced training in Japan, NWSSTC gained confidence as well. NWSSTC has been conducting basic training and on-site training even in the absence of Japanese experts due to COVID-19.

The capacity of DWSSM on the procurement of necessary equipment for WUSCs has been also strengthened through Project activities. Before the Project implementation, the target WUSCs did not know what equipment was necessary to recover the necessary function as water service providers, mainly in terms of supplying sufficient amount of water and securing quality of water. From these viewpoints, WUSCs understood the necessary equipment and DWSSM gained the procuring the necessary equipment through the Project activities.

4.7. Collaboration with other institutions

JICA signed the Memorandum of Understanding (hereinafter referred to as the "MOU") on June 9, 2015, with DWSS (then, currently DWSSM) and Project Management Office, Third Small Towns Water Supply and Sanitation Sector Project on Water Supply (hereinafter referred to as "SSPWS"), a project financed by Asian Development Bank (hereinafter referred to as "ADB") to harmonize project activities under SSPWS and the Project. Institutional Support and Service Advisory Unit (hereinafter referred to as "ISSAU"), which was established under SSPWS has supported WUSCs as well as provided institutional support DWSSM as a whole. Based on the MOU, the project team and ISSAU have met and had discussions, invited each other to workshops and capacity-building activities, and shared the reports and products.

As an example of collaboration, ISSAU will compile the KPI data of the target WUSCs under the Project (under Output 1) to their databook. In the future, KPI data under the Project might be incorporated and utilized in their National Water Sanitation and Hygiene Management Information System (hereinafter referred to as "NWaSH MIS" to be monitored. Also, as ISSAU

has highly appreciated the SOPs and teaching materials under the Project, there is a possibility that ISSAU uses those materials for WUSCs ISSAU supports. As the area of "institutional strengthening" of ISSAU's support includes "Technical, managerial and legal support in key areas of utility management, service delivery, and financial management to WUSCs under SSPWS", such collaboration between the Project outputs and ISSAU is expected.

Although still at a concept stage, ISSAU is to establish one or two pilot WUSC service support centers in the vicinity of WUSCs. Such center will be operated privately with the contribution of WUSCs and one center will look after approximately 50 WUSCs. The idea of this center is somewhat influenced by the preceding project of the Project (the Phase 1 project), according to ISSAU. And NWSSTC is considering that the service support centers will utilize the Management Model in the future, and ISSAU will revise the Model in consultation with NWSSTC. ISSAU will invite JICA and the project team while preparing the NWSSTC business plan to institutionalize the progress.

4.8. Ownership of the Project

Strong commitment and ownership of the counterparts have been observed. As shown in "3.1 Inputs", DWSSM and NWSSTC have allocated budgets for rehabilitation works of WUSC's facilities and training respectively throughout the project period. Regular reporting to DDG and DG of DWSSM through JPCM has made it possible to recognize the importance of allocating those necessary budgets.

Besides, NWSSTC was able to plan and implement training without support from Japanese experts while they were not in the country due to the COVID-19 pandemic.

Chapter 5. Results of the Evaluation

5.1. Evaluation According to Five Evaluation Criteria

5.1.1 Relevance

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

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

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

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

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

Supporting WUSCs in building their capacity to run the services, rehabilitation, and reconstruction of water infrastructures was the responsibility of DWSSM. And NWSSTC was responsible for the capacity building part. Thus, strengthening the capacity of DWSSM and NWSSTC suited their needs.

(3) Consistency with Japan's ODA policy

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

5.1.2 Effectiveness

The effectiveness of the project is relatively high.

(1) Prospects for achieving the Project Purpose

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

(2) Contributing factors for achieving the Project Purpose

Appropriateness of the counterpart agencies/appropriate change in the project design

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

Communication and ownership of the counterparts

As mentioned above in "4.8 Ownership of the Project", strong commitment and ownership of the counterparts have been observed. DWSSM and NWSSTC allocated budgets for rehabilitation works of WUSC's facilities and training respectively. Regular reporting to DDG and DG of DWSSM through JPCM has made it possible to recognize the importance of allocating those necessary budgets. Also, regular and close communication between the counterparts and the project team contributed to the achievement.

(3) Hindering factors to achieving the Project Purpose

Restructuring of organizations following the transition to federalism caused the suspension of the activities under the Project, and the Project needed to change the Project design. Besides, a weak

regulatory framework for WUSCs made it difficult to effectively approach to WUSCs. DWSSM/NWSSTC do not have legal authority over WUSCs to be accountable. Local governments are responsible for WUSCs by Constitution, Local Government Act as well as the draft WaSH Bill; however, WUSCs and local governments rarely interact in general.

5.1.3 Efficiency

The efficiency of the Project is evaluated to be relatively high, following the verification of the implementing procedure mentioned above (Chapter 4).

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

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

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

5.1.4 Impact

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

(1) Prospect for achieving the Overall Goal

The prospect to achieve the Overall Goal is moderate.

To achieve the Overall Goal, securing the trainers is necessary (Indicator 1). As for the actual practice of the Management Model at the target WUSCs (Indicator 2), although some progress has been observed, continuous support or monitoring of WUSC's practice might be required.

However, as mentioned above, possible initiatives by ISSAU may contribute to the continuation of support/monitoring to WSUCs.

(2) Other impacts

Following positive impacts have been observed.

・Possible impacts on the policy documents: Initiatives under the Project such as KPI analysis and benchmarking of WUSC performance, SOPs, Training curriculums, and training materials for WUSCs are expected to be reflected in the policy documents under development.

・Performance improvement of WUSCs resulting in better service delivery.

・Induction training to other nearby WUSCs and awareness building.

5.1.5 Sustainability

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

(1) Policy aspect

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

(2) Institutional/Organizational aspect

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

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

As for the trainers under the Project, securing the current trainers in the future might be a problem, due to the turnover/transfer of the personnel. FWSSMP under DWSSM is understaffed and it

would be difficult to provide support to WUSCs for O&M. DWSSM is currently thinking about establishing a section dedicated to O&M in each FWSSMP.

(3) Technical aspect

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

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

(4) Financial aspect

As displayed in the "3.1 Inputs" above, DWSSM and NWSSTC allocated the budget for procuring equipment and implementation of the training during the project period. Thus, the future cost for application of the Management Model and conducting training to WUSCs could be borne by DWSSM and NWSSTC, as DWSSM has given high priority.

5.2. Conclusion

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

Chapter 6. Recommendation

6.1. Recommendation within the Current Period of the Project

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

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

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

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

Concerning the Overall Goal of the project (Indicator 1: The trainings are continuously implemented by NWSSTC on the Management Model for WUSCs in semi-urban towns.), NWSSTC has stated that it will provide training to 192 WUSCs in semi-urban towns other than the 68 covered by the Project. To realize this, it is recommended that NWSSTC formulate a specific training plan, including (1) training implementation structure, (2) number of training courses each year (ToT, Basic training, On-site training, Refresher training, etc.) and participants, (3) potential trainers, and (4) budget formulation.

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

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

(4) Counterpart training (recommendation to Japanese side)

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

6.2. Recommendation after the Termination of the Project

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

Once DWSSM approves the Management Model, training implementation guideline, training plan, and training curriculums (Indicator 5-Project Purpose 1), MoWS is recommended to authorize them in order to disseminate nationally.

(2) Continuation of ToT (Recommendation to NWSSTC)

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

current trainers to brush up their skills.

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

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

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

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

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

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

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

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

Chapter 7. Lessons Learned

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

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

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

ANNEX 1: PDM

Project Design Matrix

Project Title: Capacity Development Project for the Improvement of Water Supply Management in Semi-Urban Areas (WASMIP-II)
Implementing Agencies: Department of Water Supply and Sewerage Management (DWSSM) and National Water Supply and Sanitation Training Centre (NWSSTC)
Target Group: DWSSM, NWSSTC, FWSSMP and Target Water Users and Sanitation Committee (WUSC) (*1)
Period of Project: Five years from initial assignment of JICA expert(s) in Nepal
Project Site: Nagarkot (Location of NWSSTC), Kathmandu, Location of Target WUSC (*2)

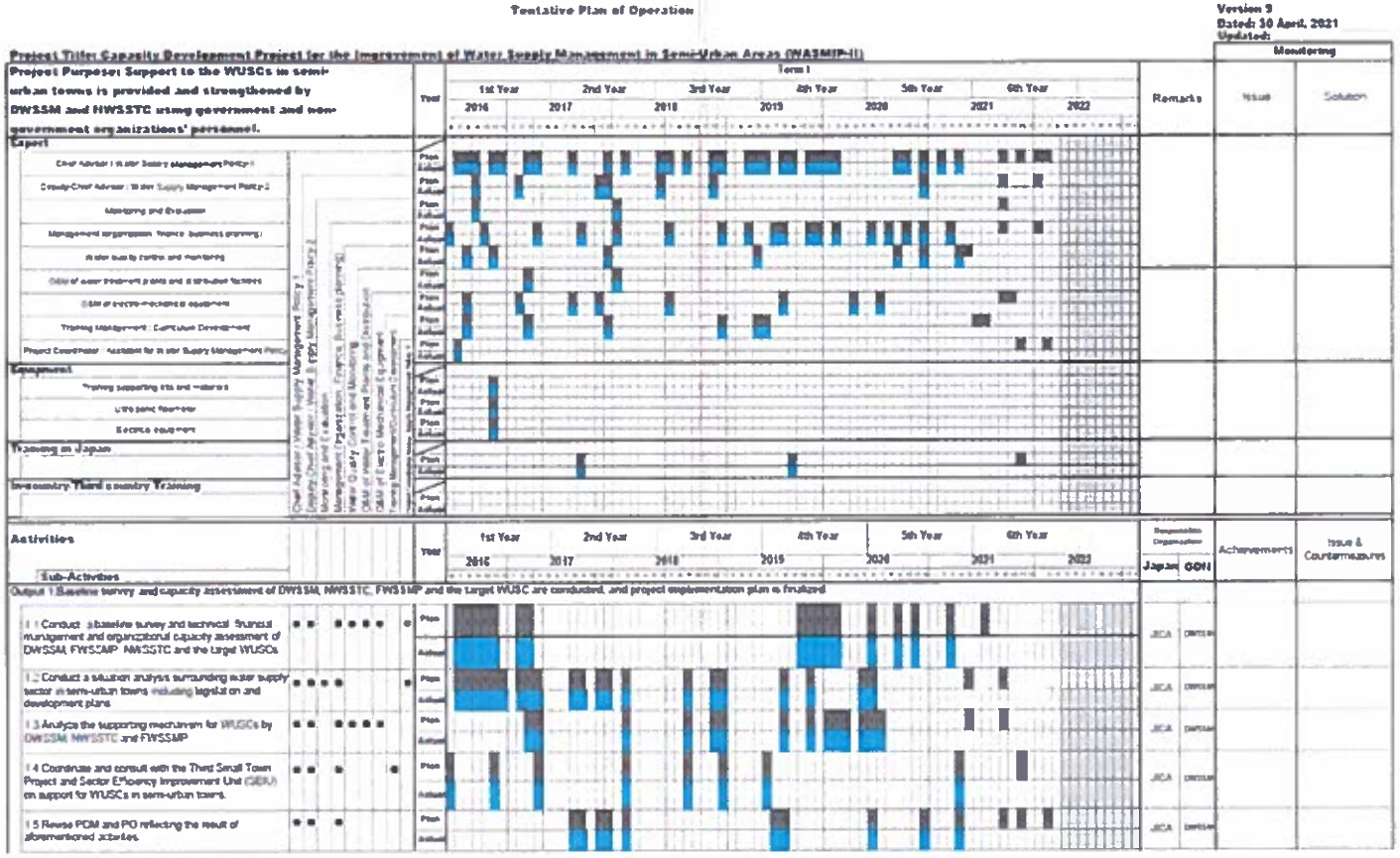
Version 4.0
Dated 18 June 2020

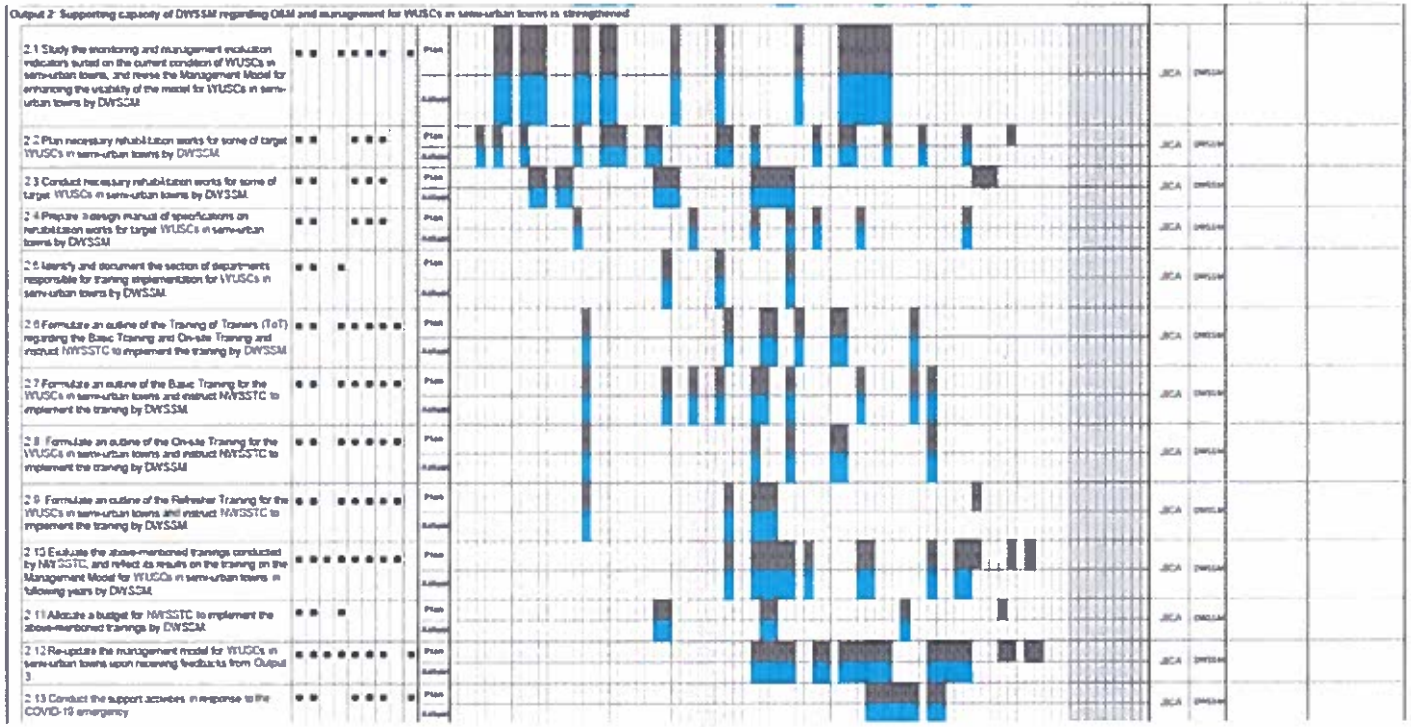
Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal					
Continuous support to WUSCs in semi-urban towns is provided by DWSSM and NWSSTC.	1. The trainings are continuously implemented by NWSSTC on the Management Model for WUSCs in semi-urban towns 2. The contents of the Management Model are utilized for the management of water supply of WUSCs in semi-urban towns	1. NWSSTC Annual Report, Interview with related persons 2. DWSSM Annual Report, Interview with related persons			
Project Purpose					
Support to the WUSCs in semi-urban towns is provided and strengthened by DWSSM and NWSSTC using government and non-government organizations' personnel (*3)	1. The revision process and sections of DWSSM responsible for the Management Model and Technical Support Mechanism for WUSCs in semi-urban towns are identified. 2. The sections of DWSSM responsible for the training on the Management Model for WUSCs in semi-urban towns and revision process of training implementation guideline are identified 3. More than 15 trainers, who are able to carry out the training on the Management Model for WUSCs in semi-urban towns, are developed. From this trainer batch, at least six must be employees of FWSSMP 4. Capacity assessment results of trainers on the Management Model for target WUSCs in semi-urban towns are improved compared to the baseline 5. The final version of the Management Model, training implementation guideline, training plan, and training curriculums for WUSCs in semi-urban towns are officially approved/authorized by DWSSM	1. Management Model and Training Implementation Guideline, Interview with related persons 2. Training Implementation Guideline, Interview with related persons 3. List of Trainers 4. Result of Capacity Assessment (by Self-evaluation) 5. Approval documentation by DWSSM	1. Budget for NWSSTC is ensured as previous year 2. There is no major changes for enrolling of the jurisdiction to WUSCs in semi-urban towns by DWSSM and NWSSTC		
Outputs					
(1) Baseline survey and capacity assessment of DWSSM, NWSSTC, FWSSMP and the target WUSCs are conducted, and project implementation plan is finalized	1.1 Results of the baseline survey and capacity assessment in DWSSM, NWSSTC, FWSSMP and target WUSCs are shared with counterpart 1.2 Project Design Matrix (PDM) and Plan of Operation (PO) are finalized	1. Minutes of Meetings 2. PDM and PO			
(2) Supporting capacity of DWSSM regarding O&M and management for WUSCs in semi-urban towns is strengthened.	2.1 The Management Model / Support Model for WUSCs in semi-urban towns formulated during phase-I project is revised in the context of the actual situation of WUSCs in semi-urban towns 2.2 Design manual of specifications on rehabilitation works for target WUSCs in semi-urban towns are shared in annual progress review meeting of FWSSMP (*4) 2.3 Rehabilitation works are carried out in more than 50 target WUSCs in semi-urban towns (*5)	1. Management model 2. Minutes of review meeting, Interview with related persons 3. DWSSM Annual Report			
(3) Implementing capacity of NWSSTC regarding the training for WUSCs in semi-urban towns is strengthened	3.1 Training implementation guideline, training plan, training curriculums and training materials for WUSCs in semi-urban towns are formulated 3.2 The Management Model for WUSCs in semi-urban towns is utilized in trainings in NWSSTC 3.3 More than 80% of target WUSCs attend the Basic Training on the Management Model. 3.4 Monitoring and Evaluation of more than 80% of target WUSCs are carried out	1. Training implementation guideline, training plan, training curriculums and training materials 2. NWSSTC Annual Report, Interview with related persons 3. NWSSTC Annual Report 4. NWSSTC Annual Report			

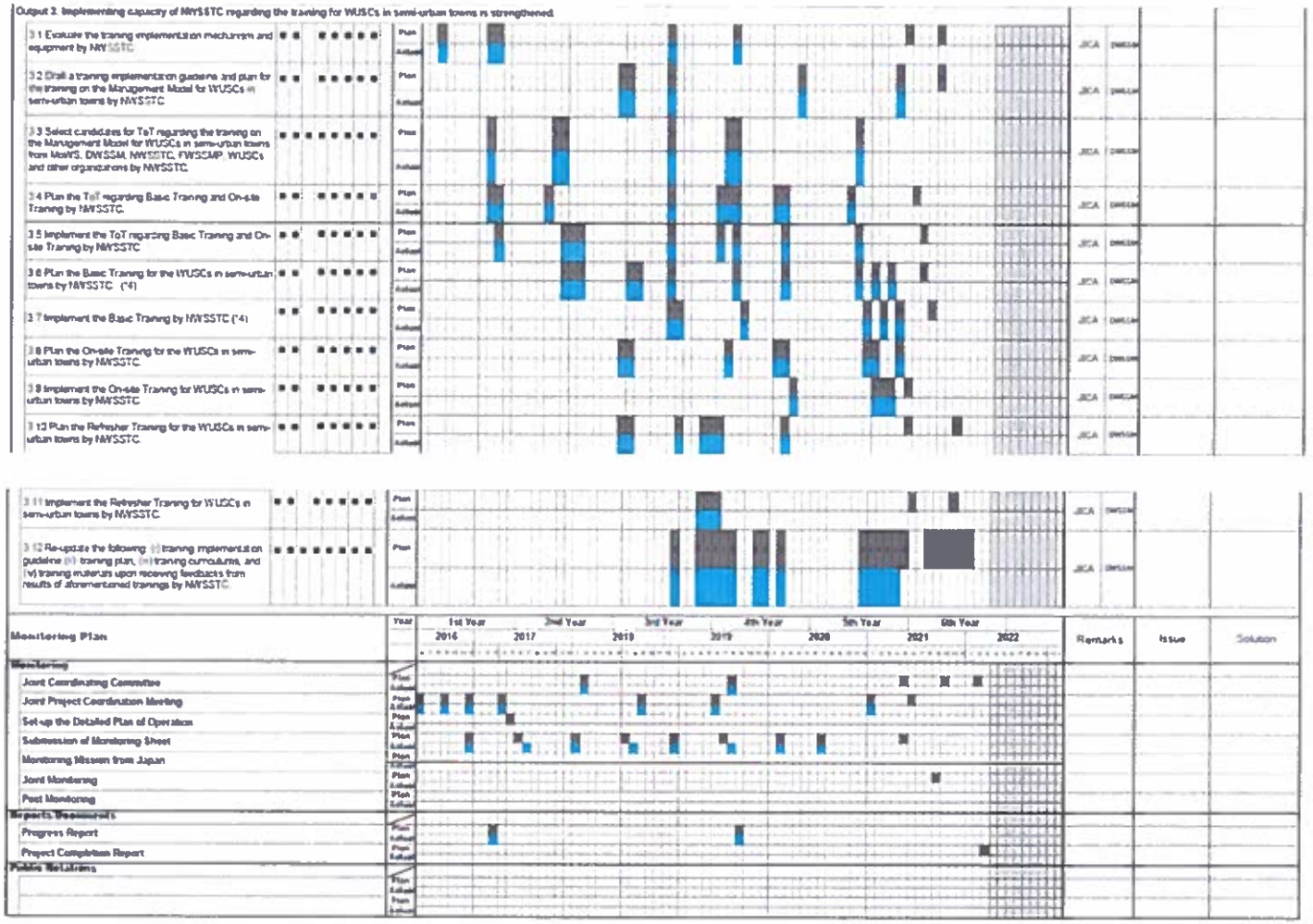
Activities	Inputs: The Japanese Side	Inputs: The Nepalese Side	Important Assumption
1.1 Conduct a baseline survey and technical, financial, management and organizational capacity assessment of DWSSM, FWSSMP, NWSSTC, and the target WUSCs 1.2 Conduct a situation analysis surrounding water supply sector in semi-urban towns including legislation and development plans 1.3 Analyze the supporting mechanism for WUSCs by DWSSM, NWSSTC and FWSSMP 1.4 Coordinate and consult with the Third Small Town Project and Sector Efficiency Improvement Unit (SEIU) on support for WUSCs in semi-urban towns. 1.5 Revise PDM and PO reflecting the result of aforementioned activities.	(1) Japanese Experts/Consultants ・Chief Advisor / Water Supply Management Policy (1) ・Deputy Chief Advisor / Water Supply Management Policy (2) ・Monitoring and Evaluation ・Management (organizational, financial, business planning) ・Water quality control and monitoring ・O&M of water treatment plants and distribution facilities ・O&M of electro-mechanical equipment ・Training Management / Curriculum Development ・Project Coordinator / Assistant for Water Supply Management Policy	(1) Assignment of C/P Unit at DWSSM and officials (2) Running Expenses - Mobilization cost of DWSSM personnel - Cost for facility rehabilitation -Procurement cost for water quality test kit and Electrical equipment (3) Office space - Office space in DWSSM, NWSSTC (4) Other Support - Costs of customs clearance, domestic transportation, storage and installation of equipment provided by JICA as per the Agreement on Technical Cooperation signed on 3 September 2003	1. No significant change in organizational structure of DWSSM is occurred **Pre-Conditions**
2.1 Study the monitoring and management evaluation indicators suited on the current condition of WUSCs in semi-urban towns, and revise the Management Model for enhancing the usability of the model for WUSCs in semi-urban towns by DWSSM. 2.2 Plan necessary rehabilitation works for some of target WUSCs in semi-urban towns by DWSSM (*5) 2.3 Conduct necessary rehabilitation works for some of target WUSCs in semi-urban towns by DWSSM (*5) 2.4 Prepare a design manual of specifications on rehabilitation works for target WUSCs in semi-urban towns by DWSSM (*5) 2.5 Identify and document the section of departments responsible for training implementation for WUSCs in semi-urban towns by DWSSM 2.6 Formulate an outline of the Training of Trainers (ToT) regarding the Basic Training and On-site Training and instruct NWSSTC to implement the training by DWSSM 2.7 Formulate an outline of the Basic Training for the WUSCs in semi-urban towns and instruct NWSSTC to implement the training by DWSSM 2.8 Formulate an outline of the On-site Training for the WUSCs in semi-urban towns and instruct NWSSTC to implement the training by DWSSM. 2.9 Formulate an outline of the Refresher Training for the WUSCs in semi-urban towns and instruct NWSSTC to implement the training by DWSSM 2.10 Evaluate the above-mentioned trainings conducted by NWSSTC, and reflect its results on the training on the Management Model for WUSCs in semi-urban towns in following years by DWSSM 2.11 Allocate a budget for NWSSTC to implement the above-mentioned trainings by DWSSM 2.12 Re-update the Management Model for WUSCs in semi-urban towns upon receiving feedbacks from Output 3 2.13 Conduct the support activities in response to the COVID-19 emergency	(2) Training programs ・Program in Japan (3) Equipment ・Training supporting kits and materials ・Ultra sonic flowmeter ・Electrical equipment		
3.1 Evaluate the training implementation mechanism and equipment by NWSSTC. 3.2 Draft a training implementation guideline and a plan for the training on the Management Model for WUSCs in semi-urban towns by NWSSTC 3.3 Select candidates for ToT regarding the training on the Management Model for WUSCs in semi-urban towns from MoWS, DWSSM, NWSSTC, FWSSMP, WUSCs and other organizations by NWSSTC 3.4 Plan the ToT regarding Basic Training and On-site Training by NWSSTC. 3.5 Implement the ToT regarding Basic Training and On-site Training by NWSSTC. 3.6 Plan the Basic Training for the WUSCs in semi-urban towns by NWSSTC (*4) 3.7 Implement the Basic Training by NWSSTC (*4) 3.8 Plan the On-site Training for the WUSCs in semi-urban towns by NWSSTC. 3.9 Implement the On-site Training for WUSCs in semi-urban towns by NWSSTC 3.10 Plan the Refresher Training for the WUSCs in semi-urban towns by NWSSTC. 3.11 Implement the Refresher Training for WUSCs in semi-urban towns by NWSSTC. 3.12 Re-update the following: (i) training implementation guideline (ii) training plan, (iii) training curriculums, and (iv) training materials upon receiving feedbacks from results of aforementioned trainings by NWSSTC.			<Issues and countermeasures>

(*1) Target WUSC consist of Target A WUSC (for the revision of Management Model formulated in phase I) and Target B WUSC (for the revision of Management Model revised in phase II)
(*2) Target A WUSC: Gularya, Belhandi, Pragatinagar, Ramgram, Shankarnagar, Besisahar, Amlekhganj, Kamaiya, Manthali, Chautara, Dhulabari, Gauradaha, Mangadh (13 WUSC)
Target B WUSC: Rajapur, Gularya II, Kusumba Sanoshree, Naulapur, Tripur, Bharatpur, Chaughera, Jhalrodhunga, Rajahar, Gadakot, Agauli, Devdaha, Anandban, Sainamaina, Sauraha-Farsatikar, Sundarbazar, Bhotewodar, Lasurebhata, Nijgadh, Simara, Kolhabi, Jitpur, Dumarbana, Bharatpura, Dhasebar, Harivan, Barhathwa, Ishworpur, Ramechhap, Pakaraas, Scheme II, Melamchi, Barahbise, Urlabari, Pathari-Sanishare municipality, Jamunagachi, Rangeli municipality, Tankisinuwari, Itahara, Madhumalla, Pichhra, Sorabhag (Karsiya), Bayarban, Katahari, Jhorahat, Shani-Arjun, Shivasatakshi, Prithivinagar (Gaurisankar), Garamuni, Topgachhi-1, Topgachhi-2, Topgachhi-3, Jurepani, Chandragadhi-1, Chandragadhi-2 (55 WUSC)
(*3) Government and non-government organizations consist of FWSSMP, NGOs, academic institutions, and so on
(*4) The contents of Basic Training are a) Water Quality Management, b) Water Treatment Plant O&M, c) Distribution Network O&M, d) Water Meter Management, e) Management Manuals
(*5) Rehabilitation works are to provide WUSCs in semi-urban towns for equipment in order to recovery the function of water supply facilities

ANNEX 2: PO


Tentative Plan of Operation
Version 3
Dated: 30 April, 2021
Updated:
Project Title: Capacity Development Project for the Improvement of Water Supply Management in Semi-Urban Areas (WASMIP-II)
Project Purpose: Support to the WUSCs in semi-urban towns is provided and strengthened by DWSSM and NWSSTC using government and non-government organizations' personnel.
Monitoring
Issue
Solution
Remarks
Term I
1st Year
2nd Year
3rd Year
4th Year
5th Year
6th Year
2016
2017
2018
2019
2020
2021
2022
Expert
Equipment
Training in Japan
In-country/Third country Training
Activities
Sub-Activities
Achievements
Issue & Countermeasures
Japan
GOM
Output 1 Baseline survey and capacity assessment of DWSSM, NWSSTC, FWSSMP and the Target WUSC are conducted, and project implementation plan is finalized
1.1 Conduct a baseline survey and technical, financial management and organizational capacity assessment of DWSSM, FWSSMP, NWSSTC and the Target WUSCs
1.2 Conduct a situation analysis surrounding water supply sector in semi-urban towns including logistic on and development plans
1.3 Analyze the supporting mechanism for WUSCs by DWSSM, NWSSTC and FWSSMP
1.4 Coordinate and consult with the Third Small Town Project and Sector Efficiency Improvement Unit (SEIU) on support for WUSCs in semi-urban towns.
1.5 Revise PDM and PO reflecting the result of aforementioned activities.
Plan
Actual
JICA


Output 2: Supporting capacity of DWSSM regarding O&M and management for WUSCs in semi-urban towns is strengthened
2.1 Study the monitoring and management evaluation indicators suited on the current condition of WUSCs in semi-urban towns, and revise the Management Model for enhancing the viability of the model for WUSCs in semi-urban towns by DWSSM
2.2 Plan necessary rehabilitation works for some of target WUSCs in semi-urban towns by DWSSM
2.3 Conduct necessary rehabilitation works for some of target WUSCs in semi-urban towns by DWSSM
2.4 Prepare a design manual of specifications on rehabilitation works for target WUSCs in semi-urban towns by DWSSM
2.5 Identify and document the section of departments responsible for training implementation for WUSCs in semi-urban towns by DWSSM
2.6 Formulate an outline of the Training of Trainers (ToT) regarding the Basic Training and On-site Training and instruct NWSSTC to implement the training by DWSSM
2.7 Formulate an outline of the Basic Training for the WUSCs in semi-urban towns and instruct NWSSTC to implement the training by DWSSM
2.8 Formulate an outline of the On-site Training for the WUSCs in semi-urban towns and instruct NWSSTC to implement the training by DWSSM
2.9 Formulate an outline of the Refresher Training for the WUSCs in semi-urban towns and instruct NWSSTC to implement the training by DWSSM
2.10 Evaluate the above-mentioned trainings conducted by NWSSTC, and reflect its results on the training on the Management Model for WUSCs in semi-urban towns in following years by DWSSM
2.11 Allocate a budget for NWSSTC to implement the above-mentioned trainings by DWSSM
2.12 Re-update the management model for WUSCs in semi-urban towns upon receiving feedbacks from Output 3
2.13 Conduct the support activities in response to the COVID-19 emergency
Plan
Actual
JICA
DWSSM


Output 3: Implementing capacity of MWSSTC regarding the training for WUSCs in semi-urban towns is strengthened.
3.1 Evaluate the training implementation mechanism and equipment by MWSSTC
3.2 Draft a training implementation guideline and plan for the training on the Management Model for WUSCs in semi-urban towns by MWSSTC
3.3 Select candidates for ToT regarding the training on the Management Model for WUSCs in semi-urban towns from MoWS, DWSSM, MWSSTC, FWSCMP, WUSCs and other organizations by MWSSTC
3.4 Plan the ToT regarding Basic Training and On-site Training by MWSSTC
3.5 Implement the ToT regarding Basic Training and On-site Training by MWSSTC
3.6 Plan the Basic Training for the WUSCs in semi-urban towns by MWSSTC (*4)
3.7 Implement the Basic Training by MWSSTC (*4)
3.8 Plan the On-site Training for the WUSCs in semi-urban towns by MWSSTC
3.9 Implement the On-site Training for WUSCs in semi-urban towns by MWSSTC
3.10 Plan the Refresher Training for the WUSCs in semi-urban towns by MWSSTC
Plan
Actual
JICA
DWSSM

3.11 Implement the Refresher Training for WUSCs in semi-urban towns by MWSSTC
3.12 Re-update the following: (i) training implementation guideline (ii) training plan, (iii) training curriculums, and (iv) training materials upon receiving feedbacks from results of aforementioned trainings by MWSSTC
Plan
Actual
JICA
DWSSM

Monitoring Plan
Year
1st Year
2nd Year
3rd Year
4th Year
5th Year
6th Year
2016
2017
2018
2019
2020
2021
2022
Remarks
Issue
Solution
Monitoring
Joint Coordinating Committee
Joint Project Coordination Meeting
Set-up the Detailed Plan of Operation
Submission of Monitoring Sheet
Monitoring Mission from Japan
Joint Monitoring
Post Monitoring
Reports, Documents
Progress Report
Project Completion Report
Public Relations
Plan
Actual

ANNEX 3: List of Japanese experts

Position	Name	M/M
Chief Advisor/Water Supply Management Policy-1	Mr. Satoru ONIKI	26.8
Deputy-Chief Advisor/Water Supply Management Policy-2	Mr. Toshiaki OOKA (from May 23, 2018)	6.85
	Mr. Kazuhiko NAKAMURA (until May 23, 2018)	
Monitoring and Evaluation	Mr. Toru YAGI (from January 20, 2020)	1.78
	Mr. Yasumi TSUTSUI (until January 20, 2020)	
Management (organization, finance, business planning)	Mr. Kenji OTSUKA (from August 31, 2020)	16.15
	Mr. Yoshiro CHIKAMATSU (until August 31, 2020)	
Water quality control and monitoring/O&M of water sources/O&M of water treatment plants-2	Mr. Yusaku NUMAJIRI	6.88
O&M of water treatment plants -1	Mr. Daisuke YASHIRO	1.67
O&M of electro-mechanical equipment	Mr. Yusaku NUMAJIRI (from June 23, 2017)	8.17
	Mr. Akira HASEBE (until June 23, 2017)	
Training Management/Curriculum Development	Mr. Kozo HAYASHISHITA	7.8
Project Coordinator /Assistant for Water Supply Management Policy	Mr. Kenta HAYASHI (from January 20, 2020)	1.55
	Mr. Mikita AMANO (until January 20, 2020)	

ANNEX 4: Equipment provided by Japan

(1) General

(Unit: Yen)

Item	Quantity	Expenses
Photocopy machine	2	430,852
PC	3	289,409
Ultrasonic flowmeter	1	975,240
Total		1,695,475

(2) Equipment for emergency response to COVID-19

(Unit: Yen)

Item	Quantity	Expenses
Bleaching Power	3.1 tons	421,154
Bleaching Powder	11.05 tons	1,672,283
Hand Wash System	15 sets	978,056
Chlorination Unit	2 sets	491,264
Water Quality Test Kit	9 sets	296,595
Portable Toilet	6 sets	1,400,377
Total		5,259,729

ANNEX 5: Training in Japan

(1) List of participants in 1st training in Japan (September 3-September 9, 2017)

Name	Title
Mr.SUBEDI Shankar Prasad	Joint Secretary, Administration Section, Ministry of Water Supply & Sanitation
Mr.DAS Sunil Kumar	Dy. Director General, Dept. of Water Supply & Sewerage, Ministry of Water Supply & Sanitation
Mr.SIMKHADA Arun Kumar	Section Chief, Foreign Assistance Coordination & Planning Section, Dept. of Water Supply & Sewerage
Mr.KARKI Kabindra Bikram	Sr Divisional Engineer, Dept. of Water Supply & Sewerage, Ministry of Water Supply & Sanitation

(2) List of participants in 2nd training in Japan (September 1-September 4, 2019)

Name	Title
Mr. KHANAL Narayan Prasayd	Section Chief (Sr. Divisional Engineer), WQI&SR Section, Department of Water Supply and Sewerage Management
Mr. SAH Sudhir Kumar	Engineer, Planning & Devt, Assistance Coordination Division, Ministry of Wafer Supply
Mr. JHA Bidur	Engineer, Sewerage Management & Environmental Sanitation Section, Department of Water Supply and Sewerage Management
Mr. SHRESTHA An kit Man	Engineer, Regional Project management Office, Itahari, Department of Water Supply and Sewerage Management
Mr. MAHATOMaheshi	Engineer, Federal Water Supply & Sewerage Management Project, Lamjung, Ministry of Water Supply
Mr. KARN Atulesh Kumar	Project Engineer, Federal Water Supply & Sewerage Management Project, Hetauda, Ministry of Water Supply
Mr. NELIPANE Mahesh	Project Chief, Federal Water Supply & Sewerage Management Project, Jumla, Ministry of Water Supply
Mr. MAHATO Suit	Engineer, Federal Water Supply & Sewerage Management Project, Biratnagar, Department of Water Supply and Sewerage Management
Mr_ ARYAL Bhojendra	Sociologist. Department of Water Supply & Sewerage Management, Ministry of Water Supply
Ms. THAPA Sunam	Engineer, Federal Water Supply & Sewerage Management Project, Pokhara. Ministry of Water Supply
Mr. SHRESTHA Chetnarayan	Engineer, Department of Water Supply & Sewerage Management Ministry of Water Supply
Mr. ADHIKARI Kamal	Sociologist. Department of Water Supply & Sewerage Management, National Water Supply & Sanitation Training Center

ANNEX 6: List of Counterparts

The C/P organization and members designated by DWSSM are shown in **Table 1** to **5**

Table 1 C/P Organizations

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

Table 2 C/P Advisory Team

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

Table 3 C/P Personnel in Nepalese side

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

Member	Chief, Sewerage Management and Environmental Sanitation Section, DWSSM	Mr. Prabhat Shrestha
Member	Engineer, Planning Monitoring and Evaluation Section, DWSSM	Mr. Bedraj Regmi (Previous) Ms. Jyoti Tamang Mr. Aarti Shrestha

Table 4 Representatives in each FWSSMP

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

Table 5 Name of Chairperson in each Target WUSC

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

9	Chandragadhi I	Purusottam Adhikari	Bishal Adhikari
10	Chandragadhi II	Chudamani Mainali	Nar Bahadur Magar
11	Dhulabari	Ajay Ghimire	GP Dhungana
12	Gauradaha	Babu Ram Bhandari	Shree P. Tajpuriya
13	Urlabari	Bhupal Singh Rai	Raju Budathoki
14	Pathari- Sanichare	Bir Bahadur Basnet	Rajendra Timilsina
15	Jamuna Gachi	Som Nath adhikari	Laxmi Adhikari
16	Rangeli	Pradeep Kumar Shah	Shiva Raj Dahal
17	Tankisnuwari	Nawa Raj Bista	Amana Karki
18	Itahara	Megh Raj Kattel	Narayan Adhikari
19	Madhumalla	Bal Kumar Bhandari	Radha Basnet
20	Pichara	Bhola Baral	Manoj Poudel
21	Sorabhag (Karsiya)	Chet Raj Shrestha	Puspa Lata shrestha
22	Bayerban	Hari Prasad Paudel	Kedar Poudel
23	Katahari	Bidhya Nanda Chaudhary	Kiran Kumar Rajbanshi
24	Jhorahat	Madan Purasaini	Bhola Prasad Neupane
25	Mangadh	Ram Bahadur Ghimire	Uttam Shrestha
26	Rajapur	Netra Prasad Choti	Rishi Baskota
27	Gulariya II	Suresh Gautam	Ashok Raj Sharma
28	Kusumba/Sanoshree	Nar Bahadur Khadka	Nar Bahadur Magar
29	Bhurigaun wusc	Bipin Bhandari	Chandra Pokharel
30	Gulariya I	Min Raj Sharma	Madhav Prasad Pokharel
31	Narayanpur/tripur	Kul Prasad Rajhaure	Urmila Neupane
32	Bharatpur	Shankar Gautam	Binod Shrestha
33	Chaughera	Raju Lal Sharma	Krishna Bahadur Yogi
34	Jhakredhunga/ Amritpur	Chandra Kant Kharel	Sushil Kumar Kafle
35	Beljhundi	Pradip Gautam	Madan Kumar Acharya
36	Ramgram	Khageswor Panthi	Parbandha Sapkota
37	Devdaha	Guman Singh kunwar	Anil Neupane
38	Anandban	Keshab Raj Neupane	Nawraj Neupane
39	Sainamaina	Kabi Kunwar	Suman Pariyar
40	Sauraha-Farsatikar	Om Bahadur Faudar	Mina Poudel Chhetri
41	Shankarnagar	Hari Prasad Tiwari	Deepak Pandey
42	Melamchi	Sagar Kumar Shrestha	Manoj Paudel
43	Barahbise	Nabendra Bahadur Shrestha	Narendra Shakya
44	Chautara	Subash Karmacharya	Anuj Shrestha
45	Nijgadh	Sudarshan Prasad Koirala.	Kedar Prasad Gautam
46	Simara	Kasim Hussein	Sashi kumar Gautam

47	Kolhabi	Raj Haran Chaudhary	Raj Haran Chaudhary
48	Jitpur Gadimai	Ajit Singh	Bharat lal chaudhary
49	Dumarbana	Ram Prasad Lamichane	Lalita basnet
50	Bharatgunj	Laxman Lamichane	Laxman Lamichane
51	Amlekhgunj	Narayan Lamichane	Narayan Lamichane
52	Dhalkebar	Ananda Shrestha	Min Bahadur Lama
53	Hariyon	Yagya Binod Dhungel	Gaurav Bogati
54	Barhathwa	Dukhi lal Mahato	Thakan Mahato
55	Ishworpur	Aita Bahadur bomjon	Ramita chaudhary
56	Karmaiya	Ripu Marjan Ale	Dil Bahadur Acharya
57	Sundarbazar	Tata Bahadur Gurung	Nabin Pokharel
58	Bhotewodar	Dambar Bahadur Adhikari	Rajan Adhikari
59	Lasunekhola	Prem GC	Chandra Bdr. Gurung
60	Besishahar	Bishnu Bahadur Adhikari	Bishnu badadur Adikari
61	Rajahar	Ganga Bahadur Thapa	Jagdish Neupane
62	Gaidakot	Shovakhar Rimal	Rabindra Raj Ghimire
63	Agauli	Sovit Sharma	Saroj Bhandari
64	Pragatinagar	Khimanada Bhusal	Ishwor Bahadur Pandey
65	Manthali	Puma Bahadur Subedi	Jagdish Subedi
66	Pakarwas Scheme I	Bhakta Bahadur Shrestha	Narayan Bahadur Shrestha
67	Pakarwas Scheme II	Netra Bahadur Kc	Nawaraj Shrestha
68	Ramechhap	Gauchan Kumar Shrestha	Niraj Magar

ANNEX 7: Evaluation Grid

<table>
<tr><th>Evaluation criteria</th><th>Main questions</th><th>Sub questions</th><th>Results</th></tr>
<tr><td rowspan="8">Achievements</td><td rowspan="8">Inputs</td><td><u>Japanese side</u>
Number of experts, expertise, MM</td><td>– A total of 14 experts (77.65MM) were assigned
– Positions are (1)Chief Advisor/Water Supply Management Policy-1, (2)Deputy-Chief Advisor/Water Supply Management Policy-2, (3) Monitoring and Evaluation, (4) Management (organization, finance, business planning), (5)Water quality control and monitoring/O&M of water sources/O&M of water treatment plants-2, (6)O&M of water treatment plants -1, (7)O&M of electro-mechanical equipment, (8)Training Management/Curriculum Development, (9)Project Coordinator/Assistant for Water Supply Management Policy
(As of August 2021)</td></tr>
<tr><td><u>Japanese side</u>
Training in Japan</td><td>– 1st training: 4 individuals participated in the training from September 3-Sepbember 9, 2017
– 2nd training: 12 individuals participated in the training from September 1-Sepbember 14, 2019</td></tr>
<tr><td><u>Japanese side</u>
Equipment</td><td>– Photocopy machines, PCs and Ultrasound flowmeter
– Equipment and consumables as an emergency response to COVID-19: hand wash systems, water quality test kits, chlorination unis, portable toilets, and bleaching powders</td></tr>
<tr><td><u>Japanese side</u>
Local cost</td><td>Operational expenses from June 2016 to August 2021 are 33,663,000 yen.</td></tr>
<tr><td><u>Nepalese side</u>
Number of counterparts assigned.</td><td>A total of 110 personnel were assigned from MOWS, DWSSM, FWSSMP, and the target WUSCs.</td></tr>
<tr><td><u>Nepalese side</u>
Land and facilities</td><td>Project office space was provided in the DWSSM by the Nepalese side, including utilities.</td></tr>
<tr><td><u>Nepalese side</u>
Local cost</td><td>
<table>
<tr><th></th><th>2073/74 (2016/17)</th><th>2074/75 (2017/18)</th><th>2075/76 (2018/19)</th><th>2076/77 (2019/20)</th><th>2077/78 (2020/21)</th><th>2078/79 (2021/22)</th></tr>
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<tr><td colspan="7">Training (NWSSTC)</td></tr>
<tr><td>Allocated budget</td><td>2,500</td><td>2,500</td><td>2,500</td><td>4,000</td><td>6,000</td><td>6,000</td></tr>
<tr><td>Actual disbursement</td><td>391</td><td>2,244</td><td>1,589</td><td>1,547</td><td>2,319</td><td>This year</td></tr>
</table>
</td></tr>
</table>

Evaluation criteria	Main questions	Sub questions	Results
	Achievement of Outputs		
		<Indicators> 1.1 Results of the baseline survey and capacity assessment in DWSSM, NWSSTC, FWSSMP and target WUSCs are shared with counterpart. 1.2 Project Design Matrix (PDM) and Plan of Operation (PO) are finalized.	1.1 Achieved ■ Baseline surveys were conducted for DWSSM, NWSSTC and Target -A WUSCs (13) on April 2017 and for Target-B WUSCs (55) on December 2017. ■ Baseline surveys were conducted for 1 MNPs(Maha Nagarpalika)-,3 UMNPs (Upa Maha Nagarpalika), 36 NPs(Nagarpalika), 9 GPs(Gaupalika), 5 MoPIDs, 10 WSSDOs,and 7 FWSSMPs (total 71 institutions/organizations) ■ Basic data to calculate KPIs were collected from 61 WUSCs. The rest is impossible to collect through telephone interviews. 5 WUSCs have no data, as they do not operate water supply facilities. ■ KPIs were collected in 2020 and to be collected again 2021 to compare the performance before/after the project. 1.2 Achieved The latest versions were approved in M/M of 18 June, 2020 (Support for COVID-19 measures were added)
		<Indicators> 2.1 The Management Model / Support Model for WUSCs in semiurban towns formulated during phase-I project is revised in the context of the actual situation of WUSCs in semi-urban towns. 2.2 Design manual of specifications on rehabilitation works for target WUSCs in semi-urban towns are shared in	2.1 Achieved Management Model/Support Model has been continuously re-updated receiving feedback from Output-3. (Deliverables and Materials) - Video materials (51 videos) for the Basic training - Handy-type SOPs were finalized (April 2021) - Finalized SOPs were submitted to DWSSM (May 2021) - Nepalese versions of SOPs and Powerpoint slides were being revised. 2.2 Partially achieved - Design manual was finalized and submitted to DWSSM. -- Due to the COVID-19 pandemic situation, the annual progress review was decided to reduce from 3 days to a single day duration. Though short information was given in the NWSSTC progress presentation on the 'Design manual of specifications on rehabilitation works, a copy of the manual along with the SOPs will be shared with FWSSMPs shortly. Also, these documents are being prepared

Evaluation criteria	Main questions	Sub questions	Results
		annual progress review meeting of FWSSMP. 2.3 Rehabilitation works are carried out in more than 50 target WUSCs in semi-urban towns.	for submission to departmental approval. <u>2.3 Achieved</u> Rehabilitation works for 68 target WUSCs were completed. Items: Flow meter, Chlorination unit, Pressure gauge, Water quality test kit,Electric Devices (digital clamp meter, insulation continuity tester, earth tester),Safety tools (mask, glove, goggles), Aeration filter media
		<Indicators> 3.1 Training implementation guideline, training plan, training curriculums and training materials for WUSCs in semi-urban towns are formulated. 3.2 The Management Model for WUSCs in semi-urban towns is utilized in trainings in NWSSTC. 3.3 More than 80% of target WUSCs attend the Basic Training on the Management Model. 3.4 Monitoring and Evaluation of more than 80% of target WUSCs are carried out.	<u>3.1 Achieved</u> - Documents were formulated. The final version of 1) Management Model, 2) Training Implementation Guideline, 3) Training Plan, 4) Training Curriculums for WUSCs in semiurban towns are to be officially approved/authorized by DWSSM. <u>3.2 Achieved</u> After the model was revised in 2017/18, the Model was utilized in TOT (January 2018), revised based on the TOT (in2018/19), and utilized in supplementally TOT and Basic training (December 2018). <u>3.3 Achieved</u> 63WUCS participated in the Basic Training <Training outline> - TOT: 5 times (67 individuals) - Basic training: 5 times (among them 1 training was online training. 63 WUSCs participated. - Onsite training (41 WUSC) - Refresher training (3 times, 59 WUSC) <u>3.4 Achieved</u> KPIs were collected in 2020 to compare the status with the baseline. The data will be collected in 2021 again. Data deficiency rate improved 63% before the project to 8% in 2020.
	Prospects for achieving the Project Purpose	<Indicators> 1. The revision process and	<Indicator 1> Achieved 1.DWSSM confirmed that mainly the Planning, Monitoring, and Evaluation Section and NWSSTC

Evaluation criteria	Main questions	Sub questions	Results
		sections of DWSSM responsible for the Management Model and Technical Support Mechanism for WUSCs in semi-urban towns are identified. 2. The sections of DWSSM responsible for the training on the Management Model for WUSCs in semi-urban towns and revision process of training implementation guideline are identified. 3. More than 15 trainers, who are able to carry out the training on the Management Model for WUSCs in semi-urban towns, are developed. From this trainer batch, at least six must be employees of FWSSMP. 4. Capacity assessment results of trainers on the Management Model for target WUSCs in semi-urban towns are improved compared to the baseline. 5. The final version of the Management Model, training implementation guideline, training plan, and training curriculums for WUSCs in	will be responsible for the revision. Though the job description of DWSSM has been draft since 2018, the job description of those sections are as follows: <NWSSTC> Job description NWSSTC includes "Work for the capacity development, promotion of innovation, and technological development of stakeholders and service providers of water supply and sanitation sector", "Develop necessary manuals, online courses and information management system for training" among others are relevant to the Project. <Planning Monitoring and Evaluation Section> Provide necessary technical assistance to concerned parties or bodies to collect and update data related to drinking water and sanitation 2. NWSSTC is committed to continuing the process to revise. Currently, Institutional Support and Service Advisory Unit (ISSAU) under DWSSM in consultation with NWSSTC is working on developing a support and management model to backstopping the WUSCs. The Management Model is expected to be revised/integrated under the framework in the future. <Indicator 2> Achieved - Though the job description of DWSSM including NWSSTC has been still a draft since 2018, job description NWSSTC includes "Work for the capacity development, promotion of innovation, and technological development of stakeholders and service providers of water supply and sanitation sector", "Develop necessary manuals, online courses and information management system for training" among others are relevant to the Project. - DWSSM and NWSSTC confirmed that NWSSTC has been and will be responsible. <Indicator 3> Achieved 70 trainees were trained. Among them 17 persons are from DWSSM/NWSSTC/MOWS, 19 are from FWSSMP. The rest has either retired/ promoted or transferred. <Indicator 4> Achieved The results of the capacity assessment (self-assessment) on General skills (self-management, communication, achievement, process, logic, information) and Specific skills (water supply system, O&M of water treatment plant, construction and O&M of network, financial management and public relation)

<table>
<tr><th>Evaluation criteria</th><th>Main questions</th><th>Sub questions</th><th>Results</th></tr>
<tr><td></td><td></td><td>semi-urban towns are officially approved/authorized by DWSSM.</td><td>Average of 70 trainers
<table><tr><th></th><th>Pre</th><th>Post</th></tr><tr><td>General skills</td><td>3.54</td><td>3.94</td></tr><tr><td>Specific skills</td><td>3.16</td><td>3.50</td></tr></table>
<Indicator 5> Likely to be achieved
According to DWSSM and NWSSTC, the final version of 1) Management Model, 2)Training Implementation Guideline, 3) Training Plan and 4)Training Curriculums for WUSCs in semiurban towns are to be officially approved/authorized by DWSSM.

These will be approved after a due process such as review by other sections and inputs from the ISSAU team. After the approval from DWSSM, they will seek approval from MoWS, and those documents will be distributed nationally (Provincial governments and local governments).</td></tr>
<tr><td></td><td>Prospects for achieving the Overall Goal</td><td><Indicators>
1. The trainings are continuously implemented by NWSSTC on the Management Model for WUSCs in semi-urban towns.
2. The contents of the Management Model are utilized for the management of water supply of WUSCs in semi-urban towns.</td><td><Indicator 1>
70 trainers were trained under the TOT of the project. However, the number of trainers who actually can regularly serve as trainers for the Basic training are limited (around 34-36 individuals from DWSSM/NWSSTC/MoWS), as many are retired/promoted/transferred. So, whether or not securing a sufficient number of trainers is an issue. As for the onsite training, 19 individuals of FWSSMPs are expected to continue facilitating, however, considering the limited number of staff and the volume of their duties, it might be difficult for them to conduct onsite training.

<Indicator 2>
The KPIs based on 2020 data show an improving trend compared to the beginning of the project (2016). This can be attributed mainly to the supply of measurement equipment through DWSSM support, and the improvement of O&M capacity and awareness of WUSC through basic, onsite and refresher training.

Although some improvement in performance (KPI) of the target WUSCs has been observed, there are differences among the WUSCs. Continuous support (taking part in Basic training/on-site training) might be needed.</td></tr>
<tr><td>Implementation</td><td>Is the management</td><td>Has JCC been appropriately</td><td>JCC meetings were planned to be held at least once a year. At the time of terminal evaluation, there</td></tr>
</table>

<table>
<tr><th>Evaluation criteria</th><th>Main questions</th><th>Sub questions</th><th>Results</th></tr>
<tr><td rowspan="5">process</td><td rowspan="2">structure of the project appropriate?</td><td>functioning? (In terms of decision-making process and monitoring of project implementation)
?</td><td>were three JCC meetings were held as follows, including the 3rd JCC to be held at the end of this terminal evaluation.
• 1st: February 2018: Revised PDM and PO were approved.
• 2nd: August 2020: Revised PDM and PO were approved.
• 3rd: October 6, 2021: JCC on Joint terminal evaluation report

JPCM has been held regularly to discuss the progress of the Project including the Project Purpose, activities, and future works needed. Information has been shared among the various sections of DWSSM. JPCM was held when some significant progress has been observed, or before the Chief Advisor temporarily leaves Nepal and whenever necessary.</td></tr>
<tr><td>Has the communication and information sharing between Nepalese side and experts been functioning (including JPCM)?</td><td>JPCM has been held whenever the stakeholders think necessary. Both the Nepalese side and the project team consider JPCM has been functioning well. Both sides regard sufficient communication and information sharing has existed through JPCM, weekly meetings, and reporting progress.

Reporting progress, achievements, and challenges to the Director General (DG) and Deputy Director General (DDG) of DWSSM at JPCM prompted their understanding and commitment to the Project.</td></tr>
<tr><td>Response to the changes in the organizational structure and federalism</td><td>Did the project responded well to the changes in the organizational structure on the Nepalese side due to federalism and regional reorganization?</td><td>Organizational restructuring following the transition to federalism during the project period forced the Project to change the mechanism for training. Initially, the Project planned cascade training through RMSO and WSSDO. However, how RMSO and WSSDO are to be reorganized was not clear and NWSSTC, that was expected to continue, was selected to be the responsible body for the training under the Project.</td></tr>
<tr><td rowspan="2">Ownership</td><td>Has the Nepalese side been involved with the project sufficiently?</td><td>Strong commitment and ownership of the counterparts have been observed. DWSSM and NWSSTC have allocated budgets for rehabilitation works of WUSC's facilities and training respectably throughout the project period. Regular reporting to DDG and DG of DWSSM through JPCM has made it possible to recognize the importance of allocating those necessary budgets.</td></tr>
<tr><td>Has the local cost been disbursed from the general budget of DWSSM/NWSSTC?</td><td>
<table>
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</td></tr>
<tr><td></td><td>Any influence of COVID-19</td><td>Has COVID-19 affected the implementation of the project? And how has the project responded to the situation?</td><td>- Japanese experts were not ablet to come to Nepal due to travel restriction under COVID-19. However, the communication via online meetings has continued and the local staff at the project team visited WUSCs.
- With the absence of Japanese experts, NWSSTC planned and implemented training by their own.
- Due to the ban for mass gathering, some refresher training was not able to be conducted.</td></tr>
<tr><td></td><td>Coordination with other Development Partners</td><td>Has the project coordinated with ADB?
(The third Small Town Project (STWSSSP)
(Have the 76 WUSCs supported by the ADB project participated in the WAMSIP-II training?)</td><td>As an example of collaboration, ISSAU will compile the KPI data of the target WUSCs under the Project (under Output 1) to their databook. In the future, KPI data under the Project might be incorporated and utilized in their NWaSH (National Water Sanitation and Hygiene) MIS(Management Information System), and monitored by the NWaSH MIS. Also, as ISSAU has highly appreciated the SOPs and teaching materials under the Project, there is a possibility that ISSAU uses those materials for WUSCs ISSAC supports. As the area of "institutional strengthening" of ISSAU's support includes "Technical, managerial and legal support in key areas of utility management, service delivery, and financial management to WUSCs under STWSSTP", such collaboration between the Project outputs and ISSAU is expected.

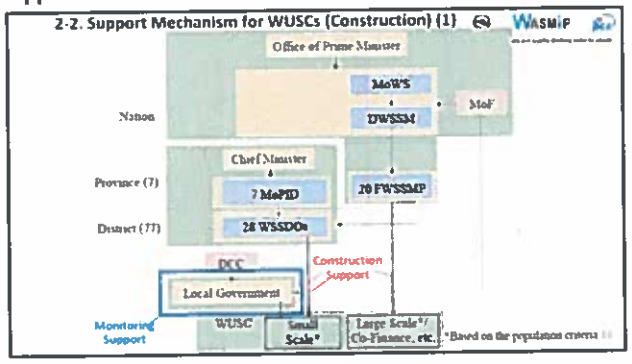
Although still at a concept stage, ISSAU is to establish one or two pilot WUSC service support centers in the vicinity of WUSCs. Such center will be operated privately with the contribution of WUSCs and one center will look after approximately 50 WUSCs. The idea of this center is somewhat influenced by the preceding project (Phase 1 project) of the Project, according to ISSAU. And NWSSTC is considering that the service support centers will utilize the Management Model in the future, and ISSAU will revise the Model in consultation with NWSSTC.</td></tr>
<tr><td>Relevance</td><td>Consistency with</td><td>Has the project been</td><td>Improvement of quality of water supply service was one of the priority areas under the "Envision</td></tr>
</table>

Evaluation criteria	Main questions	Sub questions	Results
	the development policy of Nepal	consistent with the development policy of Nepal?	Nepal 2030" and the "14th 3-year National development plan"(2016/2017-2018/2019)
	Consistency with the development needs of Nepal	Did the project meet the needs of the target groups?	The responsibility for operation & maintenance of water supply facilities in the rural areas lies with the Water Use and Sanitation Committee (WUSC). The WUSC is mandated to provide sufficient quantity of water supply to users, control water quality, collect water fees, and manage human and financial resources to keep the water supply facilities in good condition. On the other hand, until 2010, DWSS (at that time) was mainly focused on the construction of facilities and was not able to engage in activities related to strengthening the capacity of WUSC for maintenance and management.
		Was the target group appropriate?	Supporting WUSCs in building their capacity to run the services, rehabilitation, and reconstruction of water infrastructures was the responsibility of DWSSM. And NWSSTC was responsible for the capacity building part. Thus, strengthening the capacity of DWSSM and NWSSTC suited their needs.
	Consistency with the Japan's ODA policy	Was the project consistent with the Japan's ODA policy?	Under the Country Assistance Policy to Nepal (September 2016), one of the priority areas of assistance was "social and economic infrastructure development directly linked to economic growth and improvement of people's lives", which included "social infrastructure and institutional development of transportation, transportation, electric power, and urban environment directly linked to economic growth, private sector development, and improvement of people's lives". Thus, and the policy targeted improving the urban environment including water supply.
Effectiveness	Project Purpose	– Is the Project Purpose going to be achieved? – Is the Project Purpose achieved through the Outputs? – What are the promoting/hindering factors? – Are the important assumptions fulfilled?	The effectiveness of the project is relatively high. All Outputs have been achieved (except one indicator which has been partially achieved), and the indicators for the Project Purpose are mostly achieved, or likely to be achieved by the end of the project. One remaining indicator which has not been achieved at the time of terminal evaluation is indicator 5, "The final version of the Management Model, training implementation guideline, training plan, and training curriculums for WUSCs in semi-urban towns are officially approved/authorized by DWSSM." DWSSM confirmed that there will be approved after due process by the end of the project, and it is expected to be approved by MoWS for distributing them nationally. <Promoting/hindering factors> <u>Appropriateness of the counterpart agencies</u> Organizational restructuring following the transition to federalism during the project period forced the Project to change the mechanism for training. Initially, the Project planned cascade training through RMSO and WSSDO. However, how RMSO and WSSDO are to be reorganized was not clear and NWSSTC, that was expected to continue, was selected to be the responsible body for the training

Evaluation criteria	Main questions	Sub questions	Results
			under the Project. NWSSTC is very much committed to the Project activities as an agency responsible for capacity building of the sector and is willing to continue the training to WUSCs, although the regulatory framework for the post-construction status of WUSCs' facilities has been vague. Communication and ownership of the counterparts Strong commitment and ownership of the counterparts have been observed. DWSSM and NWSSTC allocated budgets for rehabilitation works of WUSC's facilities and training respectably. Regular reporting to DDG and DG of DWSSM through JPCM has made it possible to recognize the importance of allocating those necessary budgets. Also, regular and close communication between the counterparts and the project team contributed. Hindering factors to achieving the Project Purpose Restructuring of organizations following the transition to federalism caused the suspension of the activities under the project, and the project needed to change the project design. Besides, a weak regulatory framework for WUSCs made it difficult to effectively approach to WUSCs. DWSSM/NWSSTC do not have legal authority over WUSCs to be accountable. Local governments are responsible for WUSCs by Constitution, Local Government Act as well as the draft WaSH Bill; however, mostly WUSCs and local governments less interact.
Impact	Overall Goal	Are there any measures planned to achieve the Overall Goal? <Indicator 1> In order to achieve this target, please describe your future training plan including (i) training implementation structure, (ii) how to secure the trainers, (iii) number and types of training to be implemented per year, (iv) securing of budget, (v) timeframe of providing	To achieve the Overall Goal, securing the trainers is necessary (Indicator 1). As for the actual practice of the Management Model at the target WUSCs (Indicator 2), although some progress has been observed, continuous support or monitoring of WUSC's practice might be required. Also, refer to the Overall Goal above. Statement by PM /NWSSTC Chief during the 2021.8 seminar Training of WUSCs in semi-urban areas will continue even after the completion of WASMIP-II (out of 260 WUSCs, WASMIP has covered 68; after WASMIP-II, the remaining 192 WUSCs will be covered). Basic information (location, size, facility configuration, etc.) is also needed to select training targets. It is possible to invite local government engineers to train at NWSSTC, but the process is time-consuming. However, NWSSTC would like to plan training for local government engineers.

Evaluation criteria	Main questions	Sub questions	Results
		training for the rest of WUSCs (192 WUSCs). (iv) And, are there any specific plans for training of local government engineers?) <Indicator 2> Has the target 68 WUSCs' ability for actually practicing the O&M skills and procedure improved? In terms of (i) Utilization of the equipment installed, (ii) O&M procedure and record keeping (daily and periodic inspections) based on the management manual and SOPs, (iii) analysis of the data, (iv) taking measures/making and implementation of an improvement plan, (v) improvement in KPIs, and others. - What are the challenges for the application?	
		How has the project coordinated with ISSAU? And what coordination is possible to achieve the Overall Goal?	Refer to the implementing process above.
		Are important assumptions fulfilled?	1. From the past inputs by the Nepalese side, it is likely to be fulfilled. 2. WUCSs are under the jurisdiction of the local governments.

Evaluation criteria	Main questions	Sub questions	Results
	Other impacts	Are there any intended/unintended positive/negative impacts from the project?	- Possible impacts on the policy documents: Initiatives under the Project such as KPI analysis and benchmarking of WUSC performance, SOPs, Training curriculums, and training materials for WUSCs are expected to be reflected in the policy documents under development. - Performance improvement of WUSCs resulting in better service delivery. - Induction training to other nearby WUSCs and awareness building.
	Impacts on natural/social environment	Are there any negative impacts on the natural/social environment?	No negative impacts have been observed.
Efficiency	Appropriateness of the inputs from Japan side	Were the number of experts, expertise, timing appropriate?	Inputs by Japan to implement the Project and produce the Outputs have been appropriate in terms of (i) number of experts, (ii) expertise, (iii) the timing of dispatch, and (iv) duration of the dispatch. Though, inputs from Japanese experts was hindered during last one year due to the COVID-19 pandemic.
		Was the equipment provided by Japan appropriate?	Equipment for emergency measures for COVID-19 was provided based on the WUSCs, distributed and utilized.
	Appropriateness of the inputs from Nepal side	Was the number of C/Ps from Nepalese side appropriate?	Allocation of staff has been appropriate for project implementation and decision-making.
		Was the equipment and facilities appropriate?	Equipment and operational cost by the Nepalese side were also appropriately provided. Necessary equipment for strengthening the water supply function of WUSCs has been procured and installed by DWSSM (Planning, Monitoring and Evaluation Section), and NWSSTC has allocated budget to the training under the Project.
		Was the project budget by the Nepalese side appropriate?	Refer to the above.
Sustainability	Policy aspects	What are/will be the impact of WaSH Bill for the roles and responsibilities over the rural water supply?	There is policy support for the continuation of the project effects. The goal of the "Drinking Water and Sanitation" sector under the 15th National Plan (Fiscal Year 2019/20 – 2023/24) is "To enhance quality services by ensuring basic drinking-water and sanitation services to all.", and one of the objectives under the goal is "To bolster the capabilities of the federal, provincial, and local levels by increasing their roles in sustainable drinking-water and sanitation service delivery." There are still ambiguities in the roles and responsibilities between DWSSM and the local governments. According to the draft WaSH Bill and LGA act 2017, local governments are expected to be responsible for O&M of the water supply facilities of WUSCs.

Evaluation criteria	Main questions	Sub questions	Results
		How have the Model by the project positioned in the policy?	Possible impacts on the policy documents: Initiatives under the Project such as KPI analysis and benchmarking of WUSC performance, SOPs, Training curriculums, and training materials for WUSCs are expected to be reflected in the policy documents under development.
	Organizational aspect	What are the roles and responsibilities of the agencies responsible for the processes needed to achieve the Overall Goal (NWSSTC and FWSSMP within DWSSM, and between DWSSM, WSSDO, and local governments)?	There are still ambiguities in the roles and responsibilities between DWSSM and the local governments. According to the draft WaSH Bill and LGA act 2017, local governments are expected to be responsible for O&M of the water supply facilities of WUSCs. However, the number of engineers at the local governments is limited and faces difficulties in supporting WUSCs. Meanwhile, supporting WUSCs in building their capacity to run the services, rehabilitation, and reconstruction of water infrastructures is the responsibility of DWSSM. And NWSSTC is responsible for the capacity building part. So, DWSSM and NWSSTC are expected to continue their support for the O&M of WUSCs. Support mechanism for WUSCs  <u>Federal level (MoWS, DWSSM, FWSSMP)</u> Monitoring of water supply and sanitation projects (Source: Draft WaSH Bill prepared by MoWS) <u>Local governments</u> – Water supply service and its monitoring in local level – Maintenance and rehabilitation work of water supply and sanitation projects operated in local level

Evaluation criteria	Main questions	Sub questions	Results
			(Source: Draft WaSH Bill prepared by MoWS) DDG of DWSSM dispatched letters to FWSSMP for the further cooperation for the WASMIP training (asking FWSSMP to participate in the WASMIP-training)
		- What is the organizational structure of each organization? Is it appropriate for the above process? - How many people are in each organization? Is that number of people sufficient to execute the above process?	<Planning Monitoring and Evaluation Section, DWSSM> Their job description is to provide necessary technical assistance to concerned parties or bodies to collect and update data related to drinking water and sanitation <NWSSTC> Job description NWSSTC includes "Work for the capacity development, promotion of innovation, and technological development of stakeholders and service providers of water supply and sanitation sector", "Develop necessary manuals, online courses and information management system for training" among others are relevant to the Project. <FWSSMP> FWSSMP under DWSSM is understaffed and it would be difficult to provide support to WUSCs. DWSSM is currently thinking about establishing a section dedicated to O&M in each FWSSMP.
		Has/will a system of cooperation and coordination been established among NWSSTC, FWSSMP, WSSDO, and local governments to strengthen WUSC?	During the implementation of this project, onsite training was conducted not only at NWSSTC but also at seven FWSSMPs, and human resources from WSSDOs and local governments were also trained as onsite training instructors. The training created contacts between the FWSSMP, WSSDOs, and local governments, and served as a platform for the exchange of information and opinions among the three parties, but it is unclear whether it will be continued.
	Technical aspect	**NWSSTC** – Does NWSSTC have sufficient skills to plan and manage the WASMIP training? – Are the trainers have sufficient skills to be trainers?	**NWSSTC** <u>Planning and implementing of training</u> They have gained skills. During the pandemic, they planned and implemented training without support from the project team. <u>Trainers</u> Half of the trainers trained under the project retired/transferred. In order to achieve the Overall Goal, continuous TOT is needed.

Evaluation criteria	Main questions	Sub questions	Results
		- How are the human resources maintained? - Is there any system to upgrade their skills? **DWSSM** Does DWSSM have sufficient skills to rehabilitate the WUSC's facility?	**DWSSM** The capacity of DWSSM on the procurement of necessary equipment for WUSCs has been also strengthened through Project activities. Before the Project implementation, the target WUSCs did not know what equipment was necessary to recover the necessary function as water service providers, mainly in terms of supplying sufficient amount of water and securing quality of water. From these viewpoints, WUSCs understood the necessary equipment and DWSSM gained the procuring the necessary equipment through the Project activities.
		Do local governments have sufficient skills to monitor and support O&M of WUSC? Do they have any training system to upgrade their skills?	No sufficient number of engineers at the local governments, and they have less interacted with WUSCs.
	Financial aspects	Have DWSSM, NWSSTC, and local government secured the continuous WASMIP training, rehabilitation, and monitoring?	Refer to the Ownership above.

Appendix 2.46

4th JCC Minutes of Meeting in February 2022

MINUTES OF MEETINGS
BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY
AND
MINISTRY OF WATER SUPPLY
CAPACITY DEVELOPMENT PROJECT FOR THE IMPROVEMENT OF WATER SUPPLY MANAGEMENT IN SEMI-URBAN AREAS (WASMIP-II)

The Fourth Joint Coordinating Committee Meeting (hereinafter referred to as "JCC") on the Capacity Development Project for the Improvement of Water Supply Management in Semi-Urban Areas (hereinafter referred to as "the Project") was held on the 15th of February, 2022 with both the Nepali and Japanese sides.

As a result of discussion in the JCC, both sides agreed the actions to be taken until the end of the Project.

The parties acknowledge and agree that this Minute of Meetings may be executed by electronic signature, which is considered as an original signature for all purposes and has the same force and effect as an original signature. "Electronic signature" includes faxed versions of an original signature or electronically scanned and transmitted version (e.g., via pdf) of an original signature.

Kathmandu, 15 February 2022

Mr. Yoichi Inoue
Director, Water Resources Group, Global Environment Department
Japan International Cooperation Agency, Headquarters, Japan

Ms. Meena Shrestha
Joint Secretary,
Ministry of Water Supply,
The Federal Democratic Republic of Nepal

Mr. Satoru Oniki
Chief Advisor, JICA Expert
Capacity Development Project for the Improvement of Water Supply Management in Semi-Urban Areas

Madhav Prasad Adhikari
Deputy Director General

Mr. Madhav Prasad Adhikari
Project Director
Deputy Director General,
Department of Water Supply and Sewerage Management, Ministry of Water Supply,
The Federal Democratic Republic of Nepal

MAIN POINTS DISCUSSED

1. Approval of the Management Model by DWSSM

The meeting confirmed that Department of Water Supply and Sewerage Management (hereinafter referred to as "DWSSM") approval of the Management Model including the training implementation guideline, training plan and training curriculums shall be done promptly after incorporating feedback (if any) after the fourth JCC.

2. Authorization of Management Model and other documents by MoWS

The meeting confirmed that Ministry of Water Supply (hereinafter referred to as "MoWS") shall authorize the Management Model and other documents to disseminate nationally after DWSSM approved the Model and documents.

3. Utilization of Management Model by ISSAU

The meeting confirmed that the Standard Operating Procedures (hereinafter referred to as "SOPs"), videos, and other teaching materials developed by the Project are passed on to Institutional Support and Service Advisory Unit (hereinafter referred to as "ISSAU") to utilize the Management Model and other documents in ISSAU's activities.

4. Training Implementation to 192 WUSCs semi-urban towns

The meeting confirmed that National Water Supply and Sanitation Training Center (hereinafter referred to as "NWSSTC") will continue to provide trainings to 192 Water Users and Sanitation Committees (hereinafter referred to as "WUSCs") semi-urban towns with the Management Model.

5. Continuation of ToT by NWSSTC

The meeting confirmed that NWSSTC will continue Training of Trainers (hereinafter referred to as "ToT ") and ensure the availability of trainers. Also, ToT should ensure to include current trainers to brush up their skills.

6. Cooperation of FWSSMP

The meeting confirmed that the active involvement of Federal Water Supply and Sewerage Management Project (hereinafter referred to as "FWSSMP") is necessary to achieve the Overall Goal. Dispatch of FWSSMP engineers who are close to the field as trainers for On-site training is required. Also cooperation of FWSSMP is required to follow up on the target 68 WUSCs of the Project.

Attached WASMIP-II Presentation material (PowerPoint slide handout)

Madhav Prasad Adhikari
Deputy Director General

Government of Nepal
Ministry of Water Supply
Singhadurbar, Kathmandu

The Capacity Development Project for the Improvement of Water Supply Management in Semi-urban Areas in Nepal
WASMIP-II
4th Joint Coordinating Committee

Presentation of Minutes of Meeting

February 15, 2022

Chief Advisor

Satoru Oniki

Table of contents

1. Background

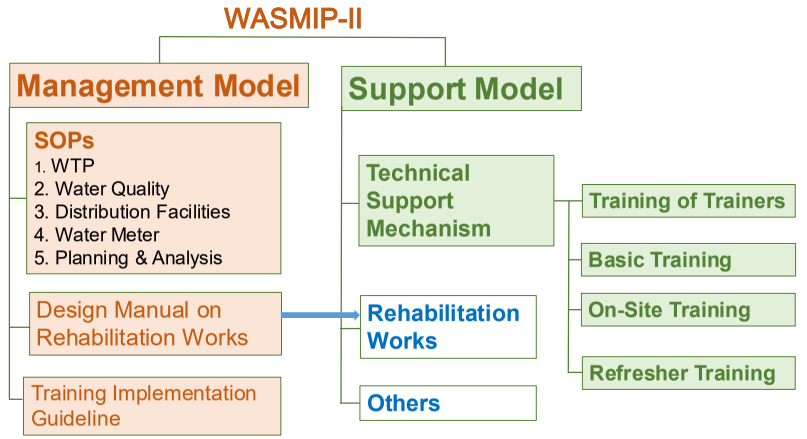
WASMIP-I (Phase-1)
January 2010 – September 2013
Morang and Jhapa districts in Province No.1
20 WUSCs semi-urban towns

Formulated
Small and Medium-Sized Water Supply Management Model for WUSCs
Small and Medium-Sized Water Supply Support Model for WUSCs

WASMIP-II (Phase-2)
June 2016 – March 2022
5 Provinces, 13 districts
68 WUSCs semi-urban towns

Revised/Updated
Management Model for WUSCs semi-urban towns
Support Model for WUSCs semi-urban towns

2. Management Model and Support Model



3. Project Location Map

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4. Project Purpose

Support to the WUSCs in semi-urban towns **is provided and strengthened by DWSSM and NWSSTC** using government and non-government organizations' personnel.

Indicators	Achievement level
1. The revision process and sections of DWSSM responsible for the Management Model	**Achieved**: Planning, Monitoring, and Evaluation Section and NWSSTC
2. Sections of DWSSM responsible for the training on the Management Model for WUSCs and revision process of training implementation guideline	**Achieved**: NWSSTC
3. More than 15 trainers, who can carry out the training on the Management Model for WUSCs	**Achieved**: 17 persons are from DWSSM/NWSSTC/MoWS, 19 are from FWSSMP
4. Capacity assessment results of trainers on the Management Model are improved	**Achieved**: General and Specific skills are improved
5. Management Model, training implementation guideline, training plan, and training curriculums are officially approved/authorized by DWSSM.	**Likely to be achieved (as of February 15)**

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5. Overall Goal

After WASMIP-II: Continuous support to WUSCs in semi-urban towns is provided by DWSSM/NWSSTC.

Indicator	Achievement Level
1. Trainings are continuously implemented by NWSSTC on the Management Model for WUSCs	At the time of terminal evaluation, **it is expected that this indicator is achieved** after the completion of the project. Whether or not securing a sufficient number of trainers is an issue due to retirement/transferring
2. Contents of the Management Model are utilized for the management of the water supply of WUSCs	Continuous support (taking part in Basic Training/On-site Training) might be needed. Grasping the figures and keeping records show the progress of WUSCs.

Ex-post evaluation will be conducted by JICA until three years after the project completion.

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6. Recommendations within the Current Period of the Project (1)

2.1 Ensuring achievement of the Activities, Outputs, and the Project Purpose

a) Basic training and On-site training shall be conducted once each.

⇒ Basic training (1 time) was conducted in January 2022.

⇒ On-site trainings (23 times) were conducted between October 2021 and January 2022.

b) DWSSM approval of Management Model including the training implementation guideline, training plan and training shall be done by the end of the project.

2.2 Development of training plan for NWSSTC

a) Information (contact details, names of chairpersons) was collected for 176 out of 192 WUSCs and a training plan was developed.

b) Training plan was developed over a period of 6 years (2022 - 2027).

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Training Plan (a part) for WUSC semi-urban towns

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

6. Recommendations within the Current Period of the Project (2)

2.3 Handover Management Model to ISSAU

a) Discussions were held with the NWSSTC Chief and it was agreed that the Management Model would be used by ISSAU.

b) Once Management Model is approved and handed over via DWSSM, ISSAU will use the Management Model. ⇒ Munities of Meeting

2.4 Counterpart Training

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

7. Recommendations after Termination of the Project (1)

3.1 Authorization of Management Model and other documents by MoWS

Once Management Model is approved by DWSSM, MoWS is recommended to authorize Management Model to disseminate nationally. ⇒ Munities of Meeting

3.2 Continuation of ToT

NWSSTC needs to continue ToT and ensure the availability of trainers. Also, ToT should ensure to include current trainers to brush up their skills. ⇒ Munities of Meeting

3.3 Cooperation of FWSSMP

Dispatch of FWSSMP engineers who are close to the field as trainers for On-site training is required. Cooperation of FWSSMP is required to follow up on the target 68 WUSCs.

⇒ Munities of Meeting

7. Recommendations after Termination of the Project (2)

3.4 Linkage with ISSAU's service and support center

ISSAU is considering the concept of a WUSC service support center. NWSSTC encourages the service support centers to utilize Management Model.

3.5 Encouraging WSSDO and Local Government engineers to participate in Trainings

- NWSSTC needs to continue encouraging WSSDO and local government engineers to participate in the trainings to improve water supply service by WUSCs.
- MoWS is recommended to support the procedure to include WSSDO and local government engineers to the trainings

3.6 Further contribution to operation and maintenance of WUSCs

Further contribution to capacity development of WUSCs through feasible methods

Appendix 2.47

WASMIP-II Deliverables Dissemination Workshop Presentation Material by WASMIP Team in February 2022

For providing safe and quality drinking water to people

The Capacity Development Project for the Improvement of Water Supply Management in Semi-urban Areas in Nepal

Dissemination Workshop of WASMIP-II

Activities and Achievements of WASMIP-II

February 15, 2022

Chief Advisor

Satoru Oniki

Table of contents

For providing safe and quality drinking water to people

1. Background

For providing safe and quality drinking water to people

i. More than 42,000 water supply systems constructed in semi-urban and rural areas.

ii. O&M responsibility of water supply system has been transferred to Water Users and Sanitation Committees (WUSCs).

WUSC Issues		Countermeasures
Transfer of knowledge and skills in O&M and management required	⇒	Development of Standard Operating Procedures (SOPs) and manuals
Human resource development required	⇒	Knowledge and skills improvement through Trainings
Stable and safe water supply required	⇒	Grasp of water distribution volume, disinfection equipment, water quality measurement

3

3

1.1 Approaches of Support to WUSCs semi-urban towns

For providing safe and quality drinking water to people

Development of skilled staffs with proper SOPs

Proper O&M, management of Water Supply Facilities

Longer lifetime of facilities with Preventive Maintenance

Supply safe water at Low Cost

Visualization of the achievements of activities

4

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1.2 WASMIP History

WASMIP
For providing safe and quality drinking water to people

WASMIP-I (Phase-1)
January 2010 – September 2013
Morang and Jhapa districts in Province No.1
20 WUSCs semi-urban towns

Formulated
Small and Medium-Sized Water Supply Management Model for WUSCs
Small and Medium-Sized Water Supply Support Model for WUSCs

WASMIP-II (Phase-2)
June 2016 – March 2022
5 Provinces, 13 districts
68 WUSCs semi-urban towns

Revised/Updated
Management Model for WUSCs semi-urban towns
Support Model for WUSCs semi-urban towns

5

1.3 Project Purpose

WASMIP
For providing safe and quality drinking water to people

Support to the WUSCs in semi-urban towns **is provided and strengthened by DWSSM and NWSSTC** using government and non-government organizations' personnel.

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WASMIP
For providing safe and quality drinking water to people

1.4 Output-1

Baseline survey and capacity assessment of DWSSM, NWSSTC, and the target WUSCs have been completed, and project implementation plan finalized.

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WASMIP
For providing safe and quality drinking water to people

1.4 Output-2

Supporting capacity of DWSSM regarding O&M and management for WUSCs in semi-urban towns is strengthened.

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WASMIP
For providing safe and quality drinking water to people

1.4 Output-3

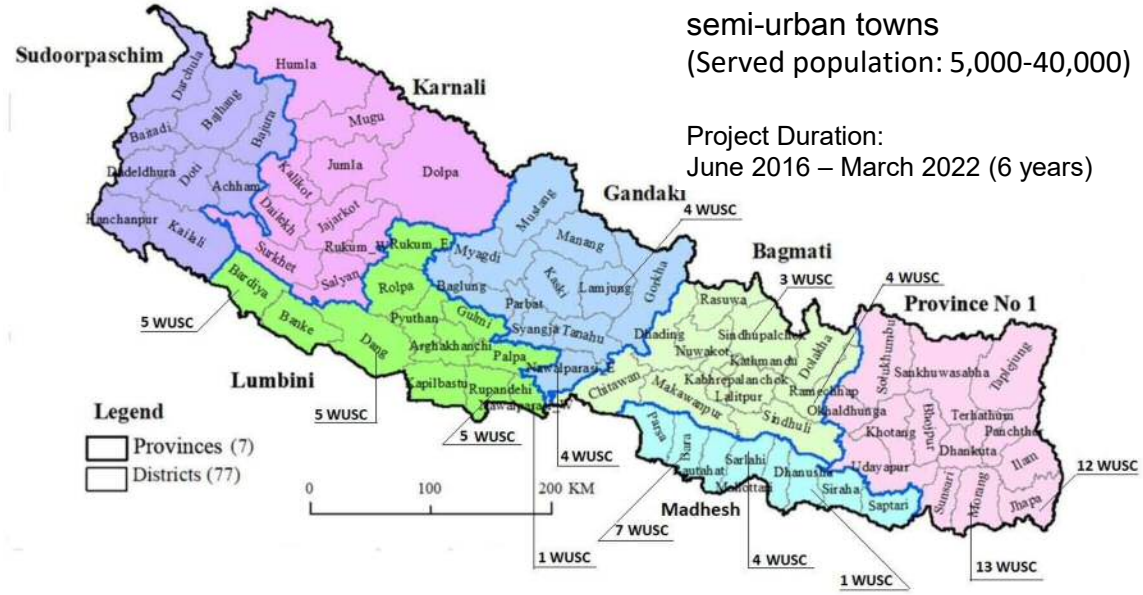
Implementing capacity of NWSSTC regarding the training for WUSCs in semi-urban towns is strengthened.

1.5 Project Location Map

WASMIP
For providing safe and quality drinking water to people

Total: 68 out of 260 WUSCs in semi-urban towns
(Served population: 5,000-40,000)

Project Duration:
June 2016 – March 2022 (6 years)



WASMIP
For providing safe and quality drinking water to people

2. Activities and Achievements

2.1 Participants/Beneficiaries in WASMIP-II

WASMIP
For providing safe and quality drinking water to people

2,038

Fiscal Year	MoWS	DWSSM/ NWSSTC	FWSSMP	MoPID	RMSO/ WSSDO	WUSC	Others	Total
2016	-	38	-	-	42	129	19	228
2017	4	92	-	-	12	-	25	133
2018	1	49	-	2	30	245	10	337
2019	7	88	29	0	2	281	13	420
2020	-	6	46	1	6	91	32	182
2021	-	29	76	4	2	615	12	738
Total	12	302	151	7	94	1,361	111	2,038

JCC: 4 times, JPCM: 5 times, Workshop: 22 times, ToT: 19 times, Basic training: 6 times, On-site training: 67 times, Observation & Interaction workshop: 4 times, Training in Japan: 3 times

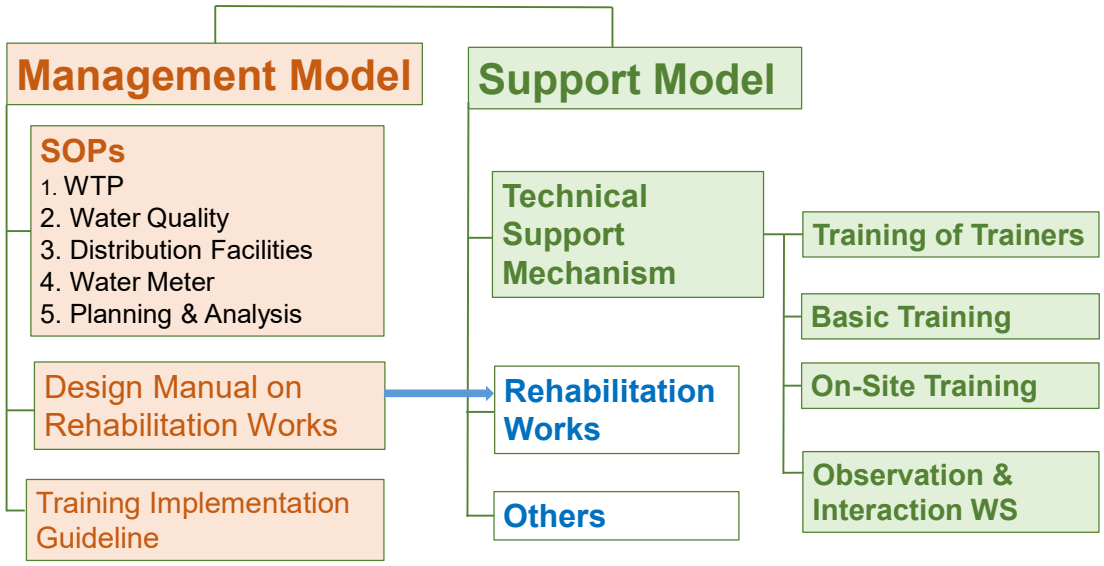
Total:130 events

As of February 1, 2022

2.2 Management Model & Support Model

WASMIP-II

For providing safe and quality drinking water to people



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2.3 Capacity Assessment of Trainers

For providing safe and quality drinking water to people

70 Trainers' Capacity Assessment

1) Conducted Capacity Assessment Pre and Post ToT/Basic training

Average of 70 Trainers

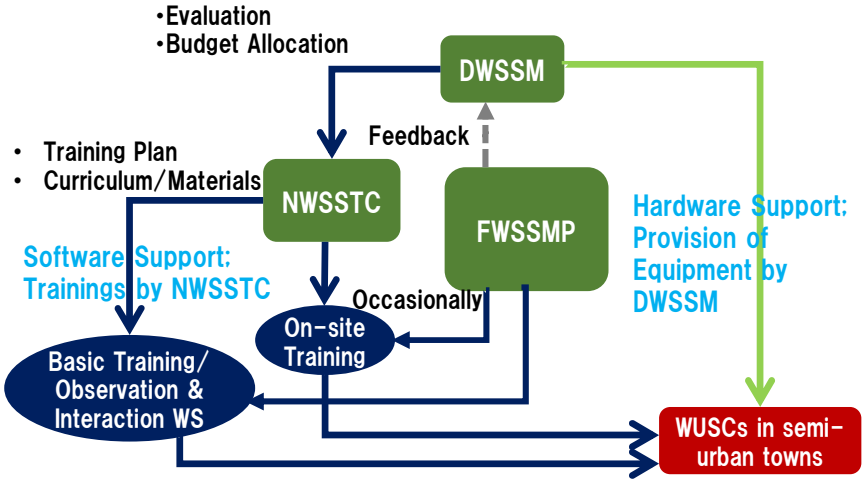
	Pre	Post
General Skills	3.54	**3.94**
Specific Skills	3.16	**3.50**

5-point scale

14

14

2.4 Technical Support Mechanism



To implement the Management Model efficiently, direct support will be provided to WUSCs through NWSSTC

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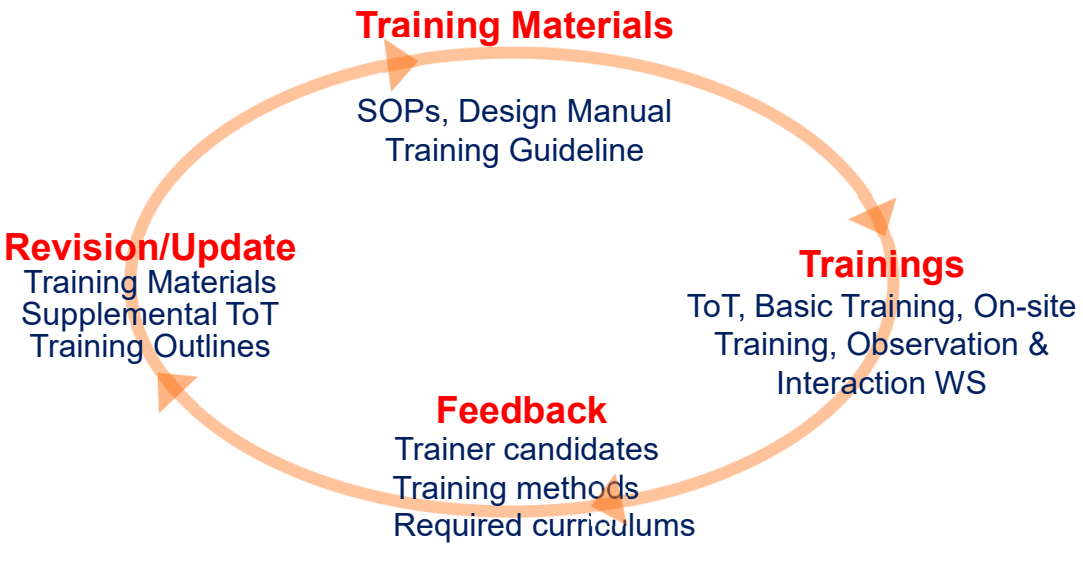
2.5 Updating Management Model



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2.6 KPIs Data Collection

SN	Name of WUSC	KPIs											KPIs									
		Service ratio	Service Time (hours)	Q Comply	Staff R	Metered Ratio	Prod Ratio (liter/c/d)	Consum Ratio (liter/c/d)	NRW	Unit Cost (NRs/m³)	Oper Ratio	Collect Ratio	Service Ratio	Service Time (hours)	Q Comply	Staff R	Metered Ratio	Prod Ratio (liter/c/d)	Consum Ratio (liter/c/d)	NRW	Unit Cost (NRs/m³)	Oper Ratio	Collect Ratio
1	Rajapur	16.9%	3.5	100%						15.7	5.00	99.6	25.0%	4.0		7.4	55.4%	138.4					
2	Gulariya-I	32.4%	8.0	100%									12.3%	3.7		6.1	100%	65.41	47.1	28.0%			
3	Gulariya-II	96.3%	7.0	86%						5.8	0.78	99.8	11.9%										
4	Kusumba/Sanoshree	85.2%	5.7	100%						19.7	0.90	67.0	53.2%	10.0									
5	Bhurigaun	63.9%	6.0	89%						6.5	0.55	82.9	18.9%	4.0									
6	Beljhungdi	64.3%	4.0										20.0%	4.0									
7	Narayanpur/tripur	19.0%	4.3	100%						11.0	0.96	95.6											
8	Bharatpur	69.3%	4.0	100%						17.4	2.57	99.6											
9	Chaughera	85.7%	3.3	100%						2.6	0.23	99.8											
10	Jhakredhunga/ Amritpur	46.5%	5.3	75%						7.6	0.59	99.2											
11	Pragatinagar	92.8%	24.0	100%						6.5	0.58	91.8	75.1%	24.0									
12	Ramgram	90.0%	2.0	100%						13.1	1.26	81.6	41.0%	2.0									
13	Rajahar	93.0%	9.0	67%						6.2	0.27	91.4	81.8%	10.0									
14	Gaidakot	57.2%	24.0	100%						4.8	0.55	95.0	75.0%	24.0									
15	Agauli	69.1%	16.0	100%						7.7	0.61	99.2	58.7%	8.0									
16	Shankarnagar	56.0%	24.0	95%						6.5	0.40	97.2	55.8%	24.0									
17	Devdaha	62.0%	8.0									90.7	29.1%										
18	Anandban	75.4%	24.0	96%						7.9	0.51	96.7	67.0%			4.1	100%	154.0					
19	Sainamaina	97.4%	24.0	100%						44.4	2.76	99.9	105.7%	24.0		3.6	100%	90.4					
20	Saurahs-Farsatikar	29.3%	15.3	100%						3.6	0.56	98.9	20.2%	3.3		9.5	100%						
21	Bessiahar	44.6%	13.3	80%						9.2	0.71	97.4	33.5%	5.3		7.6	100%	129.4	109.6	15.3%			
22	Sundarbazar	89.2%	4.0	80%						9.5	0.95	99.3	53.8%	2.3		8.4	100%	62.0					
23	Bhotewodar	27.8%	24.0	100%						10.8	2.46	97.6	65.1%	24.0		3.3	35.8%	27.7					
24	Lassunekhola	42.5%	3.3	100%						15.5	1.19	99.4	83.2%	10.0		7.0	99.7%	94.5					
25	Amlekhunj	64.9%	8.0							5.8	1.51	49.0		18.0		7.0	14.0%						
26	Nijgadh	82.7%	8.3	100%						3.9	0.79	85.2	66.4%	16.0		2.3	100%	44.9					
27	Simara	92.0%	7.5	100%						5.9	0.88	89.5	52.8%	7.3		5.8	99.4%	119.0					
30	Dumarbana	34.5%	12.0	100%						1.6	1.07	99.0	4.0%			30.0	100%						
31	Bharatpatni	55.1%	4.0										72.0%			6.7	0.0%						
32	Dhalkebar	96.4%	10.0							10.2	2.67	88.9											
33	Karmaiya	77.8%	4.3	100%						19.2	0.68	97.1	92.0%	4.0		3.4	100%	48.6	29.2	40.0%			
34	Hariyon	52.6%	4.7							6.4	0.64												
36	Ishworpur	91.9%	9.3										18.7%			4.8	100%	41.0					
37	Manthali	34.0%	3.0	100%						4.0	0.91	94.5	21.5%	3.0		9.8	100%	232.8	195.1	16.2%			
38	Ramechaap	45.6%	4.0	100%						38.4	1.00	82.4	22.4%	1.7		21.4	67.8%	44.7					
39	Pakarwas Scheme I	75.9%	1.7																				
40	Pakarwas Scheme II	55.0%																					
41	Chautara	30.0%	2.0	100%						1.6	0.58		16.4%	1.3		24.0	85.7%	83.8					
43	Barahbise	44.5%	2.0	100%						13.8	1.11	85.8	100.3%				100%	148.8					
44	Urlabari	33.6%	24.0	100%						25.8	0.44	97.7	31.3%			4.6	100%	107.6					
45	Pathari- Sanichare	34.2%	19.0	95%		4.3	99.7%	230.7	163.8	29.0%	4.2	0.52	98.2	31.8%	6.0		4.9	100%	104.7					
46	Jamuna Gachi	51.5%	14.0	100%		4.6	100%	85.7	70.8	17.4%	4.3	0.56	98.2	86.4%			6.4	100%	120.0					
47	Rangeli	25.6%	24.0	80%		5.0	99.0%	120.8	97.6	19.2%	5.1	0.73	97.3	53.6%	24.0		5.6	86.0%	104.9					
48	Tankisinuwari	30.3%	14.0	100%		4.3	100%	196.0	147.6	24.7%	9.1	0.84	97.1	38.5%	0.0		5.0	100%	80.4					
49	Bhara	32.7%	7.0			10.0	100%																
50	Madhumalla	27.5%	4.0			7.4	100%	42.0	33.0	21.4%	19.7	0.96	98.9	69.0%	6.0		8.7	100%	44.2					
51	Pichara	17.9%	11.3	100%		6.5	100%	96.5	80.9	16.2%	14.2	1.56	62.3	2.4%			40.0	70.0%						
52	Sorabhag (Karsiya)	74.8%	24.0			1.6	10.7%	17.8	14.8	17.2%	7.6	1.21		15.8%	24.0		30.3	100%						
53	Bayerban	43.3%	24.0	100%		5.3	99.9%	100.0	79.4	20.6%	11.3	2.67	90.9	9.0%	12.0		12.0	80.0%						
54	Katahari	41.9%	16.0	94%		4.1	99.7%	111.4	90.3	18.9%	7.1	0.55	98.0	22.2%	12.0		7.2	99.6%						
55	Jhorahat	42.4%	24.0	100%		5.5	100%	83.2	65.6	21.2%	8.7	0.67	99.8	44.5%	24.0		7.4	99.8%	82.1					
56	Mangadh	40.4%	16.0	95%		4.4	100%	121.0	111.6	7.8%	9.6	0.68		30.2%	10.0		4.3	100%	95.2	78.1	18.0%			
57	Dhulabari	69.3%	12.0	100%		5.0	96.3%	192.4	162.8	15.4%	44.6	5.72		83.3%	13.3		6.9	100%	72.4	54.3	25.0%			
58	Gauradaha	76.2%	24.0	100%		3.3	100%	58.4	48.9	16.2%	14.3	0.70	97.1	53.3%	24.0		3.9	100%	67.3	57.9	14.0%			
59	Shanischare (Shani Arjun)	80.8%	24.0	100%		5.2	100%	109.9	89.4	18.6%	11.5	1.14	77.8		24.0		5.6	100%	90.0					
60	Shivasatachhi	15.2%	3.7	67%		10.4	44.4%	381.7	272.6	28.6%	1.4	0.83	95.2		5.7									
61	Prithvinagar(Gaurisankar)	46.1%	24.0	100%		8.7	100%	109.2	88.8	18.7%					6.0		33.3	100%	277.8					
63	Topgachi-I	41.5%	18.0	100%		4.3	100%	77.4	60.5	21.8%	12.5	0.90	97.0		24.0		5.7	100%	23.8					
64	Topgachi-II	23.1%	14.0	100%		6.4	100%	93.5	71.8	23.2%	16.2	2.58	91.5				11.4	100%	47.6					
65	Topgachi-III	24.7%	18.0	100%		6.7	100%	70.5	57.8	18.1%	8.6	1.08	97.9		12.0		4.4	100%	222.2					
66	Juropani	18.0%	24.0	100%		4.4	99.3%	86.9	67.2	22.7%					24.0		6.0	100%	49.9					
67	Chandragadhi-I	85.1%	14.0	100%		4.3	93.0%	182.7	150.0	17.9%	6.0	0.75	99.3		14.0		4.7	100%						
68	Chandragadhi-II	68.0%	24.0	100%		5.9	98.8%	55.1	45.9	16.8%	16.9	0.79	94.0				13.2	99.0%	123.8					

2020
No Data
10%

2021
No Data
1%

2016
No Data
62%

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JICA
water to people

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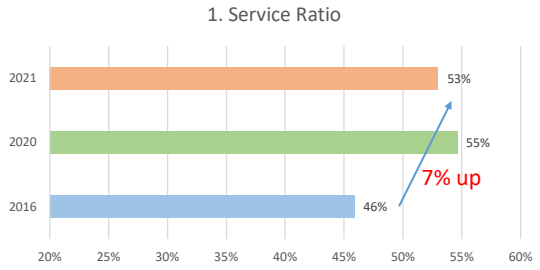
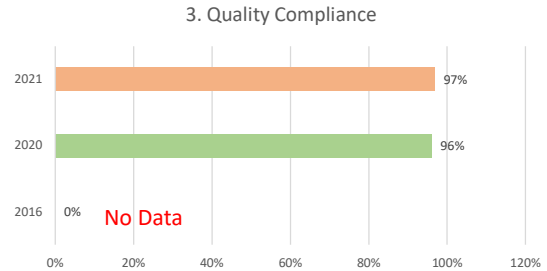
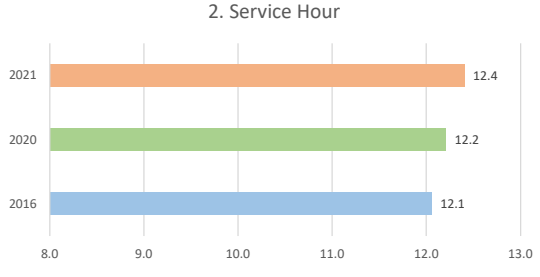
2.6.1 WUSC Performance Improvement (1)

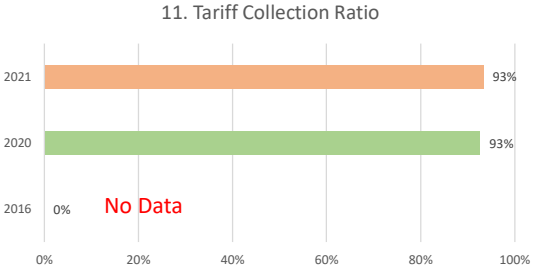
64 WUSC average Data

WASMIP
For providing safe and quality drinking water to people
JICA









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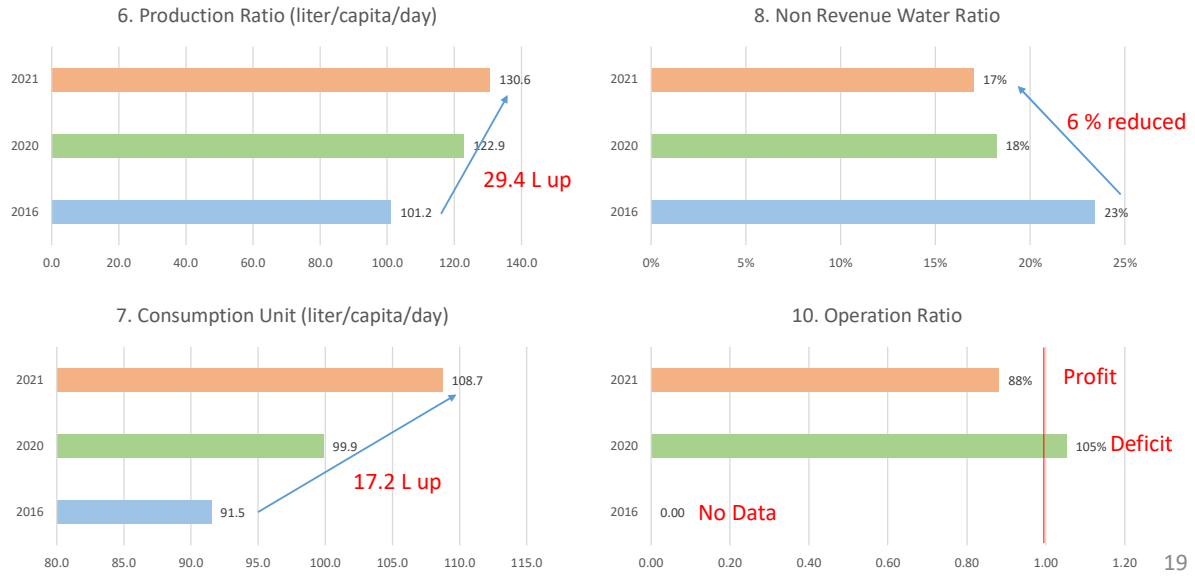
2.6.2 WUSC Performance Improvement (2)

64 WUSC average Data

For providing safe and quality drinking water to people



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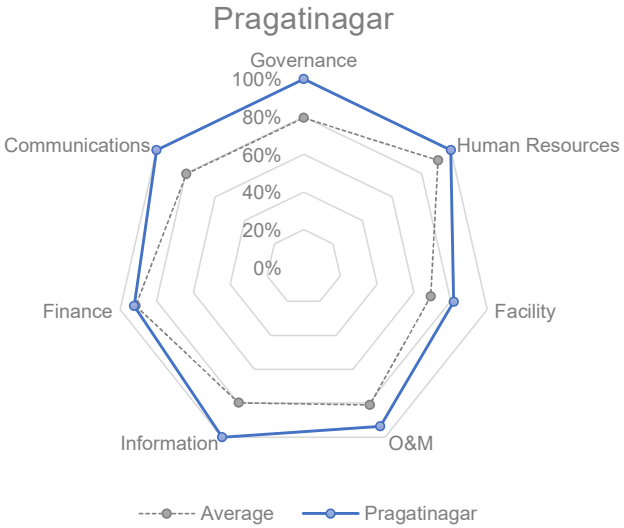
2.7 On-site Training with Management Check Sheet

For providing safe and quality drinking water to people

50 Items (147 Questions) in 7 Key Management Areas

1) Governance: 9 items,
2) Human Resources: 7 items
3) Facility: 10 items
4) O&M: 9 items
5) Information: 3 items
6) Finance: 6 items
7) Communication: 6 items



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2.8 Excellent Performance Award (November 2021)

WASMIP
For providing safe and quality drinking water to people

50th DWSSM Anniversary

1) Safe drinking water supply
2) Consumer Satisfaction
3) Work Efficiency
4) Upgrade of Organization

Pragatinagar WUSC (one of Targets)
Chairperson stated
"WASMIP support is one of big factors"

21

2.9 Support in response to COVID-19 Emergency

Bleaching Powder
11.05 tons
716 thousand Beneficiaries

July –September 2020

22

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2.9 Support in response to COVID-19 Emergency (2)

Chlorination unit(2)

Toilet(6)

Handwashing(15)

Water quality test kit(9)

In December 2020 – February 2021

WASMIP JICA

For providing safe and quality drinking water to people

Thank you very much for your attention!

For providing safe and quality drinking water to people

The Capacity Development Project for the Improvement of Water Supply Management in Semi-urban Areas in Nepal

Dissemination Workshop of WASMIP-II

WASMIP-II Deliverables

February 15, 2022

Chief Advisor

Satoru Oniki

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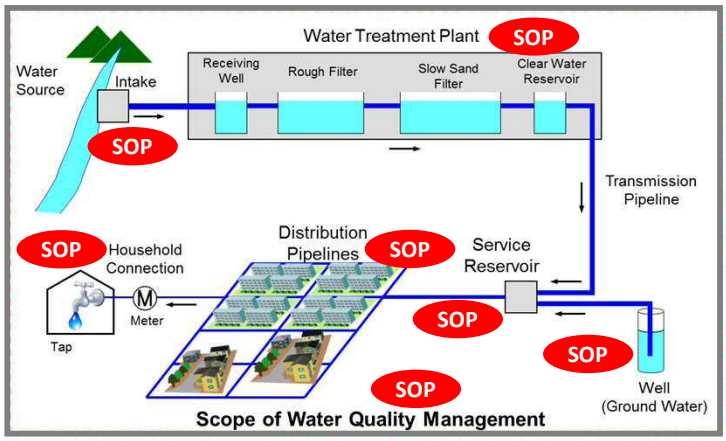
For providing safe and quality drinking water to people

1. WUSCs Support System

WASMIP
For providing safe and quality drinking water to people

WUSC semi-urban towns



Software Support

NWSSTC

Basic Training

Lectures on SOPs With Video lectures, Practice

Training Implementation Guideline

Hardware Support

DWSSM

Provision of Essential Equipment

Design Manual on Rehabilitation Works

Monitoring & Follow up

NWSSTC/ FWSSMP

On-site Training / Observation & Interaction Workshop

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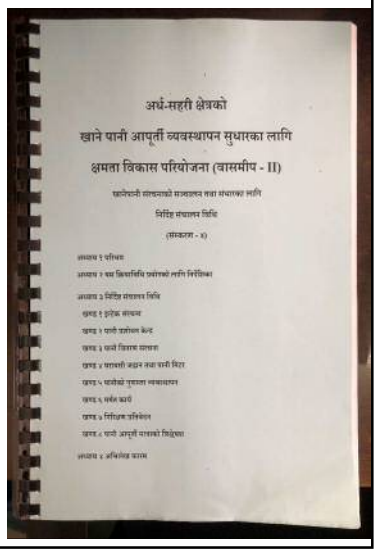
For providing safe and quality drinking water to people

2. Management Model (Deliverable)
2.1 Standard Operating Procedures (SOPs)

No.	SOP
1	Module 1 Introduction
2	Module 2 Management of Water Supply Facilities (1) - Outline -
3	Module 3 Management of Water Supply Facilities (2) - Daily Inspection and Keeping Records -
4	Module 4 Management of Water Supply Facilities (3) - Periodic Inspection -
5	Module 5 Water Quality Management
6	Module 6-1 Water Distribution Facility
7	Module 6-2 Household Connections and Water Meters
8	Module 7 Analysis of Water Supply Management
9	Module 8 Planning of Water Supply Management



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2.2 Video Material (51) (Deliverable)

For providing safe and quality drinking water to people

No.	Video Title	No.	Video Title
1	Water Users and Sanitation Committee 1	28	ENPHO Test Kit
2	Water Users and Sanitation Committee 2	29	Coliform Presence/Absence
3	Objectives of Water Supply Management	30	Free Residual Chlorine
4	Water Supply Facilities	31	pH
5	Objectives of Operations and Maintenance	32	Ammonia
6	Surface Water Facilities	33	Iron
7	Groundwater Facilities	34	Nitrate
8	Chlorination and Reservoir	35	Hardness
10	Mechanical & Electrical Equipment	36.1	Distribution Network 1
11	Objectives of Daily Operation and Maintenance	36.2	Distribution Network 2
12	Daily Operation and Maintenance: Surface Water Facilities 1	37	Valve and Fire Hydrant
13	Daily Operation and Maintenance: Surface Water Facilities 2	38	Water Meter
14	Daily Operation and Maintenance: Groundwater Facilities	39	Key Performance Indicator
15	Daily Operation and Maintenance: Chlorination Unit & Reservoir	40	Water Supply Ratio
16	Periodic Inspection and Maintenance: Intake Facilities	41	Service Hours
17	Periodic Inspection and Maintenance: Sedimentation Tank	42	Water Quality Compliance
18	Periodic Inspection and Maintenance: Roughing Filter	43	Staff Ratio
19	Periodic Inspection and Maintenance: Slow Sand Filter	44	Metered Ratio
20	Clamp Meter	45	Production Ratio
21	Insulation Tester	46	Consumption Ratio
22	Periodic Inspection and Maintenance: Pumps	47	Non-Revenue Water
23	Periodic Inspection and Maintenance: Electrical Panel	48	Unit Production Cost
24	Periodic Inspection and Maintenance: Generator	49	Operation Ratio
25	Water Quality Management	50	Collection Ratio
26	Sampling Point of Water	51	Check List
27	Turbidity Tube and Visual Inspection		

(1) Anytime

(2) Anywhere

(3) Repeatedly

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For providing safe and quality drinking water to people

2.2.1 Video Material (Deliverable)

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2.3 Simplified SOPs(1) (Deliverable)

SN	Title	SN	Title
1	Intake Flow Management	17	Daily & Periodic Inspection of Standby Generator
2	Daily & Periodic Inspection of Intake Structure	18	Daily & Periodic Inspection of Aeration Facility
3	Operation Procedure of Well Pump	19	Daily & Periodic Inspection of Pressure Filter
4	Daily & Periodic Inspection of Well Pump	20	Procedure for Distribution Flow Management
5	Daily & Periodic Inspection of Sedimentation Tank	21	Maintenance for Service Reservoir
6	Cleaning of Sedimentation Tank	22	Maintenance for Distribution Pipeline
7	Daily & Periodic Inspection of Roughing Filter	23	Procedure for Household Connection Facility Management
8	Cleaning of Roughing Filter	24	Procedure for Use Tolerance Test
9	Daily & Periodic Inspection of Slow Sand Filter	25	Sampling Point for Surface Water
10	Scraping Sand of Slow Sand Filter	26	Sampling Point for Well Water
11	Daily & Periodic Inspection of Clear Water Reservoir	27	Repair Work for Civil Structure
12	Daily & Periodic Inspection of Chlorination Unit	28	Repair Work for Pipelines
13	Preparation of Chlorine Solution	29	Repair Work for Mechanical and Electrical Equipment
14	Operation Procedure of Volute Pump	30	Report of Inspection Result
15	Daily & Periodic Inspection of Volute Pump	31	Analysis of Water Supply Amount
16	Periodic Inspection of Electrical Panel		

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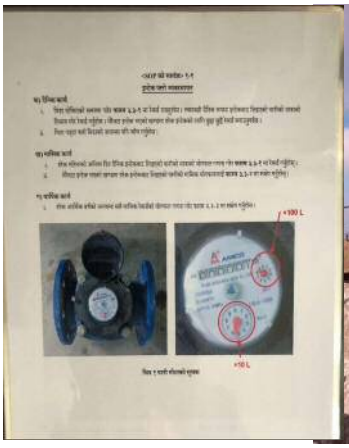
2.3 Simplified SOPs(2) (Deliverable)

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2.3 Simplified SOPs(3) (Deliverable)

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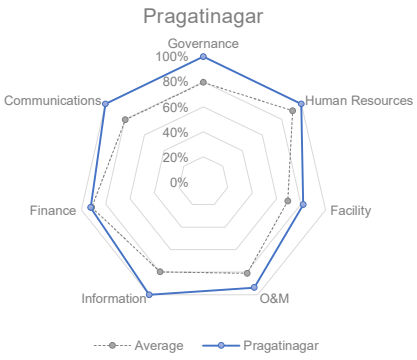
2.4 Management Check Sheet for On-site Training

Category	No	Item	Category	No	Item
Governance	1	Annual General Meeting	O&M Operation and Maintenance	27	Security and Safety
	2	Election		28	Utilization of Facilities
	3	Management Board		29	Manuals
	4	Sub Committees		30	Water Quality
	5	Internal Audit		31	Water Leakage
	6	Social Considerations		32	Periodical Operations
	7	Goal Management		33	Troubleshooting
	8	Mid-Term Plan		34	Inventory Management
	9	Annual Report		35	Office
Human Resources	10	Code of Conduct	Information	36	Operation Record
	11	Job Descriptions		37	ICT
	12	Staff Communications		38	Document Management
	13	Staff Appraisals	Finance	39	Water Tariff
	14	Motivation		40	Cost Management
	15	Knowledge and Skills		41	Tariff Collection
	16	Training		42	Accounting
Facility	17	Water Source		43	Procurement
	18	Facility for Water Volume		44	Financial Analysis
	19	Facility for Water Quality	Communications	45	Customers Management
	20	Measurement Equipment		46	Information Disclosure
	21	Maintenance Equipment		47	Public Awareness
	22	Distribution Network		48	Online Services
	23	Disaster management		49	Government
	24	Power Supply		50	WUSC Network
	25	Lifetime of Facility			
	26	Office			



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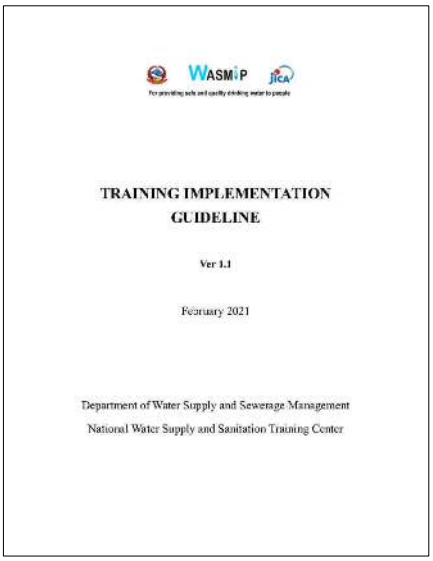
3. Training Implementation Guideline (Deliverable)



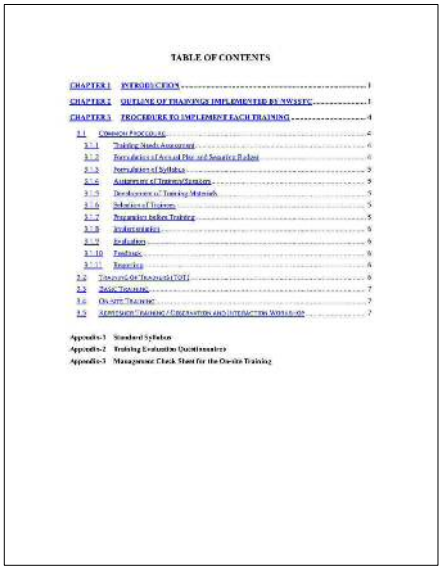
TRAINING IMPLEMENTATION GUIDELINE

Ver 1.1

February 2021

Department of Water Supply and Sewerage Management

National Water Supply and Sanitation Training Center



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4. Design Manual on Rehabilitation Works (Deliverable)

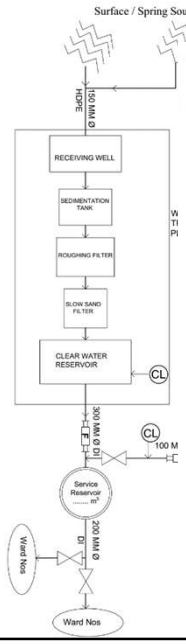
MANUAL OF

REHABILITATION WORKS

FOR WUSC IN SEMI-URBAN

TOWNS

4.1 Rehabilitation Work Procedures



1. Recognition of Purpose (See p.5)

2. Site Survey (See p.5)

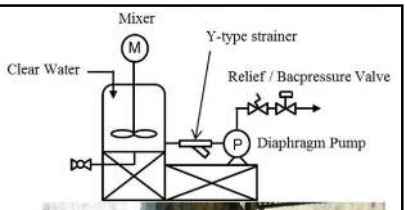
3. Development/Revision of Schemetic Flow Diagram (See p.7)

4. Identifying Installation Locations (See p.7)

5. Determination of Specification (See p.12)

6. Preparing BOQ (See p.15)

7. Procurement and Installation (See p.16)



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5. Training Scenes

Training of Trainers

Basic Training

On-site Training

Observation & Interaction Workshop

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Thank you very much for your attention!

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Appendix 2.48

WASMIP-II Deliverables Dissemination Workshop Presentation Material by DWSSN in February 2022

For providing safe and quality drinking water to people

The Capacity Development Project for the Improvement of Water Supply Management in Semi-urban Areas in Nepal

Dissemination Workshop of WASMIP-II

Utilization Plan / Way Forward

February 15, 2022

Er. Kabindra Bikram Karki

1

1

For providing safe and quality drinking water to people

1. Deliverables of WASMIP-II

No.	Training Material	Purpose/ Usage
1	***Management Model***	
1.1	**SOP** *(English / Nepali)*	◆ Reference for O&M procedures of facilities ◆ Training material for Basic Training and On-site Training
1.2	**Lecture Material** *(PowerPoints, English / Nepali)*	◆ Training material for Training of Trainers (*ToT*) and Basic Training (to WUSCs)
1.3	**Video Material** *(Nepali narration and English capture)*	◆ Reference for O&M of facilities consisting of ***51 videos*** ◆ Training material for ToT and Basic Training
1.4	**Simplified SOP** *(English / Nepali)*	◆ Simplified version of SOP consisting of ***31 parts*** ◆ To display near equipment and facilities at the site ◆ A4 size and laminated

2

1. Deliverables of WASMIP-II

For providing safe and quality drinking water to people

No.	Training Material	Purpose/ Usage
2	**Training Implementation Guideline** *(English)*	◆ Guideline for training implementation by NWSSTC ◆ Training planning, lecture contents and curriculum
3	**Rehabilitation Manual** *(English / Nepali)*	◆ Manual for WUSCs to ***request*** necessary materials and equipment for facility rehabilitation ◆ Manual for DWSSM / NWSSTC / FWSSMP to ***support*** procurement of materials and equipment to WUSC according to the request
4	**ToT Material for On-site Training** *(PowerPoint, English / Nepali)*	◆ Training material for ToT of On-site Training ◆ Aim, contents and implementation procedures of On-site Training
5	**Management Check List**	◆ Check list for interviewing WUSCs during On-site Training

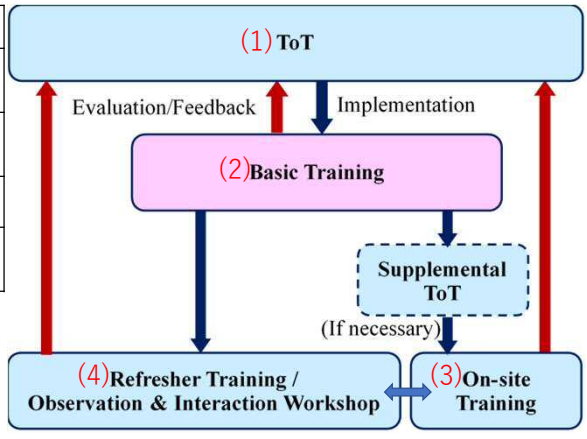
3

2. Establishment of Trainings

For providing safe and quality drinking water to people

Training	Objectives
(1)Training of Trainers (ToT)	Understanding Basic training contents, key points, teaching skills
(2)Basic Training	Knowledge, skills and management on water supply business
(3)On-site Training	Applying knowledge to sites
(4)Observation & Interaction Workshop	Feedback from Basic training, Sharing Good practice & Key issues

*Trainings have been carried out as the activities of Output 3



Relation of Trainings

Training Implementation Guideline developed by WASMIP: the administrative training procedures

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3. Training Scene (1)

Training of Trainers

Basic Training

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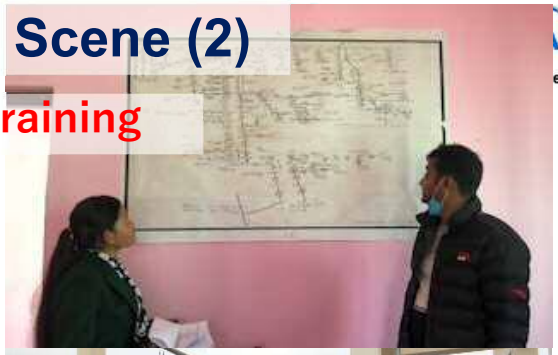
3. Training Scene (2)

On-site Training



Observation & Interaction Worksshop

6

4. Effects of Trainings

For providing safe and quality drinking water to people

S.N	DWSSM/NWSSTC	WUSCs
1	Improvement of training skills(teaching, facilitation) of trainers.	Opportunity with DWSSM and other WUSCs identifying problems and solution.
2	Increasing number of trainers in fields of O&M and management on water supply system.	Recognizing importance of O&M and keeping records and KPIs.
3	Systematic training on overall (O&M and management) water supply system	Identifying correct O&M procedures (e.g: operation of sedimentation tank) on site.
4	Opportunity to visit and give lecture at the site and visualize O&M of WUSCs.	Obtained essential equipment such as flowmeter, chlorine dosing, water quality test kit for proper O&M and safe water supply from DWSSM.
5	Identifying roles of WUSCs as stipulated by government policies, rules and regulation regarding water supply service.	

7

7

5. Training Plan for WUSC semi-urban towns after WASMIP-II

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

- 192 WUSCs under semi-urban towns
- 14 WUSCs out of 192 received Basic Training in January 2022
- Basic Training and TOT will be an ongoing process at NWSSTC

8

8

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6. Dissemination of Management Model

- The Management Model for water supply management improvement, as developed by WASMIP is submitted to DWSSM for approval,
- The Management Model along with the SOPs and Rehabilitation Manual, will be uploaded to the NWSSTC/DWSSM web page for easy access by all.
- Interested parties in water sector can use the Management Model.

9

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7. Future prospects for JICA assistance

- Water Operators' partnership (WOP) for sector learning.
- Smart water management for efficiency and economy of water services provision.

10

WASMIP JICA
For providing safe and quality drinking water to people

Thank you very much for your attention!

Appendix 2.49

1st JPCM Presentation Material in September 2016

The 1st Project Coordination Meeting

WASMIP-II

September 18, 2016

Chief Advisor

Satoru Oniki

1

1. Project Purpose

Supporting mechanism for target WUSCs to be set up by DWSS /NWSSTC /RMSOs /WSSDOs will be established.

Project Purpose in the WASMIP-I

DWSS technical support system to WUSCs is improved in Morang and Jhapa districts.

2

1.1 Subjects of the Project

1. WUSCs
   (1) Fragile management and technical skills
   (2) Lack of adequate budget and human resource
   (3) Absence of business plan

2. DWSS and WSSDO
   (1) Inadequate for regular and proper supervision and guidance to WUSCs
   (2) Lack of technical and financial capacities

3

2. Baseline Survey

1. Pilot: 13 WUSCs, 11 WSSDOs and 4 RMSOs
   (1) Explanation of the WASMIP-II
   (2) Dissemination of the WASMIP Model
   (3) Site Survey (Water Supply System)
   (4) Problem detection and Resolution/Mitigation

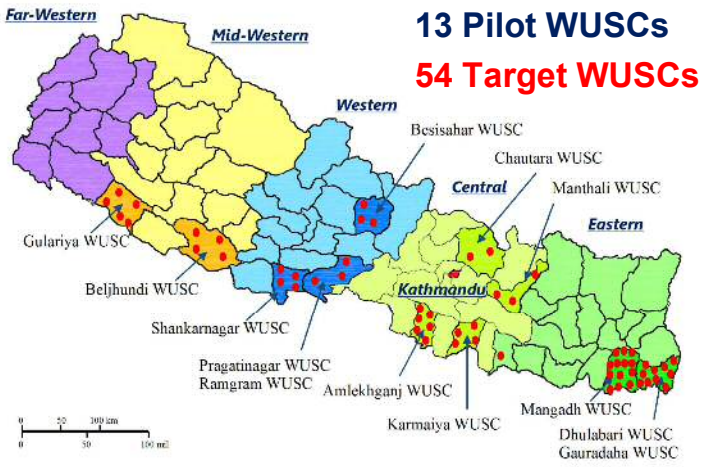
2. Method
   (1) On-site Survey
   (2) Interviews to RMSO, WSSDO and WUSC
   (3) Questionnaire Survey (PIs, Facility Check, Awareness)

4

2.1 Project Sites

13 Pilot WUSCs

54 Target WUSCs



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2.2 Criteria for Selecting Pilot Projects

1. System-wise selection
   Diverse source (groundwater, spring, stream)
2. No. of household connection
   Semi urban, small town (more than 1,000 connections)
3. Geographical coverage and regional balance
   Western, Central and Eastern (follow up)
4. Water Treatment and distribution systems
   Slow/Rapid sand filter, Iron removal, Reservoir

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2.3 Field Survey in 13 WUSCs (1)

Mangadh WUSC
Elevated Tank
Construction site

Chautara WUSC
Chlorination equipment

7

2.4 Field Survey in 13 WUSCs (2)

Manthali WUSC
Shallow well site

Manthali WUSC
Inspection of Electrical
Panel for well pump

8

2.4 Field Survey in 13 WUSCs (3)

Gulariya WUSC
Instruction of
MASMIP Model

Dhulabari WUSC
Water Treatment Plant site
Removing trash in strainer
from raw water

2.4 Field Survey in 13 WUSCs (4)

Pragatinagar WUSC
Intake site
Checking raw water turbidity

Pragatinagar WUSC
Intake site
Turbidity measurment

2.5 Problem Detection by Survey

1. Problem recognition
   Lack of manpower (skilled person) and budget
   Many projects compared with No. of WSSDO Engineers
2. Unknown field conditions
   No inspection/patrol to facilities,
3. Unrecognizable problems
   No one recognizes the problems in sites
   i.e. Recording of O&M, Water quality monitoring,
   Consumer's complaints, etc.

2.6 Unrecognizable Problems

Flow Meter Chamber

2.7 Importance of the Record(1)

1. Grasp the water demand - Supplied water
2. Planning extension pipelines/facilities
3. Sound and smooth management
   - Revenue, tariff collection,

2.7 Importance of the Record(2)

In case of Supplied water volume

Step 1: Flow Meter Installation (Equipment)

Inlet/Outlet

Step 2: Record of the Flow

(Production/Distribution volume)

(Frequency; **daily**, ~~weekly, monthly, yearly~~)

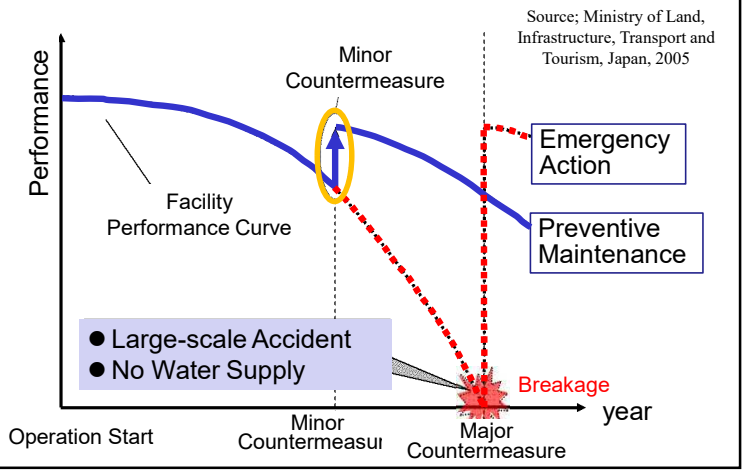
Step 3: Analysis of the Data

Annual supplied water, Non-Revenue Water,
Maximum/Minimum daily water supply, etc.

2.8 Preventive Maintenance (1)

1. Increase the life span of equipment/facility
2. Maintain or improve the facility function
3. Reduce the maintenance cost
4. Provide good service, continuous service

2.8 Preventive Maintenance (2)

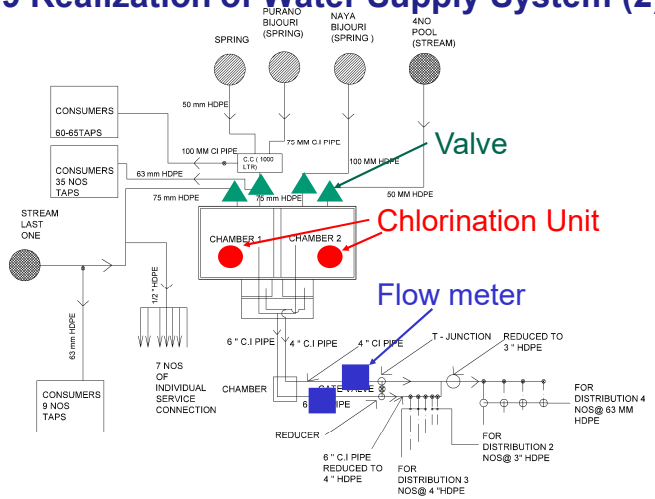


2.9 Realization of Water Supply System (1)

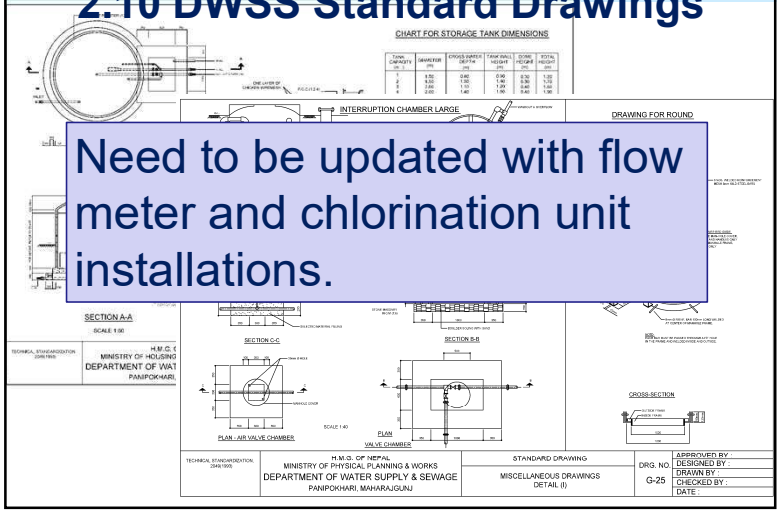
Amlekhgunj WUSC

No data (supplied volume)
No distribution map (locations, pipe dia., material)
Only staff experience (incorrect information)

2.9 Realization of Water Supply System (2)



2.10 DWSS Standard Drawings



Need to be updated with flow meter and chlorination unit installations.

2.11 Good Practice
Installation of Flow Meter

Outlet Flow Meter installed in Gulariya WUSC
By Mr. Arjun kumar Bam (Bardia WSSDO Ex Chief)

2.12 Performance Indicators (PIs) (1)

- Service provider has an accountability to inform consumers about service information.
- Management of service achievements with PIs
- Improve and promote efficiency of O&M

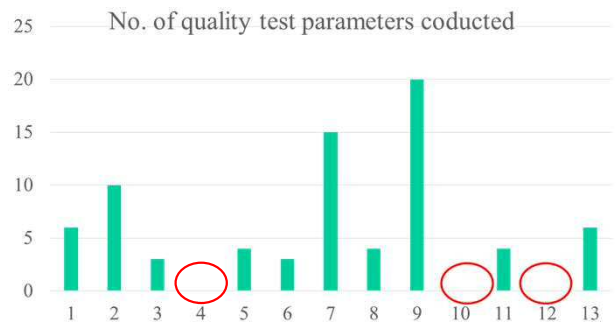
Measurement and Visualization of activities

Apply in Business Plan

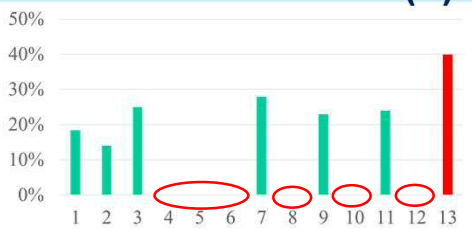
2.12 Performance Indicators (PIs) (2)

- Basic data: Population, household, service area, staff No., etc.
- WTP & Distributed water: production water, WTP capacity, revenue water, etc.
- Water quality control: water quality accident, sampling points, test parameter, etc.
- Management: annual report, total income & expenditure, water revenue, etc.
- Water supply service: complaint, type, public meeting
- O&M: Record, frequency, digitized data
- Others: water supply hours

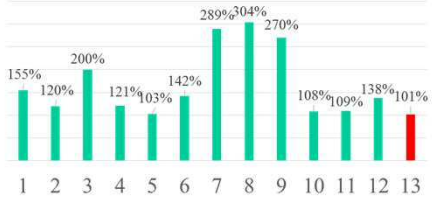
2.13 PIs Results (1)



2.13 PIs Results (2)



Non-Revenue Water Ratio



Total Income & Total Expenditure Ratio

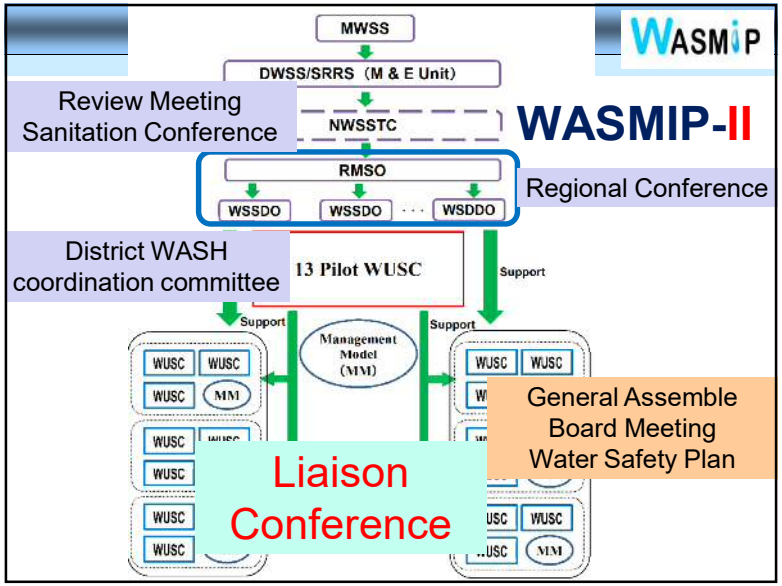
3. Cascade System (1)

Tools (Existing System)

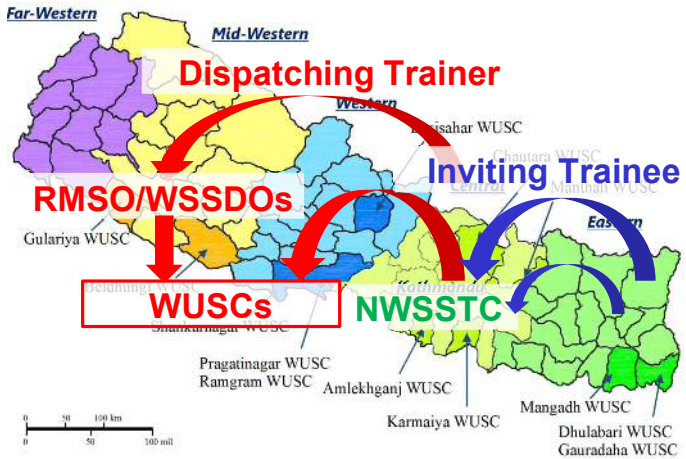
1. WSSDO Review Meeting at DWSS
2. Regional Conference (in each RMSO)
3. Sanitation Conference (DWSS)
4. General Assemble (WUSCs)
5. Board Meetings (WUSC)
6. Water Safety Plan (WSP)
7. District WASH Coordination Committee
8. Village WASH Coordination Committee

Optional

9. **Forum** adopted in Dang district (Main WUSCs)



3. Cascade System (3)



4. Schedule on WASMIP-II

1. Distribution of the WASMIP Model to Pilot & Target WUSCs (English & Nepali version, CD) (September 2016)
2. Workshop on WASMIP-II Survey (PIs, Check sheet, Awareness) to Target WUSCs (October 2016)
3. Water Supply System Improvement of 13 WUSCs i.e flow meter, chlorination unit, valve, chamber (December 2016)
4. Update/revise SOPs (February 2016)

4.1 WASMIP Model

SOPs

Water Treatment Plant O&M included Mechanical and Electrical

Water Quality Management

Water Distribution Facility O&M

Water Meter Management

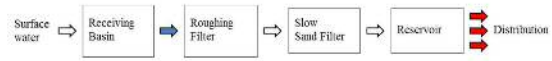
Business Plan

PIs in Annual Report

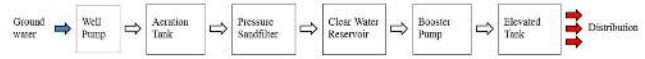
4.2 Various Water Treatment

- Pattern A

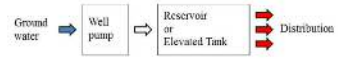
- Pattern B



- Pattern C



- Pattern D



- Pattern E

5. WASMIP-II Slogan

Preventive maintenance is like a

"Bishwakarma puja"

पुर्व-मर्मत भनेको विश्वकर्मा पुजा जस्तै नै हो ।

Thank you very much for your attention

Enjoy WASMIP-II

Appendix 2.50

2nd JPCM Presentation Material in December 2016

The 2nd Joint Project Coordination Meeting (JPCM)

WASMIP-II

December 19, 2016

Chief Advisor

Satoru Oniki

1

1

WASMIP Purpose

Supporting mechanism for target WUSCs to be set up by DWSS /NWSSTC /RMSOs /WSSDOs will be established.

2

2

WASMIP-II Progress Report

1. **Workshop for Target WUSCs**
   →5 Good practices/1 Challenge
2. **Questionnaire Collection to Target WUSCs**
   →WUSC capacity and WSSDO support
3. **Key Points of Support mechanism/Cascade System**
   →Staff Number in WSSDOs
4. **Improved Quality of Documentation**
   →Importance of Records / check sheet
5. **Water Quality Training**
   →Possession of a portable test kit

3

3

1. Workshops for Target WUSCs

Workshop Objectives;

1. Understanding of the WASMIP to the Board member
   - Importance of keeping records
   - Proper O&M / Preventive Maintenance
   - Information disclosure
2. Grasp of current status of the water supply services and facilities in each WUSC
   - PIs, Water Supply Facility, WUSC's Awareness
3. Request of cooperation to implement the WASMIP
   - Linkage with WSSDO and WUSC

4

4

1.1 Workshop in 11 WSSDOs

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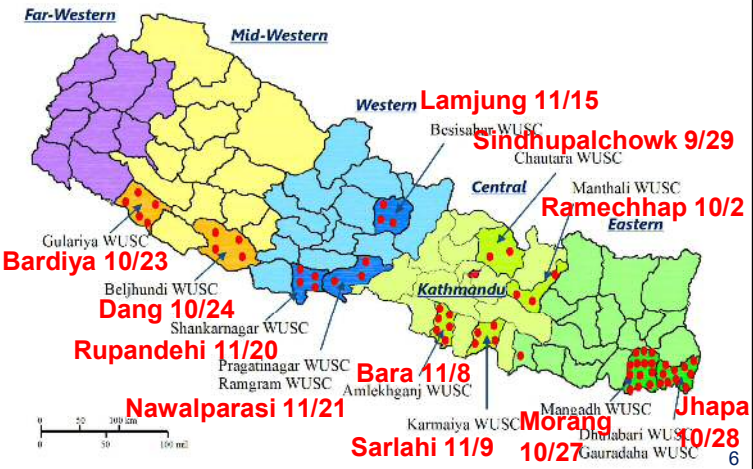
1.2 Workshop Schedule



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1.3 Good Practice in WUSCs (1)

Anandaban WUSC (Rupandehi District)

Meter Reader collects the population data including family size, tenants and also in schools and other public connections.

- Correct Information (Served Population)
- High efficiency of manpower

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1.3 Good Practice in WUSCs (1) cont.,

How WUSCs adopt High efficiency of manpower?

WUSC Board member's understanding and realization

i.e. Served population is the most important indicator.

8

1.4 Good Practice in WUSCs/WSSDOs(2)

Gulariya WUSC (Bardiya distric)

•Mr. Arjun Kumar Bam (Ex-Chief Bardiya WSSDO) installed the outlet flow meter to grasp the distribution volume.

•Gulariya WUSC has started to maintain a daily record of distributed volume using the water flow meter.

Equipment
✚
Record
✚
Analysis

9

9

1.5 Good Practice in WUSCs (3)

Shankarnagar WUSC (Rupandehi district)

has a well-equipped water quality testing laboratory with a Chemist. This WUSC checks the water quality of neighboring WUSCs as well.

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1.5 Good Practice in WUSCs (3) cont.,

1. Laboratory: NOT for all WUSCs
2. Selection of Key Stations
   - ➢ Number of WUSCs
   - ➢ Location / Accessibility
3. Near WUSCs can use the laboratory

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1.6 Good Practice in WSSDOs (4)

Dang WSSDO

Forum established by WSSDO (Mr. Jagannath Purbey) to exchange opinions to share knowledge on water supply and try to mitigate/solve common problems.

1. WSSDO Chief understanding / taking action
✚
2. WUSC Board member understanding / cooperation

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1.7 Good Practice in WSSDOs (5)

Lamjung WSSDO:

Lamjung WSSDO has conducted for 7 days training once a year for 20 persons from different WUSCs.

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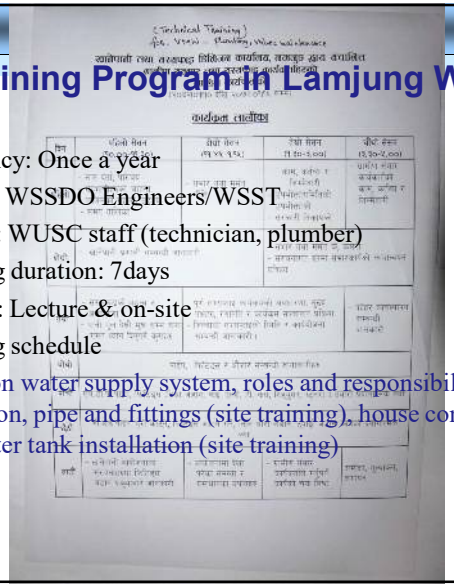
1.7 Training Program in Lamjung WSSDO



- Frequency: Once a year
- Trainer: WSSDO Engineers/WSST
- Trainee: WUSC staff (technician, plumber)
- Training duration: 7days
- Method: Lecture & on-site
- Training schedule

  O&M on water supply system, roles and responsibilities, sanitation, pipe and fittings (site training), house connection and water tank installation (site training)

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1.7 Good Practice in WSSDOs (5) cont.,

1. There were many problems on O&M in WUSCs
2. WUSCs requested supports of the WSSDO.
3. 3 years ago (since 2012/2013)
4. WSSDO's Budget

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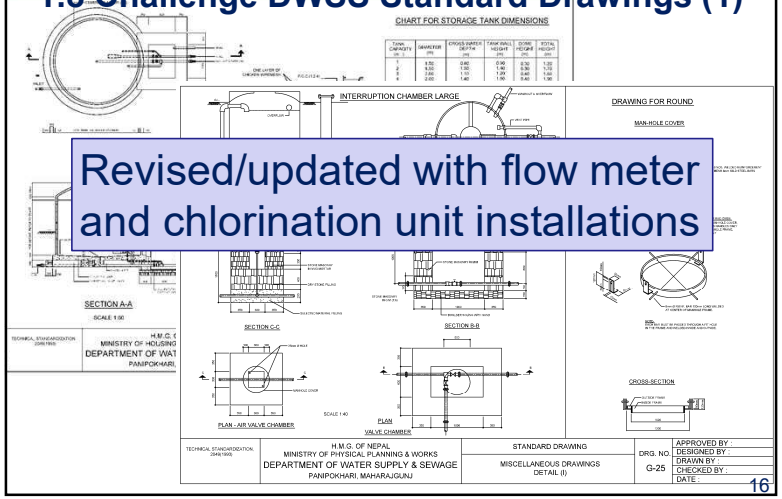
1.8 Challenge DWSS Standard Drawings (1)



Revised/updated with flow meter and chlorination unit installations

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1.9 Challenges on Valve on pipelines (2)

Many WUSCs are facing problems like in operation and maintenance due to absence of maintenance valves on water distribution pipelines.

This problem is due to long construction period of projects (approx. 10 years) and lack of budgets.

Standard Drawings show the valves
Construction budgets included in valves
→Less priority?

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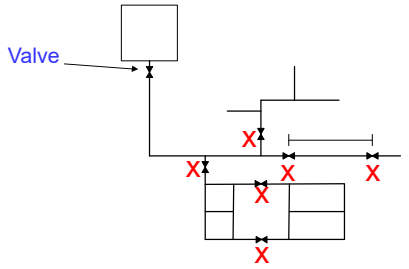
1.9 Challenges on Valve on pipelines (2) cont.,

- To control flows and maintain pipelines
  → Leakage Repair and Pipe Replacement

1. Stop the water supply → Poor services
2. Not easy to repair pipes
3. Law consumer satisfaction



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WASMIP-II Progress Report

1. **Workshop for Target WUSCs**
   →**5** Good practices/**1** Challenge
2. **Questionnaire Collection to Target WUSCs**
   →WUSC capacity and WSSDO support
3. **Key Points of Support mechanism/Cascade System**
   →Staff Number in WSSDOs
4. **Improved Quality of Documentation**
   →Importance of Records /Check sheet
5. **Water Quality Training**
   →Possession of a portable test kit

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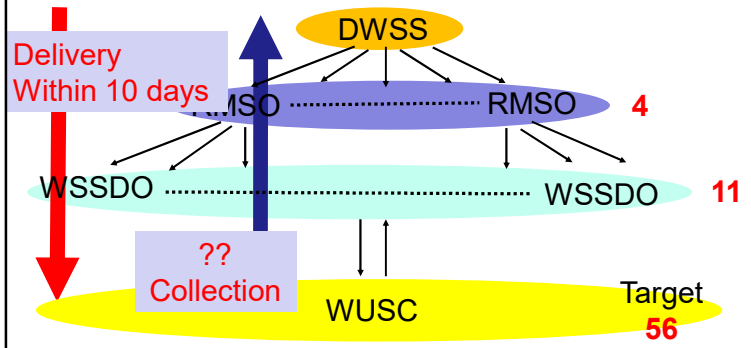
2. Questionnaire Collection from Target WUSCs



Project Purpose: **69 (=13+56) WUSCs**

20

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2.1 Questionnaires Collection Status

	WSSDO	WS Date	No. of WUSC	Prepared		Submitted	
			Target	Yes	No	Yes	No
1	Sindhupachowk	Sept. 29	2	2	0	2	0
2	Ramechhap	Oct. 2	3	3	0	3	0
					1	3	1
					0	3	1
					6	7	6
					3	5	5
7	Bara	Nov. 8	6	6	0	6	0
8	Sarlahi	Nov. 9	4	2	2	1	3
9	Danusha	Nov. 9	1	0	1	0	1
10	Lamjung	Nov. 15	3	1	2	1	2
11	Pupandehi	Nov. 20	4	1	3	0	4
12	Nawalparasi	Nov. 21	3	2	1	2	1

1. WUSCs Inactive
2. Lack of data/information
3. Need of WSSDO support

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WASMIP-II Progress Report

1. **Workshop for Target WUSCs**
   →**5** Good practices/**1** Challenge
2. **Questionnaire Collection to Target WUSCs**
   →WUSC capacity and WSSDO support
3. **Key Points of Support mechanism/Cascade System**
   →Staff Number in WSSDOs
4. **Improved Quality of Documentation**
   →Importance of Records /Check sheet
5. **Water Quality Training**
   →Possession of a portable test kit

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3.1 Number of the Projects in WSSDO

	WSSDO	Eng.	WSST	Total	No. of Project	No. of Construction	Projects/Eng.	Construction/WSST
		a	b	c	d	e	d/a	e/b
1	Nawalparasi	3	9	12	124	52	41.3	5.8
2	Pupandehi	5	8	13	74	32	15.0	4.0
3	Sarlahi	4	12	16	71	46	17.8	3.8
4	Bara	4	10	14	111	45	27.8	4.5
5	Jhapa	4	6	10	72	38	18.0	6.3
6	Morang	3	6	9	72	33	24.0	5.5
7	Dang	3	6	9	96	54	32.0	9.0
8	Bardiya	2	8	10	36	17	18.0	2.1
9	Sindhupachowk	2	4	6	104	58	52.0	14.5
10	Ramechhap	3	6	9	84	42	28.0	7.0
11	Lamjung	3	7	10	91	28	30.3	4.0

As of December 2, 2016

23

23

3.2 Key Points of Support mechanism/Cascade System

1. Technology transfer to WUSCs
   →Reduction of WSSDO's works/burden
2. High number of the Projects compared to Engineer number
   →Lack of manpower
3. Focus on WSSTs
   →Less chance of personal transfer
   →Retaining skills & knowledge

24

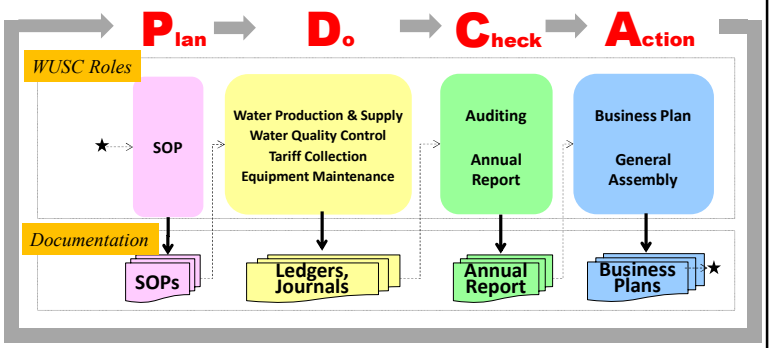
24

WASMIP-II Progress Report

1. **Workshop for Target WUSCs**
   →**5** Good practices/**1** Challenge
2. **Questionnaire Collection to Target WUSCs**
   →WUSC capacity and WSSDO support
3. **Key Points of Support mechanism/Cascade System**
   →Staff Number in WSSDOs
4. **Improved Quality of Documentation**
   →Importance of Records /Check sheet
5. **Water Quality Training**
   →Possession of a portable test kit

25

4. Improved Quality of Documentation (1)



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4. Improved Quality of Documentation (2)

Key Issues	Consequent Problems to implement Guideline
• No uniform format used	• Difficult to compare the performance of WUSC and extract exemplary practices by DWSS;
• Not compliant with Accounting/Financial Reporting Standards	• Unable to correctly calculate some PIs to analyze the efficiency and profitability of WUSC;
• No budget plan	• Unable to compare plan and actual to analyze the performance of WUSC;
• Fixed assets are not accounted, and no depreciation cost	• Different from the principles of the Act/Regulation stating property ownership and management by WUSC

27

2. WASMIP-II Progress Report

1. **Workshop for Target WUSCs**
   →**5** Good practices/**1** Challenge
2. **Questionnaire Collection to Target WUSCs**
   →WUSC capacity and WSSDO support
3. **Key Points of Support mechanism/Cascade System**
   →Staff Number in WSSDOs
4. **Improved Quality of Documentation**
   →Importance of Records /Check sheet
5. **Water Quality Training**
   →Possession of a portable test kit

28

5. Cooperation on Water Quality Test

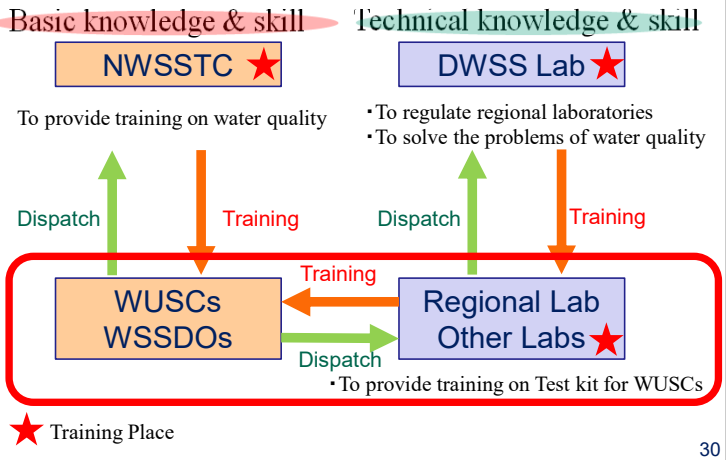
S.N.	WSSDO	Test kit?	Using it?	If no why?
1	Morang	Yes	Yes	
2	Jhapa	Yes	No	No skilled personal, skilled person transferre and retired
3	Sindhupalchowk	Yes	Yes	
4	Ramechaap	Yes	No	Needs to be repaired
5	Lamjung	Yes	No	Needs to be repaired
6	Dang	Yes	Yes	
7	Bardiya	Yes	yes	repaired
8	Rupandehi	No (given to WUSC)	Yes	
9	Nawalparasi	Yes	No	Damaged after recent flood
10	Dhanusha	Yes	Yes	
11	Bara	Yes	Yes	
12	Sarlahi	No		Damaged in last year's fire disaster

S.N.	Pilot WUSCs	Test kit ?	Using it?	Out sourcing?
1	Mangadh	Yes	Yes	Private lab at biratnagar (every 6 month)
2	Gauradha	Yes	No	Private lab at biratnagar (every 6 month)
3	Dhulabari	Yes	Yes	No
4	Chautara	No		Division office
5	Mantrnali	No	Yes	Kathmandu lab
6	Besishahar	Yes	Yes	
7	Beljhungdi	Yes	Yes	No
8	Gulariya	No		Regional lab
9	Shankarnagar	Yes	Yes	No
10	Pragatinagar	Yes	Yes	Chitwan lab (regional lab)
11	Ramgram	No		Amrapuri WUSC
12	Amlekhgunj	No		Chitwan lab (regional lab)
13	Karmaiya	Yes	Yes	No

29

29

5. Proposed Training Scheme



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30

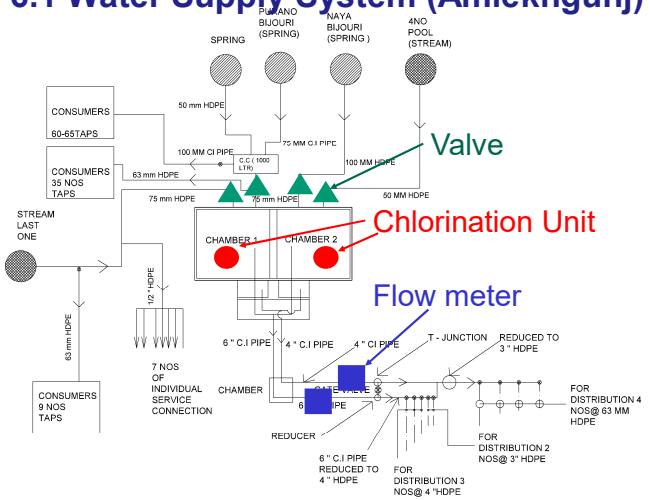
6. Concept of Rehabilitation Plan for the Pilot WUSCs

1. To recover the function of water treatment facilities
2. To grasp/measure the quantity of water supply
3. To provide the safe water to consumers
   i.e installation of a chlorination unit

31

31

6.1 Water Supply System (Amlekhgunj)



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7. Challenge with DWSS

1. WASMIP Team will participate in the Regional Conferences
2. Revise SOPs and adopt them as text books in NWSSTC

33

33

WASMIP-II Slogan

Preventive maintenance is like a

"Bishwakarma puja"

पुर्व-मर्मत भनेको विश्वकर्मा पुजा जस्तै नै हो ।

34

34

Thank you very much for your attention

Enjoy WASMIP-II

35

35

Appendix 2.51

3rd JPCM Presentation Material by DWSSM in April 2017

WASMIP

For providing safe and quality drinking water to people

Capacity Development Project for the Improvement of Water Supply Management in Semi-Urban Areas

3rd Joint Project Coordination Meeting

APRIL 22, 2017

Kabindra Bikram Karki
Project Manager
Of WASMIP-II

1

1. Outline of WASMIP-II

Project Purpose : **Supporting mechanism for target WUSCs to be set up by DWSS/NWSSTC/RMSOs/WSSDOs will be established.**

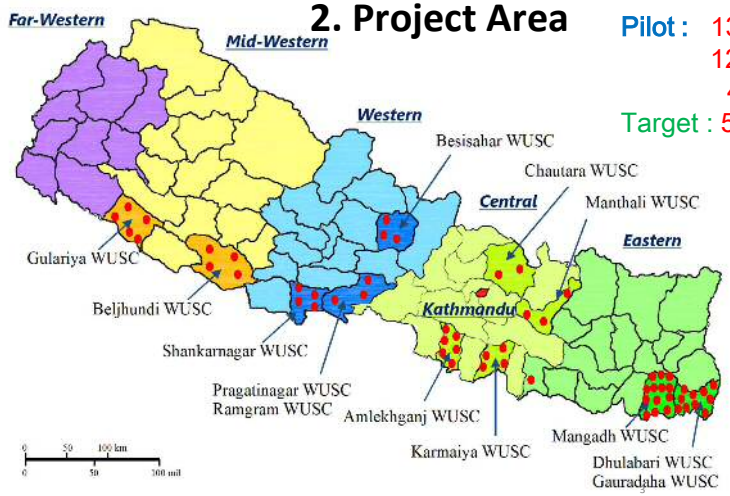
Project Period: July 2016 - May 2021 (5 years)

Target Groups: DWSS, NWSSTC,RMSOs,WSSDOs WUSCs and Water Users.

2

2. Project Area

Pilot : 13 WUSCs
12 WSSDOs
4 RMSOs
Target : 55 WUSCs



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3.DWSS Achievements

3.1 Facilitation

a. Conduct Baseline Survey in Target areas
   Water Supply System & Management
b. Conduct Workshops in Target Areas
   Project Purpose, importance of record keeping & preventive maintenance, WASMIP Model distribution
c. Conduct trial ToT training at NWSSTC & DWSS
d. Dissemination of WASMIP in a financial irregularities regional conferences
   - Outline
   - Progress of WASMIP-II
   - Effectiveness

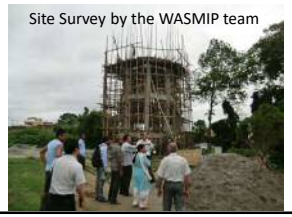
4

3.1.1 Facilitation Pictures

Workshop facilitation By the WSSDO

Activities at the NWSSTC

Site Survey by the WASMIP team



WASMIP Outline during a DWSS Conference

5

3.2 Rehabilitation Works by DWSS (Pilot WUSCs)

a. Procurement of Equipment (Chlorination unit, Flow meter & valves , Filter media etc.)
   - Recovery of the water supply system
   - Measuring the volume of distributed water
   - Providing Safe drinking Water

b. Procurement of water quality test kits to pilot & target WUSCs
   - To monitor the water quality of the supplied water

6

3.3 Budget Allocation

Proposed Budget (FY 2074/75)

- Rehabilitation/Improvement of target WUSCs
- WASMIP Model Implementation in RMSOs
- Facilitating Training at NWSSTC

7

4. Feedbacks/Support Model

a. Study and analysis on revising the WASMIP-I Support Model
b. Recommendations for Merging of MAT and MIT team
c. Regular Budget allocations for the WASMIP-II implementation
d. In corporation of training activities in regular NWSSTC programme such as business plan training , SOPs (water treatment Plant, Distribution Facilities , Water Quality & water meter management).

8

5. Challenges in DWSS/ NWSSTC/ RMSOs/ WSSDOs

- Human Resources (Trainers)
- Giving incentives
- Implementation of revised Support Model
- Water Supply Facility design with bulk meter, valves and disinfection units
- Continuity of support model
- Surveys/ Rehabilitation works for the target WUSCs.
- Incorporation of WASMIP activities in an annual program in coming fiscal year.

Thank You

Appendix 2.52

3rd JPCM Presentation Material by WASMIP Team in April 2017

3RD JOINT PROJECT COORDINATION MEETING

WASMIP-II

The capacity development project for the improvement of water supply management in semi-urban areas in Nepal

April 22, 2017

1

AGENDA

08:00	**Reception/Tea**	
08:30	**Welcome Remarks**	*Mr. Arun Kumar Simkhada, WASMIP-II Project Coordinator/DWSS*
08:35	**Opening Remarks**	*Mr. Tej Raj Bhatta, Director General of DWSS*
08:45	**Progress Highlights of WASMIP-II**	*Mr. Satoru Oniki, WASMIP-II Chief Advisor*
08:55	**WASMIP-II Activities**	*Mr. Kabindra Bikram Karki*
09:05	**Key Issues of WASMIP-II**	*Mr. Yoshio Chikamatsu, JICA Expert*
09:25	**Open Discussion and Q&A**	*All Participants*
09:50	**Plan of WASMIP-II**	*Mr. Satoru Oniki, WASMIP-II Chief Advisor*
09:55	**Closing Remarks**	*Mr. Sunil Kumar Das, Deputy Director General of DWSS*

2

Welcome Remarks

Mr. Arun Kumar Simkhada

3

Opening Remarks

Mr. Tej Raj Bhatta

4

Progress Highlights of WASMIP-II

Mr. Satoru Oniki

5

WASMIP-II PROJECT PROFILE

- **Objective**: Implement Support System for WUSCs in Small Towns by DWSS/NWSSTC/RMSO/WSSDO;
- **Target Areas**: 13 Pilot WUSCs & Target WUSCs in 11 Districts;
- **Project Components**:
  1. Improve and Implement "**WASMIP Model**"
  2. Strengthen Training Capacity of **NWSSTC**
  3. Develop Support Capacity of Target **RMSO/WSSDO**
  4. Implement Training and Support System for **Target WUSCs**
  5. Establish Performance Indicators-based **Monitor Systems**
- **Period**: 5 Years (June 2016-May 2021); 10 Months Passed

6

PROGRESS HIGHLIGHT TO DATE

Item	Until 2nd JPCM (Dec.2016)	Until 3rd JPCM (Apr.2017)
Target WUSCs	• Completed Baseline Survey of DWSS/RMSO/WSSDO & 13 Pilot WUSCs, (yet to start target WUSCs)	• Conducted Regional Workshop (Jan.-Feb.) for Introduction of WASMIP • Initiated Data Collection of Target WUSCs in cooperation with WSSDOs;
Rehabilitation Work of 13 Pilot WUSCs	• Completed Specification and Cost Estimation;	• Allocated Budget • Initiated Procurement;
WASMIP Model	• Analyzed Legislations and Rules including Directives (BS2069) and Guideline (BS2071);	• Identified Key Improvements on "Management Model" and "Support Model"
NWSSTC	• Completed Situation Analysis of NWSSTC and Laboratories;	• Identified Training Modules and "Training of Trainers"
Others		• Proposed on Training in Japan; • Submitted Progress Report I

7

WASMIP-II Activities

Mr. Kabindra Bikham Karki

8

XXXXXXX

- カビンドラさんプレゼン分挿入
  - ターゲットWUSC
  - 施設改善の調達、予算執行、来年度予算割当

9

Key Issues of WASMIP-II

Mr. Yoshio Chikamatsu

10

KEY ISSUES

WASMIP Model is…
a collection of best practices of WASMIP implementation at pilot and target WUSCs in 11 Districts

O&M Procedures & Business Management at WUSCs → **Management Model**

Capacity Development of WUSCs → **Training**

Institutionalized Support to WUSCs → **Support Model**

Convergence

Guideline is…
a set of standard rules and principles for all (small town) WUSCs

Guideline

Convergence

Legislations

Directives & Standard

STWSSSP Models & Best Practices

11

MANAGEMENT MODEL

Key Issues	Countermeasures and Action Plans in WASMIP-II
• Difficult to conduct nationwide dissemination of the current WASMIP model, which is the collection of lessons learnt from the limited coverage of WASMIP-I pilot sites;	• Expand the pilot and target sites quantitively and geographically, so as to include more lessons learnt into the WASMIP model; • Coordinate with STWSSSP to consolidate the lessons learnt into guideline;
• Difficult to apply the WTP SOP, due to different type of facilities from the WASMIP model;	• Update WTP SOP to include various WTP types;
• Too technical for some WUSCs to understand and apply SOPs;	• Update SOPs to streamline the descriptions; • Provide comprehensive version in English for RSMO/WSSDO and summarized version in Nepali for WUSC;
• Unable to develop business plan for some WUSCs, due to unavailability of performance indicators;	• Develop business management manual to include "annual report" and "practical accounting" modules, so as to facilitate the calculation of performance indicators • Apply the proposed 10 performance indicators developed by SEIU;

12

SUPPORT MODEL

Key Issues	Countermeasures and Action Plans in WASMIP-II
• Difficult to form the support teams (MET/MAT/MIT), which consists of management/staff on other duties;	• Create new permanent positions at RMSO to dedicate the support work within the region(/province); • Elaborate job description and training needs for the above positions, and provide capacity development;
• Difficult to mobilize manpower for on-site support to WUSCs, due to limited number of human resources within DWSS/RMSO/WSSDO;	• Mobilize the external resources other than RMSO staff for on-site support (e.g., DWSS/WSSDO, WUSC, NGO, private); • Develop list of such potential external resources;
• Insufficient and fragmented budget allocation for Support Model after WASMIP-I;	• Allocated 150 lakhs DWSS budget in BS2073/74; • Requested 500 lakhs for rehabilitation work and 40-50 lakhs for each RMSO/NWSSTC in BS2074/75; • Elaborate the cost estimation to implement the updated support model after approval;
• Difficult to conduct frequent on-site support due to insufficient manpower;	• Improve and exploit annual report as a primary tool of monitoring and supervision of WUSC's activities; • Develop and implement the feedback and reporting mechanism for efficient support;

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TRAINING

Key Issues	Countermeasures and Action Plans in WASMIP-II
• Need to develop training curriculum for WASMIP model implementation at WUSC;	• Propose to develop six training modules; WTP; Machinery & Electrics; Pipelines & Meters; Water Quality; Business Management; and Accounting;
• Need to provide capacity development for support staff;	• Provide the above training modules also for support staff; • Conduct workshop at a regional level so as to facilitate the knowledge sharing and support skills among support staff;
• Insufficient number of potential trainers available for training;	• Mobilize the external resources other than NWSSTC staff for training (e.g., DWSS/WSSDO, WUSC, NGO, private); • Develop list of such potential external resources;
• Need to improve the skills required for trainers;	• Develop and implement TOT, consisting of pedagogy and training contents development;
• Need to update business plan of NWSSTC;	• Conducted situation analysis including curriculum, facilities, trainers, contents, feedback, TNA; • Develop and discuss business plan, focusing on development and implementation of the above training modules;

14

CONVERGENCE OF MODEL INTO GUIDELINE

Key Issues	Countermeasures and Action Plans in WASMIP-II
• Need to consolidate various models (i.e., WASMIP, STWSSSP, etc.) to formulate the guideline;	• Create the working group consisting of stakeholders to discuss and propose guideline; Tentatively propose to meet on a quarterly basis;
• Need to develop training guideline;	• Update the current guideline to detail the training;
• Need to develop guideline which is not covered by WASMIP model (e.g. customers relations, audit, BCP)	• Explore models/manuals/lessons learnt other than WASMIP model to be applicable for guideline; • Develop the guideline for the applicable parts;
• Need to develop and implement the roadmap to develop the guideline;	• Develop roadmap to formulate, disseminate the guideline; Tentatively propose to start in early 2018 for one year; • Exploit the occasion of regional conference for dialogue with RMSO/WSSDO/WUSC;
• Need to harmonize with prevailing legislation, proposed bills on water act and policy (such as 15 year development plan);	• Continue to catch up with the contents and schedule of new bills and other updates so as to reflect them into the development of guideline;

15

Open Discussion and Q&A

All participants

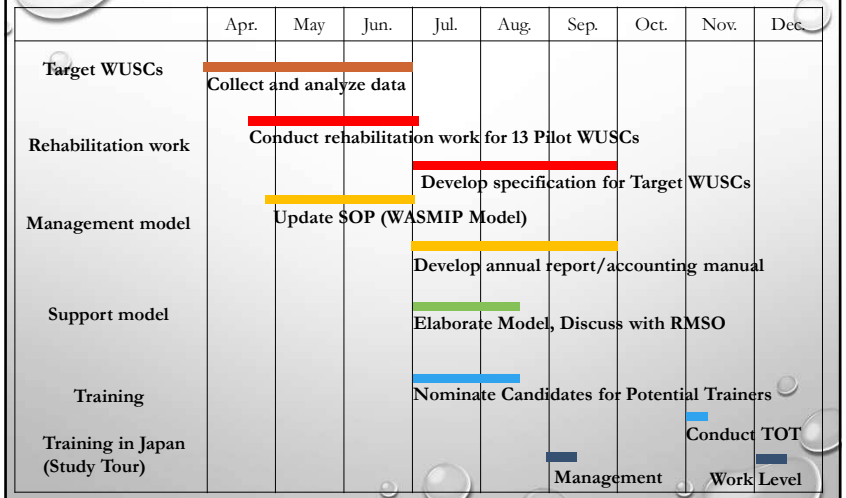
16

Plan of WASMIP-II

Mr. Satoru Oniki

17

EVENT CALENDAR IN 2017



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Closing Remarks

Mr. Sunil Kumar Das

19

Thank You

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Appendix 2.53

4th JPCM Presentation Material by DWSSM in September 2018

WASMIP
For providing safe and quality drinking water to people

The Capacity Development Project for the Improvement of Water Supply Management in Semi-Urban Areas In Nepal

Activities/Achievements of WASMIP-II

4th Joint Project Coordination Meeting

SEPTEMBER 14, 2018

Kabindra Bikram Karki
Project Manager
WASMIP-II

1

1. Project Purpose

Overall Goal: Continuous support to WUSCs in semi-urban towns is provided by DWSS and NWSSTC.

Project Purpose : **Support to the WUSCs in semi-urban towns is provided and strengthened by DWSS and NWSSTC using government and non-government organizations' personnel.**

1.

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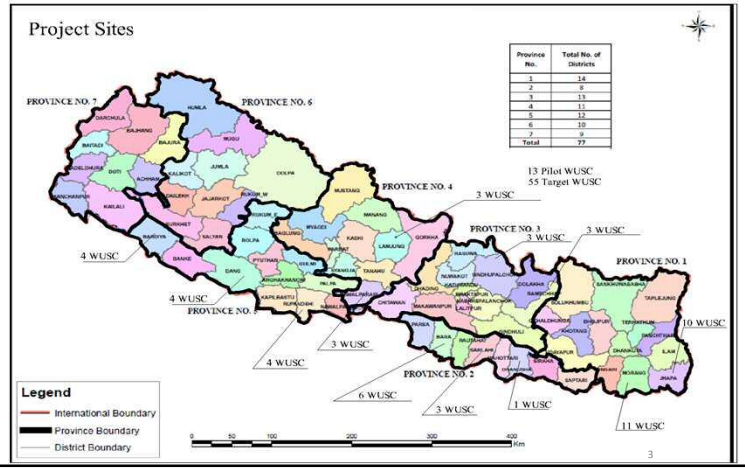
2. Location of Project Areas Total: 68 WUSCs



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3. Project Outputs

Outputs:

(1) Baseline survey and capacity assessment of DWSS, NWSSTC, RMSO, WSSDO and the target WUSCs are conducted, and project implementation plan is finalized.

(2) Supporting capacity of DWSS regarding O&M and management for WUSCs in semi-urban towns is strengthened.

(3) Implementing capacity of NWSSTC regarding the training for WUSCs in semi-urban towns is strengthened.

Project Duration: July 2016 - May 2021 (5 years)

2.

4

4. Activities of WASMIP-II

WASMIP
For providing safe and quality drinking water to people

Output 1. Baseline survey, capacity assessment and PIP finalisation.

1.1 Baseline survey of the target WUSCs. DONE

1.2 Situation Analysis of legislation and development plans of water sector. DONE, CONTINUE.

1.3 Analyze support mechanism for WUSCs . DONE.

5

WASMIP
For providing safe and quality drinking water to people

Output 1….

1.4 Coordinate with SEIU & STWSSSP on support for WUSCs. DONE, CONTINUE.

1.5 Project Design Matrix (PDM) & Plan of Operation (PO). Approved in JCC.

1.3 Analyze support mechanism for WUSCs . DONE.

6

WASMIP
For providing safe and quality drinking water to people

Output 2. Supporting capacity of DWSS for O&M and management of WUSC is strengthened.

2.1 Revision of Management Model. DONE

2.2 Necessary rehabilitation works for target WUSCs. DONE

2.3 Prepare a design manual of specifications on rehabilitation works. Draft prepared , UPDATING.

7

WASMIP
For providing safe and quality drinking water to people

Output 2…..

2.4 Identification and documentation of the section of department responsible for training implementation for WUSCs. (After Restructuring)

2.5 Formulation of an outline of the Training of Trainers (ToT). DONE. **ToT** CONDUCTED.

2.6 Formulation of an outline of the Basic Training, On-Site Training & Refresher Training for the WUSCs. PLANNED.

8

WASMIP
For providing safe and quality drinking water to people

Output 2…..

2.10 Evaluation of trainings conducted by NWSSTC. PLANNED.

2.11 Allocation of budget for NWSSTC to implement the trainings by DWSS. DONE

2.12 Re-update the Management Model for WUSCs in semi-urban towns upon receiving feedbacks. PLANNED.

9

WASMIP
For providing safe and quality drinking water to people

Output 3. Capacity of NWSSTC to conduct trainings is strengthened.

3.1 Evaluation of the training implementation mechanism and equipments of NWSSTC. DONE

3.2 Drafting a training implementation guideline and a plan for NWSSTC. PREPARING

3.3 Selection of candidates for ToT regarding the training on the Management Model for WUSCs. DONE

3.5 Implementation of the ToT regarding Basic Training and On-site Training by NWSSTC. DONE

10

WASMIP
For providing safe and quality drinking water to people

Output 3.…

3.6 Plan for the Basic, On-Site and Refresher training for the WUSCs in semi-urban towns by NWSSTC. PLANNED

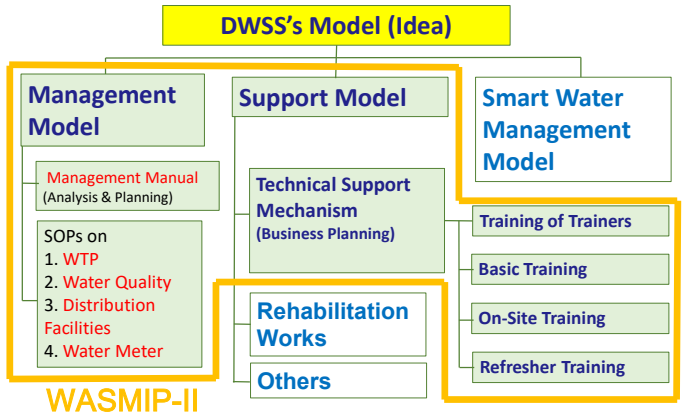
3.7 Implement the Basic, On-Site and Refresher Training by NWSSTC. PLANNED

3.12 Re-update the :
(i) training implementation guideline,
(ii) training plan,
(iii) (iii) training curriculums, and
(iv) training materials upon receiving feedbacks from results of aforementioned trainings by NWSSTC. PLANNED

11

5. Model to Support WUSCs

WASMIP
For providing safe and quality drinking water to people



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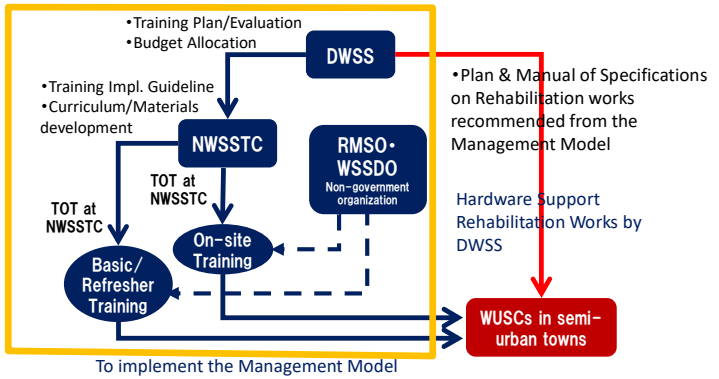
6. Technical Support Mechanism



To implement the Management Model efficiently, direct support will be provided to WUSCs through NWSSTC

8.

13

7. Challenges in DWSS/ NWSSTC

- Human Resources (Trainers/Monitors)
- Restructuring Process
- Follow-up of rehabilitation works
- Implementation of trainings (ToT, Basic, On-Site, Refresher Training).
- Securing Budget for trainings & rehabilitation works in coming years.

9

14

Thank You

15

Appendix 2.54

4th JPCM Presentation Material by WASMIP Team in September 2018

The Capacity Development Project for the Improvement of Water Supply Management in Semi-urban Areas in Nepal
WASMIP-II

Plan of WASMIP-II

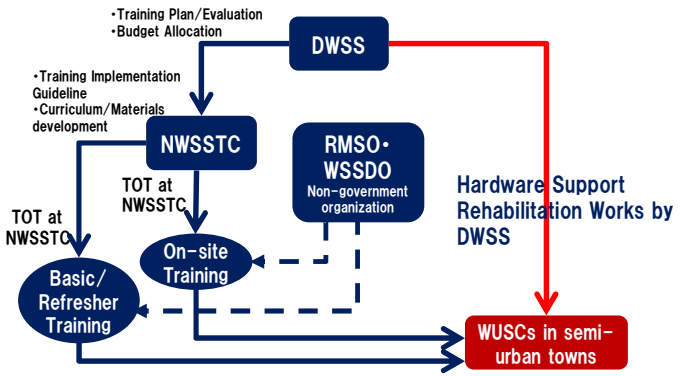
4th Joint Project Coordination Meeting

September 14, 2018

Satoru Oniki, Chief Advisor

1

1. Technical Support Mechanism



To implement the Management Model efficiently, direct support will be provided to WUSCs through NWSSTC

2

2. Training Schedule

2018/19: 1st Training (13 WUSCs)

2019/20: 2nd Training (27 WUSCs)

2020/21: 3rd Training (28 WUSCs)

2021:~ Other WUSCs in semi-urban towns
161 WUSCs

3

3. Trainings

1. Training of Trainers (ToT)
2. Basic Training on Management Model
3. On-site Training on Management and O&M
4. Refresher Training for feedback and observation tour (good practice)

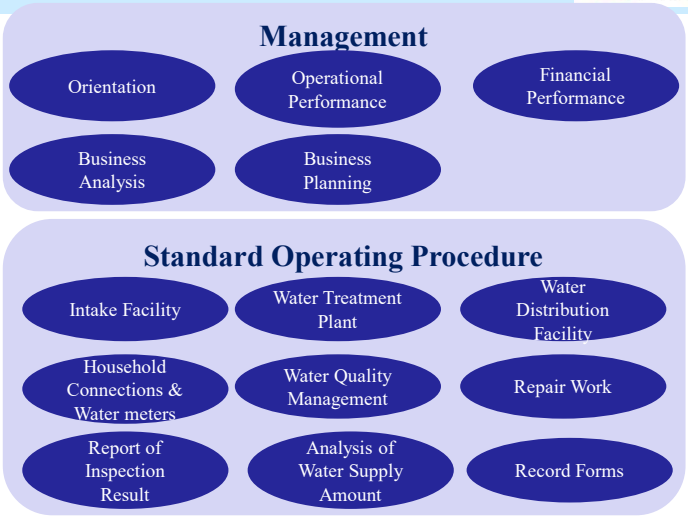
4

3.1 Training contents

Training	Objectives	Methods/Contents
Basic Training	Knowledge, skills and management on water supply business	Method; Lecturer, Practice, GW Management: KPI, Check list SOP: WTP, WQ, Distribution, WM, troubleshooting, recording
On-site Training	Applying knowledge to sites	Method; Confirmation with check lists KPI data, accounting record O&M record, inventory management, spare parts
Refresher Training	Feedback from Back & On-site Training, Good practice & key issues	Observation tour Presentation by trainers & discussion with WUSCs

5

3.2 Management Model Contents



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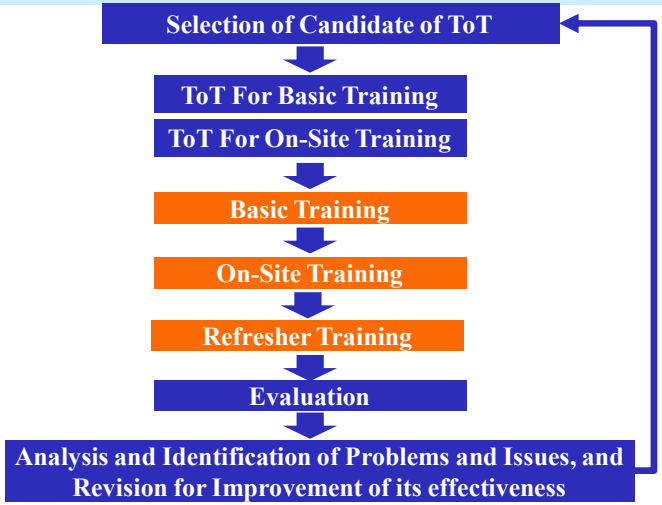
4. Training Process



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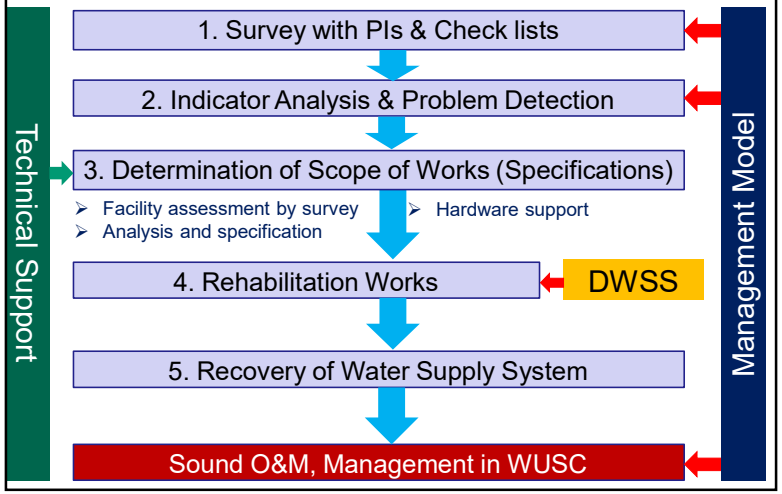
5. Roles of Management Model



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6. Challenges

WASMIP

1. Sharing/Introducing Good Practices of WUSCs

- Facilities
- Water Supply Hours
- Water Tariff
- Annual Report
- Future Plan
- Organization Chart
- Others

9

6. Challenges

WASMIP

2. DWSS Website

Disclosing activity Information

- Rehabilitation works
- Training Information at NWSSTC

10

6. Challenges

WASMIP

3. Design Manual of Specifications on Rehabilitation Works

Detection of essential equipment

- To provide safe water → Chlorination unit
- To measure supplied water → Flowmeter
- To properly maintain facilities → Valves

Equipment ← Spec. Standard DWs, BOQ, Approval DWs, O&M

Record

Analysis ← Management Model
- Management
- SOPs

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6. Challenges

WASMIP

4. Trainers' Motivation

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WASMIP-II Slogan

Preventive maintenance is like a

"Bishwakarma puja"

पुर्व-मर्मत भनेको विश्वकर्मा पुजा जस्तै नै हो ।

ビスウオカルマ・プジャ

Thank you for your Attention

Appendix 2.55

5th JPCM Presentation Material by WASMIP Team in June 2019

The Capacity Development Project for the Improvement of Water Supply Management in Semi-urban Areas in Nepal
WASMIP-II

Plan of WASMIP-II

5th Joint Project Coordination Meeting

June 16, 2019

Satoru Oniki, Chief Advisor

1

1

Sound Water Supply System

Rehabilitation Works on water supply facilities

Detection of essential equipment

i. To measure supplied water → Flow meter

ii. To provide safe water → Chlorination unit, Test kits

iii. Long life time of facilities → Valves / Pressure gage

Equipment ← Spec. Standard DWs, BOQ, Approval DWs, O&M

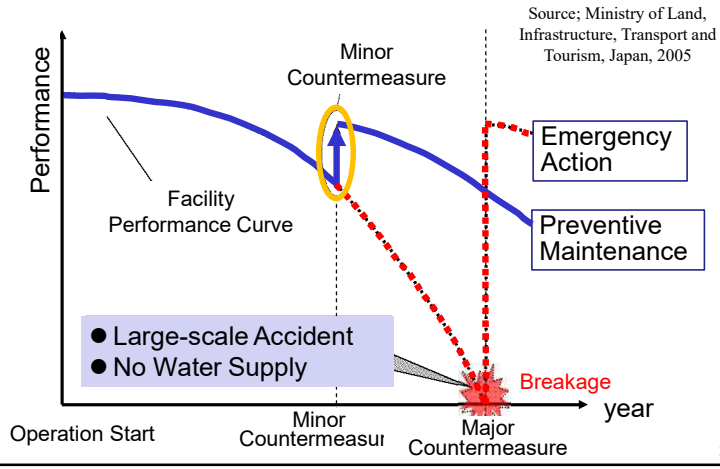
Record

Analysis/ Improvement ← Management Model
- Management
- SOPs

2

2

Preventive Maintenance



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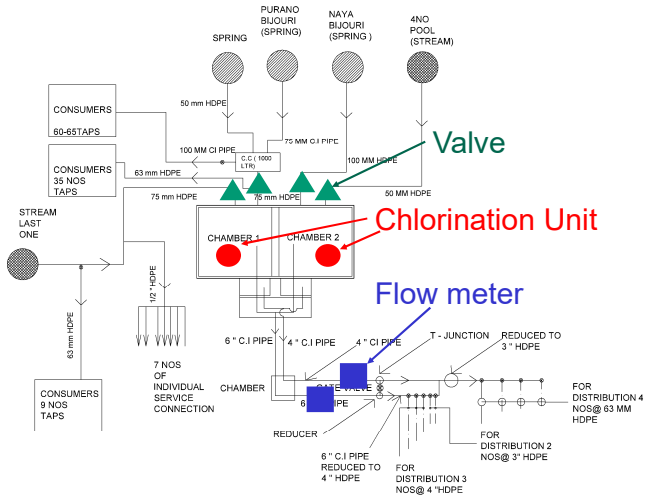
Schematic Flow Diagram



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Capacity Category on WUSC

In case DWSSM provided equipment

Level	Situation	Cause
1	NO Installation of Equipment	NO understanding of equipment importance/ proper positions, NO fittings/ Insufficient budget
2	Installation but NO Record	NO understanding of record importance
3	Keep recording, but NO Analysis	NO understanding of data analysis, how to analyze data
4	Analyzing data and Detect/ Preventive Errors	- Next stage: securing budget, human resources

5

5

Training contents

Training	Objectives	Methods/Contents
Basic Training	Knowledge, skills and management on water supply business	Method; Lecturer, Practice, GW Management: KPI, Check list SOP: WTP, WQ, Distribution, WM, troubleshooting, recording
On-site Training	Applying knowledge to sites	Method; Confirmation with check lists KPI data, accounting record O&M record, inventory management, spare parts
Refresher Training	Feedback from Back & On-site Training, Good practice & key issues	Observation and Interaction Workshop Presentation by trainers & discussion with WUSCs

6

6

Revision of SOPs

1. Visualization
   - Easier Understandable/ Rememberable
   - Uniform lecture quality
   - Whenever, Wherever, Whoever

2. Restructure
   - Introduction
   - Overall water supply facility
   - O&M (regular operation, recover functions etc.)
   - Water quality management, distribution, meter
   - Water supply business management analysis
   - Development of improvement plan

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7

WASMIP Training Overview

Step 1:Standard O&M, Management fome view points of Stable, Efficient, Safety

Step 2: Situation analysis, Improvement Plan on WUSCs

Step 3: Implementation of improvement plan, Monitoring WUSCs

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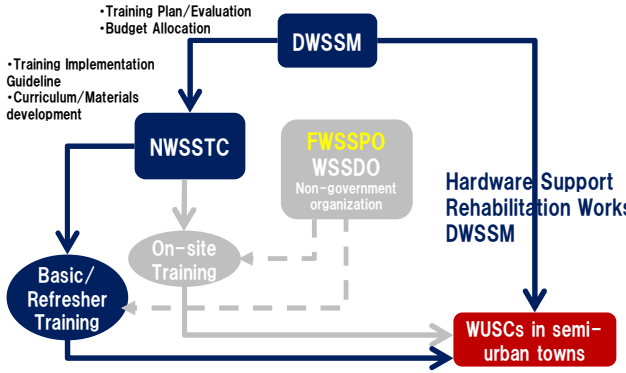
DWSSM Support



To implement the Management Model efficiently, direct support will be provided to WUSCs through NWSSTC

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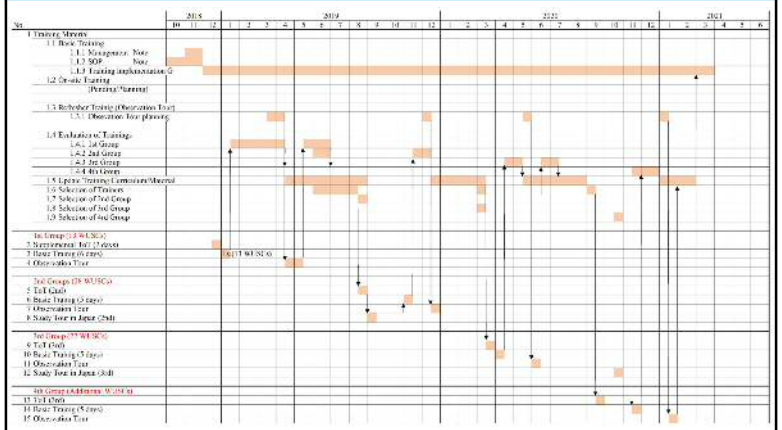

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Challenges

Budget activation

Human resources as trainers

11

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WASMIP-II Slogan

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12

Thank you for your Attention

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2. Training Schedule

2018/19: 1st Training (13 WUSCs)

2019/20: 2nd Training (27 WUSCs)

2020/21: 3rd Training (28 WUSCs)

2021:~ Other WUSCs in semi-urban towns
161 WUSCs

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3. Trainings

1. Training of Trainers (ToT)
2. Basic Training on Management Model
3. On-site Training on Management and O&M
4. Refresher Training for feedback and observation tour (good practice)

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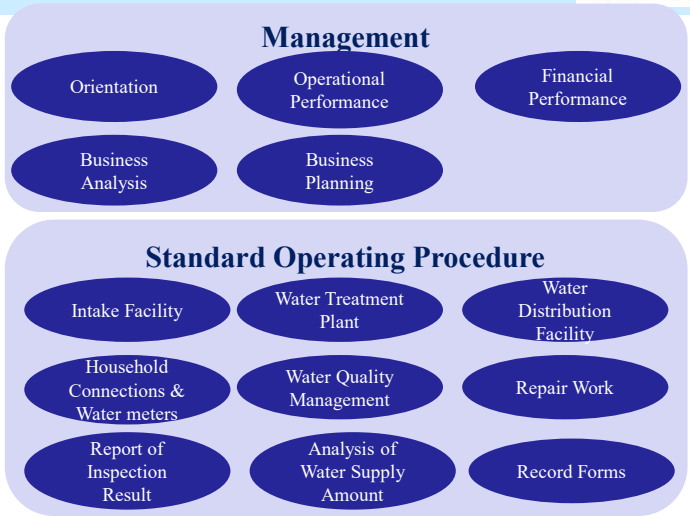
3.2 Management Model Contents



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4. Training Process

WASMIP

- Selection of Candidate of ToT
- ToT For Basic Training
- ToT For On-Site Training
- Basic Training
- On-Site Training
- Refresher Training
- Evaluation
- Analysis and Identification of Problems and Issues, and Revision for Improvement of its effectiveness

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5. Roles of Management Model

WASMIP

Technical Support

1. Survey with PIs & Check lists
2. Indicator Analysis & Problem Detection
3. Determination of Scope of Works (Specifications)
   - Facility assessment by survey
   - Analysis and specification
   - Hardware support
4. Rehabilitation Works — DWSS
5. Recovery of Water Supply System

Sound O&M, Management in WUSC

Management Model

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6. Challenges

WASMIP

1. Sharing/Introducing Good Practices of WUSCs

- Facilities
- Water Supply Hours
- Water Tariff
- Annual Report
- Future Plan
- Organization Chart
- Others

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6. Challenges

WASMIP

2. DWSS Website

Disclosing activity Information

- Rehabilitation works
- Training Information at NWSSTC

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6. Challenges

4. Trainers' Motivation

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7.1 Good Practice in WUSCs/WSSDOs(1)

1. Anandaban WUSC (in Ruapandehi District)

Meter Reader collects the population data including family size, tenants and also in schools and other public connections.

- Correct Information (Served Population)
- High efficiency of manpower

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3.2 Management Model Contents

SOP	Management	For Training
Intake facility	Business plan	Presentation material on Standard Operating Procedure.
WTP		Presentation material on Business Plan.
Water Distribution Facility		
Household connections & Water meter		
Water Quality Management		
Repair Work		
Report of Inspection Result		
Analysis of Water Supply Amount		

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7.1 Good Practice in WUSCs/WSSDOs(2)

2. Urlabari WUSC (Morang district)

•The board members and staffs have visited the other WUSCs of Nepal to grasp their situation and exchange ideas and knowledge.

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7.1 Good Practice in WUSCs/WSSDOs(3)

3. Gulariya WUSC (Bardiya distric)

•Mr. Arjun Kumar Bam (Ex-Chief Bardiya WSSDO) installed the outlet flow meter in Gualriya WUSC to grasp the distribution volume.

•Gulariya WUSC has started to maintain a daily record of distributed volume using the water flow meter.

7.1 Good Practice in WUSCs/WSSDOs(4)

4. Manthali WUSC (Ramechhap district)

•Manthali WUSC installed the two water flow meters at the distribution pipeline. The flow meters were provided by the Ramechhap WSSDO.

7.1 Good Practice in WUSCs/WSSDOs(5)

5. Shankarnagar WUSC (Rupandehi district)

•Shankarnagar WUSC has a well-equipped water quality testing laboratory with a Chemist. This WUSC checks the water quality of neighboring WUSCs as well.

7.1 Good Practice in WUSCs/WSSDOs(6)

6. Dang WSSDO

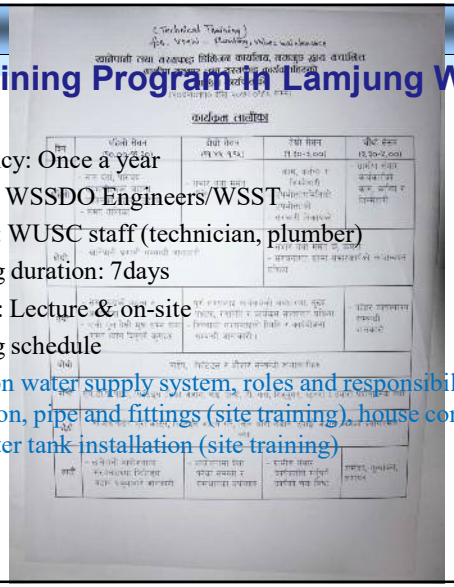
Forum established by WSSDO (Mr. Jagannath Purbey) to exchange opinions to share knowledge on water supply and try to mitigate/solve common problems.

7.1 Good Practice in WUSCs/WSSDOs(7)

7. Lamjung WSSDO:

•Lamjung WSSDO conducts 7 days training once a year for 20 persons from different WUSCs.

7.2 Training Program in Lamjung WSSDO



- Frequency: Once a year
- Trainer: WSSDO Engineers/WSST
- Trainee: WUSC staff (technician, plumber)
- Training duration: 7days
- Method: Lecture & on-site
- Training schedule

  O&M on water supply system, roles and responsibilities, sanitation, pipe and fittings (site training), house connection and water tank installation (site training)

7.3 Issues & Challenges (1)

Many WUSCs are facing problems like in operation and maintenance due to absence of maintenance valves on water distribution pipelines.

This problem is due to long construction period of projects (approx. 10 years) and lack of budgets.

1. DWSS Model's Idea