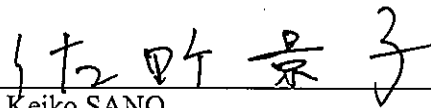



MINUTES OF MEETING  
OF  
THE SECOND JOINT COORDINATION COMMITTEE  
ON  
THE PROJECT FOR  
STRENGTHENING CAPACITY IN NON-REVENUE WATER REDUCTION  
AGREED UPON BETWEEN  
JAPAN INTERNATIONAL COOPERATION AGENCY  
AND  
MINISTRY OF WATER AND IRRIGATION  
THE REPUBLIC OF KENYA

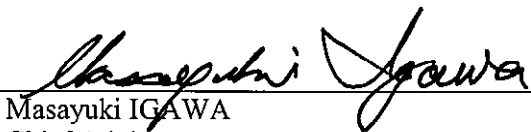
Nairobi, June 28, 2017



Keiko SANO  
Chief Representative  
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Principal Secretary  
State Department for Water Services  
Ministry of Water and Irrigation  
The Republic of Kenya



Masayuki IGAWA  
Chief Advisor  
JICA Expert Team

In accordance with the Record of Discussion (hereinafter referred to as the “R/D”) signed on March 7, 2016, between the Ministry of Water and Irrigation (hereinafter referred to as “MWI”) and Japan International Cooperation Agency (hereinafter referred to as “JICA”) on “The Project for Strengthening Capacity in Non-Revenue Water Reduction” (hereinafter referred to as “the Project”), the Government of Japan dispatched a JICA expert team (hereinafter referred to as “the Team”) to Kenya. The Team submitted the Work Plan 1 to MWI and relevant organizations (hereinafter referred to as “the Kenyan side”), and the contents of Work Plan 1 were discussed between 18<sup>th</sup> and 24<sup>th</sup> May, 2017.

The major points of discussion and agreement are summarized as follows:

### **1. Contents and Schedule of Work Plan 1**

The Kenyan side confirmed and accepted the contents of Work Plan 1 (Refer to Annex-1), which were prepared based on the results of the Baseline Survey and the Draft Work Plan agreed upon during the First Joint Coordination Committee (hereinafter referred to as “JCC”) meeting held on October 19, 2016.

### **2. Selection of Pilot WSPs and the Sequential Order of Implementation of Activities**

The Kenyan side and JICA (hereinafter referred to as “Both sides”) confirmed that Embu and Meru had already been selected as the Leading WSPs based on the R/D of the Project. In addition, both sides selected seven (7) more Pilot WSPs out of the proposed fifteen (15) Potential Pilot WSPs based on the selection criteria, which were agreed upon at the First JCC meeting. Both sides also agreed on further grouping of seven Pilot WSPs into two as mentioned below based on the other criteria approved at the same JCC meeting.

- Group 1 consists of 4 Pilot WSPs: Kisumu, Nakuru, Ruiru-Juja and Nyahururu
- Group 2 consists of 3 Pilot WSPs: Mavoko, Eldoret and Kilifi-Mariakani

In order to implement the project efficiently, the Team started the project activities with the Leading WSPs in Phase 1. Activities for Group 1 Pilot WSPs will be conducted in the next Phase, Phase 2. Activities for Group 2 Pilot WSPs will be implemented in Phase 3, depending on the progress and performance achieved during-Phase 2.

### **3. Additional Members of JCC**

Both sides agreed that Water Service Provider Association (WASPA) representative, all Managing Directors of the Pilot WSPs including the Leading WSPs, the Chairman of the Technical Committee of the Council of Governors (CoG) in charge of Water, Forestry and Mining and a representative of CoG as appointed by the Chief Executive Officer of CoG will be included as new members of JCC in the subsequent meetings.

### **4. Amendment of Plan of Operation (PO)**

Both sides agreed that a part of Sub Activities of PO were amended as per attached hereto as Annex-2,

based on the results of the baseline survey carried out jointly by the Team and MWI. (Refer to Annex-2.)

**5. FOC between County Governments and Pilot WSPs**

The Team recommended and the Kenyan side agreed to direct individual Pilot WSPs and respective County Governments at holding discussions on the model FOC for project implementation and having FOC signed by duly authorized representatives of both parties. (Refer to Annex-3 for the model FOC.)

**6. Result of Monitoring**

Both sides confirmed the contents of the Project Monitoring Sheet Ver. 2 (covering the period from February through May 2017), which was presented during the Second JCC meeting. (Refer to Annex-4.)

**7. Date of the Next JCC**

Both sides agreed that the next JCC meeting would be held in September 2017.

END

Annex-1: Work Plan 1

Annex-2: Amended PO

Annex-3: FOC between County Governments and Pilot WSPs

Annex-4: Project Monitoring Sheet Ver. 2

Annex-5: Attendant list

Minutes of Meeting of the 2nd JCC

ANNEX



WORK PLAN 1

ANNEX

K

FS





PROJECT FOR STRENGTHENING CAPACITY IN  
NON-REVENUE WATER REDUCTION

IN

THE REPUBLIC OF KENYA

**WORK PLAN 1**

**MAY 2017**

**KYOWA ENGINEERING CONSULTANTS CO., LTD.**

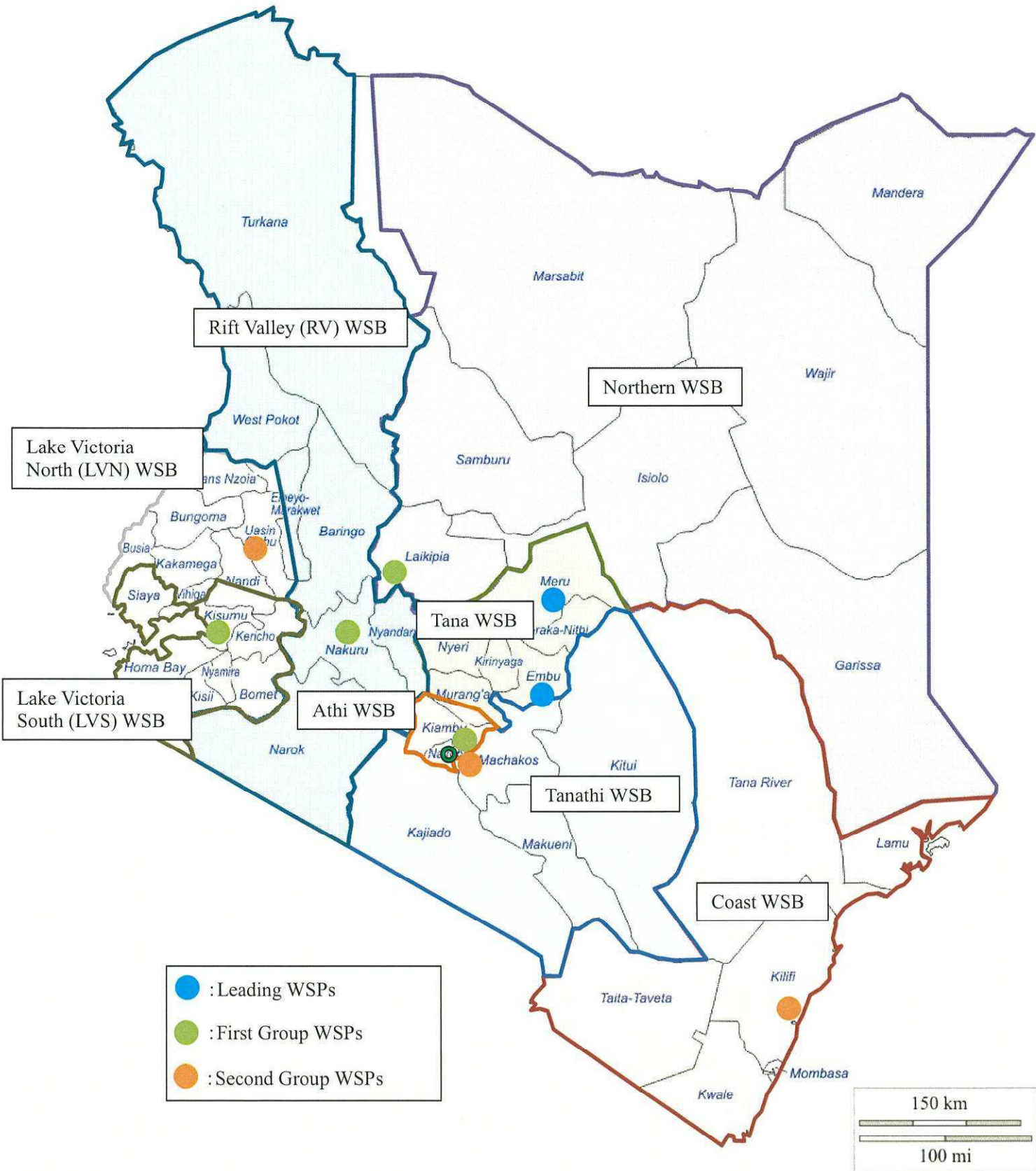
**TSS TOKYO WATER CO., LTD.**

**TOKYO WATERWORKS INTERNATIONAL CO., LTD.**

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# Location of Project Sites



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## ANNEX

ANNEX 1: PDM (Version 0)

ANNEX 2: PO (Version 0)

ANNEX 3: Prerequisite and Selection Criteria and Basis of Assessment for Each Aspect for Selecting Pilot WSPs

## ABBREVIATIONS

ABBREVIATIONS	FULL NAME
AFD	Agence Française de Developpment
CoG	Council of Governors
CP	Counter Part
DMA	District Metered Area
FOCs	Framework of Cooperation
GIS	Geographic Information System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GoJ	Government of Japan
GoK	Government of Kenya
ICT	Information and Communication Technology
JCC	Joint Coordination Committee
JICA	Japan International Cooperation Agency
KEWI	Kenya Water Institute
KEWASNET	Kenya Water and Sanitation CSOs Network
KfW	Kreditanstalt für Wiederaufbau
M/M	Minutes of Meeting
MOUs	Memorandum of Understanding
MWI	Ministry of Water and Irrigation
NGOs	Non-Governmental Organisations
NRW	Non-Revenue Water
O&M	Operations & Maintenance
PDCA	Plan Do Check Act
PDM	Project Design Matrix
PIC	Project Implementation Committee
PO	Plan of Operation
R/D	Record of Discussion
SNV	Stichting Nederlandse Vrijwilligers
ToT	Training of Trainers
USAID	United States Agency for International Development
VEI	Vitens Evides International
WB	World Bank
WASPA	Water Service Providers Association
WASREB	Water Service Regulatory Board
WSB	Water Services Board
WSP	Water Service Provider

## 1. Project Outline

### 1.1 Project Background

Approximately 80% of Kenya's landmass is arid or semi-arid, consequently with population growth and increased demand for water, the land and people of Kenya are experiencing a phenomenon referred to as "Water Stress". The Government of Kenya (GoK) therefore recognises the reduction of Non-Revenue Water (NRW) as a matter of urgency in the quest for efficient water resource usage.

Following the Water Sector Reforms of 2002, Water Service Providers (WSPs) were established as financially independent companies which undertook NRW reduction measures to enhance their profitability. As a result, Kenya's national NRW ratio was reduced to approximately 42%<sup>1</sup> in 2015, but many challenges remain to achieve the national NRW target ratio set at 25%<sup>2</sup> by 2030.

The Government of Japan (GoJ), through the Japan International Cooperation Agency (JICA), implemented the "Project for Management of Non-Revenue Water in Kenya (2010-2014)" (hereinafter referred to as "the Previous Project"). The Previous Project took place alongside three Grant Aid projects; "The Project for Augmentation of Water Supply System in Kapsabet Town (2007-2010)", "The Project for Improvement of the Water Supply System in Embu and the Surrounding Area (2010-2013)" and "The Project for Augmentation of Water Supply System in Narok Town (2013-2016)". The outcomes of these pilot projects undertaken by Embu, Kapsabet, and Narok WSPs are evidence of improved capacity to reduce NRW in these areas as well as the enhancement of physical facilities. The Kenya Water Institute (KEWI) introduced a short-term training course on NRW reduction and an organisational structure for WSPs to prepare NRW reduction plans was established. However, only a few WSPs have implemented NRW reduction activities in accordance with the prepared and approved plans. One possible reason may be the discrepancy between the plans and the actual existing financial or human resources or capacities for implementation. It is therefore important to develop a support system for WSPs to reduce NRW according to realistic plans, while fully utilising the achievements of Previous Project.

To improve this situation, the GoK looked to Japan for assistance. Consequently, the "Project for Strengthening Capacity in Non-Revenue Water Reduction" (hereinafter referred to as "the Project") was formulated to establish a support system for WSPs to continuously reduce NRW by strengthening their capacities and the organisations.

---

<sup>1</sup> WASREB Impact Report No. 8

<sup>2</sup> WASREB Impact Report No. 8

## 1.2 Objective of the Project

The Objective of the Project is to enhance NRW reduction activities among Urban WSPs<sup>3</sup> in Kenya by establishing a NRW reduction support mechanism and technical standards. By achieving Project Outputs, the overall technical capacity of Counter Part (CP) organisations for NRW reduction is expected to improve during the five-year project period. The skills and experience gained from the Project will lead to the establishment of a comprehensive support system for NRW reduction efforts.

Table 1 below presents the project outline, as described in the Project Design Matrix (PDM), which is included in the Record of Discussion (R/D) signed in March 2016 between Japan International Cooperation Agency (JICA) and the Ministry of Water and Irrigation (MWI).

Table 1 Outline of the Project (PDM version 0)

Item	Description
Overall Goal	Under NRW reduction support mechanism, Urban WSPs enhance NRW reduction activities.
Project Purpose	A NRW reduction support mechanism is established for Urban WSPs to implement NRW reduction activities.
Output expected	【Output 1】Promotion and coordination of NRW reduction activities by MWI NRW Unit are strengthened.
	【Output 2】Use of NRW reduction standards by Urban WSPs is promoted by WASREB.
	【Output 3】NRW related training capacity of KEWI is strengthened.
	【Output 4】NRW planning and/or implementation capacity of pilot Urban WSPs is enhanced.
	【Output 5】Experience and knowledge of NRW reduction activities are shared among Urban WSPs.

This Project is a technical cooperation project, which supports human resource development, technology dissemination and the development of institutional frameworks. The role of the JICA experts (hereafter, “the Experts”) is to provide technical support to the Kenyan CP organisations to implement project activities. The specific role of each expert is indicated in section 6. It is important to understand that ownership of the Project belongs to the CP organisations, the Kenyan government and WSPs who will implement the Project.

## 1.3 Project Target Areas

Whilst the target area is the entire territory of Kenya, the Project will specifically focus on Nairobi, where major CP organisations are located and the Counties where the nine Pilot WSPs (including the 2 Leading WSPs) will implement NRW reduction activities.

## 1.4 Phase 1 Work Plan

After the first dispatch of the Experts in October 2016, the First Joint Coordination Committee (JCC)

<sup>3</sup> For categories of Urban and Rural WSPs refer to Impact Report 7.

meeting of the Project was held on 19<sup>th</sup> October 2016. During the meeting, a draft Work Plan which contained project framework, implementation structure and selection criteria for the Pilot WSPs was presented and confirmed. It was agreed that the draft Work Plan would be revised based on the results of the Baseline Survey which was conducted from October 2016 to March 2017. After the consultation with CPs on the approach and schedule of project implementation, the finalised Work Plan will be presented in the Second JCC in May 2017 for the approval of JCC.



## 2. Framework of the Project

The purpose of the Project is to enhance NRW reduction activities among Urban WSPs in Kenya by establishing an NRW reduction support mechanism and technical standards. The framework of the Project is presented below.

### 2.1 Project Design Matrix (PDM)

The Project activities will be implemented in accordance with PDM (version 0) and the Plan of Operation (PO) (version 0). The contents of PDM (version 0) are indicated in Table 2 and Table 3 while the PDM and PO are attached in Annex 1 and 2.

Table 2 Project Purpose, Outputs and Indicators (PDM version 0)

Narrative Summary	Objectively Verifiable Indicators
<b>【Overall Goal】</b> Under NRW reduction support mechanism, Urban WSPs enhance NRW reduction activities.	<ol style="list-style-type: none"> <li>1. X of Urban WSPs participate in knowledge sharing activities established by the Project.</li> <li>2. X of pilot Urban WSPs continue achieving the target(s) set by the annual NRW reduction plan.</li> <li>3. NRW annual report during the project period produced and disseminated.</li> </ol>
<b>【Project Purpose】</b> To establish an NRW reduction support mechanism with whose support Urban WSPs can implement NRW reduction activities.	X of pilot Urban WSPs continue achieving the target set(s) by the annual NRW reduction plan for two years.
<b>【Output 1】</b> Promotion and coordination of NRW reduction activities by MWI NRW Unit are strengthened.	<ol style="list-style-type: none"> <li>1-1 All County representatives participate in NRW related seminar(s).</li> <li>1-2 NRW reduction campaigns are conducted semi-annually.</li> <li>1-3 NRW reduction reports are produced annually.</li> </ol>
<b>【Output 2】</b> Use of NRW reduction standards by Urban WSPs is promoted by WASREB.	<ol style="list-style-type: none"> <li>2-1 NRW reduction standards are revised by the end of year X.</li> <li>2-2 Revised NRW reduction standards are disseminated to all Urban WSPs through workshop training session(s).</li> </ol>
<b>【Output 3】</b> NRW related training capacity of KEWI is strengthened.	<ol style="list-style-type: none"> <li>3-1 KEWI conducts NRW reduction courses with contents incorporating on-site training and revised course materials.</li> <li>3-2 Evaluations by the NRW course participants are higher than before the revision of course materials.</li> <li>3-3 X % of NRW course participants formulate the work plans.</li> </ol>
<b>【Output 4】</b> NRW planning and/or implementation capacity of pilot Urban WSPs is enhanced.	<ol style="list-style-type: none"> <li>4-1 More than X of pilot Urban WSPs continuously make the annual NRW reduction plan based on the review of previous years implementation.</li> <li>4-2 More than X of pilot Urban WSPs continuously implement the annual NRW reduction plan formulated in 4-1.</li> <li>4-3 More than X of pilot Urban WSPs are able to implement skills and activities that pilot Urban WSPs were not able to adopt prior to the Project.</li> <li>4-4 More than X of pilot Urban WSPs are able to implement priority activities indicated in the NRW reduction plan.</li> <li>4-5 More than X of pilot Urban WSPs train all personnel of NRW reduction section.</li> </ol>
<b>【Output 5】</b> Experience and knowledge of NRW reduction activities are shared among Urban WSPs.	<ol style="list-style-type: none"> <li>5-1 Case study and lessons learnt of Output 4 and other NRW activities are compiled and disseminated.</li> <li>5-2 Regular meetings of NRW are organised three times a year.</li> </ol>

Table 3 Project Activities (PDM version 0)

<p><b>【Activities for Output 1】</b></p> <p>1-1 MWI NRW Unit, in cooperation with WASREB, produces NRW annual report which includes NRW reduction data.</p> <p>1-2 MWI NRW Unit plans and conducts NRW reduction sensitization activities for the Counties.</p> <p>1-3 MWI NRW Unit plans and conducts NRW reduction campaigns.</p> <p>1-4 MWI NRW Unit conducts reviews of KEWI NRW courses.</p> <p>1-5 MWI NRW Unit conducts reviews of WASREB's NRW reduction activities.</p>
<p><b>【Activities for Output 2】</b></p> <p>2-1 WASREB conducts a survey of the usage of current NRW reduction standards.</p> <p>2-2 Based on the survey result as well as Output 4 and 5, WASREB revises the NRW reduction standards.</p> <p>2-3 WASREB promotes revised NRW standards through workshop session(s).</p> <p>2-4 WASREB incorporates the review results of NRW reduction activities by MWI NRW Unit in their activities.</p> <p>2-5 WASREB monitors and evaluates the usage of revised NRW standards.</p>
<p><b>【Activities for Output 3】</b></p> <p>3-1 KEWI studies the current status of NRW reduction courses and its challenges.</p> <p>3-2 KEWI reviews NRW reduction training strategies and course contents.</p> <p>3-3 KEWI, in collaboration with Leading WSPs (Embu and Meru, etc.), conducts on-site NRW training.</p> <p>3-4 KEWI reflects on-site NRW training into NRW course contents and materials.</p> <p>3-5 KEWI incorporates results of the review by MWI NRW Unit into NRW course contents.</p> <p>3-6 KEWI conducts trace studies of NRW reduction course participants.</p>
<p><b>【Activities for Output 4】</b></p> <p>4-1 The Project team conducts a survey of Urban WSPs and selects Pilot Urban WSPs.</p> <p>4-2 Each Pilot WSP conducts analyses of current NRW reduction activities and identifies its challenges.</p> <p>4-3 Each Pilot WSP identifies measures to solve challenges and formulates the NRW reduction plan.</p> <p>4-4 Each Pilot WSP formulates the annual NRW reduction plan including financial schedule based on the NRW reduction plan.</p> <p>4-5 Each Pilot WSP implements the annual NRW reduction plan.</p> <p>4-6 Each Pilot WSP evaluates and analyses implementation results and revises the plans.</p> <p>4-7 Each Pilot WSP produces the NRW reduction activity report annually.</p> <p>4-8 Each Pilot WSP holds regular NRW reduction meetings attended by relevant departments of WSP.</p>
<p><b>【Activities for Output 5】</b></p> <p>5-1 MWI NRW Unit organises NRW related regular meetings in cooperation with other relevant organisations.</p> <p>5-2 WASREB compiles case studies/lessons learnt about NRW reduction activities.</p>

## 2.2 Project Outputs

The Project aims at the following five outputs in order to achieve the Project Purpose.

### Output 1

The MWI Non-Revenue Water Unit (hereafter, “the NRW Unit”) will support effective implementation of NRW reduction activities of the Pilot WSPs. The Unit will conduct sensitization activities to enhance understanding about the Project and NRW reduction, as well as coordinating activities with the respective County Governments. The Unit will also compile annual reports and review activities of WASREB and KEWI to develop a system that facilitates NRW reduction activities at the national level.



## **Output 2**

WASREB will incorporate experience and lessons from the activities of Output 4 and other organisations, revise the NRW Reduction Standards<sup>4</sup> (hereafter, “the NRW Standards”), disseminate, and promote the revised Standards to Urban WSPs.

## **Output 3**

KEWI will review its NRW reduction training courses to improve the teaching content. The institute will link their training courses with the activities of the Leading WSPs in Meru and Embu so that the training courses incorporate necessary skills and knowledge of daily operations. It will utilize the above activities to improve the NRW training course contents, materials and teaching methods, and equip lecturers with the skills and knowledge necessary for NRW reduction activities of WSPs. The Project’s support to KEWI will end in Phase 2 and KEWI is expected to then assist the NRW reduction efforts of Pilot WSPs in Phase 3 with achievements made in Output 1, and 2.

## **Output 4**

The Leading WSPs will strengthen their skills on NRW reduction and assist other Pilot WSPs to perform NRW reduction activities, which will be commensurate with their capacity to formulate and implement the plan. Through such activities, the Pilot WSPs will gain expertise in planning, implementation, review and mode of evaluation, after which they will modify their NRW reduction plans. This process is called the PDCA cycle<sup>5</sup>. Through grant aid and technical cooperation projects with both Meru and Embu WSPs, JICA recognises the two WSPs have a high level of commitment to reduce NRW. In addition, they are familiar with JICA’s support. Therefore, the activities in Phase 1 will focus on Embu and Meru WSPs to enhance their capacity for NRW reduction so that they can become the model WSPs for other Pilot WSPs in later Phases.

## **Output 5**

The NRW Unit will disseminate and, share lessons and experience from the activities of Output 4 with Urban WSPs through seminars and regular meetings organised by Water Service Providers Association (WASPA).

Figure 1 of the next page shows a conceptual diagram of Project Outputs, Project Purpose, and the CP/implementing organisations described in the PDM (version 0). The overall flow of the Project and the activities for achieving Outputs are shown in Figure 2.

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<sup>4</sup> NRW Standards include guidelines, manuals and handbooks.

<sup>5</sup> PDCA: Plan, Do, Check, Action

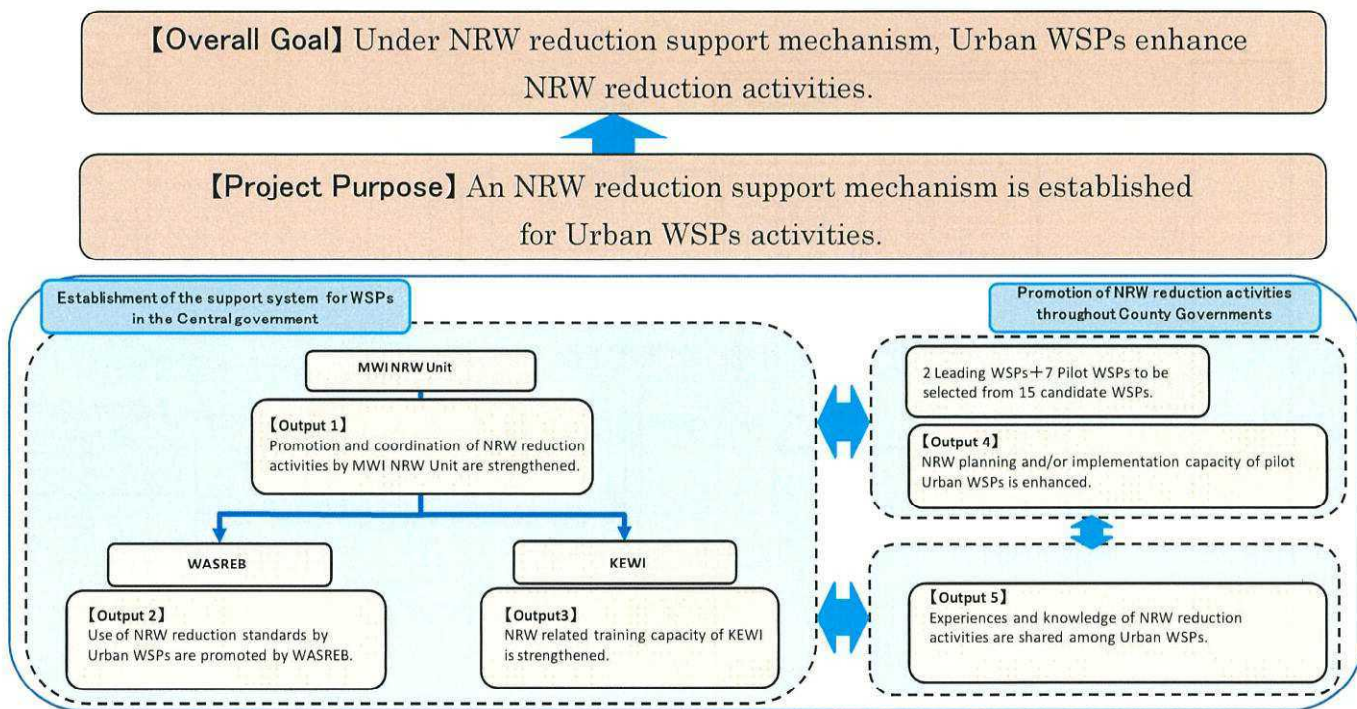


Figure 1 Project Purpose, Output and Implementing Organisations

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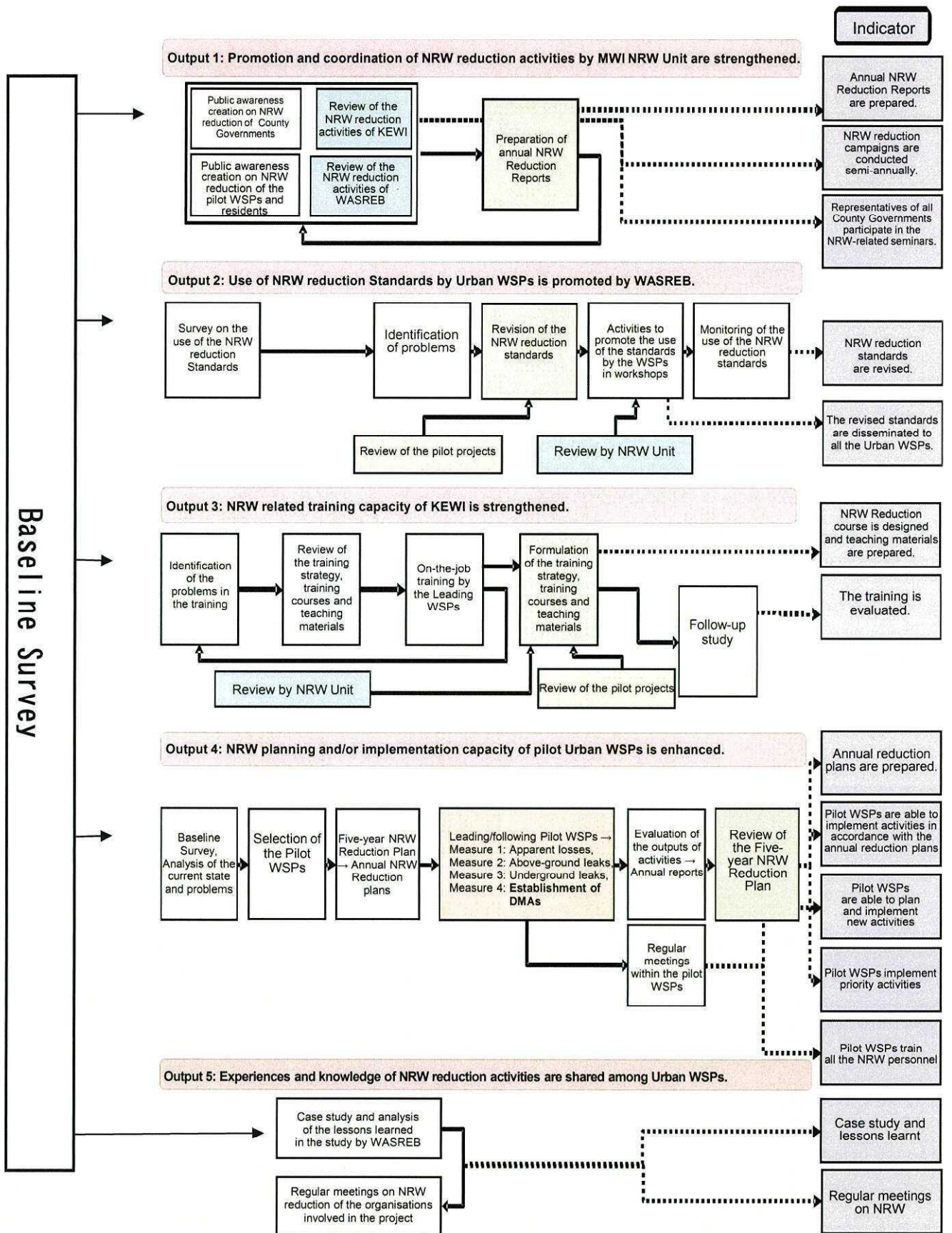


Figure 2 Flow of Achievements of Outputs

### 3. Project Implementation Structure

#### 3.1 Phases of Project

The Project will be implemented in the following three phases. Key activities of each Phase are shown in Table 4.

Phase 1: October 2016 – September 2017 (12 months)

Phase 2: October 2017 – September 2019 (24 months)

Phase 3: October 2019 – September 2021 (24 months)

Table 4 Project Phases and Activities

Phase	Duration	Activities
Phase 1	October 2016 to September 2017 (one year)	Conduct the Baseline Survey to review the current situation and identify issues of CP organisations. Select Pilot WSPs. Assist Leading WSPs to strengthen their NRW reduction capacity. Establish the organisational structure of CP for Phase 2. Carry out regular monitoring, meetings, workshops and reporting of the activities.
Phase 2	October 2017 to September 2019 (two years)	Continue supporting capacity development of NRW reduction of the Leading WSPs, and assist activities of First Group Pilot WSPs. Complete strengthening the capacity of NRW Unit and KEWI. Carry out monitoring, meetings, workshops and reporting of the activities.
Phase 3	October 2019 to September 2021 (two years)	Implement Second Group Pilot WSPs by CPs on NRW reduction technology acquired in earlier Phases. Carry out monitoring, meetings, workshops and reporting of the activities.

#### 3.2 Project CP/Implementing Organisations

The roles and responsibilities of each organisation in this Project are described below:

##### **MWI, NRW Unit**

The NRW Unit leads and coordinates NRW reduction activities in cooperation with County Governments, WASREB, KEWI and WASPA. It will also indirectly support WSPs' efforts of NRW reduction activities by organising NRW sensitization activities.

##### **WASREB**

WASREB conducts a survey for current usage of NRW Standards by WSPs. Using the results of the survey and activities of Pilot WSPs, WASREB will review and revise NRW Standards, then distribute and promote them.

##### **KEWI**

KEWI is the only institution providing NRW related training in the country. Its role is to offer training for WSPs to transfer knowledge, skills and expertise of NRW reduction activities. To improve the effectiveness of the training, KEWI will conduct practical training in collaboration with two Leading WSPs.

### **Pilot WSPs (including Leading WSPs)**

Through the Project activities, the Pilot WSPs will gain knowledge and skills in formulation of NRW reduction plans and their subsequent implementation, review and evaluation. This will enable the Pilot WSPs to effectively reduce the NRW ratio.

In the Previous Project, Embu and Meru WSPs successfully implemented the NRW reduction activities. In this Project, Embu and Meru will be the Leading WSPs. As Leading WSPs, they will further strengthen their technical and operating capacities and assist other Pilot WSPs in implementing their NRW reduction activities. Seven Pilot WSPs have been selected out of fifteen candidates and they will undertake NRW reduction activities with support provided by the Experts. The Pilot WSPs (2 Leading and 7 Pilot WSPs) are divided into three groups: the Leading WSPs, the First Group WSPs; and the Second Group WSPs based on the implementation phases. Table 5 indicates the group and phases of Pilot WSPs. All nine WSPs are called Pilot WSPs. However, when the terms Leading WSPs and Pilot WSPs are used, the latter classification refers to the First and the Second Group WSPs.

Table 5 Grouping of Pilot WSPs by Phases

Group of WSPs	Phase to implement activities	No. of WSPs
Leading WSPs	Phase 1	2
First Group WSPs	Phase 2	4
Second Group WSPs	Phase 3	3

### **WASPA (Cooperating Organisation)**

WASPA in collaboration with the NRW Unit will provide a platform for sharing experience and lessons learnt from the activities of Output 4 to other WSPs.

### **Council of Governors (Cooperating Organisation)**

For promotion to County Governments, the NRW Unit will work closely with Council of Governors (CoG) to coordinate public awareness activities. Some counties may decide to get involved in the implementation and monitoring of NRW reduction activities of the Pilot WSPs in Output 4.

### **3.3 Implementation Structure**

The implementation structure of the Project is shown in Figure 3. While final pertinent decisions shall be concluded at the JCC, the Project Implementation Committee (PIC) coordinates the implementation of the Project on a daily basis. These two are the key implementation bodies of the Project.



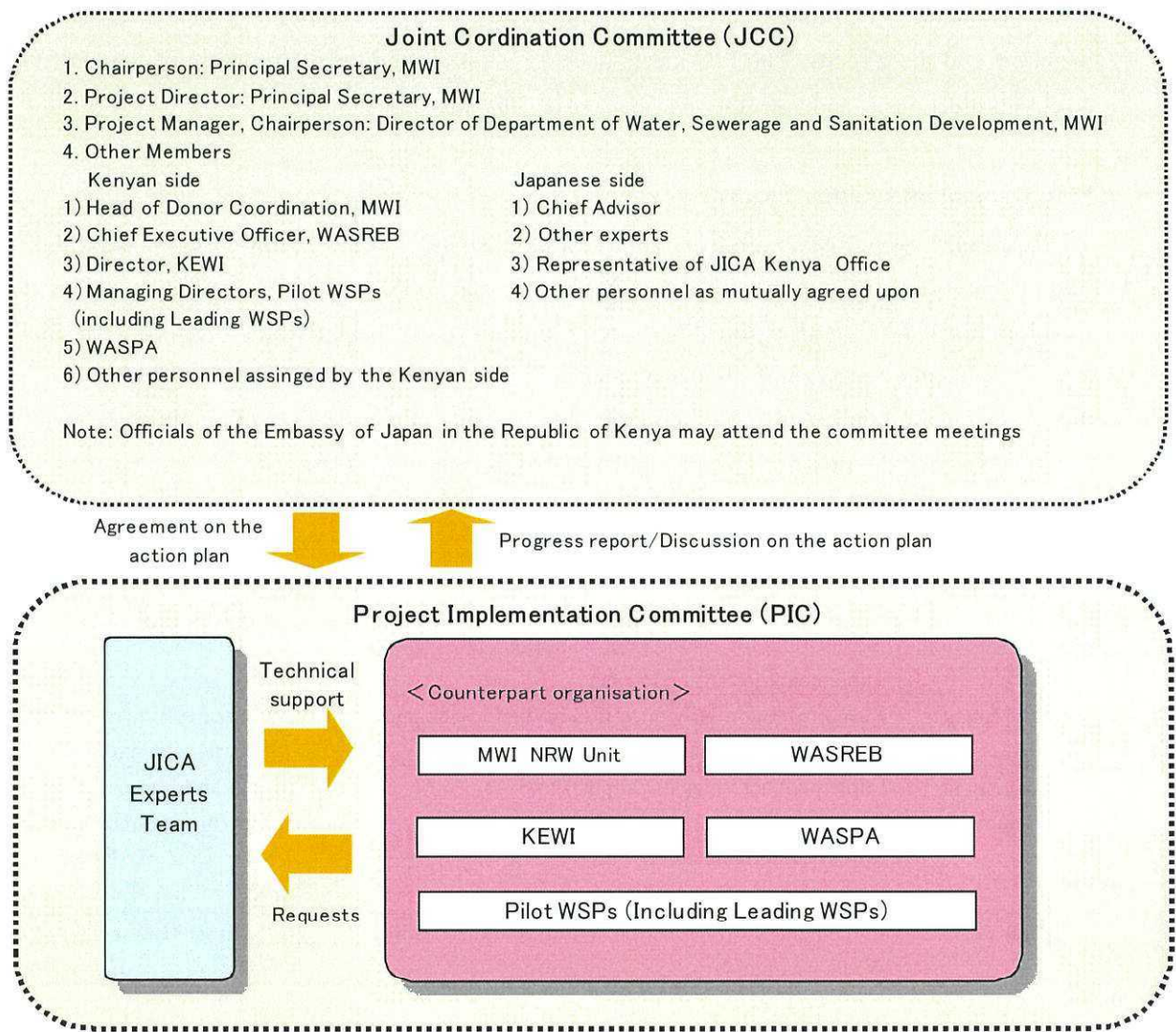


Figure 3 Project Implementation Structure

**Joint Coordination Committee (JCC)**

JCC is the decision-making body of the Project to ensure smooth implementation. JCC members include the CP/Implementation organisations, the Experts, and representatives from JICA's Kenya office. The JCC meets three times in Phase 1; first at the commencement of the Project (October 2016), the second time after completion of the Baseline Survey and selection of the Pilot WSPs (May 2017), and the third time on completion of Phase 1 (September 2017). In Phases 2 and 3, JCC will meet twice yearly. The roles of JCC are;

1. To confirm the Work Plan which will be prepared at the beginning of each phase,
2. To approve the results of the project monitoring,
3. To confirm the revision of PDM and PO, and
4. To discuss budgetary allocations and other important elements of the Project implementation.

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### Project Implementation Committee (PIC)

PIC is mandated to coordinate daily project activities and it consists of CP/Implementing organisation members and the Experts. The PIC meets once a month to monitor the progress of implementation, discuss project plans, and any other pertinent issues that may arise.

### Management and Action Teams

The Kenyan project team is headed by the Water Secretary (MWI) as the Project Director who is responsible for overall implementation of the Project. The Director of Water, Sewerage and Sanitation Development (MWI), is the Project Manager whose role is to manage the Project on a regular basis and is responsible for administrative and technical matters of the Project. The Team Group consists of the Management Team, the Action Team and the Experts. The members of the Project Team were confirmed during the first JCC meeting at the commencement of Project.

Table 6 Members of Project Group

Project Group	Role and Duty	Member
Project Director	Responsible for overall administration and implementation of the Project	Water Secretary, MWI
Project Manager	Responsible for daily operation of the Project, and administrative and technical matters	Director of Water, Sewerage and Sanitation Development, MWI
Management Team	Implement activities in Output 1 to 5 Participate in management of project activities Monitor implementation Participate in JCC and PIC	Senior staff members of the following organisations: NRW Unit, WASREB KEWI, Pilot WSPs
Action Team	Implement NRW reduction activities at the Leading WSPs (Output 4)	Staff members in charge of NRW reduction activities of Pilot WSPs

Table 7 indicates the CPs and the Experts in charge of each Output.

Table 7 CPs and Experts Responsible for Each Output

	CP organisations	Main JICA Expert to be involved
Output 1	NRW Unit	Chief Advisor/NRW Management 1, NRW Reduction Specialist 2, Information/Public Relations Management
Output 2	WASREB	Chief Advisor/NRW Management 1, NRW Reduction Specialist 2
Output 3	KEWI	NRW Reduction Specialist 2, Training Management/Training Strategy
Output 4	Pilot WSPs	Chief Advisor/NRW Management 1, NRW Reduction Specialist 2, Water Distribution Network (Mapping & Network Analysis), Flow/Pressure and Leakage Monitoring, Customer management/Billing collection
Output 5	NRW Unit WASREB, WASPA	Chief Advisor/NRW Management 1 Information/Public Relations Management

Note: List of Experts is shown in Plan of Dispatch of JICA Experts in section 6.

### 3.4 Joint Monitoring

The Experts and CPs will jointly monitor the progress of the Project and prepare a monitoring sheet every six months. The monitoring sheet will be submitted to JCC and PIC meetings and any issues arising will be discussed. In Phase 1, the first monitoring report was prepared in February 2017, while the second and third reports will be prepared after every three months.

### 3.5 Dissemination and Sharing of Project Outputs

#### 3.5.1 Workshops

Workshops or seminars will be organised to disseminate the outcome of the activities of the Project to the organisations involved in water services in Kenya. Table 8 indicates the proposed plan and contents of workshops in each phase.

Table 8 Workshop Schedule and Contents

Phase	Planned date	Presentations and contents
Phase 1	Sep. 2017	- Activities carried out in Project - Existing and anticipated challenges of Pilot WSPs in next five years and proposed solutions. - Capacity development activities of Leading WSPs
Phase 2	Sep. 2018	- Achievements of Outputs and planned activities in Phase 2 - Challenges faced in activities of Pilot WSPs and solutions. - Revised plan for second half of Phase 2 (including projection of NRW ratio)
	Sep. 2019	- Achievements of Outputs in Phase 2 and case studies etc. - Plan for extension of NRW reduction activities in future
Phase 3	Sep. 2020	- Achievements of Outputs in Phase 3 - Challenges faced in activities of Pilot WSPs and solutions - Revised plan for second half of Phase 3 (including projection of NRW ratio)
	Sep. 2021	- Achievements of Outputs in Phase 3 and case studies etc. - Plan for the extension of NRW reduction activities in future

#### 3.5.2 Outputs of the Project

Table 9-11 indicates the planned reports and documents of the Project in each phase.

Table 9 Planned reports and documents in Phase 1

Title	Time of submission
Work Plan 1	Within 7 months after commencement of Phase 1
Baseline Survey Report (summary)	Within 2 months after the Second JCC
Monitoring Sheet Ver. 1	Within 4 months after commencement of Phase 1
Monitoring Sheet Ver. 2	Within 4 months after the submission of Monitoring Sheet Ver. 1
Monitoring Sheet Ver. 3	Within 3 months after the submission of Monitoring Sheet Ver. 2
Progress Report 1	After the completion of Phase 1



Table 10 Planned reports and documents in Phase 2

Title	Time of submission
Work Plan 2	Within 4 months after commencement of Phase 2
NRW Annual Report	After the issuance of Impact Report by WASREB
Monitoring Sheet Ver. 4	Within 6 months after the submission of Monitoring Sheet Ver. 3
Monitoring Sheet Ver. 5	Within 6 months after the submission of Monitoring Sheet Ver. 4
Monitoring Sheet Ver. 6	Within 6 months after the submission of Monitoring Sheet Ver. 5
Monitoring Sheet Ver. 7	Within 6 months after the submission of Monitoring Sheet Ver. 6
Progress Report 2	After the completion of Phase 2

Table 11 Planned reports and documents in Phase 3

Title	Time of submission
Work Plan 3	Within 4 months after commencement of Phase 3
NRW Annual Report	After the issuance of Impact Report by WASREB
Monitoring Sheet Ver. 8	Within 6 months after the submission of Monitoring Sheet Ver. 7
Monitoring Sheet Ver. 9	Within 6 months after the submission of Monitoring Sheet Ver. 8
Monitoring Sheet Ver. 10	Within 6 months after the submission of Monitoring Sheet Ver. 9
Monitoring Sheet Ver. 11	Within 6 months after the submission of Monitoring Sheet Ver. 10
Revised NRW Standards	To be decided
Progress Report 3	After the completion of Phase 3

### 3.6 Project Publicity

#### Transmission of Information to the Mass Media

At key turning points of the Project, press releases will be published and press conferences will be held in order to inform the public in Kenya of the plan and the outcomes of the Project.

#### Transmission of Information to other Organisations, Donors and NGOs

Information about the Project will be transmitted to relevant organisations, other donors and Non-Governmental Organisations (NGOs) via appropriate information channels in order to attract interest in the Project and to facilitate cooperation and participation in its implementation. Manuals and other technical documents produced by the Project will be shared with relevant organisations.

### 3.7 Key Issues regarding Implementation

#### 3.7.1 Signing of MOUs<sup>6</sup> with County Governments

The administrative reforms of 2014 changed the ownership of WSPs from the Water Services Boards (WSBs) to County Governments. The transition period of WSPs' assets from WSBs to the respective counties is three years. During this period, the situation of WSPs may change, therefore careful monitoring is necessary. The involvement of counties in the Project is key to its successful

<sup>6</sup> MOUs has been changed to Framework of Cooperation (FOCs) after the Second JCC.

implementation. In Output 1, the NRW Unit will conduct awareness activities targeting the County management and technical officers, in collaboration and coordination with the CoG. Involvement of counties in monitoring of activities by the Pilot WSPs in Output 4 will also be encouraged. After the confirmation of the selection of Pilot WSPs, the organisations involved in Output 4, *i.e.* MWI, County Governments and the Pilot WSPs will sign Memorandum of Understandings (MOUs) to ensure cooperation and financial support for WSPs. The Experts will assist the MWI to facilitate the signing of these MOUs.

As the Water Act, 2016 came into effect in April 2017 and NRW policy is expected to be finalised in 2017, it is important to carefully monitor the policy development of the water services sector in Kenya. When the need for adjustment of the implementation arises, the Project Management should respond appropriately.

### 3.7.2 Measures for NRW reduction

Table 12 indicates the key areas of NRW reduction activities to be employed in Output 4. These activities will be applied to each Pilot WSP based on their levels of NRW reduction and capacity. Based on the results of the Baseline Survey, each Pilot WSP will select measures and prepare their capacity development plans.

Table 12 Basic Measures for NRW Reduction

NRW Reduction Measures				Countermeasures
Measures & Targets		Action		
Measures against Real loss	Leakage	Pipeline (distribution and service pipes and fittings)	Mapping	Drawing of pipeline and pipe network
			Zoning	Plan on DMA, leak monitoring block and construction
			Minimum Night Flow	Searching for leaks and identifying their locations.
			Leakage detecting	Use of detectors
			Repairing	Maximum repair works
			Pipe net developing	Pipeline maintenance plan in zone, replacement of pipes and fittings
Measures against Apparent loss	Water theft	Searching for water theft		Proper investigation and identification of illegal connection
		Notice, Persuade		Contact and negotiation with illegal water users
		Correction of water theft		Disconnection of illegal connection or meter installation
		Fine and penalty		Charging fines and imposing punishment
	Metering inaccuracy	Customer meter	Searching	Identification of defective meters
			Installation/replacement	Replacement of defective meters and relocation of their position
	Reading error	Meter replacement		Changing to easily readable meters, improvement of the condition of positions
Data processing error		Reviewing data processing, rectify programming errors		
Basic work performance	Data collection	Collection and reading		Extraction of errors of data collected and recorded
		Data analysis		Pipe flow analysis, improving countermeasures, re-setting of NRW rate
		Consolidated management system		GIS, customer information, SCADA, financial data management

NRW Reduction Measures		Countermeasures
Measures & Targets	Action	
Planning	Pipeline improvement plan	Identification of pipelines for replacement and planning of pipe replacement
	Water distribution management plan	SCADA, water pressure and volume
	Organisation improvement plan	Staffing, responsibilities, function, action, equipment
	Setting of suitable NRW rate	Estimation of B/C pre/post countermeasures
	Legislative reform	Increased penalties for intentional water theft and introduction of award system for staff
Training	Creation of user awareness	Public campaign, hearings, education

Figure 4 indicates the stages of NRW ratio. Examples of the suggested countermeasures at each stage are shown in Table 13. Kenya has set a national target of reducing average NRW ratio from approx. 42% to 25% by 2030<sup>7</sup> (Vision 2030). Applying appropriate reduction activities at each stage of NRW ratio will be effective for achieving its national target.

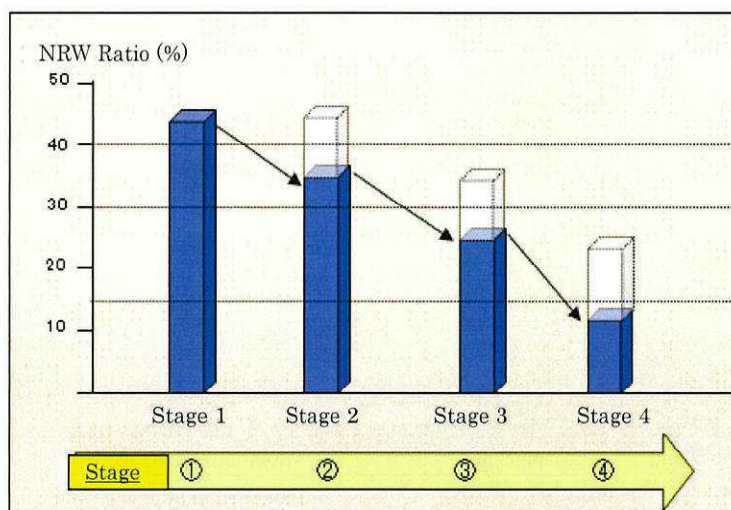


Figure 4 Stages of NRW Reduction Ratio

<sup>7</sup> WASREB Impact Report No. 8

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Table 13 Applicable Countermeasures for Each Stage of NRW Ratio

NRW rate		Countermeasures
Stage 1	More than 40%	Repair of surface leakages, identification of illegal connections, adequate installation of service meters, replacement of defective meters, saving and maintenance of pipeline data, measuring water flow volume and pressure of distribution pipes and analysing for improving water services, saving and maintenance of customer data, review of water tariff and O&M cost.
Stage 2	30-40%	Repair of ground leakages, replacement of leaking pipelines, repair of valves with leakages and pipelines subject to regular leakage occurrence by ground subsidence, planning of introducing DMA management.
Stage 3	15-30%	Full-scale implementation of ground leakage detection in DMAs and repair, replacement of deteriorated pipelines, maintaining meter accuracy, dismantling illegal connections.
Stage 4	Less than 15%	Adequate implementation of leakage protection work in all areas.

This Project focuses on capacity building and technology transfer and not infrastructure development. However, the Project will support WSPs to formulate infrastructure development and financial plans for NRW reduction as a part of the implementation of NRW reduction plans. Each pilot WSP will prepare a five-year NRW reduction plan. Based on the five-year plan, WSPs will draw up an annual plan and secure the budget for the implementation of project activities.

### 3.7.3 Roles of the Leading WSPs

Among the Pilot WSPs, two Leading WSPs, Meru and Embu WSPs, are highly motivated to reduce NRW and have sufficient knowledge and practical experience for NRW reduction. However, their NRW planning capacity can be improved so that they can formulate plans that are feasible and realistic to reduce NRW ratio further. Since JICA has more information and data about NRW reduction of the two WSPs compared with other Pilot WSPs, the activities will be implemented initially with focus on the Leading WSPs. Experience and success cases from the implementation of activities at the Leading WSPs will be used to aid the activities of other WSPs in Phase 2 and 3.

### 3.7.4 Strategy for Strengthening KEWI

KEWI will strengthen the training programmes in which the trainees practice leak detection and other NRW reduction skills by using the contents of existing test-piping courses. In addition, Information, Communication Technology (ICT), customer management, and business operations that are related to NRW reduction will be incorporated into the revised training courses. Also, the possibility of developing a comprehensive NRW reduction training course that can cater not only to WSPs in Kenya but also other countries of East Africa will be explored.

In addition to existing training contents, the inclusion of the following subjects is proposed:

1. Improving the teaching materials using multimedia (audiovisual)

Video materials depicting the training of NRW reduction skills and test-piping courses can be created.

Access to the materials should be available via Information, Communication Technology (ICT) in order to help WSP staff in remote areas who have difficulties participating in the training courses.

## 2. Synergistic effect with improvement of PC operating skills

Improving Personal Computer (PC) skills can facilitate the use of various data such as the preparation of water balance tables, water distribution system management sheet, pipe network asset registers (including pipeline registers, valve registers and facility registers), Operation & Maintenance (O&M) reports, and use of Geographic Information System (GIS) mapping. Training courses for trainees with different levels of skills should be designed to improve data management and to realise the impact of the NRW reduction plans.

### 3.7.5 Flexibility for the Implementation Schedule

Although the Project will be implemented based on PDM and PO, changes of the situation surrounding WSPs, the capacity of CPs, and external factors may affect the Project implementation, which may require adjustment of the plan. If such a situation occurs, the progress of implementation and achievement of Outputs must first be assessed. If an adjustment to the plan is considered to improve the efficiency or effectiveness of the Project, the plan will be modified after careful consultation with CPs as well as with JICA.

In the implementation of Output 4, activities of the Pilot WSPs in Phase 3 may be affected by the progress of the activities of WSPs in Phase 2 and the following cases may arise.

1. If the First Group Pilot WSPs fail to achieve the NRW targets described in the annual action plans, implementation of activities for the Second Group Pilot WSPs may be delayed or the activities may be revised.
2. Priority should be given to the follow-up activities to the First Group Pilot WSPs over the implementation of Second Group Pilot WSPs.

#### **4. Project Activities Conducted from Oct. 2016 to May 2017**

Phase 1 is the overall planning period of the Project and the initial four months are considered as preparation for the Project. During this period, the Baseline Survey was conducted. Based on the survey results, selection of Pilot WSPs, finalisation of detailed Work Plan (activities and timelines), formulation of a visual image for NRW reduction support system and revision of PO have been implemented.

##### **4.1 Commencement**

After the first dispatch of the Experts in October 2016, the First JCC meeting of the Project was held on 19<sup>th</sup> October 2016. During the meeting, a draft Work Plan which contained project framework, implementation structure and selection criteria for the Pilot WSPs was presented and confirmed. It was agreed that the draft Work Plan will be revised based on the results of the Baseline Survey. After the consultation with CPs on the approach and schedule of project implementation, the finalised Work Plan was presented in the Second JCC for the approval by JCC members.

The Minutes of Meeting (MM) signed on 4<sup>th</sup> December 2015, stipulate that the decisions on the following four issues shall be confirmed within three months of the commencement of the Project. Subsequently the duration of the period was extended from three to four months because the Baseline Survey was suspended in December 2016. By the time of the Second JCC in May 2017, the following items had been confirmed:

1. The assigned personnel of the NRW Unit were decided at the first JCC meeting.
2. The selection of Pilot WSPs was communicated to the CoG in March 2017.
3. The provision of equipment for KEWI and Pilot WSPs (Outputs 3 and 4) was agreed upon. The Experts are assessing the effectiveness and relevance of equipment requests made by KEWI, *i.e.* leak noise correlator, leak detection workshop and water meter testing equipment, as well as water meters for the Pilot WSPs.
4. The draft training plans in Japan were agreed upon.

##### **4.2 Implementation of the Baseline Survey**

The project framework was agreed upon during the Detailed Planning Survey of the Project. During the Survey, it was agreed that the Baseline Survey was to be conducted to assess organisations involved with the Project and establish an implementation structure and detailed activities. The Baseline Survey commenced in October 2016. Through the Baseline Survey, the capacities of CP/Implementation organisations were assessed and the current situation of the water service sector in Kenya was studied. Based on the results of Baseline Survey, a revised Work Plan was proposed. Table 14 shows the subjects and survey/analysis methods of the Baseline Survey.

Table 14 Subjects and Survey/Analysis Methods

Subject	Survey/Analysis Method
<p>Issues related to the NRW Unit</p> <ul style="list-style-type: none"> <li>• The state of the services provided by the NRW Unit and its administrative capacity</li> <li>• The state of the activities of the CoG (including the frequency of the meetings, attendance to the meetings and cost-sharing)</li> <li>• Awareness activities for County Governments provided by MWI (including those not in the water supply sector)</li> <li>• Awareness activities for the public by MWI (including the themes, frequency and budget of activities)</li> </ul>	<ul style="list-style-type: none"> <li>• Interviews with persons in charge of NRW reduction and collection of information (Purposes of establishing NRW Unit, personnel assignment plan, duties and job description, budget, outline of the action plan, outline and management of Counter Fund, water supply service strategy, implemented campaigns, etc.)</li> </ul>
<p>Issues related to WASREB</p> <ul style="list-style-type: none"> <li>• Level of the recognition of the NRW Standards</li> <li>• State of the use of the NRW Standards (frequency and cases of the use)</li> <li>• Evaluation of the NRW Standards by WSPs</li> </ul>	<ul style="list-style-type: none"> <li>• Interview with persons in charge of NRW reduction and collection of information (Mission of organisation, roles, personnel assignment plan, duties, outline of the regular field inspection and composition of the inspection team, latest Impact Report, financial statement, NRW reduction standards, etc.)</li> </ul>
<p>Issues related to KEWI</p> <ul style="list-style-type: none"> <li>• Contents of the medium-term strategic plan (2016-2020) and the role of the training courses related to NRW (the long-term training, short-term NRW course and GIS course)</li> <li>• Contents of the available reference materials of the NRW reduction courses (syllabuses, textbooks, etc.)</li> <li>• Contents of the available data on NRW reduction courses (numbers of the trainees, numbers of courses per year, regular or irregular courses, etc.)</li> <li>• State of equipment owned by KEWI, its usage and storage</li> <li>• Teaching methods used by the lecturers</li> <li>• Availability of follow-up studies</li> <li>• Confirmation of financial status, budget for the training on NRW</li> <li>• Degree of satisfaction and request for the improvement of the training contents</li> </ul>	<ul style="list-style-type: none"> <li>• Interview with persons in charge of NRW reduction and collection of information (Mission of organisation, roles, strategic planning, organisational structure, personnel assignment plan, state of the implementation of training, budgetary process, equipment owned, facilities, collection of financial statements, etc.)</li> <li>• Evaluation of lectures by the lecturers in charge of the training</li> </ul> <p>Interview with trainees</p>
<p>Issues related to WSPs</p> <ul style="list-style-type: none"> <li>• Organisational structures and personnel assignment in the candidate WSPs (backup structure of executives, internal information sharing, qualification of trainees, etc.)</li> <li>• Availability of medium- to long-term or annual NRW reduction plans</li> <li>• Customer management and management of drawings</li> <li>• State of the water meters (types of meters, level of deterioration, etc.) installed and need for the replacement of the meters</li> <li>• NRW reduction activities (availability of pre-set indicators of the plan, monitoring of the implementation of the plan, DMA management, water pressure control, experience in implementing awareness activities to the users)</li> <li>• State of the equipment for NRW reduction (equipment owned and its storage and use)</li> <li>• Capacity in the practical work of the staff in charge of NRW reduction</li> <li>• Survey on the satisfaction of the water users of the WSPs (including a survey on requests of the users to WSPs)</li> </ul>	<ul style="list-style-type: none"> <li>• Interview and questionnaire inquiry with the executives, field staff and engineers in charge of NRW reduction and collection of information (Population, the population in the service area, number of customers, water tariff, water production, amount of water sold, NRW ratio, number, duties and work experience of staff, state of internal information sharing, the level of awareness of the executives on NRW reduction, the use of the NRW Standards, etc.)</li> <li>• Collection of the record of repair of leaks, customer related data and map of the water supply systems</li> <li>• Field survey of the waterworks (site visits to water processing plants, water intakes, water transmission and distribution facilities, water kiosks, large-scale customers and sites of pipeline repair, etc.)</li> </ul> <p>Survey of the satisfaction of the people to the water committees, etc.</p>
<p>Issues related to WASPA</p> <ul style="list-style-type: none"> <li>• State of activities at the regular meetings of WASPA and the NRW and GIS subcommittees (numbers of the participants, details of activities, meeting frequency, published documents, number of technical papers on NRW reduction, etc.)</li> <li>• The number of the members of WASPA (only Urban WSPs)</li> </ul>	<ul style="list-style-type: none"> <li>• Interview with persons in charge of NRW. (Objective, mission, structures, activities, members, support from donors, NRW related activities, annual plan, etc.)</li> </ul>

### **4.3 Results of the Baseline Survey**

The Baseline Survey was conducted between October 2016 and March 2017. A summary of results of the Baseline Survey is presented below.

#### **Output 1 (MWI NRW Unit)**

Since the NRW Unit was only recently established officially, there is a general lack of capacity to support WSPs. Well-defined measures concerning promotion and support for NRW reduction activities for WSPs do not exist. Currently, there is no established framework or system of cooperation between the three key organisations (the NRW Unit, WASREB, and KEWI) for the implementation of NRW reduction activities at the national level. Regarding sensitization and awareness activities for counties and the public at large, it is necessary for the NRW Unit to independently formulate plans for their implementation.

#### **Output 2 (WASREB)**

Although the current NRW Standards have been recognised by the WSPs, their opinions of the content and status of usage have not been investigated thoroughly. A major concern is that the current standards are not easy for small to medium-sized WSPs to comply with due to limited operations and maintenance budgets. It is, therefore, necessary to include NRW reduction activities that can be implemented without large capital investments. WASPA, in cooperation with GIZ<sup>8</sup> and bfZ<sup>9</sup>, has published technical guidelines on water meter management, water pipes, valves and pumps. Many WSPs are already using WASPA's guidelines and therefore attention must be paid to the consistency with that content.

#### **Output 3 (KEWI)**

It is necessary to improve the training programme in order to combine theory and fieldwork experience. Developing human resources that can keep up with changes in the educational environment is an urgent task for KEWI. 65% of KEWI's annual budget is covered by subsidies, and since the majority of the expenditure goes to human resource expenses, capital for improvement of facilities is lacking. There is no facility for students to experience basic NRW skills such as improving water leakage detection, and water meter quality control equipment.

#### **Output 4 (Pilot WSPs)**

##### **Process of Selecting Pilot WSPs**

The Experts conducted the Baseline Survey and collected information on the NRW reduction activities of the candidate WSPs. At the beginning of the Survey, the Experts prepared a questionnaire

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<sup>8</sup> GIZ: Deutsche Gesellschaft Für Internationale Zusammenarbeit

<sup>9</sup> bfZ: The Bavarian Employers' Associations (bfz) GmbH



and sent it to the candidate WSPs prior to visiting them, after which responses were confirmed during the visits. (Additionally, a local company was procured to conduct similar visits to all the other candidate WSPs which the Experts could not cover.)

During the Detailed Planning Survey of the Project, Meru and Embu were identified as Leading WSPs and 15 candidate Pilot WSPs were selected. Criteria to select candidate WSPs were as follows:

1. Urban WSPs (Very Large, Large, and Medium, as defined by WASREB's Impact Report);
2. WSPs locations within the designated areas by JICA's security guideline;
3. WSPs that are not receiving other development partners' assistance with similar activities of the Project;
4. WSPs that have established NRW units;
5. WSPs with O&M Cost Recovery of 95 % or higher;
6. WSPs with Metering Ratio of 75% or higher;
7. WSOs with Water Coverage Ratio of 30% or higher; and
8. WSPs with Water Service Hours for 10 hours or longer.

Fifteen candidate WSPs and two Leading WSPs, as well as the selection criteria, were confirmed at the first JCC meeting. During the Baseline Survey, the candidate WSPs shown in Figure 5 were evaluated based on the evaluation criteria (Annex 3: Prerequisite and Selection Criteria and Basis of Assessment for Each Aspect for Selecting Pilot WSPs).

Table 15 Information of Leading and Candidate Pilot WSPs

No.	Name of WSP	Name of WSB	Name of County	Total Population in Service Area	Total Population Served	Water Coverage (%)	NRW (%)
1	Eldoret	LVN	Uasin Gishu	394,991	276,914	70	35
2	Nzoia	LVN	Trans Nzoia	405,807	325,791	80	38
3	Nakuru	RV	Nakuru	446,850	409,045	92	32
4	Kisumu	LVS	Kisumu	404,097	256,364	63	42
1	Embu	Tana	Embu	178,910	110,153	62	36
2	Meru	Tana	Meru	133,461	78,643	59	29
5	Nanyuki	Northern	Laikipia	86,768	80,571	93	35
6	Nyahururu	Northern	Laikipia	73,798	57,780	78	49
7	Isiolo	Northern	Isiolo	62,421	33,193	53	35
8	Kilifi Mariakani	Coast	Kilifi	799,788	315,980	40	44
9	Kwale	Coast	Kwale	294,155	194,092	66	32
10	Machakos	Tanathi	Machakos	213,105	114,010	53	26
11	Mavoko	Tanathi	Machakos	182,093	111,132	61	46
12	Limuru	Athi	Kiambu	235,245	108,830	46	32
13	Ruiru-Juja	Athi	Kiambu	184,217	122,354	66	29
14	Kiambu	Athi	Kiambu	98,858	38,453	39	38
15	Chemususu	RV	Baringo	36,040	16,370	45	70

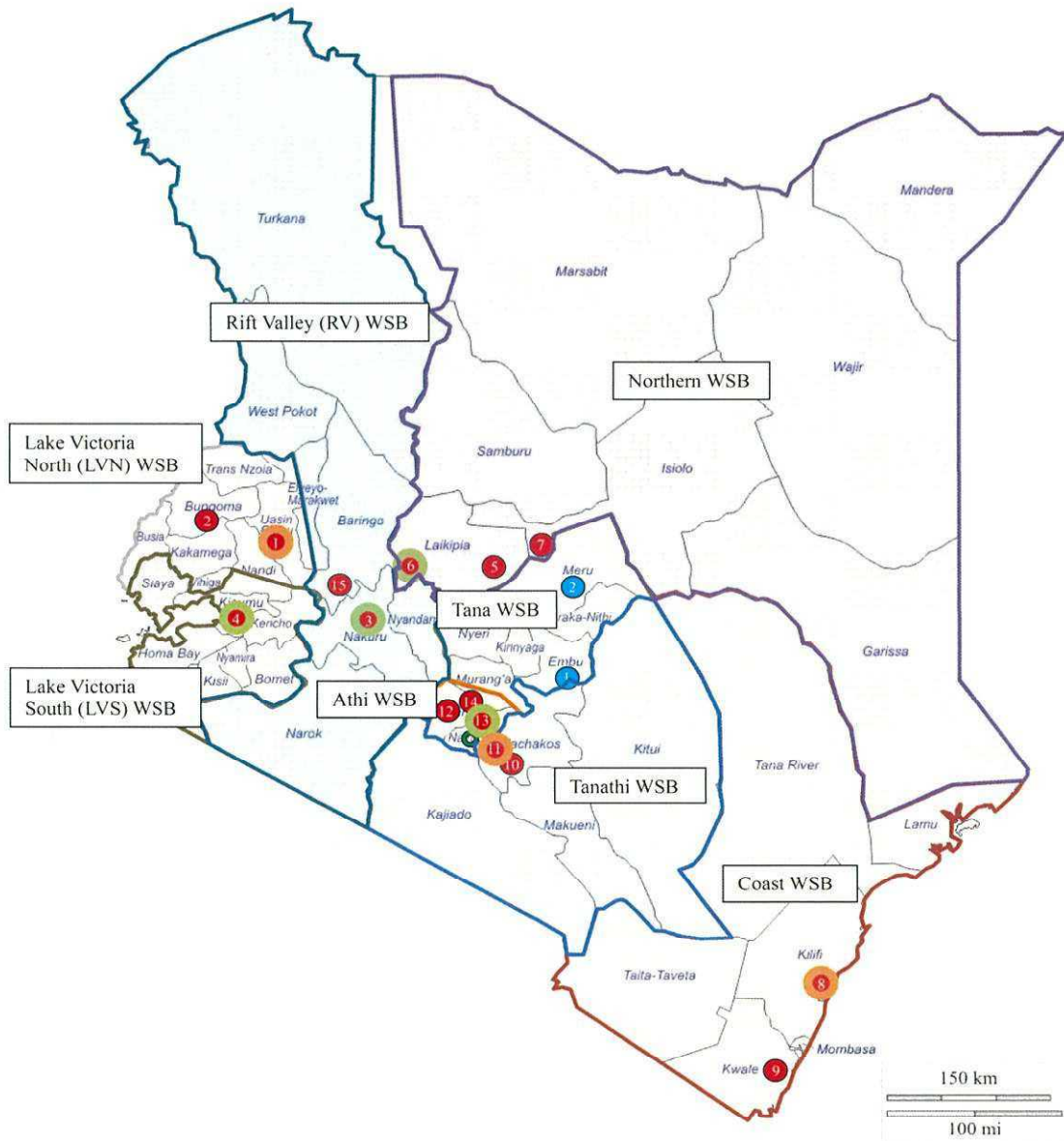


Figure 5 Location of 15 Candidate Pilot WSPs and 2 Leading WSPs

In the Survey, 15 candidate WSPs were evaluated based on the detailed evaluation criteria. The detailed criteria are shown in Annex 3 “Prerequisite and Selection Criteria and Basis of Assessment for Each Aspect for Selecting Pilot WSPs”. Based on the Survey results, the Experts and the NRW Unit selected seven Pilot WSPs with the high potential for achieving Project Outputs. In addition to the selection of Pilot WSPs, phases in which each WSPs will start their implementation of activities have been decided. Table 16 indicates the list of selected Pilot WSPs and their implementation phases.

Table 16 List of Selected Pilot WSPs

Group of WSPs	Pilot WSPs	Implementation Phase
Leading WSPs	Meru, Embu	Phase 1
First Group WSPs	Kisumu, Nakuru, Nyahururu, Ruiru-Juja	Phase 2
Second Group WSPs	Eldoret, Kilifi-Mariakani, Mavoko	Phase 3

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Figure 6 shows the selection process of the Pilot WSPs and their implementing phases.

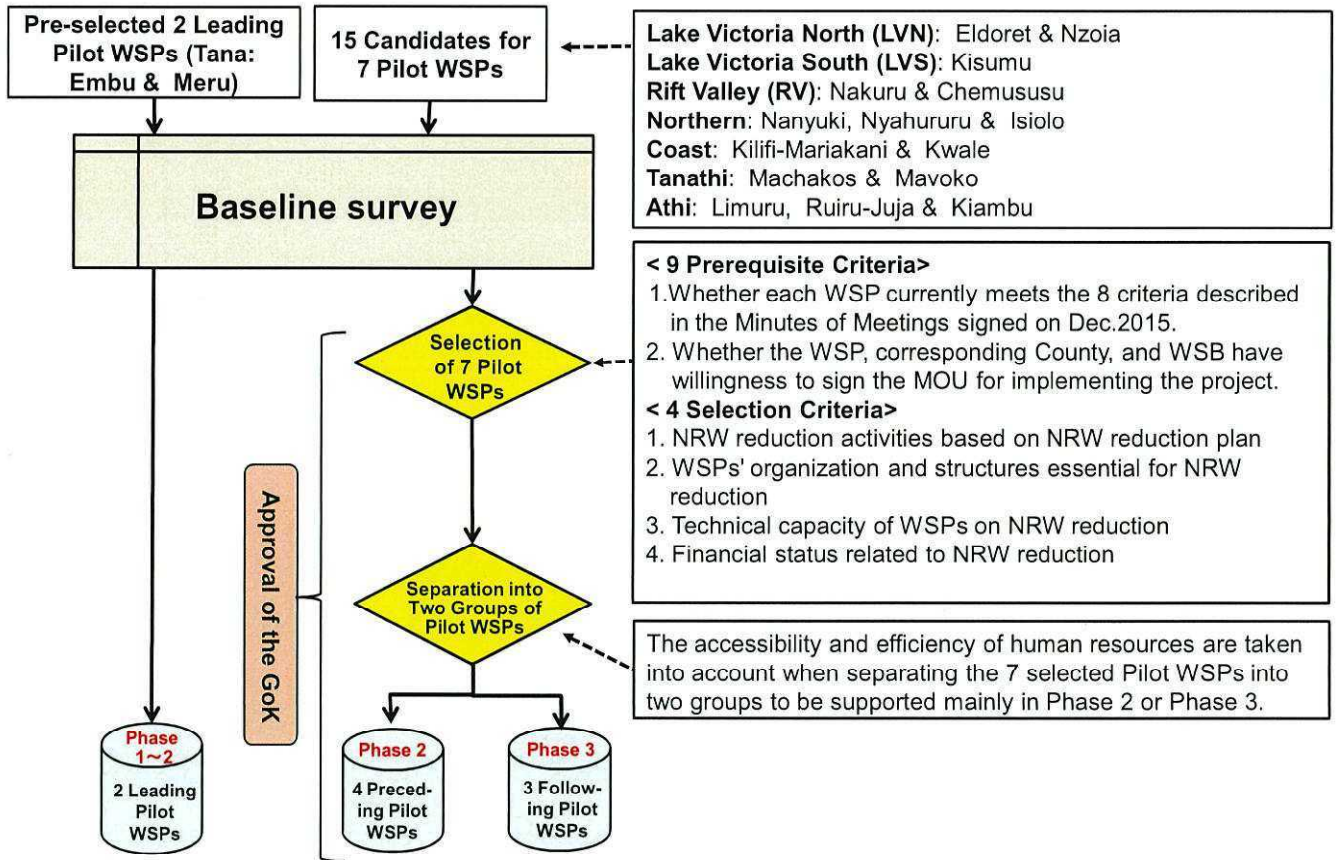


Figure 6 Selection Process of the Pilot WSPs

Note: Although the Leading WSPs are included in the Pilot WSPs, they have been already selected thus the Leading WSPs are distinguished from other Pilot WSPs in this figure.

The Experts conducted analysis and evaluation of collected information. The results of evaluation and analysis are shown in Table 17 and 18, as well as Figure 7 and 8.

Table 17 Comparison of Capacity Assessment Results for Selecting Pilot WSPs (1/2)

Type of WSP in the Project		Leading WSP						Pilot WSP Candidates																				
WSB Area		Tana						Athi				Tanathi				RV												
WSP		Embu		Meru		Ruru-Juja		Limuru		Kiambu		Machakos		Mavoko		Nakuru		Chemususu (Eldama Ravine)										
NRW Ratio / Difference from the Previous Year (as background information)	2007 / 08	58	-	27	-	31	-	-	-	-	-	-	-	38	-	46	-	82	-									
	2008 / 09	57	-1	28	1	34	3	-	-	38	-	41	-	35	-3	47	1	80	-2									
	2009 / 10	55	-2	23	-5	31	-3	33	-	58	20	48	7	37	2	53	6	80	0									
	2010 / 11	41	-14	23	0	31	0	30	-3	37	-21	48	0	39	2	47	-6	69	-11									
	2011 / 12	40	-1	26	3	30	-1	32	2	42	5	62	14	34	-5	48	1	66	-3									
	2012 / 13	41	1	26	0	30	0	34	2	41	-1	57	-5	38	4	46	-2	71	5									
	2013 / 14	36	-5	29	3	29	-1	32	-2	38	-3	55	-2	46	8	32	-14	69	-2									
	2014 / 15	49	13	19	-10	28	-1	32	0	35	-3	48	-7	46	0	37	5	70	1									
Prerequisite Criteria		Assessment																										
Same as the Pre-selection Criteria	1) WSPs that are not receiving other development partner's assistance with similar activities of the Project. (Yes if there has not been recently.)	-	Yes	-	Yes	-	Yes	-	Yes	-	Yes	SNV (2014-15)	No	-	Yes	VEI	No	-	Yes									
	2) WSPs that have established NRW units.	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes										
	3) O&M cost recovery is 80% or more.	126	Yes	109	Yes	114	Yes	115	Yes	94	Yes	113	Yes	101	Yes	111	Yes	14	No									
	4) Metering ratio is 75% or more.	100	Yes	100	Yes	100	Yes	100	Yes	100	Yes	100	Yes	94	Yes	94	Yes	35	No									
	5) Water coverage ratio is 30% or more.	68	Yes	57	Yes	77	Yes	45	Yes	37	Yes	57	Yes	66	Yes	90	Yes	45	Yes									
	6) Water service hours are 10 hour or more.	23	Yes	22	Yes	22	Yes	18	Yes	17	Yes	11	Yes	9	No	17	Yes	10	Yes									
	7) Service connections are more than 5,000. (Medium or Larger WSP (number of towns))	Large (2)	Yes	Large (2)	Yes	Large (2)	Yes	Medium (1)	Yes	Medium (1)	Yes	Medium (2)	Yes	Large (1)	Yes	Very Large (4)	Yes	Small (1)	No									
	8) WSPs in location acceptable under JICA's security guidelines.	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes										
Number of the pre-selection criteria which are currently not met.	0		0		0		0		0		1		1		1		3											
Additional Criteria	9) Counties, WSBs and WSPs have willingness to sign Memorandum of Understanding (MoU).	-		-		Yes		Yes		Yes		Yes		Yes		Yes		Yes										
Selection Criteria		Assessment																										
Aspect to Evaluate		Value / Level	Point	Value / Level	Point	Value / Level	Point	Value / Level	Point	Value / Level	Point	Value / Level	Point	Value / Level	Point	Value / Level	Point	Value / Level	Point									
Selection Criteria 1: NRW reduction activities based on NRW plan [Allocation: 20 Points]	1) Whether the County has a clear water supply development strategy.	1		1		1		1		1		1		1		5		1										
	2) Whether the WSP uses subsidy from the County.	5		5		5		4		4		4		4		5		4										
	3) Whether the WSP has an NRW reduction plan.	5	16.0	5	17.3	1	12.0	5	16.7	1	11.3	1	11.3	5	15.3	1	14.7	1	11.3									
	4) Whether the WSP has been implementing the NRW reduction plan.	4		5		3		5		3		3		4		3		3										
	5) Whether the WSP periodically reports NRW reduction activities to its Board of Directors	5		5		5		5		5		5		5		5		5										
Selection Criteria 2: WSP's Organization and structures necessary for NRW reduction [Allocation: 20 Points]	1) Whether the NRW Unit has allocated necessary and adequate staff for NRW reduction activities.	3		5		5		2		1		2.5		4		1.5		1										
	2) Status of budget allocation for NRW reduction.	5		5		3		3		1		5		4		5		4										
	3) Whether the WSP has an internal capacity building system such as OJT.	4	14.2	4	17.8	3	15.6	3	9.8	2	6.2	2	12.7	5	17.5	2.5	12.4	2.5	9.8									
	4) Whether the WSP has sufficient communication between commercial and technical staff for NRW reduction.	2		3		4		3		3		3		5		4		3										
Selection Criteria 3: Technical capacity of WSP on NRW reduction [Allocation: 40 Points]	1) Whether zoning and bulk meters are functioning.	3		4		4		2		2		4		2.5		2.5		2.5										
	2) Whether maps of pipeline networks are well prepared and utilized.	4		4		4		2.5		2		3		2.5		4		2.5										
	3) Whether the WSP properly controls the accuracy of customer meters.	4	29.3	4	36.0	4	29.3	4	23.3	3	20.0	3.5	28.7	2.5	24.7	4	30.0	0	20.0									
	4) Whether the WSP appropriately manages illegal water use.	3		5		3		2		1		4		4		3		3										
	5) Whether the WSP actively makes efforts to reduce leakage.	3		5		2		2		2		2		2		4		2										
	6) Whether the WSP repair leakage promptly	5		5		5		5		5		5		5		5		5										
Selection Criteria 4: Financial status related to NRW reduction [Allocation: 20 Points]	1) Difference between Cash Flow Available for Debt Service and Total Debt (million KES) (note 2)	25	4	101	5	62	5	2	2	2	2	6	2	19	3	61	5	3.7	2									
	> Cash Flow Available for Debt Service (mill KES)	66	-	101	-	62	-	2	-	2	-	6	-	19	-	61	-	3.7	-									
	> Total Debt (mill KES)	71	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-									
	2) Liquidity Ratio (%) (note 3)	109	5	116	5	120	5	10	1	2	1	8	4	30	5	20	4	0.5	1									
	3) Liquidity Reserves as % of annual operating expenses (%)	49	5	15.6	63	5	16.9	43	5	17.1	3	1	8.4	2	1	6.2	6	5	11.5	11	2	13.1	9	1	15.8	1.6	1	9.1
	4) O&M Cost Coverage Ratio (%)	126	4	109	2	114	3	115	3	94	1	113	3	101	2	111	3	14	1									
	> Grant Revenue (mill KES)	0	-	0	-	0	-	0	-	11.7	-	2.1	-	0	-	0	-	8.4	-									
	> Grant Dependency, for opex (%)	0	-	0	-	0	-	0	-	11	-	2	-	0	-	0	-	24	-									
	5) Collection Efficiency (%)	89	2	107	5	100	5	92	3	84	1	79	1	92	3	96	5	101	5									
	6) Average Tariff Differentialia (%) (note 4)	61	5	17	2	36	4	29	3	22	3	53	5	48	4	43	4	53	5									
7) Revenue Diversification (%) (note 5)	51	2	23	4	72	1	57	2	69	2	80	1	9	5	8	5	54	2										
TOTAL POINTS (Max 100)		75		88		74		58		44		64		71		73		50										
Selection as Pilot WSP		Yes (Phase 1 to 2)		Yes (Phase 1 to 2)		Yes (Phase 2)		No		No		No		Yes (Phase 2 to 3)		Yes (Phase 2)		No										

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Table 18 Comparison of Capacity Assessment Results for Selecting Pilot WSPs (2/2)

Type of WSP in the Project		Pilot WSP Candidates																
WSB Area		LVS				LVN				Northern				Coast				
WSP		Kisumu		Eldoret		Nzoia		Nanyuki		Nyahururu		Isiolo		Kilifi-Mariakani		Kwale		
NRW Ratio / Difference from the Previous Year (as background information)	2007 / 08	59	-	42	-	51	-	46	-	56	-	43	-	38	-	23	-	
	2008 / 09	62	3	52	10	57	6	46	0	57	1	38	-5	39	1	59	36	
	2009 / 10	50	-12	25	-27	61	4	43	-3	57	0	51	13	39	0	50	-9	
	2010 / 11	49	-1	27	2	52	-9	36	-7	53	-4	48	-3	38	-1	42	-8	
	2011 / 12	50	1	29	2	46	-6	35	-1	51	-2	41	-7	43	5	41	-1	
	2012 / 13	47	-3	32	3	40	-6	33	-2	49	-2	43	2	47	4	38	-3	
	2013 / 14	42	-5	35	3	38	-2	35	2	49	0	35	-8	44	-3	32	-6	
2014 / 15	49	7	45	10	43	5	35	0	46	-3	34	-1	47	3	46	14		
Prerequisite Criteria		Assessment																
Same as the Pre-selection Criteria	1) WSPs that are not receiving other development partner's assistance with similar activities of the Project. (Yes if there has not been recently.)	VEI	No	SNV	No	SNV, WB	No	SNV	No	-	Yes	SNV	No	WB	No	WB	No	
	2) WSPs that have established NRW units.	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes		
	3) O&M cost recovery is 80% or more.	104	Yes	105	Yes	97	Yes	104	Yes	110	Yes	93	Yes	101	Yes	83	Yes	
	4) Metering ratio is 75% or more.	100	Yes	100	Yes	78	Yes	90	Yes	100	Yes	100	Yes	91	Yes	98	Yes	
	5) Water coverage ratio is 30% or more.	68	Yes	72	Yes	82	Yes	94	Yes	80	Yes	58	Yes	39	Yes	47	Yes	
	6) Water service hours are 10 hour or more.	24	Yes	15	Yes	22	Yes	23	Yes	20	Yes	11	Yes	14	Yes	8	No	
	7) Service connections are more than 5,000. (Medium or Larger WSP (number of towns))	Very Large(5)	Yes	Very Large(2)	Yes	Large(6)	Yes	Large(1)	Yes	Large(1)	Yes	Medium (1)	Yes	Large(3)	Yes	Large(1)	Yes	
	8) WSPs in location acceptable under JICA's security guidelines.	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes		
	Number of the pre-selection criteria which are currently not met.	1		1		1		1		0		1		1		1		
Additional Criteria	9) Counties, WSBs and WSPs have willingness to sign Memorandum of Understanding (MoU).	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes		
Selection Criteria	Aspect to Evaluate	Assessment																
		Value / Level	Point	Value / Level	Point	Value / Level	Point	Value / Level	Point	Value / Level	Point	Value / Level	Point	Value / Level	Point	Value / Level	Point	
Selection Criteria 1: NRW reduction activities based on NRW plan [Allocation: 20 Points]	1) Whether the County has a clear water supply development strategy.	1		4		1		1		1		3		1		3.0		
	2) Whether the WSP uses subsidy from the County.	5		5		5		5		4		1		5		4		
	3) Whether the WSP has an NRW reduction plan.	5	17.3	5	19.3	5	17.3	1	9.3	1	12.7	5	13.3	5	14.0	5	15.3	
	4) Whether the WSP has been implementing the NRW reduction plan.	5		5		5		2		5		4		4		4		
	5) Whether the WSP periodically reports NRW reduction activities to its Board of Directors	5		5		5		3		3		3		2		3		
Selection Criteria 2: WSP's Organization and structures necessary for NRW reduction [Allocation: 20 Points]	1) Whether the NRW Unit has allocated necessary and adequate staff for NRW reduction activities.	5		4.5		5		3		3		3		3		3		
	2) Status of budget allocation for NRW reduction.	5		5		5		3		4		3		3		1		
	3) Whether the WSP has an internal capacity building system such as OJT.	5	20.0	3	16.4	5	20.0	3	11.3	5	16.0	3	12.7	2	10.5	1	7.6	
	4) Whether the WSP has sufficient communication between commercial and technical staff for NRW reduction.	5		3		5		2		5		4		2		2		
Selection Criteria 3: Technical capacity of WSP on NRW reduction [Allocation: 40 Points]	1) Whether zoning and bulk meters are functioning.	2.5		4		2.5		3.5		4		3		3		3		
	2) Whether maps of pipeline networks are well prepared and utilized.	4		3.5		4		3		1		1		1		1		
	3) Whether the WSP properly controls the accuracy of customer meters.	4	19.3	4	30.0	4	27.3	4	26.0	4	24.0	3	20.0	1	14.7	1	14.7	
	4) Whether the WSP appropriately manages illegal water use.	1		3		2		3		3		2		2		2		
	5) Whether the WSP actively makes efforts to reduce leakage.	2		3		3		2		2		2		1		1		
	6) Whether the WSP repair leakage promptly	1		5		5		4		4		4		3		3		
Selection Criteria 4: Financial status related to NRW reduction [Allocation: 20 Points]	1) Difference between Cash Flow Available for Debt Service and Total Debt (million KES) (note 2)	4	2	78	5	17	3	24	4	4	2	7	2	-208	1	5	2	
	> Cash Flow Available for Debt Service (mill KES)	8	-	78	-	17	-	24	-	4	-	7	-	7	-	5	-	
	> Total Debt (mill KES)	4	-	0	-	0	-	0	-	0	-	0	-	214	-	0	-	
	2) Liquidity Ratio (%) (note 3)	2	1	17	3	7	1	18	3	9	1	131	5	5	1	4	1	
	3) Liquidity Reserves as % of annual operating expenses (%)	1	1	18	3	14.7	6	1	9.1	10	1	13.1	3	1	10.9	9	1	11.6
	4) O&M Cost Coverage Ratio (%)	104	2	105	2	97	1	104	2	110	3	93	1	101	2	83	1	
	> Grant Revenue (mill KES)	5.5	-	6.3	-	0	-	0	-	0	-	0	-	0	-	22	3	-
	> Grant Dependency for opex. (%)	1	-	2	-	0	-	0	-	0	-	0	-	0	-	18	-	
	5) Collection Efficiency (%)	94	4	108	5	91	3	93	4	95	5	101	5	98	5	76	1	
	6) Average Tariff Differentia (%) (note 4)	52	5	48	4	45	4	38	4	49	4	29	3	46	4	32	3	
7) Revenue Diversification (%) (note 5)	-23	5	53	2	36	3	-31	5	-17	5	29	5	7	5	4	5		
TOTAL POINTS (Max 100)		67		80		74		60		64		58		48		45		
Selection as Pilot WSP		Yes (Phase 2)		Yes (Phase 2 to 3)		No		No		Yes (Phase 2)		No		Yes (Phase 3)		No		

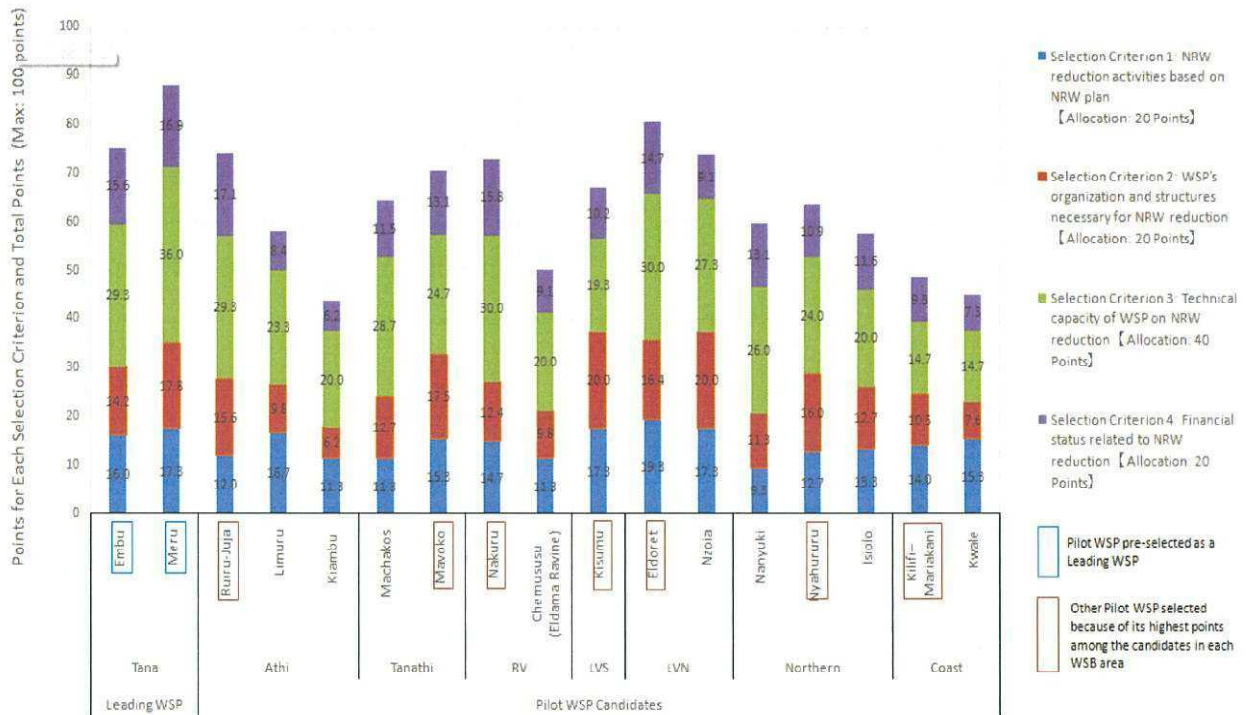


Figure 7 Selection of Pilot WSPs by WSB Areas based on the Results of Capacity Assessment

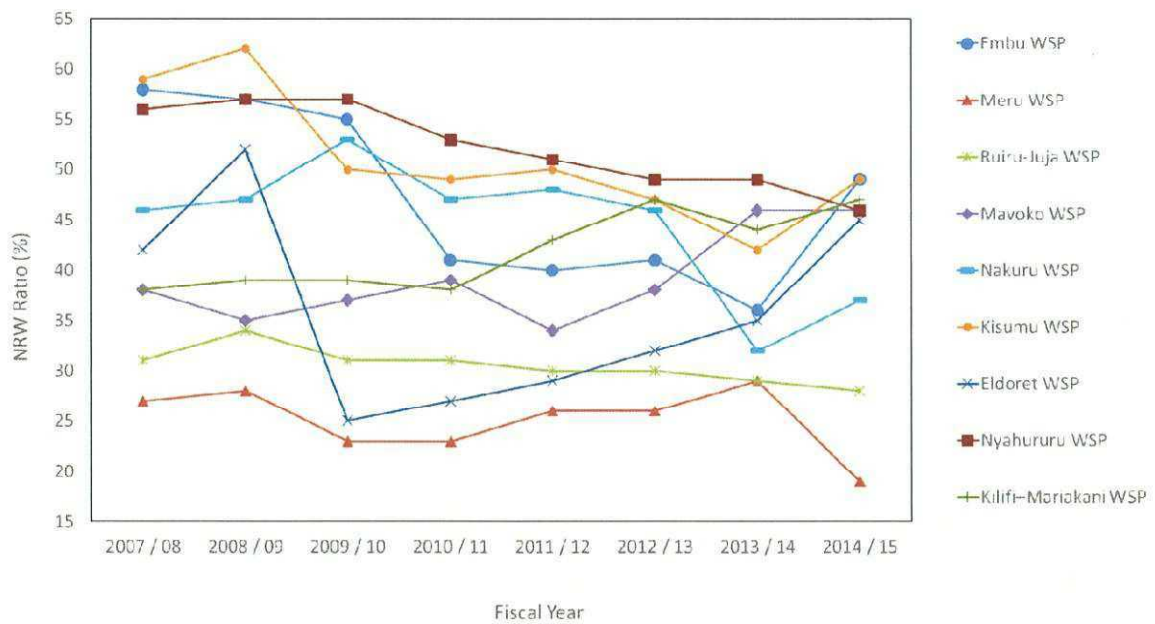


Figure 8 Changes in NRW Ratio of Pilot WSPs since 2007

**Output 5 (WASPA etc.)**

Currently, the NRW Unit does not have any means where the project activities can be shared among WSPs. On the other hand, WASPA has been organising knowledge sharing forums where experience and lessons of the Project can be exchanged. In order to ensure sustainability, it is necessary for the NRW Unit to sign an MOU with WASPA to officially establish a relationship and secure the necessary budget for knowledge sharing activities.

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### Cooperation with Other Donors and Related Projects

The efficiency and effectiveness of the Project are likely to improve if it is implemented in cooperation with other donors and relevant organisations. Especially concerning Output 4, it is necessary to understand the activities by other donors and relevant organisations to avoid duplicating or overlapping activities. Based on the interviews with MWI and the Pilot WSPs, the assistance by other donors relevant to the Project was identified and the possible areas of collaboration are listed in Table 19, 20. In the case of selected Pilot WSPs receiving some assistance from another donor, detailed examination of the contents of assistance was conducted in order to identify synergies to be achieved by collaboration.

Table 19 Other Donors Assistance Related to the Each Counterparts

Output	Counterparts	Donor/organisation	Efficiency expected by collaborating with donors
Output 1	NRW Unit	GIZ, VEI, WASPA, KEWASNET	<ul style="list-style-type: none"> <li>• To build up a support system of CP</li> <li>• To carry out public campaign using toolkits they have</li> </ul>
Output 2	WASREB	GIZ	<ul style="list-style-type: none"> <li>• To monitor condition of utilisation of current NRW Standards</li> <li>• To review and improve the current Standards</li> </ul>
Output 4	Pilot WSPs	WB, VEI, AFD, SNV	<ul style="list-style-type: none"> <li>• Since their projects probably overlap with the Project, careful study is necessary to collect further detailed information.</li> <li>• To collect views and opinions of the implementation of NRW reduction activities.</li> </ul>
Output 5	NRW Unit WASREB	GIZ, SNV, VEI, WASPA	<ul style="list-style-type: none"> <li>• To disseminate knowledge and lessons about NRW reduction</li> <li>• To enhance knowledge sharing among WSPs</li> </ul>

Note: GIZ: Deutsche Gesellschaft Für Internationale Zusammenarbeit, SNV: Stichting Nederlandse Vrijwilligers, VEI: Vitens Evides International, KEWASNET: Kenya Water and Sanitation CSOs Network, WB: World Bank, KfW: Kreditanstalt für Wiederaufbau, USAID: United States Agency for International Development, AFD: Agence Française de Développement

Table 20 Other Donors Assistance to the Pilot WSPs

WSPs	SNV	VEI	WB	AFD
Meru				
Embu	●			
Kisumu		●		●
Nakuru		●		
Nyahururu				
Ruiru-Juja				
Eldoret	●			
Kilifi-Mariakani			●	
Mavoko	●			

## 5. Work Plan for Phase 1 (May to Sept. 2017)

The Work Plan 1 for Phase 1 is presented below.

### 5.1 JCC in Phase 1

In Phase 1 JCC is scheduled to be held at the time of Project Inception (October 2016), after the selection of the Pilot WSPs (May 2017) and the end of Phase 1 (Sept. 2017) as shown in Table 21.

Table 21 Date and Themes of JCCs in Phase 1

	Time	Theme
1st JCC	October 2016 when draft W/P 1 is submitted	Presentation of Draft W/P 1 Confirmation of the Framework of the Project Confirmation of the Project Period Confirmation of the undertakings of the Kenyan side (Appointment and deployment of CP personnel, securing the budget for the Project, approval of candidate Pilot WSPs and their selection process)
2nd JCC	May 2017 when W/P 1 is submitted	Reporting and discussion on the result of the Baseline Survey including the selection of Pilot WSPs Approval on finalised W/P (Phase 1) Confirmation of the Joint Monitoring (1 <sup>st</sup> JCC-2 <sup>nd</sup> JCC) Confirmation of revision of PO
3rd JCC	September 2017	Confirmation on the Joint Monitoring (2 <sup>nd</sup> JCC-3 <sup>rd</sup> JCC) Reporting and discussion on progress of the Project Confirmation of revision of PDM and PO

### 5.2 Activities for the Outputs in Phase 1

Based on results of Baseline Survey, activities of Outputs in Phase 1 are shown below.

#### 5.2.1 Activities for Output 1

The role of NRW Unit is to coordinate and promote NRW reduction activities nationwide. Therefore, it is necessary to establish an implementation plan for the activities as soon as possible. The NRW Unit will prepare for the compilation of NRW annual report. In addition, the Unit will conduct awareness activities to improve the understanding of County Governments about NRW reduction. The targets and the activities for achieving the goals in Phase 1 are as follows:

- The NRW Unit makes its annual plan for NRW reduction and compiles an annual report describing the outcomes and issues arising during NRW reduction activities each year. The concept of the report will be determined around May 2017, information collected by June 2017, and the final contents drafted by Sept. 2017.
- The NRW Unit reviews the NRW reduction activities of WASREB and KEWI and provides appropriate suggestions (Sept. 2017).



- The NRW Unit's support of the NRW reduction activities of WSPs will be discussed with relevant organisations. A support framework shall be formulated in conjunction with the Leading WSPs (Embu, Meru).
- The NRW Unit formulates and implements the plan for the awareness activities on NRW reduction for County Governments (March 2017). The plan includes objectives, activities, timeline, and budget allocations. Activities will be conducted from May 2017 taking into consideration the fiscal year of GoK. Especially for County Governments, it is necessary to start sensitization earlier to enhance their understandings of NRW reduction in order to obtain their cooperation. Therefore, the sensitization efforts will start in Phase 1. Additional campaigns by the Pilot WSPs for water users to reduce water theft will be considered in a later Phase.

### **5.2.2 Activities for Output 2**

WASREB will revise the NRW Standards in Phase 3. It is important to obtain the baseline information on the use of the Standards by WSPs and formulate a strategy for the revision of the Standards in Phase 1. The targets and the activities for achieving the goals in Phase 1 are as follows:

WASREB will identify the usages of current NRW Standards by conducting a survey on the adoption and use by WSPs. Upon the results, WASREB will formulate a strategy for the revision of the Standards (Aug. 2017). Approaches to obtaining the information are:

- Collection and analysis of data collected through interviews with the Pilot WSPs conducted during the Baseline Survey;
- Survey results on the use of NRW Standards in 13 Urban WSPs supported by SNV.

Based on the information above, revisions will be made to the existing Standards while considering their applicability and adaptability for all of the WSPs, from small to very large, and their technical and financial capacity.

### **5.2.3 Activities for Output 3**

KEWI is expected to become an organisation capable of providing practical training within Phase 2. Therefore, KEWI should identify the problems in its training structures, redefine and formulate a strategy for the improvement of the current methods in Phase 1. The targets for Phase 1 and activities necessary to achieve them are outlined below:

- KEWI identified the problems in the current training on NRW reduction (October to December 2016) and formulated a plan (draft) for the training course and materials (March to June 2017).
- KEWI will establish relationships with the Leading WSPs for the implementation of joint training.
- The Leading WSPs will propose the contents of the course and teaching method to KEWI. (June 2017).
- KEWI will establish a training implementation system to be employed by other WSPs after

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analysing current training methods of Leading WSPs, including the frequency, contents and models of cost sharing. It should also consider the results of the Baseline Survey, specifically the procedures required for the implementation of joint training with the Leading WSPs. The duration of the joint training is estimated at two weeks per course, and KEWI will make administrative arrangements including the scheduling and budget allocation for the lecturers.

- KEWI will utilise audio-visual equipment to enhance learning experience and efficiency. Some of the equipment for this purpose has already been procured by JICA (March 2017).
- KEWI will conduct a course on Hydraulic Analysis (November 2017).

#### **5.2.4 Activities for Output 4**

The key activities for Output 4 in Phase 1 are the selection of Pilot WSPs and commencement of NRW reduction activities of the Leading WSPs, which are expected to support other Pilot WSPs in Phases 2 and 3 by sharing their experience. It is therefore very important to augment the technical capacity of Leading WSPs. In addition, the possibility of expanding the infrastructure of Leading WSPs with funds from private financial institutions to ensure maximised outputs will be considered.

The programme agreed with each selected Pilot WSP is outlined in Table 22, while NRW survey equipment (e.g. leak detectors) to be procured for WSPs using the MWI's budget is shown in Table 23. In Phase 1, the following activities are planned: technical support to six Pilot WSPs, assistance with MWI's equipment procurement and initial training on GIS application, pressure management, etc. for the Leading Pilot WSPs (Embu and Meru) are all scheduled in Phase 1 as part of its Goals. The targets and the activities necessary to achieve them are outlined below:

- Preparation of NRW Reduction Plans (January to June 2017)

In Phase 1, the Leading and the First Group Pilot WSPs will discuss suitable measures to solve their current NRW-related problems in consideration of their current situation. Each Pilot WSP is expected to prepare a five-year plan for NRW reduction upon which an annual plan will be developed. The planning process has been conducted via on-line using Cloud computing system which allows dialogues between the Pilot WSPs and the Experts. Each WSP will formulate NRW reduction plan and submit it in the on-line based depository where the Experts can provide advises on the plan and monitor the progress remotely.

- NRW Reduction Measures (June to September 2017)

The activities of Leading WSPs are:

1. Preparation for trials on the improvement of metering (use of smart meters for large customers, use of ultrasonic bulk meters with logging function, etc.),
2. Preparation of pressure maps covering large areas,
3. Consideration of suitable pressure management measures, and
4. Improvement of GIS development and applications.

In addition to this, some of the Pilot WSPs, such as Nakuru and Nyahururu WSPs, will be tasked with improving their GIS development and prepare pressure maps with assistance provided by the Experts.

Table 22 Agreed Programme for Supporting NRW Reduction Activities at Each Pilot WSP

	Category of Pilot WSP	Leading Pilot WSP		Preceding Pilot WSP				Following Pilot WSP		
	Timing of Conducting TA	Phases 1 and 2		Mainly Phase 2				Mainly Phase 3		
	WSB Area	Tana		LVS	RV	Athi	Northern	Tanathi	LVN	Coast
	Pilot WSP	Meru	Embu	Kisumu	Nakuru	Ruiru-Juja	Nyahururu	Mavoko	Eldoret	Kilifi-Mariakani
<b>&lt; B &gt;</b> Current Level of the 6 Key Aspects of NRW Reduction and Trials to be supported by JICA Experts	1) Planning and Implementation of NRW reduction (yearly cycle based on a mid-term vision)	5	4	5	3	3	5	4	5	4
	Trials									
	a) Participatory planning using sample templates and Google Drive	●	●	●	●	●	●	●	●	●
	b) Plan-do-check-adjust (PDCA) Cycle (mid-term, yearly, quarterly, monthly, weekly, etc.)	●	●	●	●	●	●	●	●	●
	c) Introduction of HDPE pipe and elimination of asbestos pipe, etc.	●	●	●	●	●	●	●	●	●
	d) Setting priority activities to be completed without failure as commitment targets	●	●	●	●	●	●	●	●	●
	e) Inclusion of NRW-related training	●	●	●	●	●	●	●	●	●
	2) GIS Preparation and Applications	4	4	4	4	4	1	2.5	3.5	1
	Trials									
	a) Open source utilization (QGIS, Google Earth, etc.) for fast GIS development and wider access/applications of GIS (including participatory mapping)	●	●	●	●	●	●	●	●	●
	b) Linking GIS with customer/billing data for special analysis on meter problems and illegal connections	●	●	●	-	●	-	-	-	-
	c) Use of GIS for assessing pipe conditions including mapping of leaks, bursts and aged pipes.	●	●	●	-	●	-	-	●	-
	3) Zoning and NRW Monitoring (monthly and weekly NRW management cycles)	4	3	2.5	2.5	4	4	2.5	4	3
	Trials									
	a) Planning of strategic zoning (distribution/pressure zones→flexible DMA division from large to small for tracking down) to monitor NRW ratio of different areas and control pressure based on hydraulic analysis and field measurements	-	●	-	-	-	●	●	●	-
	b) Confirmation of the hydrological isolation and inflow metering of each distribution zone and DMA and the consistency of the existing customers in each zone and DMA between GIS and billing system.	-	●	-	●	-	●	●	-	●
	c) Establishment of easy and sustainable monitoring of NRW ratio, water balance(MNF), and abnormal flow due to burst using billing system, smart meters, remote monitoring, etc.	●	●	-	-	●	●	●	●	-
	d) Periodical analysis and discussions to prioritize areas for different activities	-	●	-	-	-	●	●	●	-
	e) Building capacity for NRW-related analysis at zone level for self-directive development of strategy to encourage inter-zone competition	-	-	-	-	-	-	-	-	-
	4) Leakage Management	5	3	2	4	2	2	2	3	1
	Trials									
	a) Spread of the daily use of listening sticks over many field staff against leakage	●	●	●	●	●	●	●	●	●
	b) Implementation of strategic track down of under ground leakage ( zoning→step test→listening stick→USF/leak detector/correlator)	●	●	●	●	●	●	●	●	●
	c) Measurement and optimization of pressure distribution (other than zoning)	●	●	●	-	●	-	-	-	-
	d) Reduction of spaghetti service connections	-	-	-	-	-	-	-	-	●
	e) Pressure tests with hand pump for checking installation quality of service connections	●	-	●	-	●	●	●	●	●
	5) Customer Meter Management	4	4	4	4	4	4	2.5	4	1
	Trials									
a) Achieving 100% in metering ratio	-	-	-	-	-	-	●	-	●	
b) Preparation and implementation of meter replacement/relocation strategies (monitoring of consumption with billing system, accuracy testing with bench, mobile tester and/or bucket, sizing, specifications, etc.)	-	-	●	-	●	●	●	-	●	
c) Focused management of large consumption customers with high accuracy meter, smart meter or additional meter.	●	●	-	-	-	-	-	-	-	
d) Management of large residential buildings with customer identification survey and additional use of master meter.	-	-	-	-	-	-	-	-	-	
6) Illegal Use Management	5	3	1	3	3	3	4	3	2	
Trials										
a) Active patrol for finding illegal water use (including use of chlorine DPD tablets, detecting equipment, etc.)	-	●	●	-	-	●	-	●	-	
b) Inclusion of a penalizing mechanism against water theft in the county's water act	-	●	-	-	-	-	-	●	-	
c) Enhancement of law enforcement against water theft with support from the county	-	●	-	-	-	-	-	●	-	

Note: 1 to 5 : Level of Key Aspect from the initial capacity assessment (5 as the highest level)  
 ●: Trial agreed to carry out through discussion between each pilot WSP and JICA experts

Table 23 Number of Existing and Expected to be Procured Pieces of NRW Survey Equipment in the Pilot WSPs

Equipment		Number of Existing Pieces of Equipment in brackets ( ) and Required Number for Procurement								
Category	Type of Equipment	Leading WSP Phase 1 and 2		First Group Pilot WSPs Mainly Phase 2				Second Group Pilot WSP Mainly Phase 3		
		Meru	Embu	Kisumu	Nakuru	Ruiru-Juja	Nyahururu	Mavoko	Eldoret	Kilifi-Mariakani
		Pressure Measurement	Pressure Logger	4	(3+1 with dead battery)	4	(20 mostly with dead battery)	(1)	2	2
Programming Cable for the Logger	1			1			1	1	1	
Flow Measurement	Portable Ultrasonic Flow Meter	(1)	(1)	(1)	(1)	(1)	(1)	1	1 (2 broken)	1
	Portable Meter Tester	1	1	(2)	(2)	(1)	1	(1)	(2)	1
Detection of Leak and Pipe Location	Hand Pump for Leak Check	1	1	1	1	1	1	1	1	1
	Ground Microphone (Leak Detector)		(1)		(1)	1	1		(1 old)	(1)
	Listening Stick	18 (2)	7(3)	8	8	8	8	8	8	8
	Leak Noise Correlator				(1)	(1)	(1)			(1)
	Leak Noise Correlator with Ground Microphone	(1)	1	(1)				1	1	
	Impulse Generator (sound box) for Plastic Pipes	1	1	(1)	(1)	1	1	1	1	1
	Pipe Locator for Metal Pipes + Cable for Plastic Pipes	1	1	(1)	(1)	(1)	1	1	(2 old)	(1)

### 5.2.5 Activities for Output 5

WASPA has already agreed to be a cooperating organisation of the Project during the Detailed Planning Survey. An MOU<sup>10</sup> on the cooperation to make the relationship between MWI and WASPA official has been signed. A strategy for the cooperation between the MWI and WASPA will be determined in Phase 1 and this will include using WASPA's regular meeting as a forum to share the results of Output 4 in Phases 2 and 3. The objectives and the activities for achieving the targets in Phase 1 are as follows:

- Signing of MOU to establish an official relationship between the MWI and WASPA (October 2016 to May 2017).
- Regular meetings for the dissemination of knowledge and expertise (First meeting in October 2017).

<sup>10</sup> After the discussion between MWI and WASPA, MOU was changed to Framework of Cooperation (FOC) which was signed by the two organizations.

## 6. Project Input

### 6.1 The Expert Team

The team of Experts is composed of a joint venture among Kyowa Engineering Consultants Co., Ltd., Tokyo Suido Service Co., Ltd. and Tokyo Waterworks International Co., Ltd. The subcontractor for the Baseline Survey, Mangat I. B. Patel and Partners, may be assigned to the Project when and if the need arises.

A plan for the dispatch of Experts is shown in Table 24 where Phase 1 is indicated by a red square.

Table 24 Plan for Dispatch of JICA Experts

Expert	Name	Phase 1												Phase 2												Phase 3																																						
		2016						2017						2018						2019						2020						2021																																
		1st Year						2nd Year						3rd Year						4th Year						5th Year																																						
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep			
Chief Adviser NRW management 1	Masavuki IGAWA																																																															
NRW reduction specialist 2 (1)	Noboru SAITO																																																															
NRW reduction specialist 2 (2)	Masavuki TAGUCHI																																																															
Water distribution Network (Mapping & Network analysis)	Shozo MORI																																																															
Flow, Pressure and Leakage Monitoring (1)	***																																																															
Flow, Pressure and Leakage Monitoring (2)	Shinichi SEKIMOTO																																																															
Customer management / Billing collection (1)	***																																																															
Customer management / Billing collection (2)	Naoki HARADA																																																															
Training Management Training Strategy	Satoru SHIBAZAKI																																																															
Information Public Relation Management	Hiroko SUGIMOTO																																																															

Table 25 describes the activities for each expert through the Project.

Table 25 Activities by the Expert

Expert	Activity
Supervision/ NRW management 1	<ul style="list-style-type: none"> <li>Supervision and monitoring of the Project Implementation</li> <li>Preparation and presentation of the Work Plans</li> <li>Participation in JCC/PIC meetings</li> <li>Coordination with other donors and other water supply projects</li> <li>Review of the NRW reduction measures being implemented</li> <li>Provide support for NRW reduction management of the Pilot WSPs</li> <li>Assistance in the planning of the training in Japan/third country</li> <li>Planning for workshops and seminars</li> </ul>
NRW management 2	<ul style="list-style-type: none"> <li>Management of the procurement of equipment through the Project</li> <li>Survey of the management of the water distribution networks/identification and analysis of problems in the management</li> <li>Implement theoretical training on NRW reduction</li> <li>Selection of the materials and equipment required for the hydraulic separation of the water distribution networks and recommendation on the budgetary measures</li> <li>Estimation of leakage/analysis of the amount of NRW</li> <li>Evaluation of the measures implemented against leaks/verification of their effect</li> <li>Support NRW Unit with preparations for the compilation of NRW annual reports</li> </ul>

Expert	Activity
	<ul style="list-style-type: none"> <li>• Support WASREB with the revision of NRW Standards</li> </ul>
Distribution pipe network (mapping, network analysis)	<ul style="list-style-type: none"> <li>• Implementation of a survey for the selection of the Pilot WSPs</li> <li>• Survey of the management of the water distribution networks/identification and analysis of the problems in the management</li> <li>• Support Pilot WSPs in the formulation of the NRW reduction plans</li> <li>• Study on the plan for the procurement of equipment for the Pilot WSPs</li> <li>• Assist in the zoning of the distribution networks</li> <li>• Assist in the preparation of piping diagrams</li> <li>• Provide guidance on the preparation and use of the pipeline installation management standards</li> <li>• Training on the distribution network management technology and theoretical training on water pressure management</li> </ul>
Flow rate/water pressure/leak management	<ul style="list-style-type: none"> <li>• Identification of OJT activities on the water pressure management technologies</li> <li>• Training on theoretical studies on water pressure management</li> <li>• Presentation of best measures for the optimisation of water pressure and formulation (selection of the materials and equipment and budget)</li> <li>• Evaluation of the measures for the optimisation of water pressure</li> <li>• Study on the estimation of leakage/analysis of the status of NRW</li> <li>• Evaluation of the measures implemented on leakages</li> <li>• Management of the procurement of equipment provided/brought in the Project (Japan and Kenya)</li> <li>• Technical training on leak detection</li> <li>• Formulation of the plans for OJT of the Pilot WSPs</li> <li>• Guidance in OJT of Pilot WSPs (on management of water pressure/NRW)</li> <li>• Support installation of measuring facilities/equipment</li> </ul>
Customer management/billing collection	<ul style="list-style-type: none"> <li>• Assistance in the establishment of a framework of an information system for customer management</li> <li>• Assistance in the formulation of annual budget plans</li> <li>• Support for activities to promote billing collection/installation of water meters</li> <li>• Monitoring of data on the water usage and billing collection</li> <li>• Creation of the database of customer information</li> <li>• Assist in the inspection of water meters</li> </ul>
Training Planning/Management	<ul style="list-style-type: none"> <li>• Review the current training materials and the methods used, and also identify the measures to improve them</li> <li>• Identify the teaching materials and equipment required</li> <li>• Preparation of the programme and schedule of the training in Japan/assistance to the training participants in Japan</li> </ul>
Information Management/Public Relations	<ul style="list-style-type: none"> <li>• Provide support for formulation of NRW sensitization plan</li> <li>• Provide support for implementation of NRW sensitization for the Counties</li> <li>• Provide support for WSP's NRW sensitization activities</li> <li>• Coordinate knowledge sharing of Project Outputs</li> <li>• Dissemination of information to the local media, donor organisations, NGOs and other relevant parties</li> <li>• Publicity activities in Japan</li> <li>• Creation and distribution of JICA Project Brief Notes</li> </ul>

## 6.2 Training in Japan

A training programme in Japan for the Management Team in Japan is scheduled in June 2017 for Phase 1. Training programmes in Japan for the Action Team are scheduled around June 2018 for Phase 2 and 2020 for Phase 3 respectively. Tentative training curricula are shown in Table 26 and Table 27. The selection of participants and training contents will be determined after consultation with CP.

Table 26 Training Curriculum for the Management Team

Items of training	Instructor in charge	Topics (lecture / training / discussion / site visit)	Venue	Days
Guidance of Training programme	JICA/TSS/TWI	Introduction to life in Japan: Orientation for the training programme, etc.	JICA	1
Lecture	Tokyo Waterworks Bureau /relevant facilities	Japan's waterworks (law, standards, vision, etc.) Tokyo's waterworks (Plan, Management, Organisation, Performance Indicators, Measures for NRW reduction, System of water supply, etc.)	Tokyo Waterworks Bureau/relevant facilities	1
Water supply facility visits	Tokyo Waterworks Bureau	History of water supply Customer service/complaint management Pipe laying work of distributing pipes and feeding pipes Water utility	Tokyo Waterworks Bureau/relevant facilities	3.5
Lecture	Tokyo Metropolitan University	Study on the technology of piping works and the latest trends in Japan.	JICA	0.5
Water pipe factory visit	Kubota ChemiX Co., Ltd.	Introduction to pipes and fittings & quality control (lecture) Pipe production process Demonstration of piping installation	Manufacturer	1
Valve factory visit	Maezawa Industries, Inc.	Introduction to branch saddles & valves (lecture) Production process of valves	Manufacturer	1
Water meter factory visit	Aichi Tokei Denki Co., Ltd.	Introduction to water meters Production process of water meters	Manufacturer	1
Workshop	Participants	Reporting on the Training course, Presentation on the output of the training course.	JICA	1
Holiday/travel days				4
Total				14

Table 27 Training Curriculum for the Action Team (Draft)

Items of training	Instructor in charge	Topics (lecture / training / discussion / site visit)	Venue	Days
Guidance of Training programme	JICA/TSS/TWI	Introduction to life in Japan: Orientation for the training programme, etc.	JICA	1
Lecture	Tokyo Waterworks Bureau/relevant facilities	Japan's waterworks (management indicators, Measures for NRW reduction, Water leakage detection, water supply equipment, water leakage prevention technology, etc.)	Tokyo Waterworks Bureau/relevant facilities	1
Water supply facility visits	Tokyo Waterworks Bureau/relevant facilities	History of water supply, Customer service/complaint management, Pipe laying work of distributing pipes and feeding pipes, Water utility	Tokyo Waterworks Bureau/relevant facilities	3
Water supply equipment construction site visit	Tokyo Waterworks Bureau/Related facilities	Review/Examination of affairs and inspection of construction work and drawing management affairs Construction site of the water supply equipment Mapping system	Relevant construction office	2
Water pipe factory visit	Relevant factory	Introduction to pipes and fittings & quality control (lecture) Introduction to the production process of water pipes Demonstration of pipe installation	Manufacturer	1
Valve factory visit	Relevant factory	Introduction to branch saddles & valves (lecture) Introduction to production process of valves	Manufacturer	1
Water meter factory visit	Relevant factory	Introduction to water meters Introduction to the production process of water meters	Manufacturer	1
Holiday/travel days				4
			Total	14

### Training in Third Country

Training in a third country will be considered upon request from the Kenyan side and its necessity will be evaluated against the terms of project implementation. Obtaining JICA's approval is required when implementing third country training.

### 6.3 Provision of Equipment

The equipment list is shown in Table 28. The equipment consists of:

1. The training equipment for KEWI in Output 3, and
2. The survey equipment for the Pilot WSPs for Output 4.

The detailed specifications and quantities were discussed with the Kenyan side, agreed upon and the equipment for KEWI procured in March 2017. The survey equipment for Pilot WSPs will be decided based on the results of the Baseline Survey and shall be procured by September 2017.



The equipment list in Table 29 indicates the items requested by KEWI and verified during the Baseline Survey. It was confirmed that some of the equipment would be procured using MWI's budget for this fiscal year. The remaining equipment, which is not required urgently, can be procured using MWI's budget for the next fiscal year.

Table 28 Equipment to be Procured

Organisation	Equipment	Quantity	Country to source	Time of decision
Equipment for KEWI	Notebook PC	1	Kenya	Within 4 months after the commencement of the Project
	Multi-purpose photocopier machine	1		
	Digital camera	1		
	Overhead projector	1		
Survey equipment for Pilot WSPs	Portable ultrasonic water meter	1	Japan	
	Pressure logger	10		
	Potable checker of water meter	2		
	Leak noise correlator	1		
	Electronic leak detector	1		
	Metal locator	1		
	Listening stick (1.5m & 1.0m lengths)	4 each		

Table 29 Equipment to be Studied for Appropriateness for Procurement

Organisation	Equipment	Quantity	To be procured from	Delivery timing
Requested by KEWI for training	Leak noise correlator	X	Japan/third country	After justifying their appropriateness and before starting activities in Pilot WSPs
	Equipment for improving a training yard for leakage detection	X		
	Water meter testing equipment	X		
Requested by KEWI for works in the Pilot WSPs	Measuring Instrument including digital leak noise correlator for field work	X	Japan/third country	
	Ground leakage detector for field work	X	Kenya	
	Valves and meters for establishing DMA	X		
	Service meters for house connection	X		
	Piping materials and repair tools and equipment	X		

Note: "X" is to be finalised after the Baseline Survey

#### **6.4 Undertakings and Inputs by the Kenyan Side**

Undertakings by GoK were agreed upon in R/D signed on March 7, 2016, between the MWI and JICA as shown below. These undertakings were reconfirmed by the Kenyan side at the first JCC meeting.

##### **6.4.1 Undertakings by GoK**

GoK will take necessary measures to:

1. Ensure that the technologies and knowledge acquired by the Kenya nationals as a result of Japanese technical cooperation contribute to the economic and social development of Kenya, and that the knowledge and experience acquired by the personnel of Kenya from technical training as well as the equipment provided by JICA will be utilized efficiently in the implementation of the Project; and
2. Grant privileges, exemptions and benefits to the JICA experts and their families, which are no less favourable than those granted to experts and members of the missions and their families of third countries or international organisations performing similar missions in the Republic of Kenya.

The MWI will take necessary measures to conclude FOCs with the Pilot WSPs (in particular, Embu and Meru, which will start the NRW reduction activities in Phase 1). FOCs should also include County Governments responsible for the Pilot WSPs to ensure timely implementation of the Project for three following purposes;

1. To involve County Governments for smooth implementation of the Project;
2. To acquire budget for NRW Reduction activities of the Pilot WSPs, and
3. To confirm and agree on the inputs and undertakings of the Pilot WSPs.

GoK will take necessary measures to:

1. Provide security-related information as well as measures to ensure the safety of the JICA experts;
2. Permit the JICA experts to enter, leave and stay in the Republic of Kenya for the duration of their assignments therein and exempt them from foreign registration requirements and consular fees.
3. Exempt the JICA experts from taxes and any other charges on the equipment, machinery and other material necessary for the implementation of the Project;
4. Exempt the JICA experts from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to them and/or remitted to them from abroad for their services in connection with the implementation of the Project; and
5. Meet taxes and any other charges on the equipment, machinery and other material, referred to in II-7 of R/D, necessary for the implementation of the Project; and
6. GoK will bear claims, if any arise, against the JICA experts resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the implementation of the

Project, except when such claims arise from gross negligence or wilful misconduct on the part of the JICA experts.

#### **6.4.2 Input by MWI, WASREB, KEWI and Pilot WSPs**

MWI, WASREB, KEWI and the Pilot WSPs will take necessary measures to provide at their own expense:

1. Assignments of counterpart personnel and support staff;
2. Payment of per-diem (daily allowance, transportation fee and accommodation fee) to the counterpart personnel;
3. Suitable office space with necessary equipment in MWI, KEWI and the Pilot WSPs;
4. Utility charges such as electricity, water supply, if any;
5. 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;
6. Costs of activities for Public awareness and campaigns by MWI;
7. Survey cost on the usage of current NRW reduction Standards by WASREB;
8. Expense for training of the Pilot WSPs at KEWI (short term course);
9. Expense for On-site Training of the Pilot WSPs by KEWI;
10. Expense for On-site Training of Trainers (ToT) in the Pilot WSPs;
11. Expense for NRW activities of the Pilot WSPs;
12. Information in obtaining medical service;
13. Available data (including maps and photographs) and information related to the Project; and
14. Necessary facilities to the JICA experts for the remittance as well as utilisation of the funds introduced into Kenya in connection with the implementation of the Project.

The main undertakings and inputs to be met by the Kenyan side are summarised in Table 30.

Table 30 Undertakings and Inputs by the Kenyan Side

Work to be Implemented	Organizations involved in the project				
	MWI	WASREB	KEWI	County	WSP
Utilization of the project outputs	•	•	•	•	•
Provision of privileges to the Japanese experts	•				
Guidance to County Governments for their involvement in the project	•				
Guidance to the pilot WSPs to allocate budget to the NRW reduction activities	•				
Provision of security information to the Japanese experts and means to ensure their safety	•				
Issuance of the residence permits to the Japanese experts and their exemption from paying consulage	•				
Exemption of the Japanese experts from paying taxes and levies	•				
Exemption of the Japanese experts from taxation on their salaries and allowances	•				
Responses to the inconveniences encountered by the Japanese experts in the project activities	•				
Appointment of the counterpart personnel and support staff	•	•	•		•
Payment of allowances ( <i>per diem</i> , transport allowance, accommodation allowance) of the counterpart personnel	•	•	•		•
Provision of an office for the project activities	•		•		•
Provision of the materials and equipment to be used in the project activities not to be provided by JICA and their	•	•	•		•
Implementation of the campaigns and awareness creation activities and payment of its cost by MWI	•			•	•
Cost of a survey on the use of the NRW reduction standards to be conducted by WASREB		•			
Cost of the training of the pilot WSPs at KEWI			•	•	•
Cost of the on-the-job training of the pilot WSPs by KEWI			•	•	•
Cost of the on-the-job TOT of the pilot WSPs			•	•	•
Cost of the NRW reduction activities taken by the pilot WSPs			•	•	•
Provision of medical information	•	•	•	•	•
Data and information (including maps and photographs) for the implementation of the projects	•	•	•	•	•
Assistance required for the Japanese experts to receive money transferred from Japan in Kenya	•			•	•

## Project Design Matrix

**Project Title:** Project for Strengthening Capacity in Non-Revenue Water Reduction

**Implementing Agency:** MWI,WASREB,KEWI

**Target Group:**Urban WSPs

**Period of Project:**5 years from the date when the first JICA Expert is dispatched

**Project Site:** The entire country of Kenya

**Pilot Site:** Embu, Meru, and others

**Version 0**

**Dated**

<b>Narrative Summary</b>	<b>Objectively Verifiable Indicators</b>	<b>Means of Verification</b>	<b>Important Assumption</b>	<b>Achievement</b>	<b>Remarks</b>
<p><b>Overall Goal</b> Under NRW reduction support mechanism, Urban WSPs enhance NRW reduction activities.</p>	<p>1. X of Urban WSPs participate knowledge sharing activities established by the Project. 2. X of pilot Urban WSPs continue achieving target(s) set by the annual NRW reduction plan. 3. NRW annual report is continuously produced and disseminated.</p>	<p>MWI NRW Unit annual reports Pilot WSPs annual NRW reduction plans</p>	<p>NRW reduction remains as priority of MWI and WSPs.</p>		
<p><b>Project Purpose</b> A NRW reduction support mechanism is established for Urban WSPs to implement NRW reduction activities.</p>	<p>X of pilot Urban WSPs continue achieving targets set by the annual NRW reduction plan for two years.</p>	<p>NRW reduction plans Platform (online) Impact reports Project reports JCC meeting minutes</p>	<p>NRW reduction remains as priority of MWI and WSPs.</p>		
<p><b>Outputs</b> 1. Promotion and coordination of NRW reduction activities by MWI NRW Unit are strengthened.</p>	<p>1-1 All County representatives participate NRW related seminar(s). 1-2 NRW reduction campaigns are conducted semi annually. 1-3 NRW reduction annual reports are produced.</p>	<p>Materials for County seminar List of seminar participants Campaign materials NRW reduction annual reports Project reports JCC meeting minutes</p>	<p>Project budget of the CPs is secured. NRW Unit staff positions are fulfilled.</p>		
<p>2. Use of NRW reduction standards by Urban WAPs are promoted by WASREB.</p>	<p>2-1 NRW reduction standards are revised by year X. 2-2 Revised NRW reduction standards are disseminated to all Urban WSPs through workshop (s).</p>	<p>Revised NRW reduction standards Workshop program and list of participants Project reports JCC meeting minutes NRW reduction annual reports</p>	<p>Current WASREB's role and authority remains.</p>		
<p>3. NRW related training capacity of KEWI is strengthened.</p>	<p>3-1 KEWI conducts NRW reduction courses with contents incorporating on-site trainings and revised course materials. 3-2 Evaluations by the NRW course participants is higher than before the revision of course materials. 3-3 O% of NRW course participants formulate the workplans.</p>	<p>Revised course materials Revised course syllabus Course participants' evaluation sheets Project reports JCC meeting minutes NRW reduction annual reports Trace studies</p>	<p>KEWI continues to offer NRW short courses. Project budget of the CPs is secured.</p>		

ANNEX 1 PDM (Version 0)

	NRW reduction annual plans NRW reduction plans IMPACT reports Project reports JCC meeting minutes NRW reduction annual reports	Trained personnel do not leave WSPs Drastic climatic changes such as draught will not affect the water resources. Project budget of the CPs is secured.			Pre-Conditions
<b>Inputs</b>					
<b>Activities</b>			<b>The Japanese Side</b>	<b>The Kenya Side</b>	<b>&lt;Issues and countermeasures&gt;</b>
<p>4. NRW planning and/or implementation capacity of pilot Urban WSPs is enhanced.</p>	<p>4-1 More than X of pilot Urban WSPs continuously make the annual NRW reduction plan based on the review of previous year's implementation. 4-2 More than X of pilot Urban WSPs continuously implement the annual NRW reduction plan formulated in 4-1. 4-3 More than X of pilot Urban WSPs are able to implement skills and activities that pilot Urban WSPs were not able to adopt prior to the Project. 4-4 More than X of pilot Urban WSPs are able to implement priority activities indicated in the NRW reduction plan. 4-5 More than X of pilot Urban WSPs train all of NRW personnel.</p>	<p>NRW reduction remains as priority of WSPs.</p>			
<p>5. Experiences and knowledge of NRW reduction activities are shared among Urban WSPs.</p>	<p>5-1 Case study and lessons learnt of Output 4 and other NRW activities are compiled and disseminated. 5-2 Regular meeting(s) of NRW is/are organized three times a year.</p>	<p>Completed lessons learnt NRW regular meeting minutes and list of participants Project reports JCC meeting minutes NRW reduction annual reports</p>			
<p>1.1 MWI NRW Unit, in cooperation with WASREB, produces NRW annual reports which include NRW reduction data. 1.2 MWI NRW Unit plans and implements NRW reduction sensitization activities for the Counties. 1.3 MWI NRW Unit plans and implements NRW reduction campaigns. 1.4 MWI NRW Unit conducts reviews of KEWI NRW courses. 1.5 MWI NRW Unit conducts reviews of WASREB's NRW reduction activities.</p>	<p>2.1 WASREB conducts a survey of the usages of current NRW reduction standards. 2.2 Based on the survey result as well as Outputs 4 and 5, WASREB revises the NRW reduction standards. 2.3 WASREB promotes revised NRW reduction standards through workshop(s). 2.4 WASREB incorporates the review results of NRW reduction activities by MWI NRW Unit in their activities. 2.5 WASREB monitors and evaluates the usages of revised NRW standards.</p>	<p>1. Experts 2. Equipment/Tools/Materials 3. Japan or third country training</p>	<p>1. Counterpart personnel 2. Equipment/Tools/Materials 3. Facility/Office Space</p>		
<p>3.1KEWI studies current status of NRW reduction courses and its challenges. 3.2KEWI reviews NRW reduction training strategies and course contents. 3.3KEWI, in collaboration with leading WSPs (Embu and Meru, etc.), conducts on-site NRW trainings. 3.4KEWI reflects on-site NRW trainings into NRW course contents and materials. 3.5KEWI incorporates the results of review by MWI NRW Unit into NRW course contents. 3.6KEWI conducts trace studies of NRW reduction course participants.</p>	<p>4.1 The Project team conducts a survey of Urban WSPs and selects pilot Urban WSPs. 4.2 Each pilot WSP conducts analyses of current NRW reduction activities and identifies its challenges. 4.3 Each pilot WSP identifies measures to solve challenges and formulates the NRW reduction plan. 4.4 Each pilot WSP formulates the annual NRW reduction plan including financial schedule based on the NRW reduction plan. 4.5 Each pilot WSP implements the annual NRW reduction plan. 4.6 Each pilot WSP evaluates and analyzes implementation results and revise plans. 4.7 Each pilot WSP produces the NRW reduction activity report annually. 4.8 Each pilot WSP holds regular NRW reduction meetings attended by relevant departments of WSP</p>				
<p>5.1 MWI NRW Unit organizes NRW related regular meetings in cooperation with other relevant organizations. 5.2 WASREB compiles case studies/lessons learnt about NRW reduction activities.</p>					

Note: "X" is the indicator that will be decided after the project commencement.

Revised Plan of Operation (PO)

Inputs	Project Title: Strengthening Capacity of Non-Revenue Water Reduction												Monitoring					
	1st Year			2nd Year			3rd Year			4th Year			5th Year			Remarks	Issue	Solution
	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III			
<b>Expert</b>																		
Chief Adviser/NRW management	Plan																	
Group A: NRW reduction specialist 1/water distribution Network (incl. Mapping & Network analysis)	Actual																	
Group A: NRW reduction specialist 2 /Flow, Pressure and Leakage Monitoring	Plan																	
Group A: NRW reduction specialist 2 /Flow, Pressure and Leakage Monitoring	Actual																	
Group A: NRW reduction specialist 2 /Flow, Pressure and Leakage Monitoring	Plan																	
Group A: NRW reduction specialist 2 /Flow, Pressure and Leakage Monitoring	Actual																	
Group B: NRW reduction management 1 /water distribution Network (incl. Mapping & Network analysis)	Plan																	
Group B: NRW reduction management 1 /water distribution Network (incl. Mapping & Network analysis)	Actual																	
Group B: NRW reduction management 2 /Flow, Pressure and Leakage Monitoring	Plan																	
Group B: NRW reduction management 2 /Flow, Pressure and Leakage Monitoring	Actual																	
Group B: NRW reduction management 2 /Flow, Pressure and Leakage Monitoring	Plan																	
Group B: NRW reduction management 2 /Flow, Pressure and Leakage Monitoring	Actual																	
Training management (incl. training strategy)	Plan																	
Information/Public relation Management	Actual																	
Information/Public relation Management	Plan																	
Information/Public relation Management	Actual																	
Other experts if necessary	Plan																	
Other experts if necessary	Actual																	
Other experts if necessary	Plan																	
Other experts if necessary	Actual																	
<b>Equipment</b>																		
<b>Training in Japan or third country</b>																		
<b>In-country Training</b>																		
<b>Activities</b>																		
<b>Sub-Activities</b>																		
<b>Output 1: Promotion and coordination of NRW reduction activities by MWI NRW Unit are strengthened.</b>																		
1.1 MWI NRW Unit, in cooperation with WASREB, produces NRW annual reports which include NRW reduction data.	Plan																	
1.1 MWI NRW Unit, in cooperation with WASREB, produces NRW annual reports which include NRW reduction data.	Actual																	
1.2 MWI NRW Unit plans and implements NRW reduction sensitization activities for the Counties.	Plan																	
1.2 MWI NRW Unit plans and implements NRW reduction sensitization activities for the Counties.	Actual																	
1.3 MWI NRW Unit plans and implements NRW reduction campaigns.	Plan																	
1.3 MWI NRW Unit plans and implements NRW reduction campaigns.	Actual																	
1.4 MWI NRW Unit conducts reviews of KEWI NRW courses.	Plan																	
1.4 MWI NRW Unit conducts reviews of KEWI NRW courses.	Actual																	
1.5 MWI NRW Unit conducts reviews of WASREB's NRW reduction activities.	Plan																	
1.5 MWI NRW Unit conducts reviews of WASREB's NRW reduction activities.	Actual																	
<b>Output 2: Use of NRW reduction standards by Urban WAPs are promoted by WASREB.</b>																		
2.1 WASREB conducts a survey of the usages of current NRW reduction standards.	Plan																	
2.1 WASREB conducts a survey of the usages of current NRW reduction standards.	Actual																	
2.2 Based on the survey result as well as Outputs 4 and 5, WASREB revises the NRW reduction standards.	Plan																	
2.2 Based on the survey result as well as Outputs 4 and 5, WASREB revises the NRW reduction standards.	Actual																	
2.3 WASREB promotes revised NRW reduction standards through workshop(s).	Plan																	
2.3 WASREB promotes revised NRW reduction standards through workshop(s).	Actual																	
2.4 WASREB incorporates the review results of NRW reduction activities by MWI NRW Unit in their activities.	Plan																	
2.4 WASREB incorporates the review results of NRW reduction activities by MWI NRW Unit in their activities.	Actual																	
2.5 WASREB monitors and evaluates the usages of revised NRW standards.	Plan																	
2.5 WASREB monitors and evaluates the usages of revised NRW standards.	Actual																	
<b>Output 3: NRW related training capacity of KEWI is strengthened.</b>																		
3.1 KEWI studies current status of NRW reduction courses and its challenges.	Plan																	
3.1 KEWI studies current status of NRW reduction courses and its challenges.	Actual																	
3.2 KEWI reviews NRW reduction training strategies and course contents.	Plan																	
3.2 KEWI reviews NRW reduction training strategies and course contents.	Actual																	
3.3 KEWI, in collaboration with leading WSPs (Embu and Meru, etc.), conducts on-site NRW trainings.	Plan																	
3.3 KEWI, in collaboration with leading WSPs (Embu and Meru, etc.), conducts on-site NRW trainings.	Actual																	
3.4 KEWI reflects on-site NRW trainings into NRW course contents and materials.	Plan																	
3.4 KEWI reflects on-site NRW trainings into NRW course contents and materials.	Actual																	
3.5 KEWI incorporates the results of review by MWI NRW Unit into NRW course contents.	Plan																	
3.5 KEWI incorporates the results of review by MWI NRW Unit into NRW course contents.	Actual																	
3.6 KEWI conducts trace studies of NRW reduction course participants.	Plan																	
3.6 KEWI conducts trace studies of NRW reduction course participants.	Actual																	





Table: Prerequisite and Selection Criteria and Basis of Assessment for Each Aspect for Selecting Pilot WSPs (1/4)

Prerequisite Criteria		Level Assessment				
Same as the Pre-selection Criteria		Level 5	Level 4	Level 3	Level 2	Level 1
Selection Criteria	Aspect to Evaluate	Weight (note 1)	Additional Criteria			
1: NRW reduction activities based on NRW plan [Allocation: 20 Points]	1) Whether the County has a clear water supply development strategy.	1	Strategy/plan of the County includes a pipe replacement plan and mentions about NRW (e.g. in its county integrated development plan)	Strategy/plan of the County does not include a pipe replacement plan but it mentions about NRW.	Strategy/plan of the County includes a pipe replacement plan but it does not mention about NRW.	Strategy/plan of the County does not include a pipe replacement plan nor mentions about NRW.
	2) Whether the WSP uses subsidy from the County.	1	The WSP does not use subsidy from the County for its water supply services.	The WSP uses subsidy from the County (excluding payment for services).	-	The WSP applies for subsidy to the County but not able to receive it.
	3) Whether the WSP has an NRW reduction plan.	1	The WSP has an annual NRW reduction plan for this year.	-	-	The WSP does not have an annual NRW reduction plan for this year.
	4) Whether the WSP has been implementing the NRW reduction plan.	2	The WSP carries out NRW reduction activities along the NRW reduction plan.	The WSP has NRW reduction activities are not following the plan.	The WSP carries out NRW reduction activities but does not have NRW reduction plan	The WSP does not have NRW reduction plan and does not carry out NRW reduction activities.
	5) Whether the WSP periodically reports NRW reduction activities to its Board of Directors	1	The WSP periodically reports its NRW reduction activities to its Board of Directors (in addition to the monthly report to WSB/WASREB).	-	The WSP reports its NRW reduction activities to its Board but not periodically.	The WSP currently does not report the activities to its Board but has a plan to report in the near future.
Additional Criteria			Number of the pre-selection criteria which are currently not met.			
9) Counties, WSBs and WSPs have willingness to sign Memorandum of Understanding (MoU).			Number of the pre-selection criteria which are currently not met.			
1) WSPs that are not receiving other development partner's assistance with similar activities of the Project. (Yes if there has not been recently)						
2) WSPs that have established NRW units.						
3) O&M cost recovery is 80% or more.						
4) Metering ratio is 75% or more.						
5) Water coverage ratio is 30% or more.						
6) Water service hours are 10 hour or more.						
7) Service connections are more than 5,000. (Medium or Larger WSP (number of towns))						
8) WSPs in location acceptable under JICA's security guidelines.						

Table: Prerequisite and Selection Criteria and Basis of Assessment for Each Aspect for Selecting Pilot WSPs (2/4)

Selection Criteria	Aspect to Evaluate	Weight (note 1)	Level Assessment				
			Level 5	Level 4	Level 3	Level 2	Level 1
Selection Criteria 2: WSP's Organization and structures necessary for NRW reduction [Allocation: 20 Points]	1) Whether the NRW Unit has allocated necessary and adequate staff for NRW reduction activities.	2	The roles of the NRW Unit is clear and sufficient staff is allocated to implement activities.	The roles of the NRW Unit is not clear but sufficient staff is allocated to the Unit.	The roles of the NRW Unit is clear but no prospect of having sufficient staff.	The roles of the NRW Unit is not clear and no prospect of having sufficient staff.	
	2) Status of budget allocation for NRW reduction.	1.5	Budget for NRW reduction has been continuously allocated for three years or more.	Budget for NRW reduction has been continuously allocated for two years.	Budget for NRW reduction is allocated this year.	No budget is allocated for NRW reduction this year.	
	3) Whether the WSP has an internal capacity building system such as OJT.	1	The WSP has a functioning internal capacity building system sufficient for various NRW reduction activities.	The WSP has an internal capacity building system for NRW reduction but it is not functioning well or not sufficient.	The WSP has internal capacity building system but not specific to NRW reduction.	The WSP does not have an internal capacity building system but it has a plan to develop the system.	The WSP neither have an internal capacity building system nor a plan to develop it.
	4) Whether the WSP has sufficient communication and technical staff for NRW reduction.	1	Communication between commercial and technical staff are sufficient for effective and efficient NRW reduction activities, which include monthly inter-departmental meetings for NRW reduction and use of information technologies.	Meetings between commercial and technical staff specifically for NRW reduction are held once a month.	Inter-departmental meetings for NRW reduction are not held once a month but NRW reduction activities and NRW ratios are usually discussed in monthly general meetings.	Inter-departmental meetings, where NRW reduction activities and NRW ratios are discussed, are held less frequent than monthly but at least quarterly.	Inter-departmental meetings, where NRW reduction activities and NRW ratios are discussed, are held less frequent than quarterly.

Table: Prerequisite and Selection Criteria and Basis of Assessment for Each Aspect for Selecting Pilot WSPs (3/4)

Selection Criteria	Aspect to Evaluate	Weight (note 1)	Level Assessment				
			Level 5	Level 4	Level 3	Level 2	Level 1
Selection Criteria 3: Technical capacity of WSP on NRW reduction [Allocation: 40 Points]	1) Whether zoning and bulk meters are functioning.	2	NRW ratios for well-established sub-zones (i.e. DMA) are calculated monthly based on functioning bulk meters.	NRW ratios are partly calculated at sub-zones level every month while NRW ratios of all the distribution zones are calculated monthly based on functioning bulk meters.	NRW ratios of all the distribution zones are calculated monthly based on functioning bulk meters.	A single NRW ratio of all water service areas is calculated monthly based on functioning bulk meters.	A single NRW ratio of all water service areas is not calculated monthly based on functioning bulk meters.
	2) Whether maps of pipeline networks are well prepared and utilized.	2	A full-scale GIS database (including service pipes, customer meters, etc.) has been well-established, updated and well-utilized (e.g. for pipe rehabilitation planning, hydraulic analysis, etc.)	A full-scale GIS database (including service pipes, customer meters, etc.) has been established but it has some problems with completeness, update and/or utilization.	A preliminary GIS database has been established (including transmission and distribution branch mains).	Paper drawings are available for transmission and distribution trunk mains, but drawings of branch distribution mains are limited.	Available paper drawings of transmission and distribution trunk mains are limited.
	3) Whether the WSP properly controls the accuracy of customer meters.	2	High-accuracy customer meters (e.g. Class C) are used and systematically exchanged area by area in a cycle of less than 10 years.	High-accuracy customer meters (e.g. Class C) are used, and Customer meters are exchanged customer by customer both proactively (e.g. checking with billing system and field tests) and passively.	High-accuracy customer meters are not used, but Customer meters are exchanged customer by customer both proactively and passively.	Customer meters are only exchanged passively but promptly when found broken or customer complained.	Customer meters are only exchanged passively and not promptly when found broken or customer complained.
	4) Whether the WSP appropriately manages illegal water use.	2	Illegal connections are minimum.	Illegal connections are not minimum but there are no area where illegal connections are found repeatedly.	Illegal connections are found repeatedly in limited areas although proactive control measures are conducted.	Illegal connections are still common in many areas.	Illegal connections are widespread all over its service areas.
	5) Whether the WSP actively makes efforts to reduce leakage.	2	Various measures including step test are conducted for underground leakage detection in accordance to an effective and efficient strategy.	Multiple measures are proactively conducted for underground leakage detection.	Underground leakage detection is conducted rather passively only when the needs arises.	Regular patrol for surface leakage detection is conducted.	Regular patrol for surface leakage detection is not conducted.
	6) Whether the WSP repair leakage promptly	2	Taking less than one day on average to fix leakages once they are reported or detected.	Taking less than two days on average to fix leakages once they are reported or detected.	Taking less than three days on average to fix leakages once they are reported or detected.	Taking less than one week on average to fix leakages once they are reported or detected.	Taking more than one week on average to fix leakages once they are reported or detected.

Table: Prerequisite and Selection Criteria and Basis of Assessment for Each Aspect for Selecting Pilot WSPs (4/4)

Selection Criteria	Aspect to Evaluate	Weight (note 1)	Level Assessment				
			Level 5	Level 4	Level 3	Level 2	Level 1
Selection Criteria 4: Financial status related to NRW reduction [Allocation: 20 Points]	1) Difference between Cash Flow Available for Debt Service and Total Debt (million KES) (note 2)	3	>50	21-50	11-20	0-10	<0
	> Cash Flow Available for Debt Service (mill KES)	-	-	-	-	-	-
	> Total Debt (mill KES)	-	-	-	-	-	-
	2) Liquidity Ratio (%) (note 3)	1.5	>25%	20-25%	15-20%	10-15%	<10%
	3) Liquidity Reserves as % of annual operating expenses (%)	1.5	>25%	20-25%	15-20%	10-15%	<10%
	4) O&M Cost Coverage Ratio (%)	1.5	>130%	120-130%	110-120%	100-110%	<100%
	> Grants Revenue (mill KES)	-	-	-	-	-	-
> Grant Dependency for opex.	-	-	-	-	-	-	
5) Collection Efficiency	1.5	>95%	93-94%	90- 92%	85-89%	<85%	
6) Average Tariff Differentia (%) (note 4)	1	>50%	35-50%	20-35%	5-20%	<5%	
7) Revenue Diversification (%) (note 5)	1	<10%	10-30%	30-50%	50-70%	>70%	

Note 1: Score = Weight x Level, and Point for each selection criteria = Total score / Max score x Allocated points; Note 2: Cash flow available to service debt payments (i.e. net operating cash flow + Interest repayments) - Total debt, which indicates utility's ability to service debt; Note 3: Liquidity reserves (i.e. cash & near cash reserves) / Current liabilities; Note 4: (Unit production cost - Average tariff) / Unit production cost; and Note 5: (Residential revenue - Institutional revenue) / Total revenue

Amended Plan of Operation (Version 1)

Project Title: Strengthening Capacity of Non-Revenue Water Reduction													Date: 29 May, 2017										
Inputs													Monitoring										
Expert	1st Year				2nd Year				3rd Year				4th Year				5th Year				Remarks	Issue	Solution
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV			
Chief Adviser/NRW management	Plan				Plan				Plan				Plan				Plan						
Group A: NRW reduction specialist 1 (water distribution Network (incl. Mapping & Network analysis)	Actual				Actual				Actual				Actual				Actual						
Group A: NRW reduction specialist 2 (Flow, Pressure and Leakage Monitoring)	Plan				Plan				Plan				Plan				Plan						
Group A: Customer Management/Billing collection	Actual				Actual				Actual				Actual				Actual						
Group B: NRW reduction management 1 (water distribution Network (incl. Mapping & Network analysis)	Plan				Plan				Plan				Plan				Plan						
Group B: NRW reduction management 2 (Flow, Pressure and Leakage Monitoring)	Actual				Actual				Actual				Actual				Actual						
Group B: Customer Management/Billing collection	Plan				Plan				Plan				Plan				Plan						
Training management (incl. training strategy)	Actual				Actual				Actual				Actual				Actual						
Information/Public relation Management	Plan				Plan				Plan				Plan				Plan						
Other experts if necessary	Actual				Actual				Actual				Actual				Actual						
Equipment	Plan				Plan				Plan				Plan				Plan						
Training in Japan or third country	Plan				Plan				Plan				Plan				Plan						
In-country Training	Actual				Actual				Actual				Actual				Actual						
Activities	Plan				Plan				Plan				Plan				Plan						
Sub-Activities	Actual				Actual				Actual				Actual				Actual						
Output 1: Promotion and coordination of NRW reduction activities by MWI NRW Unit are strengthened.	Plan				Plan				Plan				Plan				Plan						
1.1 MWI NRW Unit, in cooperation with WASREB, produces NRW annual reports which include NRW reduction data.	Actual				Actual				Actual				Actual				Actual						
1.2 MWI NRW Unit plans and implements NRW reduction sensitization activities for the Counties.	Plan				Plan				Plan				Plan				Plan						
1.3 MWI NRW Unit plans and implements NRW reduction campaigns.	Actual				Actual				Actual				Actual				Actual						
1.4 MWI NRW Unit conducts reviews of KEWI NRW courses.	Plan				Plan				Plan				Plan				Plan						
1.5 MWI NRW Unit conducts reviews of WASREB's NRW reduction activities	Actual				Actual				Actual				Actual				Actual						
Output 2: Use of NRW reduction standards by Urban WAPs are promoted by WASREB.	Plan				Plan				Plan				Plan				Plan						
2.1 WASREB conducts a survey of the usages of current NRW reduction standards.	Actual				Actual				Actual				Actual				Actual						
2.2 Based on the survey result as well as Outputs 4 and 5, WASREB revises the NRW reduction standards.	Plan				Plan				Plan				Plan				Plan						
2.3 WASREB promotes revised NRW reduction standards through workshop(s).	Actual				Actual				Actual				Actual				Actual						
2.4 WASREB incorporates the review results of NRW reduction activities by MWI NRW Unit in their activities.	Plan				Plan				Plan				Plan				Plan						
2.5 WASREB monitors and evaluates the usages of revised NRW standards.	Actual				Actual				Actual				Actual				Actual						
Output 3: NRW related training capacity of KEWI is strengthened.	Plan				Plan				Plan				Plan				Plan						
3.1 KEWI studies current status of NRW reduction courses and its challenges.	Actual				Actual				Actual				Actual				Actual						
3.2 KEWI reviews NRW reduction training strategies and course contents.	Plan				Plan				Plan				Plan				Plan						
3.3 KEWI, in collaboration with leading WSPs (Embu and Meru, etc.), conducts on-site NRW trainings.	Actual				Actual				Actual				Actual				Actual						
3.4 KEWI reflects on-site NRW trainings into NRW course contents and materials.	Plan				Plan				Plan				Plan				Plan						
3.5 KEWI incorporates the results of review by MWI NRW Unit into NRW course contents.	Actual				Actual				Actual				Actual				Actual						
3.6 KEWI conducts trace studies of NRW reduction course participants.	Plan				Plan				Plan				Plan				Plan						

**Output 4: NRW planning and/or implementation capacity of pilot Urban WSPs is enhanced.**

	Plan		Actual		1st Year		2nd Year		3rd Year		4th Year		5th Year		Remarks	Issue	Solution
	Plan	Actual	Plan	Actual	I	II	III	IV	I	II	III	IV	I	II			
4.1 The Project team conducts a survey of Urban WSPs and selects pilot Urban WSPs.																	
4.2 Each pilot WSP conducts analyses of current NRW reduction activities and identifies its challenges.																	
4.3 Each pilot WSP identifies measures to solve challenges and formulates the NRW reduction plan.																	
4.4 Each pilot WSP formulates the annual NRW reduction plan including financial schedule based on the NRW reduction plan.																	
4.5 Each pilot WSP implements the annual NRW reduction plan.																	
4.5.1 Embu and Meru implement the annual NRW reduction plan																	
4.5.2.2 of 4 pilot WSPs implement the annual NRW reduction plan																	
4.5.3 The rest 2 pilot WSPs implement the annual NRW reduction plans.																	
4.6 Each pilot WSP evaluates and analyzes implementation results and revise plans.																	
4.7 Each pilot WSP produces the NRW reduction activity report annually.																	
4.8 Each pilot WSP holds regular NRW reduction meetings attended by relevant departments of WSP.																	

**Output 5: Experiences and knowledge of NRW reduction activities are shared among Urban WSPs.**

5.1 MWI NRW Unit organizes NRW related regular meetings in cooperation with other relevant organizations.																	
5.2 WASREB compiles case studies/lessons learnt about NRW reduction activities.																	

	Plan		Actual		1st Year		2nd Year		3rd Year		4th Year		5th Year		Remarks	Issue	Solution
	Plan	Actual	Plan	Actual	I	II	III	IV	I	II	III	IV	I	II			
<b>Duration / Phasing</b>																	
<b>Monitoring Plan</b>																	
Joint Coordination Committee																	
Submission of the Monitoring sheet																	
Joint Monitoring																	
<b>Reports/Documents</b>																	
Work Plan																	
Project Progress Report																	
Project Completion Report																	
<b>Public Relations</b>																	
Plan																	
Actual																	

Note: ● Main person in charge ○ Person concerned

**(MODEL FORM)**  
**FRAMEWORK OF COOPERATION**  
**FOR**  
**NON-REVENUE WATER REDUCTION ACTIVITIES**  
**OF**  
**“PROJECT FOR STRENGTHENING CAPACITY IN NON- REVENUE**  
**WATER REDUCTION”**

This Framework of Cooperation (FOC) is made and entered by and among the following parties:

-The County Government of XXXX as one party represented by [Name of Position] (hereinafter referred to as “County Government”)

and

-XXXX Water and Sewerage Services as one party by the General Manager (hereinafter referred to as “YYYY”)

Witnessed by

Ministry of Water and Irrigation, represented by the Director Water, Sewerage and Sanitation Development (hereinafter referred to as “MWI”).

**1. Background of the FOC**

Based on the result of the survey conducted by the Japan International Cooperation Agency (hereinafter referred to as “JICA”) experts and MWI, YYYY has been selected as one of the Pilot Water Service Providers of “Project for Strengthening Capacity in Non-Revenue Water Reduction” (hereinafter referred to as “the Project”). This FOC is an agreement between the two parties specified above for smooth implementation of the Project.

**2. Dates of Validation and Completion of the FOC**

This FOC shall be valid from the date of FOC signing, (Date Month, Year) until the completion of the Project.

**3. Amendments of the FOC**

Any necessary amendments to the FOC may be negotiated by the two parties. Agreed amendments shall be evidenced by a written document signed by the two parties.

**4. Law**

The law of the Republic of Kenya shall govern this FOC.

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## 5. Indemnities

**County Government** shall indemnify **YYYY** for any actions and/or defaults of the former. **County Government** shall take full responsibility for any loss or damage caused by any actions performed by itself.

**YYYY** shall indemnify **County Government** for any actions and/or defaults of the former. **YYYY** shall take full responsibility for any loss or damage caused by any actions performed by itself.

## 6. Confidentiality

Both parties shall not transfer, divulge or disclose any confidential information to the third party, unless:

- Prior written consent from the other party is obtained; and/or
- The information is already in the public domain; and/or
- Disclosure is required by applicable laws or by judgment of a court of justice or an arbitral decision.

## 7. Role of the County Government

**County Government** shall be responsible for the following particulars during the period of the Project.

- County Government** shall support **YYYY**, as its lawful owner, for the implementation of non-revenue water (NRW) reduction activities of the Project.
- County Government** shall provide budgetary allocation for NRW reduction activities.
- County Government** shall provide the legal framework to assist **YYYY** in taking actions for NRW reduction against any wrong doing to cause NRW such as illegal connections, and tampering water meters etc.
- County Government** shall monitor the operations of **YYYY** to ensure that the NRW targets are achieved.
- County Government** shall support **YYYY** in promotion of public awareness on NRW related activities.

## 8. Role of the Water Service Provider

**YYYY** shall be responsible for the following particulars during the period of the Project. .

- Assignment of counterpart personnel and support staff.
- Payment of per diem (daily allowance, transport fee and accommodation fee) to the counterpart personnel.
- Provision of suitable workspace with furniture and equipment for JICA experts (for at least 4 persons).
- Utility charges such as electricity, telephone and water supply, if any.
- Supply or replacement of machinery, equipment, instruments, vehicles, tools, spares parts and any other materials necessary for the implementation of the project other than the equipment provided by JICA as well as maintaining those items including equipment provided by JICA.

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- f) Expenses for NRW activities.
- g) Provision of information on available medical services for JICA experts.
- h) Provision of available data (including maps and photographs) and information required for project activities.

**9. Settlement of Dispute**

Upon any dispute arising, both parties shall attempt to settle the dispute amicably.

Venue, date

---

Name  
Position  
The County Government of XXXX

---

Name  
Position  
XXXX Water and Sewerage Services

Witnessed by

---

Eng. SAO Alima  
Director Water, Sewerage and Sanitation Development,  
State Department for Water Service,  
Ministry of Water and Irrigation

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**TO CR of JICA Kenya OFFICE****PROJECT MONITORING SHEET Ver.2**

**Project Title: THE PROJECT FOR STRENGTHENING CAPACITY IN NON-REVENUE WATER REDUCTION**

**Version of the Sheet: Ver.2 (Term: Feb. – May 2017)**

**Name: Masayuki IGAWA**

**Title: Chief Advisor**

**Submission Date: May 29, 2017**

**I. Summary****1 Progress****1-1 Progress of Inputs (as of 15 of May, 2017)****Input by Japanese**

Experts: Overall 8 experts were dispatched in two missions during the reporting period:

First mission (1 Feb.2017-24 Mar. 2017)

Second mission (7 May - 15 May 2017)

Man Month (M/M) in total from Oct. 2016:

Experts: 26.0 M/M (excluding MM in Japan)

Local staff: 11.9 M/M

**Input by Kenyan**

Project CPs: Total number of CPs participated in the period is 34 representing the following organization.

MWI ( 5 ), WASREB ( 5 ), KEWI ( 4 ), WASPA (3), Meru WSP ( 6 ), Embu WSP ( 11 )

Facilities: Project office at MWI and KEWI as well as regular meeting rooms were provided. Vehicles for field visits were provided.

Project implementation costs: The traveling costs of MWI/KEWI staff during the Baseline Survey were provided by MWI.

**1-2 Progress of Activities**

The following tables indicate the activities implemented during the reporting period.

Activity	Progress
<b>Output 1</b>	
1-1 MWI NRW Unit, in cooperation with WASREB, produces NRW annual reports which include NRW reduction data.	Discussion on the contents of annual report is ongoing.
1-2 MWI NRW Unit plans and implements NRW reduction sensitization activities for the Counties.	Annual plan for sensitization activities has been formulated. Three NRW sensitization workshops will be conducted in May/June 2017
1-3 MWI NRW Unit plans and implements NRW reduction campaigns.	Survey on sensitization activities by Pilot WSPs has been conducted. Annual plan for sensitization is formulated.
1-4 MWI NRW Unit conducts reviews of KEWI NRW courses.	Assessment of KEWI is conducted as part of Output3 with MWI involved.
1-5 MWI NRW Unit conducts reviews of WASREB's NRW reduction activities.	Assessment of WASREB is conducted as part of Output2 with MWI involved.
<b>Output 2</b>	
2-1 WASREB conducts survey of the usage of current NRW reduction standards.	Procurement of consultant to conduct the survey is on going, The Survey will be conducted between May to Sep.2017.
2-2 Based on the survey result as well as Output 4 and 5, WASREB revises the NRW reduction standards.	The activity will be implemented in the 3rd phase.
2-3 WASREB promotes revised NRW standards through workshop(s).	The activity will be implemented in the 3rd phase.
2-4 WASREB incorporates the review results of NRW reduction activities by MWI NRW Unit in their activities.	The activity will be implemented in the 2nd phase.
2-5 WASREB monitors and evaluates the usage of revised NRW standards.	The activity will be implemented in the 3rd phase.





<b>Output 3</b>	
3-1 KEWI studies current status of NRW reduction courses and its challenges.	Current status and issues has been identified from the Baseline Survey.
3-2 KEWI reviews NRW reduction training strategies and course contents.	Materials for joint training with Leading WSPs has been developed.
3-3 KEWI, in collaboration with leading WSPs (Embu and Meru, etc.), conducts on-site NRW trainings.	Preparation of pilot joint training with the Leading WSPs is ongoing and will be conducted in June.
3-4 KEWI incorporates on-site NRW trainings into NRW course contents and materials.	Textbook for on-site NRW trainings has been developed.
3-5 KEWI incorporates the results of review by MWI NRW Unit into NRW course contents.	Review is ongoing by NRW Unit.
3-6 KEWI conducts trace studies of NRW reduction course participants.	KEWI has not carried out this survey so far.
<b>Output 4</b>	
4-1 The Project team conducts a survey of Urban WSPs and selects pilot Urban WSPs.	Based on the Baseline Survey, 7 Pilot WSPs were selected out of 15 candidate WSPs.
4-2 Each Pilot WSP conducts analyses of current NRW reduction activities and identifies its challenges.	The Experts shared the results of assessments with Pilot WSPs. Participatory planning including identification of weaknesses and interventions is ongoing.
4-3 Each Pilot WSP identifies measures to solve challenges and formulates the NRW reduction plan.	
4-4 Each Pilot WSP formulates the annual NRW reduction plan including financial schedule based on the NRWE reduction plan.	
4-5 Each Pilot WSP implements the annual NRW reduction plan.	Leading and 4 Group 1 Pilot WSPs are scheduled to start implementations of their annual plans from July 2017.
4-6 Each Pilot WSP evaluates and analyzes implementation results and revises the plans.	Reviews of implementation results of pilot WSPs will start from April 2018 to revise the NRW reduction plans while
4-7 Each Pilot WSP produces the NRW reduction activity report annually.	

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	preparing their annual activity reports.
4-8 Each Pilot WSP holds regular NRW reduction meetings attended by relevant departments of WSP.	Regular internal meetings for NRW reduction will be held once the implementation starts in July 2017.
<b>Output 5</b>	
5-1 MWI NRW Unit organizes NRW related regular meetings in cooperation with other relevant organizations.	MoU with WASPA has been signed. Survey results on
5-2 WASREB compiles case studies/lessons learnt about NRW reduction activities.	Knowledge management is finalized.

**1-3 Achievement of Output**

Output 1: Promotion and coordination of NRW reduction activities by MWI NRW Unit are strengthened.	
1-1 All County representative participate NRW related seminar(s).	Sensitization to County technical officers are planned in May-June 2017.
1-2 NRW reduction campaigns are conducted semi annually.	Annul sensitization plan is formulated.
1-3 NRW reduction annual reports are produced.	Discussions on how to improve the report are ongoing
Output 2: Use of NRW reduction standards by Urban WSPs are promoted by WASREB	
2-1 NRW reduction standards are revised by year X.	X will be decided upon the user survey is completed.
2-2 Revised NRW reduction standards are disseminated to all Urban WSPs through workshop(s).	Not yet happen
Output 3: NRW related training capacity of KEWI is strengthened.	
3-1 KEWI conducts NRW reduction courses with contents incorporating on-site trainings and revised course materials.	On-site training text have been developed. Pilot joint training is planned in June 2017.
3-2 Evaluations by the NRW course participants is higher than before the revision of course materials.	This will happen once revisions of the training course materials are completed.

3-3 X % of NRW course participants formulate the work plans.	Not yet happen
Output 4: NRW planning and/or implementation capacity of pilot Urban WSPs is enhanced.	
4-1 More than X of pilot Urban WSPs continuously make the annual NRW reduction plan based on the review of previous years implementation.	Leading and 4 Group 1 Pilot WSPs are scheduled to start implementations of their annual plans from July 2017. X will be decided in early Phase 2.
4-2 More than X of pilot Urban WSPs continuously implement the annual NRW reduction plan formulated in 4-1.	
4-3 More than X of pilot Urban WSPs are able to implement skills and activities that pilot Urban WSPs were not able to adopt prior to the Project.	
4-4 More than X of pilot Urban WSPs are able to implement priority activities indicated in the NRW reduction plan.	
4-5 More than X of pilot Urban WSPs train all personnel of NRW reduction section.	
Output 5: Experiences and knowledge of NRW reduction activities are shared among Urban WSPs.	
5-1 Case study and lessons learnt of Output 4 and other NRW activities are compiled and disseminated.	Not yet happened
5-2 Regular meeting(s) of NRW is/are organized three times a year.	Not yet happened

#### 1-4 Achievement of the Project Purpose

Project Purpose: A NRW reduction support mechanism is established for Urban WSPs to implement NRW	
Indicator	Achievement
X of Pilot Urban WSPs continue achieving target set by the annual NRW reduction plan for two years.	Pilot WSPs has been selected. Number of X will be determined after Oct 2017 after the activities on Group 1 Pilot WSPs (and Leading WSPs) commenced.

#### 1-5 Changes of Risks and Actions for Mitigation

At this moment, there is no risks have been identified.

#### 1-6 Progress of Actions undertaken by JICA

JICA has been providing project vehicles. Representative from Kenya office has been attending JCC meetings.

#### 1-7 Progress of Actions undertaken by GoK

MWI has secured the budget for NRW Unit for the year 2016-17 which will be used for

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the activities. They have also submitted the budget for 2017-18 for the following year.

**1-8 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)**

MoU between MWI and WASPA

WASPA represents many of Urban WSPs in Kenya. Memorandum of Understanding has been signed between WASPA and MWI, making their cooperation as official.

Coordination of Project activities with county governments

A seminar to introduce the selection of Pilot WSPs to county government was organized in March 2017 at the secretariat of the Council of Governors (CoG). Corporation and coordination for the Project implementation with CoG has been agreed.

Development of NRW Policy

National NRW Policy has been developed and the stakeholder workshop was organized in May 2017. The Policy is expected to be finalized by the end of 2017.

**2 Delay of Work Schedule and/or Problems (if any)**

There are following delays of activities during the reporting period.

Extension of Baseline Survey		
2-1 Detail	2-2 Cause	2-3 Actions Taken
The duration of the Baseline Survey was extended from 3 month to 4 months.	The Survey period was extended because the activities were stopped in the month of December 2016.	The Baseline Survey has been completed in March 2017.

**2-4 Roles of Responsible Persons/Organization (JICA, GoK etc.)**

Indicated above.

**3 Modification of the Project Implementation Plan**

**3-1 PO**

Some medications of timing of activities/input have been made in PO (version 0) and the

modifications are expected to be approved in the 2<sup>nd</sup> JCC.

### **3-2 Other modifications on detailed implementation plan**

*(Remarks: The amendment of RID and PDM (title of the project, duration, project site(s), target group(s), implementation structure, overall goal, project purpose, outputs, activities, and input) should be authorized by JICA HDQs. If the project team deems it necessary to modify any part of RID and PDM, the team may propose the draft.)*

No modification has been made in the reporting period.

## **4 Preparation of GoK Outlook after completion of the Project**

Formulation of NRW policy is at the final stage and is expected to be effective in this year.

MWI secured enough budget to conduct activities to the NRW Unit that shows the seriousness of MWI on issues on NRW reduction in Kenya.

**II. Project Monitoring Sheet 2 is Attached**

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## Annex- 5

## Attendant list

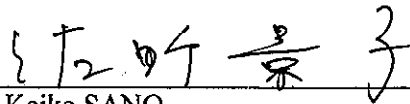
Members Present	Name	Organization	Position
1	PROF. FRED H.K. SEGOR	MWI	Principal Secretary
2	ENG.LAWRENCE SIMITU	MWI	Water Secretary
3	ENG. SAO ALIMA	MWI	Director, WSSD
4	DAVID N. MABONGA	MWI	Chief Superintendent, Water
5	MARY W. MWANGI	MWI	Senior Superintendent, Water
6	ONESMUS MWANGI	MWI	Superintendent, Water
7	DANIEL NGUGI	WASREB	Engineer
8	EDDAH WAMBUI	WASPA	CEO
9	DR.LEUNITA SUMBA	KEWI	Director
10	DAVID NGETICH	KEWI	Deputy Director
11	WALTER MOSETI	KEWI	Lecturer
12	GEORGE KARANJA	MEWASS	General Manager
13	H.M. KARUGENDO	EWASCO	Managing Director
14	ENG. DAVID ONYANGO	KIWASCO	Managing Director
15	HEZEKIAH MWARUA	KIMAWASCO	Acting Managing Director
16	JIMMY KEMBOI	ELDOWASS	Acting Managing Director
17	SHINJIRO AMAMEISHI	JICA	Senior Representative
18	MASAHITO MIYAGAWA	JICA	Representative
19	JOHN N. NGUGI	JICA	Senior Programming Officer
20	MASAYUKI IGAWA	JICA	JICA Expert Team
21	SHOZO MORI	JICA	JICA Expert Team
22	HIROKO SUGIMOTO	JICA	JICA Expert Team
23	EVANS GITAHU	JICA	JICA Expert Team
24	CHARLES MAINGI	JICA	JICA Expert Team
25	SATOSHI SHIBAZAKI	JICA	JICA Expert Team
26	MASAYUKI TAGUCHI	JICA	JICA Expert Team

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MINUTES OF MEETING  
OF  
THE THIRD JOINT COORDINATION COMMITTEE MEETING  
ON  
THE PROJECT FOR  
STRENGTHENING CAPACITY IN NON-REVENUE WATER REDUCTION  
AGREED UPON BETWEEN  
JAPAN INTERNATIONAL COOPERATION AGENCY  
AND  
MINISTRY OF WATER AND IRRIGATION  
THE REPUBLIC OF KENYA

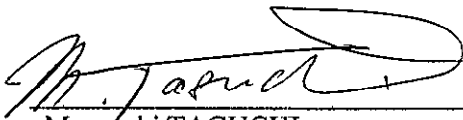
Nairobi, February 16, 2018



Keiko SANO  
Chief Representative  
JICA Kenya Office



Professor Fred H.K. SEGOR  
Principal Secretary  
State Department for Water Services  
Ministry of Water and Irrigation  
The Republic of Kenya



Masayuki TAGUCHI  
Chief Advisor  
JICA Experts Team

In accordance with the Record of Discussion (hereinafter referred to as the "R/D") signed on March 7<sup>th</sup>, 2016 between the Ministry of Water and Irrigation (hereinafter referred to as "MWI") and Japan International Cooperation Agency (hereinafter referred to as "JICA") on "The Project for Strengthening Capacity in Non-Revenue Water Reduction" (hereinafter referred to as "the Project"), JICA dispatched an experts team (hereinafter referred to as "the JICA Experts Team") for the Project.

The Third Joint Coordinating Committee (hereinafter referred to as "the JCC") meeting was held by the initiative of MWI on 25<sup>th</sup> January 2018 to discuss and confirm the progress and Work Plan 2 for the Project. The major points of discussions and agreements are as follows:

**1. Contents and Schedule of Work Plan 2**

The JCC approved the contents and schedule of Work Plan 2. (Refer to Annex-1)

**2. Result of Project Monitoring Ver. 3**

The JCC confirmed the contents of the Project Monitoring Sheet Ver. 3 (covering the period from June 2017 to December 2017), which was presented by the Project Implementation Committee (hereinafter referred to as "the PIC"). (Refer to Annex-2)

**3. Revision of PDM ver.0 and Schedule of the Modification of R/D**

The JCC agreed to revise PDM ver.0 to PDM ver.1 (Annex-3). The numerical targets of some objectively verifiable indicators shown as X of PDM ver.1 will be determined in the next JCC (4<sup>th</sup> JCC). The JCC agreed to modify the R/D after setting the remaining X of the numerical targets in the 4<sup>th</sup> JCC.

**4. Other issues discussed in the third JCC meeting**

**(1) The Current Issues between County Governments and WSPs**

The JICA Experts Team requested the Kenyan side to settle the current issues between County governments and WSPs, including Meru's case. MWI responded that currently there were similar issues in Muranga and Kiambu counties. MWI explained that WASREB has been exercising its power as an institution for regulating water service providers. MWI also said that the Ministry would make a sensitization forum for County governments to understand the water service provider's role and responsibility in February or early March 2018 in order not to affect the Project implementation.

**(2) Equipment and Materials for Pilot WSPs' Activities in Phase 2**

The JICA Experts Team requested the Kenyan side to procure equipment and materials necessary for supporting pilot WSPs' activities in Phase 2 by April 2018. The JCC confirmed that MWI NRW Unit is responsible for this issue. MWI NRW Unit agreed to procure the equipment and materials (annex-4) by April 2018 as requested.

**(3) Budget for Activities in Phase 2 and Renovation of KEWI's Training Facilities**

The JICA Experts Team requested the Kenyan side to ensure disbursement of budget for implementing the project activities in Phase 2 and for KEWI's renovation of the training facilities within this fiscal year 2017/18 in a timely manner. MWI NRW Unit agreed to discuss with KEWI and to decide the amount of allocation to KEWI within the next two weeks.

**(4) Formulation of Editorial Committee for Revision of NRW Management Standards**

The JICA Experts Team proposed that the Kenyan side formulates an editorial committee for revising WASREB's "NRW Management Standards" by the end of March 2018. WASREB agreed to nominate appropriate committee members by the end of February 2018.

**(5) Increase of Number of Young C/P Officers in MWI NRW Unit**

The JICA Experts Team requested the Kenyan side to increase the number of young counterpart officers assigned to the NRW Unit of MWI for succession arrangements in order to sustain the NRW reduction support mechanism being formulated in the Project. MWI agreed to make an effort to arrange for assigning two engineers to the NRW Unit at the time of next recruitment.

**5. Schedule of the Next JCC**

The JCC decided that the next JCC meeting will be held in July 2018.

END

Annex-1: Work Plan 2

Annex-2: Project Monitoring Sheet Ver. 3

Annex-3: PDM Ver.1

Annex-4: List of Equipment and Materials for Pilot WSPs' activities in Phase 2

Annex-5: Attendance list

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ANNEX 1:  
WORK PLAN 2



PROJECT FOR STRENGTHENING CAPACITY IN  
NON-REVENUE WATER REDUCTION

IN

THE REPUBLIC OF KENYA

**WORK PLAN 2**

**JANUARY 2018**

**KYOWA ENGINEERING CONSULTANTS CO., LTD.**

**TSS TOKYO WATER CO., LTD.**

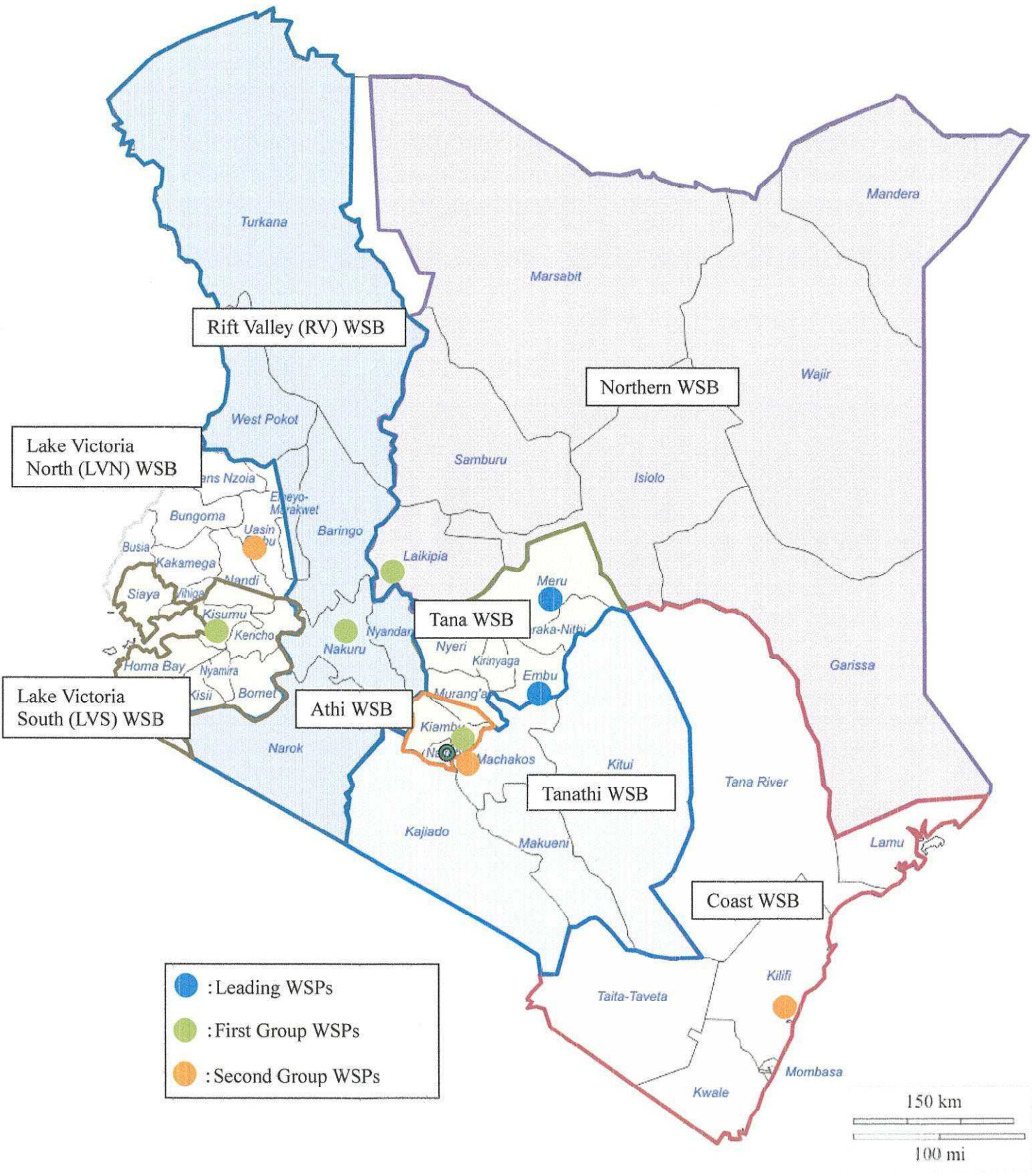
**TOKYO WATERWORKS INTERNATIONAL CO., LTD.**

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*[Signature]*

# Location of Project Sites



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## ABBREVIATIONS

ABBREVIATIONS	FULL NAME
AFD	Agence Française de Developpment
CoG	Council of Governors
CP	Counter Part
DMA	District Metered Area
FOCs	Framework of Cooperation
GIS	Geographic Information System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GoJ	Government of Japan
GoK	Government of Kenya
ICT	Information and Communication Technology
JCC	Joint Coordination Committee
JICA	Japan International Cooperation Agency
KEWI	Kenya Water Institute
KEWASNET	Kenya Water and Sanitation CSOs Network
KfW	Kreditanstalt für Wiederaufbau
M/M	Minutes of Meeting
MOUs	Memorandum of Understanding
MWI	Ministry of Water and Irrigation
NGOs	Non-Governmental Organisations
NRW	Non-Revenue Water
O&M	Operations & Maintenance
PDCA	Plan Do Check Act
PDM	Project Design Matrix
PIC	Project Implementation Committee
PO	Plan of Operation
R/D	Record of Discussion
SNV	Stichting Nederlandse Vrijwilligers
ToT	Training of Trainers
USAID	United States Agency for International Development
VEI	Vitens Evides International
WB	World Bank
WASPA	Water Service Providers Association
WASREB	Water Service Regulatory Board
WSB	Water Services Board
WSP	Water Service Provider

## **Chapter 1 Outline of the Project**

### **1.1 Background of the Project**

Approximately 80% of the land of the Republic of Kenya (hereinafter referred to as “Kenya”) is arid and semi-arid. The Kenyan people are reportedly experiencing “water stress” because of the decrease of the available water resource per person caused by the population growth. The Government of Kenya (hereinafter referred to as “GoK”) has recognized the reduction of Non-Revenue Water (NRW) as a priority issue to be addressed for the effective use of water resources.

Due to the water reforms in 2002, Water Service Providers (hereinafter referred to as “WSPs”) were established as financially independent organizations and many of them have autonomously taken NRW reduction measures for financial reasons. As a result, according to the annual report issued by the Water Service Regulatory Board (hereinafter referred to as “WASREB”) in December 2015, the national average NRW ratio, which was 60% in 2010, had been reduced to approx. 42% by 2015. However, many challenges still need to be solved in order to achieve the goal of reducing the NRW ratio to 25% by 2030.

The Government of Japan (hereinafter referred to as “GoJ”) has implemented the “Project for Management of Non-Revenue Water in Kenya (2010 to 2014)” (hereinafter referred to as “the Previous Project”) together with three grant aid projects, the “Project for Augmentation of Water Supply System in Kapsabet Town (2007 to 2010),” “Project for Improvement of the Water Supply System in Embu and the Surrounding Areas (2010 to 2013)” and “Project for Augmentation of Water Supply System in Narok Town (2013 to 2016).” As results of these projects, the facilities of Embu, Narok and Kapsabet WSPs have been upgraded and their capacity to reduce NRW has been improved in the pilot areas of the Previous Project. In addition, a short-term training course on NRW reduction was established at the Kenya Water Institute (hereinafter referred to as “KEWI”). Although an organizational structure required for WSPs to prepare a plan for NRW reduction was established by achieving the outputs in the Previous Project, only a few WSPs are implementing NRW reduction activities in accordance with plans. This may be because the plans have been prepared without consideration of capacities for implementing actual work, and the financial or human resources of WSPs were not fully taken into account. Therefore, it is necessary to develop a support system for WSPs to reduce NRW in accordance with realistic plans for fully utilizing the outputs of the Previous Project.

Against this background, it was necessary to establish a support system enabling WSPs to continuously reduce NRW by strengthening not only WSPs but also the organizations associated with them. Thus, the “Project for Strengthening Capacity in Non-Revenue Water Reduction” (hereinafter referred to as “the Project”) was requested by the GoK to the GoJ in 2014.

In response to the request of the GoK, JICA implemented a detailed design survey for the Project in 2015 and reached an agreement with the Ministry of Water and Irrigation (hereinafter referred to as

“MWI”) with respect to the cooperation framework on 4<sup>th</sup> December, 2015 (Minutes of Meeting, hereinafter referred to as “M/M”). On the basis of this result, in March 2016, the Record of Discussion (hereinafter referred to as “R/D”) was signed and exchanged among three parties, namely, MWI, the National Treasury and the JICA Kenya Office.

## **1.2 Outline of the Project**

Table 1.1 shows the Project Design Matrix (PDM) included in the R/D agreed between JICA and MWI.

Table 1.1 PDM of the Project

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement
<p><b>Overall Goal</b></p> <p>Under NRW reduction support mechanism, Urban WSPs enhance NRW reduction activities</p>	<p>1. X of Urban WSPs participate knowledge sharing activities established by the Project.</p> <p>2. X of pilot Urban WSPs continue achieving target(s) set by the annual NRW reduction plan.</p> <p>3. NRW annual report is continuously produced and disseminated.</p>	<p>MWI NRW Unit annual reports</p> <p>Pilot WSPs annual NRW reduction plans</p>	<p>NRW reduction remains as priority of MWI and WSPs.</p>	
<p><b>Project Purpose</b></p> <p>A NRW reduction support mechanism is established for Urban WSPs to implement NRW reduction activities.</p>	<p>X of pilot Urban WSPs continue achieving targets set by the annual NRW reduction plan for two years.</p>	<p>NRW reduction plans</p> <p>Platform (online)</p> <p>Impact reports</p> <p>Project reports</p> <p>JCC meeting minutes</p>	<p>NRW reduction remains as priority of MWI and WSPs.</p>	
<p><b>Outputs</b></p> <p>1. Promotion and coordination of NRW reduction activities by MWI NRW Unit are strengthened</p>	<p>1-1 All County representatives participate NRW related seminar(s).</p> <p>1-2 NRW reduction campaigns are conducted semi annually</p> <p>1-3 NRW reduction annual reports are produced.</p>	<p>Materials for County seminar</p> <p>List of seminar participants</p> <p>Campaign materials</p> <p>NRW reduction annual reports</p> <p>Project reports</p> <p>JCC meeting minutes</p>	<p>Project budget of the CPs is secured</p> <p>NRW Unit staff positions are fulfilled.</p>	
<p>2. Use of NRW reduction standards by Urban WAPs are promoted by WASREB.</p>	<p>2-1 NRW reduction standards are revised by year X.</p> <p>2-2 Revised NRW reduction standards are disseminated to all Urban WSPs through workshop (s).</p>	<p>Revised NRW reduction standards</p> <p>Workshop program and list of participants</p> <p>Project reports</p> <p>JCC meeting minutes</p> <p>NRW reduction annual reports</p>	<p>Current WASREB's role and authority remains.</p>	
<p>3. NRW related training capacity of KEWI is strengthened</p>	<p>3-1 KEWI conducts NRW reduction courses with contents incorporating on-site trainings and revised course materials</p> <p>3-2 Evaluations by the NRW course participants is higher than before the revision of course materials.</p> <p>3-3 0% of NRW course participants formulate the workplans</p>	<p>Revised course materials</p> <p>Course syllabus</p> <p>Course participants</p> <p>Evaluation sheets</p> <p>Project reports</p> <p>JCC meeting minutes</p> <p>NRW reduction annual reports</p> <p>Trace studies</p>	<p>KEWI continues to offer NRW short courses.</p> <p>Project budget of the CPs is secured.</p>	

<p>4. NRW planning and/or implementation capacity of pilot Urban WSPs is enhanced.</p>	<p>4-1 More than X of pilot Urban WSPs continuously make the annual NRW reduction plan based on the review of previous year's implementation. 4-2 More than X of pilot Urban WSPs continuously implement the annual NRW reduction plan formulated in 4-1. 4-3 More than X of pilot Urban WSPs are able to implement skills and activities that pilot Urban WSPs were not able to adopt prior to the Project. 4-4 More than X of pilot Urban WSPs are able to implement priority activities indicated in the NRW reduction plan. 4-5 More than X of pilot Urban WSPs train all of NRW personnel</p>	<p>NRW reduction annual plans NRW reduction plans IMPACT reports Project reports JCC meeting minutes NRW reduction annual reports</p>	<p>Trained personnel do not leave WSPs Drastic climatic changes such as draught will not affect the water resources Project budget of the CPs is secured</p>
<p>5. Experiences and knowledge of NRW reduction activities are shared among Urban WSPs.</p>	<p>5-1 Case study and lessons learnt of Output 4 and other NRW activities are compiled and disseminated 5-2 Regular meeting(s) of NRW is/are organized three times a year.</p>	<p>Completed lessons learnt NRW regular meeting minutes and list of participants Project reports JCC meeting minutes NRW reduction annual reports</p>	<p>NRW reduction remains as priority of WSPs</p>
<p>Activities</p>			
<p>1.1 MWI NRW Unit, in cooperation with WASREB, produces NRW annual reports which include NRW reduction data. 1.2 MWI NRW Unit plans and implements NRW reduction sensitization activities for the Counties. 1.3 MWI NRW Unit plans and implements NRW reduction campaigns. 1.4 MWI NRW Unit conducts reviews of KEWI NRW courses. 1.5 MWI NRW Unit conducts reviews of WASREB's NRW reduction activities.</p>			
<p>2.1 WASREB conducts a survey of the usages of current NRW reduction standards. 2.2 Based on the survey result as well as Outputs 4 and 5, WASREB revises the NRW reduction standards. 2.3 WASREB promotes revised NRW reduction standards through workshop(s). 2.4 WASREB incorporates the review results of NRW reduction activities by MWI NRW Unit in their activities. 2.5 WASREB monitors and evaluates the usages of revised NRW standards.</p>			
<p>3.1 KEWI studies current status of NRW reduction courses and its challenges. 3.2 KEWI reviews NRW reduction training strategies and course contents. 3.3 KEWI, in collaboration with leading WSPs (Embu and Meru, etc.), conducts on-site NRW trainings. 3.4 KEWI reflects on-site NRW trainings into NRW course contents and materials 3.5 KEWI incorporates the results of review by MWI NRW Unit into NRW course contents 3.6 KEWI conducts case studies of NRW reduction course participants.</p>			
<p>4.1 The Project team conducts a survey of Urban WSPs and selects pilot Urban WSPs 4.2 Each pilot WSP conducts analyses of current NRW reduction activities and identifies its challenges. 4.3 Each pilot WSP identifies measures to solve challenges and formulates the NRW reduction plan. 4.4 Each pilot WSP formulates the annual NRW reduction plan including financial schedule based on the NRW reduction plan. 4.5 Each pilot WSP implements the annual NRW reduction plan. 4.6 Each pilot WSP evaluates and analyzes implementation results and revise plans. 4.7 Each pilot WSP produces the NRW reduction activity report annually.</p>			
<p>4.8 Each pilot WSP holds regular NRW reduction meetings attended by relevant departments of WSP 5.1 MWI NRW Unit organizes NRW related regular meetings in cooperation with other relevant organizations 5.2 WASREB compiles case study lessons learnt about NRW reduction activities</p>			
<p>Note: "X" is the indicator that will be decided after the project commencement.</p>			

Note: Pilot WSPs mentioned in this table include leading WSPs. The leading WSPs are two WSPs (Embu and Meru), which were selected at the time of detailed design.

This project is scheduled for 5 years, from October 2016 to September 2021. The whole project is divided into three phases as shown in Figure 1.1 below.

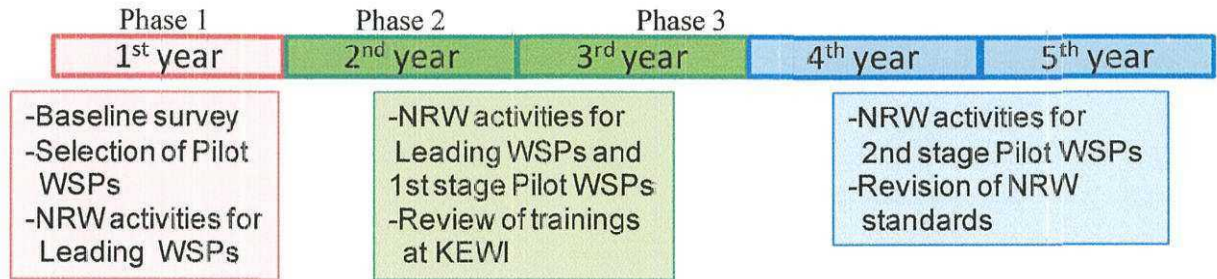


Fig. 1.1 Project Phases and Timing of Support (2016 to 2021)

With respect to the concept of the activity process to realise the outputs of the Project, Fig. 1.2 shows the flow chart and Table 1.2 shows the work plan. Among the project activities described in the figure and the table, the activities for Output 1 should be repeated every year. With regard to Output 2, preparation for revision of the NRW reduction standards (Phase 3) and study of the content should be continued in Phase 1 and Phase 2. As for Output 3, in accordance with the result of the first joint training implemented in Phase 1, 4 more joint training courses are scheduled to be conducted in Phase 2, updating the training structure and the training content. With regard to Output 4, activities to support the pilot WSPs should be implemented on a full scale in Phase 2 and Phase 3. With respect to Output 5, information on the activity results from the activities relating to the other outputs should be collected and such information will be actively communicated and shared among the WSPs.

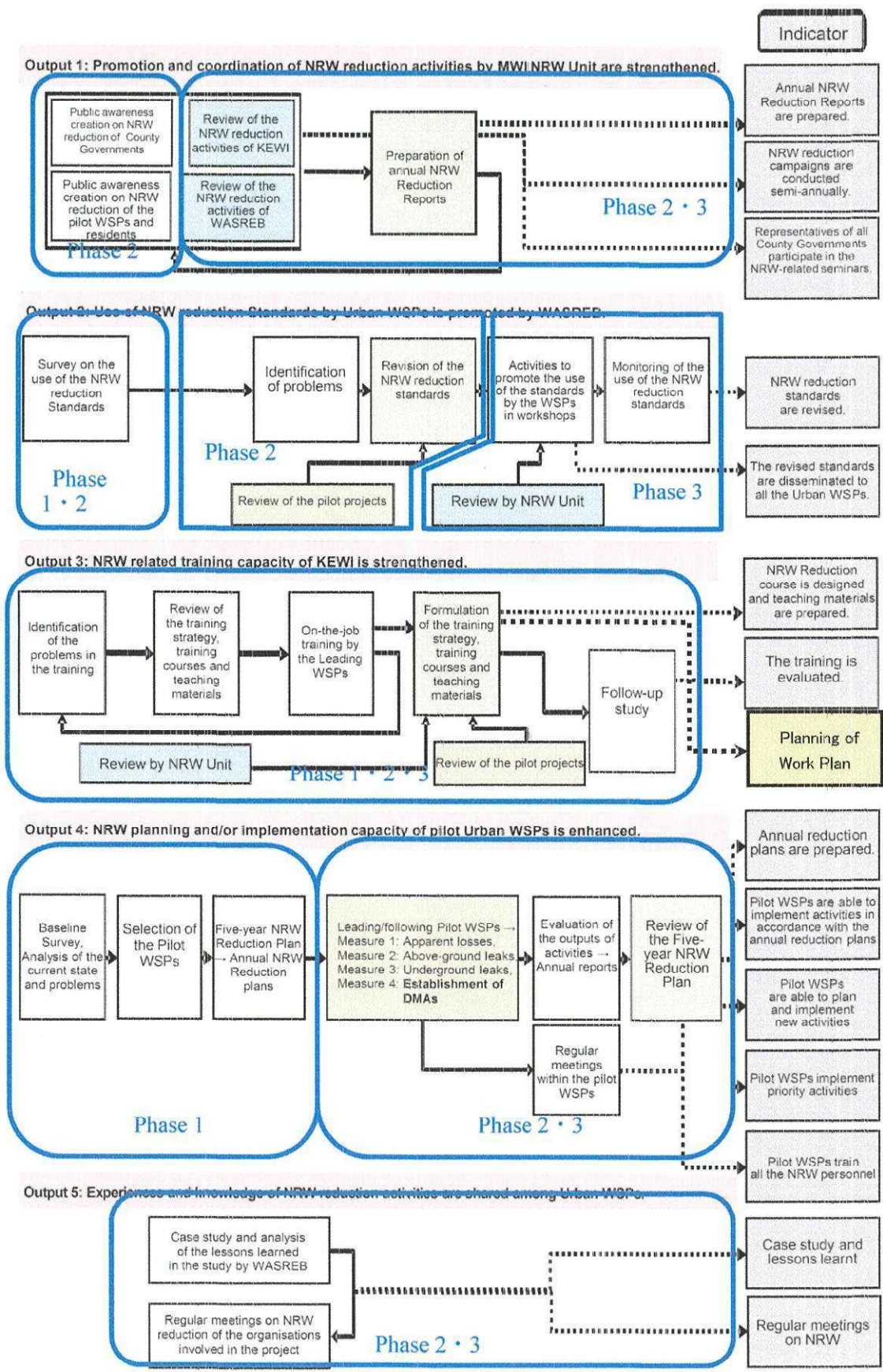


Fig. 1.2 Activity Process Flow to Realise the Outputs



Table 1.2 Work Plan

Project Phase		Phase 2												Phase 3											
Year		2018												2019											
Project year in order		2nd Year												3rd Year											
Expert	Name	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Chief Adviser/NRW management 1	Masayuki TAGUCHI																								
NRW reduction specialist 2	Noboru SAITOH																								
Water distribution Network (Mapping & Network analysis)	Shozo MORI																								
Flow, Pressure and Leakage Monitoring (1)	Junichi TAKAHASHI																								
Flow, Pressure and Leakage Monitoring (2)	Shinichi SEKIMOTO																								
Customer management / Billing collection (1)	Toshio KANO																								
Customer management / Billing collection (2)	Naoki HARADA																								
Training Management/Training Strategy	Satoru SHIBAZAKI																								
Information/Public Relation Management	Hiroko SUGIMOTO																								
Output 1	Promotion and coordination of NRW reduction activities by MWI NRW Unit are strengthened.																								
	1.1 MWI NRW Unit, in cooperation with WASREB, produces NRW annual reports which include NRW reduction data.																								
	1.2 MWI NRW Unit plans and implements NRW reduction sensitization activities for the Counties.																								
	1.3 MWI NRW Unit plans and implements NRW reduction campaigns.																								
	1.4 MWI NRW Unit conducts reviews of KEWI NRW courses.																								
Output 2	Use of NRW reduction standards by Urban WSPs are promoted by WASREB.																								
	2.1 WASREB conducts survey of the usage of current NRW reduction standards.																								
	2.2 Based on the survey result as well as Output 4 and 5, WASREB revises the NRW reduction standards.																								
	2.3 WASREB promotes revised NRW standards through workshop(s).																								
	2.4 WASREB incorporates the review results of NRW reduction activities by MWI NRW Unit in their activities.																								
Output 3	NRW related training capacity of KEWI is strengthened.																								
	3.1 KEWI studies current status of NRW reduction courses and its challenges.																								
	3.2 KEWI reviews NRW reduction training strategies and course contents.																								
	3.3 KEWI, in collaboration with leading WSPs (Embu and Meru, etc.), conducts on-site NRW trainings.																								
	3.4 KEWI reflects on-site NRW trainings into NRW course contents and materials.																								
	3.5 KEWI incorporates the results of review by MWI NRW Unit into NRW course contents.																								
Output 4	NRW planning and/or implementation capacity of pilot Urban WSPs is enhanced.																								
	4.1 The Project team conducts a survey of Urban WSPs and selects pilot Urban WSPs.																								
	4.2 Each Pilot WSP conducts analyses of current NRW reduction activities and identifies its challenges.																								
	4.3 Each Pilot WSP identifies measures to solve challenges and formulates the NRW reduction plan.																								
	4.4 Each Pilot WSP formulates the annual NRW reduction plan including financial schedule based on the NRW reduction plan.																								
	4.5 Each Pilot WSP implements the annual NRW reduction plan.																								
	1) GIS Preparation and Applications																								
	2) Zoning and NRW Monitoring (monthly and weekly NRW management cycles)																								
	3) Leakage Management																								
	4) Customer Meter Management																								
4.6 Each Pilot WSP evaluates and analyzes implementation results and revises the plans.																									
4.7 Each Pilot WSP produces the NRW reduction activity report annually.																									
4.8 Each Pilot WSP holds regular NRW reduction meetings attended by relevant departments of WSP.																									
Output 5	Experiences and knowledge of NRW reduction activities are shared among Urban WSPs.																								
	5.1 MWI NRW Unit organizes NRW related regular meetings in cooperation with other relevant organizations.																								
5.2 WASREB compiles case studies/lessons learnt about NRW reduction activities.																									
Monitoring/Meeting/Training/Document																									
Work Plan																									
Monitoring Sheet																									
Joint Coordination Committee (JCC)																									
Training in Japan																									
Progress Report/Completion Report																									

## 1.1 Project Implementation Structure

### 1.1.1 Organizations Related to the Project

To describe the organizations relating to this Project, Fig. 1.3 shows the counterparts (hereinafter referred to as “C/Ps”) and their related organizations involved in the implementation of the Project and Table 1.3 shows the outline of each organization.

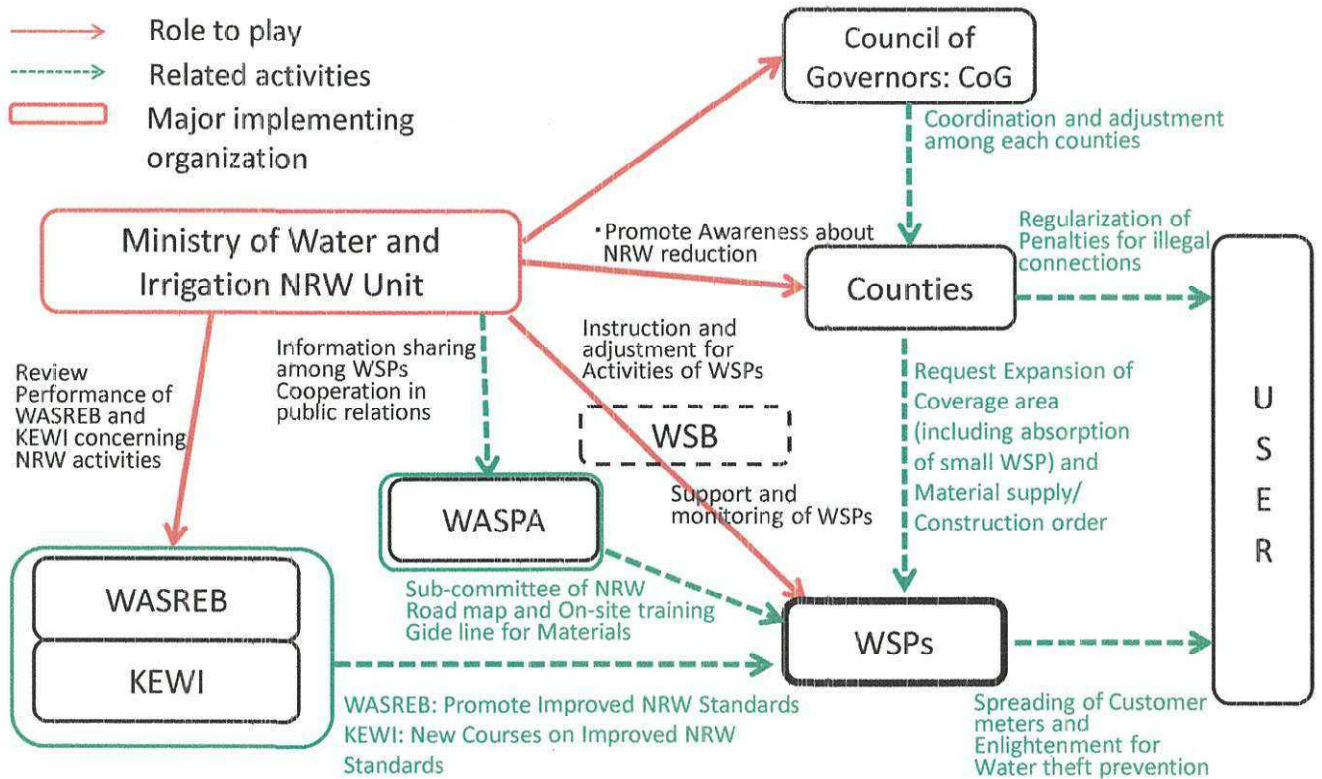


Fig.1.3 Organizations Related to the Project

Table 1.3 Outlines of Related Organizations

	Name of organization	Type of organization	Basis of establishment	Relation with outputs of activities	Responsibilities in the Project
1	Ministry of Water & Irrigation (MWI), Non-Revenue Water Unit	Unit with a special mission within the central government ministry	Circular of February 2016	Output 1	Responsible organization of this Project in charge of development, activity promotion, awareness-raising, communication and dissemination of NRW strategy
2	Water Services Regulatory Board (WASREB)	Organization affiliated with MWI	Former Water Act 2002	Output 2	Revision and dissemination of the NRW reduction standards
3	Kenya Water Institute (KEWI)	Educational institute under MWI	KEWI Act 2001	Output 3	Education of NRW reduction technologies, guidance to WSPs

4	Water Service Providers Association (WASPA)	Industry association	Societies Act (CAP 108)	Output 5	Communication and dissemination of NRW information, dissemination of related technologies
5	Water Service Provider (WSP)	Independent commercial company	Former Water Act 2002	Output 4	Implementation of NRW reduction activities, production of outputs
6	County	Local government body	Revised Constitution of 2010	Target of Output 1	Jurisdiction of and support to WSPs, raising the awareness of residents
7	Council of Governors (CoG)	Federation of county governors	Revised Constitution of 2010	Target of Output 1	Expansion of NRW reduction activities to the whole county
8	Water Services Board (WSB)	Local office of MWI	Established in accordance with the former Water Act and disbanded in accordance with the new Water Act		Functions as a branch office of MWI to support WSPs for 3 years until the completion of transfer of authority

Fig. 1.3 shows the roles and responsibilities of the MWI NRW Unit, which is the responsible organization of this project, and its related organizations. WASREB and KEWI, apart from MWI, are major C/Ps of this project on the central government side. WASPA is a private organization whose members mainly consist of WSPs across the country implementing the water supply business. Considering the activities carried out so far and collaborative relationship with WSPs in the past and its organizational capacity, WASPA is regarded as a semi C/P that may act as a partner for communication and information sharing activities. WSPs are local companies operating urban water supply services and since they carry out NRW reduction activities as part of their routine work, they are responsible for producing the NRW reduction effects in Kenya. Due to the revision to the Water Act in 2016, it was decided that the ownership of water supply facilities used by WSPs and the jurisdiction of water supply services be transferred from WSBs under MWI to the county governments. Since three years will be required to complete the transfer of authority, a favourable relationship should be established between the county governments and WSPs. CoG, which is a federation of county governors, is an organization to negotiate with the central government, coordinating among the counties and representing their interests. The county governments indirectly receive the benefit from the support activities to WSPs, which are implemented in this project. As such, raising the awareness and information sharing with regard to the NRW reduction activities should be carried out through CoG.

### 1.1.2 Operating Structure of the Project

The operating structure of the Project is shown in Fig. 1.4. The Joint Coordination Committee (JCC) has been established as the decision-making body of the Project and the Project Implementation Committee (PIC) is a platform to coordinate and preside over the implementation of the activities of the

Project. These organizations make up the structure to operate the activities of the Project.

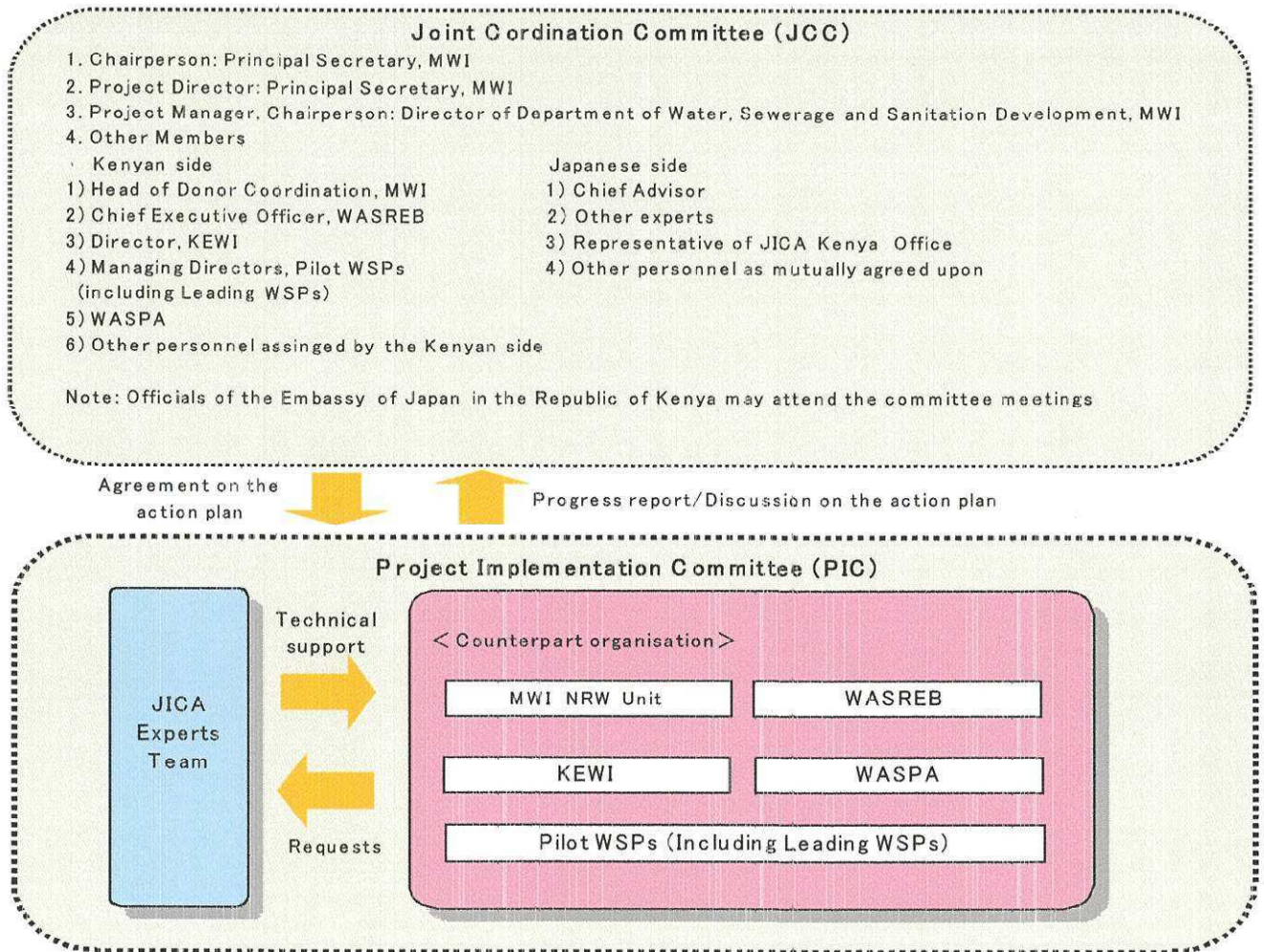


Fig.1.4 Project Operating Structure

(1) Joint Coordination Committee (JCC)

As mentioned earlier, JCC is a decision-making body to ensure the smooth implementation of the Project. The members of JCC consist of the C/Ps of the Kenyan side involved in the project activities, Japanese experts and the representative of JICA Kenya Office. The roles and responsibilities of JCC are as follows:

- Approval of the work plan prepared at the beginning of each phase
- Approval of the project monitoring result
- Approval of the modifications of PDM and PO
- Discussion of budget allocation and other important matters concerning the implementation of the Project

### (2) Project Implementation Committee (PIC)

PIC is a platform to jointly manage the progress of the Project and discuss the planning and implementation of activities carried out in the Project. It is composed of the Kenyan side C/Ps responsible for coordinating and implementing the activities and the Japanese experts.

### (3) Project Team

As shown in Table 1.4, a project team has been organized as part of the implementation structure of the Project. The project director (Water Secretary, MWI), who is supported by the project manager (Director of Water Sewerage and Sanitation Development, MWI), assumes the overall responsibility of the Project. The project manager manages the implementation of the Project and assumes the responsibilities in the administrative and technical aspects. The management team and the action team implement the activities to achieve the outputs of the Project and the Japanese experts support them. The project team members were determined at the first JCC meeting organized at the commencement of the Project. Table 1.5 shows the support system for the project team provided by the Japanese experts.

Table 1.4 Project Team Members

Project Group	Role and duty	Member	Number of members
Project Director	Person in charge of the supervision of the Project	Water Secretary, MWI	1
Project Manager	Implementation management, verification of the achievement and outcomes of activities, solving issues regarding implementation	Director of Water, Sewerage and Sanitation Development, MWI	1
Management Team	Implementation/Participation and monitoring concerning the Project activities Participation in JCC/PIC meetings	• NRW Unit (MWI) • WASREB (CEO/TM/Technical Officer) • KEWI (CEO/Deputy Director/Lecturer) • Leading/Pilot WSPs (MD)	3 3 3 Each 1
Action Team	Implementation of activities related to Output 4	Staff members in charge of NRW reduction activities of the Leading and Pilot WSPs	around 5~10

The implementation structure for each project output is as shown in Table 1.5.

Table 1.5 Support System for the Project Team provided by Japanese Experts

Output	C/P organization	JICA Expert <sup>*1</sup>
Output 1	NRW Unit/MWI	Chief Adviser/NRW Management 1 NRW Reduction Specialist 2 Information/Public Relations Management
Output 2	WASREB	Chief Adviser/NRW Management 1 NRW Reduction Specialist 2
Output 3	KEWI	NRW Reduction Specialist 2 Training Management/Training Strategy
Output 4	NRW Unit/MWI WASREB, KEWI Leading and Pilot WSPs	Chief Adviser/NRW Management 1, NRW Reduction Specialist 2, Water Distribution Network (Mapping & Network analysis), Flow/Pressure and Leakage Monitoring, and Customer management/Billing collection
Output 5	NRW Unit/MWI WASREB, WASPA	Chief Adviser/NRW Management 1 NRW Reduction Specialist 2 Information/Public Relations Management

In Phase 1, NRW management administration was under three people which are Chief Adviser/NRW Management 1 (Mr. Igawa) and NRW Management 2 (Part 1) (Mr. Saito) as well as NRW Management 2 (Part 2) (Mr. Taguchi). However, in Phase 2, Mr. Igawa will be replaced by Mr. Taguchi as the Chief Adviser/NRW Management 1, while NRW management administrative work will be under Mr. Taguchi and Mr. Saito. For this reason, the following changes were made to the initial plan:

- 1) Mr. Taguchi to serve as Chief Adviser/NRW Management 1 as well as NRW Management 2 (Part 2) as initially planned.
- 2) Mr. Saito to serve as NRW Management 2, as well as increase his work volume to include Water Supply administration and Water Policy Support work.

### 1.1.3 Outputs of the Project

Monitoring Sheets shall be used for project management. Monitoring sheets shall be prepared by MWI NRW Unit and JICA experts in collaboration and will be presented at the JCC and PIC meetings for discussions about project progress and management issues of project activities. Monitoring sheets and deliverables for each period are shown in Tables 1.6 to 1.8.

Table 1.6 Reports and documents in Phase 1 (Done)

Title	Time of submission
Work Plan 1	Within 9 months after commencement of Phase 1
Baseline Survey Report (summary)	Within 2 months after the Second JCC
Monitoring Sheet Ver. 1	Within 4 months after commencement of Phase 1
Monitoring Sheet Ver. 2	Within 4 months after the submission of Monitoring Sheet Ver.1
Progress Report 1	After the completion of Phase 1

Table 1.7 Planned reports and documents in Phase 2

Title	Time of submission
Work Plan 2	Within 2 months after commencement of Phase 2
NRW Annual Report	By June 2018 (2017/2018 edition) By June 2019 (2018/2019 edition)
Monitoring Sheet Ver. 3	Within 4 months after commencement of Phase 2
Monitoring Sheet Ver. 4	Within 6 months after the submission of Monitoring Sheet Ver. 3
Monitoring Sheet Ver. 5	Within 6 months after the submission of Monitoring Sheet Ver. 4
Monitoring Sheet Ver. 6	Within 6 months after the submission of Monitoring Sheet Ver. 5
Progress Report 2	After the completion of Phase 2

Table 1.8 Planned reports and documents in Phase 3

Title	Time of submission
Work Plan 3	Within 1 month after commencement of Phase 3
NRW Annual Report	By June 2018 (2017/2018 edition) By June 2019 (2018/2019 edition)
Monitoring Sheet Ver. 7	Within 6 months after the submission of Monitoring Sheet Ver. 6
Monitoring Sheet Ver. 8	Within 6 months after the submission of Monitoring Sheet Ver. 7
Monitoring Sheet Ver. 9	Within 6 months after the submission of Monitoring Sheet Ver. 8
Monitoring Sheet Ver. 10	Within 6 months after the submission of Monitoring Sheet Ver. 9
Progress Report 3	After the completion of Phase 3

#### 1.1.4 Undertakings and Inputs by the Kenyan Side

Undertakings and inputs by GoK agreed on the Record of Discussion (RD) on March 7, 2016 between MWI and JICA are shown below. During the commencement of the Phase 1 Project, it had been confirmed by both sides.

(1) GoK will take necessary measures to:

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

(b) grant privileges, exemptions and benefits to the JICA experts and their families, which are no less favourable than those granted to experts and members of the missions and their families of third countries or international organizations performing similar missions in the Republic of Kenya.

(2) MWI will take necessary measures to conclude FoC with Pilot WSPs (in particular, Embu and Meru, which will start the NRW Reduction activities in Phase 1) and Counties responsible of Pilot WSPs for timely implementation of the Project with following three items:

- (a) To involve Counties for smooth implementation of the Project;
- (b) To acquire budget for NRW Reduction activities of Pilot WSPs; and
- (c) To confirm and agree the inputs and undertakings of Pilot WSPs.

(3) GoK will take necessary measures to:

- (a) provide security-related information as well as measures to ensure the safety of the JICA experts;
- (b) permit the JICA experts to enter, leave and sojourn in the Republic of Kenya for the duration of their assignments therein and exempt them from foreign registration requirements and consular fees;
- (c) exempt the JICA experts from taxes and any other charges on the equipment, machinery and other material necessary for the implementation of the Project;
- (d) exempt the JICA experts from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to them and /or remitted to them from abroad for their services in connection with the implementation of the Project; and
- (e) meet taxes and any other charges on the equipment, machinery and other material, referred to in II-7 in R/D, necessary for the implementation of the Project.

(4) GoK will bear claims, if any arise, against the JICA experts resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the implementation of the Project, except when such claims arise from gross negligence or wilful misconduct on the part of the JICA experts.

(5) MWI, WASREB, KEWI and Pilot WSPs will take necessary measures to provide at their own expense:

- (a) Assignments of counterpart personnel and support staff;
- (b) Payment of per-diem (daily allowance, transportation fee and accommodation fee) to the



counterpart personnel;

- (c) Suitable office space with necessary equipment in MWI, KEWI and Pilot WSPs;
- (d) Utility charges such as electricity, water supply, if any;
- (e) 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;
- (f) Costs of activities for sensitization and campaigns by MWI;
- (g) Survey cost on the usage of current NRW reduction standards by WASREB;
- (h) Expense for training of Pilot WSPs at KEWI (short term course);
- (i) Expense for On-site training in Pilot WSPs by KEWI;
- (j) Expense for On-site ToT in Pilot WSPs;
- (k) Expense for NRW activities of Pilot WSPs;
- (l) Information in obtaining medical service for JICA Expert Team;
- (m) Available data (including maps and photographs) and information related to the Project;
- (n) Necessary facilities to the JICA experts for the remittance as well as utilization of the funds introduced into Kenya in connection with the implementation of the Project.

Main undertakings and inputs by the Kenyan side are summarized in Table 1.9.

Table 1.9 Undertakings and Inputs by the Kenyan Side

Work to be implemented	Organizations involved in the project				
	MWI	WASREB	KEWI	County	WSP
Utilization of the project outputs	•	•	•	•	•
Provision of privileges to the Japanese experts	•				
Guidance to the county governments for their involvement in the project	•				
Guidance to the pilot WSPs to allocate budget to the NRW reduction activities	•				
Provision of security information to the Japanese experts and means to ensure their safety	•				
Issuance of the residence permits to the Japanese experts and their exemption from paying consulage	•				
Exemption of the Japanese experts from paying taxes and levies	•				
Exemption of the Japanese experts from taxation on their salaries and allowances	•				
Responses to the inconveniences encountered by the Japanese experts in the project activities	•				
Appointment of the counterpart personnel and support staff	•	•	•		•
Payment of allowances ( <i>per diem</i> , transport allowance, accommodation allowance) of the counterpart personnel	•	•	•		•
Provision of an office for the project activities	•		•		•
Provision of the materials and equipment to be used in the project activities not to be provided by JICA and their installation	•	•	•		•
Implementation of the campaigns and awareness creation activities and payment of its cost by MWI	•			•	•
Cost of a survey on the use of the NRW reduction standards to be conducted by WASREB		•			
Cost of the training of the pilot WSPs at KEWI			•	•	•
Cost of the on-the-job training of the pilot WSPs by KEWI			•	•	•
Cost of the on-the-job TOT of the pilot WSPs			•	•	•
Cost of the NRW reduction activities taken by the pilot WSPs			•	•	•
Provision of medical information	•	•	•	•	•
Data and information (including maps and photographs) for the implementation of the projects	•	•	•	•	•
Assistance required for the Japanese experts to receive money transferred from Japan in Kenya	•			•	•

## **Chapter 2 Activities reached in Phase 1**

### **2.1 Details of Activities for Each Output**

In the baseline survey conducted during Phase 1 of this project, the present situation of Non-revenue water in Kenya was examined and the problems and countermeasures were identified. Based on the PO agreed at R/D, the contents of the activities of each project's outcome were clarified in Work Plan 1 (May 2017). The actual results of the first phase of this project based on Work Plan 1 are as follows.

#### **2.1.1 Promotion and coordination of NRW reduction activities by MWI NRW Unit are strengthened (Output 1)**

##### **(1) MWI NRW Unit, in cooperation with WASREB, produces NRW annual reports which include NRW reduction data (Activity 1-1)**

###### **(i) Status of achievement:**

The MWI NRW unit was scheduled to summarize the draft by September 2017, but it was incomplete.

###### **(ii) Actual performance of activities:**

In the discussions regarding planning of the annual NRW reduction report, similar reports issued by WASREB and WSPs were taken as samples, and the table of contents, contents of articles, binding, etc., of the report were discussed. The planned contents of the report include (1) Introduction to this project, (2) Current status of NRW in Kenya, (3) Contributions and activities of MWI, (4) Contributions and activities of KEWI, (5) Contributions and activities of WASPA, (6) Results of baseline survey, and (7) Current status of the pilot WSPs and support activities towards them. Note that data indicating the status of NRW is to be obtained with the cooperation of WASREB. Dissemination of the report will be implemented through seminars, regular meetings of WASPA, publication on the website, etc.

##### **(2) MWI NRW Unit plans and implements NRW reduction sensitization (awareness-raising) activities for the Counties and Pilot WSPs (Activity 1-2, 1-3)**

###### **(i) Status of achievement:**

The MWI Non-Revenue Water Unit completed the preparation of a sensitization activity plan (March 2017). A campaign for pilot WSP was prepared, but it could not be implemented.

###### **(ii) Actual performance of activities:**

The MWI NRW Unit and the Japanese experts prepared the awareness-raising activities plan for the counties and the pilot WSPs (March 2017). The plan divides the 47 counties in the whole country into 4 groups, and the activities will be implemented in stages, and the aims, contents, schedule, and

budget are included in the plan. It is necessary for the heads of the departments responsible for water supply in the counties and their staff to be involved in and understand the Project at an early stage, and it is necessary that understanding of the activities be deepened from the first phase. Therefore, at the awareness-raising seminar, it was scheduled to provide information on NRW reduction (including a video on NRW prepared by JICA), presentations from WASREB and WSPs, and to hold a group discussion regarding the support of the counties for NRW reduction activities being implemented by WSPs. The first seminar was planned to be held by May 2017, taking into consideration the budgetary provisions in Kenya. However, the decision regarding the budget to be allocated to the MWI NRW Unit was delayed, so the schedule for the first seminar was changed to the end of August 2017 or later. Note that the awareness-raising seminar for the County level is planned to be held in Phase 2 or later in coordination with the Council of Governors (CoG), after the presidential election in August. In addition, NRW reduction activities for citizens are planned and will be conducted by WSPs in Phase 2 or later.

**(3) MWI NRW Unit plans and implements NRW reduction campaigns (Activity 1-4)**

**(i) Status of achievement:**

A review of the KEWI NRW joint course was conducted in September 2017 but it has not been finalized.

**(ii) Actual performance of activities:**

The evaluation meetings for the first joint training (conducted in June 2017) have been held several times since July 2017, with the participation of KEWI and the leading WSPs and MWI non-revenue water unit, but the finalization which was supposed to be held during the first phase was not completed. With the completion of the joint evaluation report prepared by KEWI, the MWI NRW unit will carry out the review of the NRW course.

**(4) MWI NRW Unit conducts reviews of WASREB's NRW reduction activities (Activity 1-5)**

**(i) Status of achievement:**

Planned to be carried out in Phase 2 onwards.

**(ii) Actual performance of activities:**

This activity is based on the results of a survey of the status of use of the NRW reduction standards (Activity 2-1) described below in 2.1.2 (1), to be carried out by WASREB, and it will review the NRW reduction activities by WASREB. Specifically, in June 2017, WASREB concluded a contract with a local consultant to carry out this survey, and this survey work was scheduled to be completed in September 2017 but it was postponed till December 2017. Therefore, the MWI NRW Unit plans to carry out the review of the survey results from Phase 2 onwards.

**(5) MWI NRW Unit ensures the budget for the activities based on the NRW reduction annual plan for each output**

**(i) Status of achievement:**

The MWI NRW Unit secured its budget of 60 million Ksh for 2016/17 and has partially implemented the initial plan.

The MWI NRW Unit has already secured its budget of 65 million Ksh for 2017/18. However, the budget has been secured by the Head of the MWI NRW Unit also serving as the Director of the Water, Sewerage & Sanitation Department, and the budget will be formally allocated to each activity based on the activities plan for the MWI NRW Unit for next financial year.

**(ii) Actual performance of activities:**

One of the most important roles of the MWI NRW Unit is to secure the funding for the activities carried out by the unit itself, and the funding to support NRW reduction activities of other related organizations. The budget secured by MWI NRW Unit (60 million Ksh) for this financial year (2016/17) was not based on concrete budget cost items that include activities currently being studied by the MWI NRW Unit and support for other organizations. Therefore, JICA experts supported the MWI NRW Unit through repeated discussions to formulate a new effective distribution in considerations of the technical support for the Pilot WSPs and KEWI's activity plan. As a result, the distribution plan for the MWI NRW unit and for each activity agreed is shown in Table 2.1 (Please refer to the Phase 1 progress report for detailed budget for each item).

Based on the same plan, the MWI NRW unit covered the cost of the first joint training of KEWI. In addition, budget was allocated for the procurement of equipment (meters, survey equipment etc.) to support pilot WSP's NRW reduction activities through the WSB, but due to inadequate instructions, purchasing of the planned equipment could not be implemented.

Table 2.1 Updated Distribution Plan of MWI NRW Unit's Budget for the Financial Year 2016/17

March 30, 2017

## Updated Distribution Plan of MWI NRW Unit's Budget (60 million KES) for the Financial Year 2016/17

Table 1 shows the updated distribution plan of MWI NRW Unit's budget (60 million KES) for the financial year 2016/17. The breakdowns of each item group are shown in Table 2 to Table 11. Procurement by order is required for Item Groups No. 3 to No.9 of Table 1 because the specified equipment of these Item Groups will be required by August 2017 for JICA Expert Team to start their training sessions targeting pilot WSPs smoothly and effectively in October 2017.

Table 1: Modified Distribution Plan of MWI NRW Unit's Budget (60 million KES) for 2016/17

Item Group No.	Description	Cost (KES) including VAT	Note	Type of Procurement (Time Frame)
1	Office Preparation, NRW Policy Preparation, JCC, Campaign, Workshop, NRW Joint Training of KEWI, Perdiem, etc.	12,820,610	including the costs of NRW Joint Training of KEWI specified in Table 2	-
2	NRW Training Platform Modification at KEWI	4,640,000	Table 3	-
3	NRW and GIS-related Equipment for KEWI	2,369,566	Table 4	Order (to be procured by August 2017)
4	GPSs and A3-size All-in-one Printers for Nyahururu and Killifi-mariakani WSPs and MWI NRW Unit	508,273	Table 5	
5	volumetric Meters for Small Customers of Mavoko WSP	3,828,000	Table 6	
6	Ultrasonic Smart Meters for Large Customer Meters of Meru and Embu WSPs	3,706,528	Table 7	
7	Ultrasonic Zonal Bulk Meters for Meru and Embu WSPs	3,752,686	Table 8	
8	Mechanical Production Bulk Meters for Meru and Embu WSPs	1,463,239	Table 9	
9	NRW Equipment mainly for Pilot WSPs	26,882,791	Table 10	
	1) Pressure Loggers and Ultrasonic Flow Meters	4,491,938	Table 11 - Package 1	
	2) Potable Meter Testers, Handpump for Leak Check and Gound Microphone	3,079,800	Table 11 - Package 2	
	3) Listening Sticks	3,570,480	Table 11 - Package 3	
	4) Leak Noise Correlator with Ground Microphone and Impulse Generators for Plastic Pipes	3,887,067	Table 11 - Package 4	
	5) Leak Noise Correlators with Ground Microphones	4,401,318	Table 11 - Package 5	
	6) Impulse Generator for Plastic Pipes	4,216,020	Table 11 - Package 6	
	7) Pipe Locator for Metal Pipes + Cable for Locating Prastic Pipe	3,236,168	Table 11 - Package 7	
	Grand Total	59,971,692	Remaining: 028,308 (KES)	-

※ Support of Activities for WSPs were planned to start from November.

### **2.1.2 Use of NRW reduction standards are promoted by WASREB (Output 2)**

#### **(1) WASREB conducts survey of the usage of current NRW reduction standards (Activity 2-1)**

(i) Status of achievement:

WASREB is conducting a survey of the status of use of the NRW reduction standards in 9 WSPs, with support from SNV. (By the end of December 2017)

(ii) Actual performance of activities:

WASREB decided to conduct a survey on the current use of non-revenue reduction standards targeting 13 WSPs with support of SNV. The survey was awarded to a local consultant (Howard Humphreys), but due to a discrepancy between the estimated price and the SNV budget, and the WSPs targeted for survey was reduced from the initial plan of 13 WSPs to 9 WSPs. Completion of the survey is scheduled for December 2017. Based on the results, WASREB will consider future activities.

#### **(2) Based on the survey result as well as Output 4 and 5, WASREB revises the NRW reduction standards (Activity 2-2)**

Planned to be carried out in Phase 2 onwards, therefore no progress in Phase 1.

#### **(3) WASREB promotes revised NRW standards through workshop(s) (Activity 2-3)**

Planned to be carried out in Phase 2 onwards, therefore no progress in Phase 1.

#### **(4) WASREB incorporates the review results of NRW reduction activities by MWI NRW Unit in their activities (Activity 2-4)**

Planned to be carried out in Phase 2 onwards, therefore no progress in Phase 1.

#### **(5) WASREB monitors and evaluates the usage of revised NRW standards (Activity 2-5)**

Planned to be carried out in Phase 3 onwards, therefore no progress in Phase 1.

### **2.1.3 NRW related training capacity of KEWI is strengthened (Output 3)**

#### **(1) KEWI studies current status of NRW reduction courses and its challenges (Activity 3-1)**

(i) Status of achievement:

KEWI studied the current status of NRW reduction courses, and identified its challenges. (By the end of February 2017)

(ii) Actual performance of activities:

KEWI carried out the baseline survey with assistance from the JICA experts. Specifically, in addition to an interview survey carried out using a questionnaire, work was carried out to confirm a) the status of implementation of the classroom lectures, b) the status of storage of the equipment, c) the existing

training facilities, d) the status of implementation of the practical training, e) the training programme, and f) the content of the training materials used, in order to identify its challenges.

**(2) KEWI reviews NRW reduction training strategies and course contents (Activity 3-2)**

**(i) Status of achievement:**

KEWI studied the course contents and training materials jointly with the relevant organizations, for the joint training trial. (Completed in May 2017)

**(ii) Actual performance of activities:**

This activity is linked with Activities 3-3 and 3-4, and it was planned to carry out a joint training trial and obtain the evaluation results, in order to carry out a specific review of the strategy and course contents for NRW reduction training. Technical personnel from each organization were brought together and jointly prepared the training materials as prior preparation for implementation of the joint training trial.

**(3) KEWI, in collaboration with leading WSPs (Embu and Meru, etc.), conducts on-site NRW training (Activity 3-3)**

**(i) Status of achievement:**

KEWI cooperated with the leading WSP to carry out the first joint training (June 2017). As part of this training, a sensitization workshop was conducted for the top management in the leading and pilot WSPs.

**(ii) Actual performance of activities:**

The awareness-raising workshop for the top management in the leading and pilot WSPs was held by KEWI on 5 June 2017. In this workshop, there were discussions on the importance of NRW reduction activities in Kenya among the participants of the relevant organizations. In particular, both the Managing Directors (MDs) of the leading WSPs, Embu WSP and Meru WSP, explained the activities carried out in their own WSPs, and responded to all the questions posed by the participants of pilot WSPs. In addition to the top management from each WSP, there were participants from the MWI NRW Unit, WASREB, WASPA, JICA, etc. with a total of about 40 people.

The 1st Joint Training was devised to incorporate KEWI's classroom training programme for 5 days from June 6<sup>th</sup> to June 10<sup>th</sup> to improve the effectiveness of the training course. In addition, On the Job Training was carried out at Embu WSP in the six-day schedule from June 19<sup>th</sup> to the 24<sup>th</sup>. In this training, Embu WSP carried out this initiative as a cooperative activity, which led to deepening of the relationship between MWI NRW Unit, KEWI, and the leading WSPs.

The MWI NRW Unit provided budgetary support for the cost of the activities for this joint training trial. It was possible for more than 20 participants to attend, and although it was highly evaluated by the course participants, some budgetary problems remain with respect to independent operation by



KEWI.

**(4) KEWI reflects on-site NRW training into NRW course contents and materials (Activity 3-4)**

(i) Status of achievement:

The joint training evaluation document (draft) was discussed by stakeholders including the MWI NRW Unit at a meeting held in July 2017.

(ii) Actual performance of activities:

KEWI prepared a training evaluation report based on discussions by stakeholders after the training. The objective of the report is to improve subsequent training courses and it was based on responses collected from the course participants before and after the training. In future, such a questionnaire (comment survey) will be used to collect data from the participants.

**(5) KEWI incorporates the results of review by MWI NRW Unit into NRW course contents (Activity 3-5)**

(i) Status of achievement:

The first joint evaluation report prepared by KEWI but was not finalized during the Phase 1.

(ii) Actual performance of activities:

This activity is linked with Activity 1-5. MWI NRW Unit participated in the joint training evaluation, and carried out a review of the training course. KEWI will incorporate the review of MWI NRW Unit in future NRW training courses.

**(6) KEWI conducts trace studies of NRW reduction course participants (Activity 3-6)**

Planned to be carried out in Phase 2 onwards, therefore no progress in Phase 1.

(A complementary explanation about KEWI's activities is added in Annex 1.)

**2.1.4 NRW planning and/or implementation capacity of pilot Urban WSPs is enhanced (Output 4)**

**(1) The Project team conducts a survey of urban WSPs & selects Pilot WSPs (Activity 4-1)**

(i) Status of achievement:

The Project team conducted a survey of 15 candidate pilot WSPs and selected seven Pilot WSPs (Kisumu, Nakuru, Nyahururu, Ruiru-juja as 1st Group Pilot WSPs, main targets of Phase 2, and Eldoret, Mavoko and Kilifi-mariakani as 2nd Group Pilot WSPs, main targets of Phase 3, in addition to the pre-selected Leading (Pilot) WSPs (Meru and Embu, main targets of Phases 1 & 2). The nine Pilot WSPs are located over the eight jurisdiction areas of all the WSBs. The results of the baseline survey were presented at the 2<sup>nd</sup> JCC.

(ii) Actual performance of activities:

The JICA experts studied the candidate WSPs using the evaluation sheet approved by the MWI’s NRW Unit and JICA and prepared a comparative evaluation table for the selection of pilot WSPs. A consensus was reached on the evaluation table between the NRW Unit and JICA in the technical notes signed in March 2017 at the completion of the baseline survey, and the evaluation table was officially approved and finalized by the second JCC meeting in May 2017.

**(2) Each Pilot WSP conducts analyses of current NRW reduction activities and identifies its challenges (Activity 4-2)**

**(i) Status of achievement:**

The results of the analysis and the challenges identified in the baseline survey conducted by the JICA experts were shared among the pilot WSPs. The JICA experts discussed with each Pilot WSP regarding the contents of technical assistance to be provided in order to overcome various challenges it faces, in consideration of their expressed needs. A consensus was formed with each Pilot WSP regarding the contents of the assistance.

**(ii) Actual performance of activities:**

**a) Analysis of current status of NRW reduction from the view of assistance**

Fig. 2.1 shows the results of capacity assessment for the Pilot WSPs regarding the following six aspects of NRW Management in which technical assistance was considered particularly necessary.

- Aspect 1: Planning and implementation of NRW reduction
- Aspect 2: GIS preparation and applications
- Aspect 3: Zoning and NRW monitoring
- Aspect 4: Leakage management
- Aspect 5: Customer meter management
- Aspect 6: Illegal use management

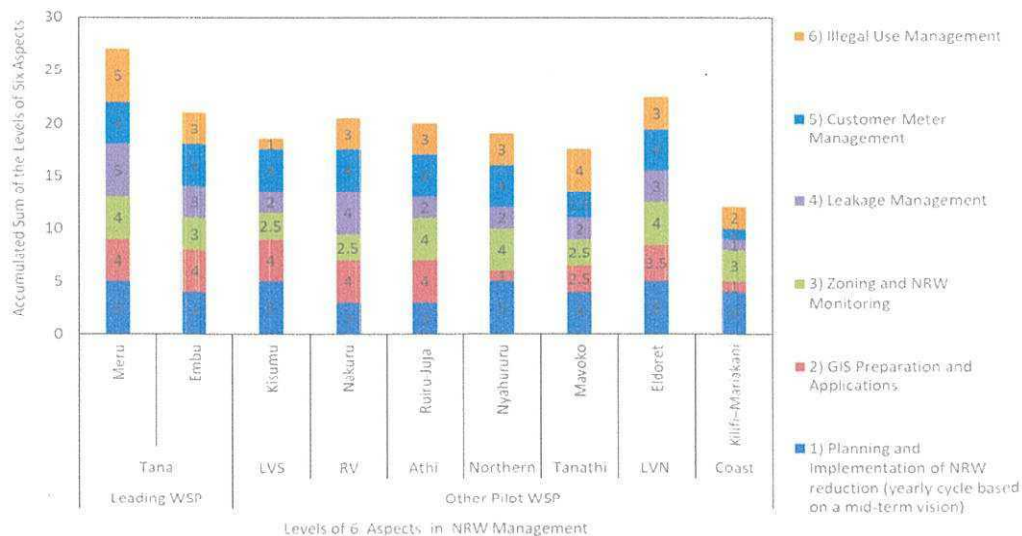


Fig. 2.1 Levels of Six Aspects in NRW Management

#### b) Technical Assistance (TA) Plan

JICA experts visited each WSP and shared the results as well as the challenges identified during the baseline survey. As a result of discussions between the JICA experts and each Pilot WSP, a consensus was achieved on the trials for the six aspects to be jointly implemented during this technical cooperation. As shown in Table 2.2 below (Tentative Plan of TA for Each Pilot WSP), different trials for NRW management were selected for each pilot WSP (see the circular marks ● in the table) in consideration of their particular needs. The red marks ● in the table show the trials which JICA expert think especially attract attention of each Pilot WSP. The scores of 1 to 5 in Table 2.2 show the results of comparative evaluation among the pilot WSPs (same as Fig. 2.1). Although there are the highest scores of 5 in this table, each WSP still faces many challenges. As the leading WSPs are expected to implement activities that should set a good example for the other WSPs, the quality of their NRW reduction activities should be improved further. The colours filling cells in the table shows the focus of JICA experts' support required for each trial at each Pilot WSP (i.e. red - high, yellow – medium & lightblue - low). Each of the trials shown in Table 2.2 is explained separately in Section 1 of Annex 2 at the end of this Work Plan 2 as part of the results from the baseline survey. Current challenges and expected improvements through the trials at each Pilot WSP is separately summarized in Section 2 of Annex 2 as a result from the baseline survey. In accordance to this tentative TA plan, the trials enclosed within red rectangles (i.e. 1-a Participatory Planning, 1-b PDA Cycle and 2-a GIS applications using free mobile software programs) in the table were partly conducted with some emphasis in the latter half of Phase 1. Those within blue rectangles (e.g. 2-b & 5-c Categorization and targeting of large customers, 3- a & c Improvement of zoning and monitoring, 4-a Use of listening sticks and 4-c Pressure management) were also dealt with to some extent in relation to the trials in red rectangles. The results of these trials conducted in Phase 1 are presented in the following (3) and (4).

Table 2.2 Tentative Plan of Technical Assistance (TA) for Each Pilot WSP

	Category of Pilot WSP	Leading Pilot WSP		Preceding Pilot WSP			Following Pilot WSP				
	Timing of Conducting TA	Phases 1 and 2		Mainly Phase 2			Mainly Phase 3				
	WSB Area	Tana		LVS	RV	Athi	Northern	Tanathi	LVN	Coast	
	Pilot WSP	Meru	Embu	Kisumu	Nakuru	Ruiru-Juja	Nyahururu	Mavoko	Eldoret	Kilifi-Mariakani	
Current Level of the 6 Key Aspects of NRW Reduction and Trials to be supported by JICA Experts	1) Planning and Implementation of NRW reduction (yearly cycle based on a mid-term vision)	5	4	5	3	3	5	4	5	4	
	Trials	<div style="border: 2px solid red; padding: 2px;">                     a) Participatory planning using sample templates and Google Drive                 </div> <div style="border: 2px solid red; padding: 2px;">                     b) Plan-do-check-adjust (PDCA) Cycle (mid-term, yearly, quarterly, monthly, weekly, etc.)                 </div> <div style="border: 2px solid blue; padding: 2px;">                     c) Introduction of HDPE pipe and elimination of asbestos pipe, etc.                 </div> <div style="border: 2px solid blue; padding: 2px;">                     d) Setting priority activities to be completed without failure as commitment targets                 </div> <div style="border: 2px solid blue; padding: 2px;">                     e) Inclusion of NRW-related training                 </div>									Explained in (3)
	2) GIS Preparation and Applications	4	4	4	4	4	1	2.5	3.5	1	
	Trials	<div style="border: 2px solid red; padding: 2px;">                     a) Open source utilization (QGIS, Google Earth, etc.) for fast GIS development and wider access/applications of GIS (including participatory mapping)                 </div> <div style="border: 2px solid blue; padding: 2px;">                     b) Linking GIS with customer/billing data for special analysis on meter problems and illegal connections                 </div> <div style="border: 2px solid blue; padding: 2px;">                     c) Use of GIS for assessing pipe conditions including mapping of leaks, bursts and aged pipes.                 </div>									
	3) Zoning and NRW Monitoring (monthly and weekly NRW management cycles)	4	3	2.5	2.5	4	4	2.5	4	3	
	Trials	<div style="border: 2px solid blue; padding: 2px;">                     a) Planning of strategic zoning (distribution/pressure zones→flexible DMA division from large to small for tracking down) to monitor NRW ratio of different areas and control pressure based on hydraulic analysis and field measurements                 </div> <div style="border: 2px solid red; padding: 2px;">                     b) Confirmation of the hydrological isolation and inflow metering of each distribution zone and DMA and the consistency of the existing customers in each zone and DMA between GIS and billing system.                 </div> <div style="border: 2px solid yellow; padding: 2px;">                     c) Establishment of easy and sustainable monitoring of NRW ratio, water balance(MNF), and abnormal flow due to burst using billing system, smart meters, remote monitoring, etc.                 </div> <div style="border: 2px solid yellow; padding: 2px;">                     d) Periodical analysis and discussions to prioritize areas for different activities                 </div> <div style="border: 2px solid yellow; padding: 2px;">                     e) Building capacity for NRW-related analysis at zone level for self-directive development of strategy to encourage inter-zone competition                 </div>									Explained in (4)
	4) Leakage Management	5	3	2	4	2	2	2	3	1	
	Trials	<div style="border: 2px solid blue; padding: 2px;">                     a) Spread of the daily use of listening sticks over many field staff against leakage                 </div> <div style="border: 2px solid yellow; padding: 2px;">                     b) Implementation of strategic track down of under ground leakage (zoning→step test→listening stick→USF/leak detector/correlator)                 </div> <div style="border: 2px solid red; padding: 2px;">                     c) Measurement and optimization of pressure distribution (other than zoning)                 </div> <div style="border: 2px solid blue; padding: 2px;">                     d) Reduction of spaghetti service connections                 </div> <div style="border: 2px solid yellow; padding: 2px;">                     e) Pressure tests with hand pump for checking installation quality of service connections                 </div>									
	5) Customer Meter Management	4	4	4	4	4	4	2.5	4	1	
	Trials	<div style="border: 2px solid blue; padding: 2px;">                     a) Achieving 100% in metering ratio                 </div> <div style="border: 2px solid yellow; padding: 2px;">                     b) Preparation and implementation of meter replacement/relocation strategies (monitoring of consumption with billing system, accuracy testing with bench, mobile tester and/or bucket, sizing, specifications, etc.)                 </div> <div style="border: 2px solid red; padding: 2px;">                     c) Focused management of large consumption customers with high accuracy meter, smart meter or additional meter.                 </div> <div style="border: 2px solid blue; padding: 2px;">                     d) Management of large residential buildings with customer identification survey and additional use of master meter.                 </div>									
	6) Illegal Use Management	5	3	1	3	3	3	4	3	2	
	Trials	<div style="border: 2px solid yellow; padding: 2px;">                     a) Active patrol for finding illegal water use (including use of chlorine DPD tablets, detecting equipment, etc.)                 </div> <div style="border: 2px solid blue; padding: 2px;">                     b) Inclusion of a penalizing mechanism against water theft in the county's water act                 </div> <div style="border: 2px solid blue; padding: 2px;">                     c) Enhancement of law enforcement against water theft with support from the county                 </div>									

Legend

- ● ● Trials partly conducted in Phase 1 with some emphasis
- ● ● Trials dealt with in Phase 1 to some extent in relation to the trials enclosed in the red rectangles

NOTE: 1 to 5 - Level of Key Aspect from the initial capacity assessment (5 as the highest level)

- Trial agreed to carry out through discussion between each pilot WSP and JICA experts
- The trial which the JICA experts think would especially attract attention at each WSP.

Focus for Support:   High   Medium   Low

Based on the results in the latter half of Phase 1, these trials for the six aspects have been reorganized into four groups of activities at the beginning of Phase 2 for a detailed scheduling of the TA for Phase 2 (see Section 4 of Annex 2 for the schedule of TA for Phase 2). This reorganization was done in consideration of the Work Flow Approach proposed by JICA experts for a realistic and sustainable NRW management in Kenya (i.e. multiplex targeting and easy implementation with free mobile work flow management tools) (see 3.2.4 for the explanation of this approach).

**(3) Each Pilot WSP identifies measures to solve challenges and formulates the NRW reduction plan (Activity 4-3), and Each Pilot WSP formulates the annual NRW reduction plan including financial schedule based on the NRW reduction plan (Activity 4-4)**

**(i) Status of Achievement:**

Many of the pilot WSPs have prepared their initial mid-term and annual plans for NRW reduction.

**(ii) Actual performance of activities:**

The activities mentioned in this section correspond to Trials 1-a & b under Aspect 1: Planning and implementation of NRW reduction (see the trials enclosed in red rectangles at the top of Table 2.2). In Phase 1, JICA experts visited eight pilot WSPs (other than Kilifi-mariakani WSP) once during the baseline survey period and another time later in Phase 1 in order to initiate their planning and the PDCA cycle. Additional visits were also made to some pilot WSPs including Kisumu and Nyahururu WSPs in Phase 1 for supporting the formulation of NRW plans with some demonstration of basic NRW reduction measure.

Table 2.3 summarizes the progress in the formulation of the NRW reduction plans by the Pilot WSPs. Four of them completed or mostly completed the preparation of draft medium-term NRW reduction plans and five of them completed the preparation of draft annual NRW reduction plans in a timely or a rather timely manner (i.e. before the end of July, 2017).

Table 2.3 Status of the Formulation of NRW Reduction Plans by the Pilot WSPs

Group	Pilot WSP	Medium-term NRW reduction plan	Annual NRW reduction plan
Leading Pilot WSP	Meru WSP	Four areas that should be covered by a medium-term plan have been identified. A medium-term plan in these areas is being formulated.	Formulated
	Embu WSP	The WSP is revising a large part of the draft plan based on the discussion with JICA experts.	To be formulated based on the medium-term plan being revised
1st Group Pilot WSP	Nakuru WSP	A draft plan for most of the activities has been formulated.	A draft plan for most of the activities has been formulated.
	Kisumu WSP	A draft has been formulated.	Formulation in progress
	Nyahururu WSP	A draft has been formulated.	A draft has been formulated.
	Ruiru-juja WSP	A draft plan for most of the activities has been formulated.	A draft has been formulated.
2nd Group Pilot WSP	Mavoko WSP	Not prepared	Formulation in progress
	Eldoret WSP	A draft has been formulated.	A draft has been formulated.
	Kilifi-Mariakani WSP	A long-term NRW reduction plan is being formulated with assistance from another donor. Assistance in plan formulation has not provided yet by this project.	Assistance has not been provided yet by this project.

(as of the end of July 2017)

An example of mid-term and annual NRW reduction plans from Nyahururu WSP is shown in Section 3 of Annex 2.

In general, the pilot WSPs did not have enough capacities to formulate practical NRW reduction plans independently in Phase 1. The JICA experts will continuously assist the pilot WSPs in preparing realistic plans under the concept of PDCA (Plan-Do-Check-Adjust) cycle shown in Fig. 2.2.

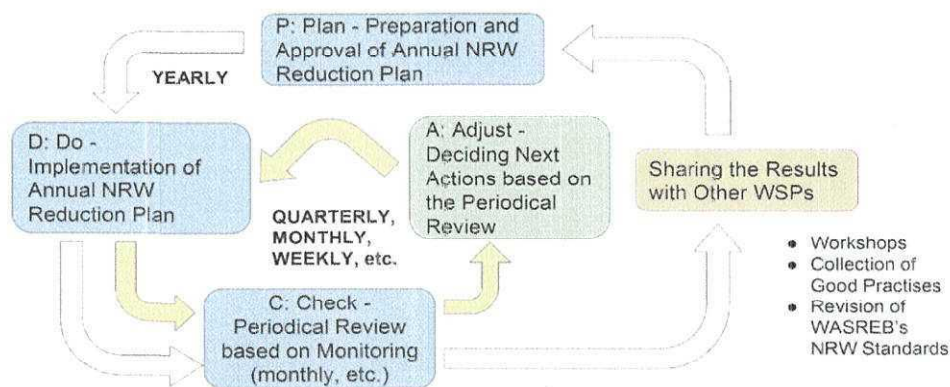


Fig. 2.2 Schematic Diagram of the Plan-Do-Check-Adjust (PDCA) Cycle (Trial 1-b)

Successful implementation of NRW reduction activities requires active participation of relevant sections (not only NRW unit but also commercial, O&M and GIS sections) especially in the discussion for the formulation of NRW reduction plans. Therefore, the JICA experts proposed a trial for participatory planning using a cloud-based system (Google Drive) and templates, and the pilot WSPs agreed to conduct the trial after receiving an explanation of its goal and contents. The goal of implementing this trial is to establish a planning practice that allows [a] participation of various WSP

staff in the planning of NRW reduction, [b] multiple staff members to work on the same document simultaneously, [c] easy monitoring and commenting on the plans by JICA experts through the Internet and [d] optimisation of the templates by improving them every year with the Pilot WSPs. The JICA experts also considered [e] the facilitation of information sharing and mutual learning among the staff of different Pilot WSPs by establishing this cloud-based system that allows staff of a WSP to obtain information on the plans of other Pilot WSPs at any time. The JICA experts prepared the cloud system and reference templates, and provided assistance to each Pilot WSP for using them effectively.

**(4) Each Pilot WSP implements the annual NRW reduction plan. (Activity 4-5)**

**(i) Status of achievement:**

Some of the Pilot WSPs are implementing NRW reduction activities based on the prepared annual NRW reduction plans for the financial year 2017/2018.

**(ii) Actual performance of activities:**

The leading and other pilot WSPs were expected to begin their implementation of NRW reduction activities from the beginning of the financial year 2017/2018 in accordance with their prepared plans. However, the implementation have been facing various obstacles including a significant delay in the procurement of necessary equipment and acquisition of technical assistance from JICA experts. Unfortunately, the various devices required for their NRW reduction activities (e.g. ground microphone for leakage detection), which the NRW Unit of MWI planned to provide to each Pilot WSPs through their corresponding WSBs by around August 2017, have not been delivered to the pilot WSPs due to the delay in their procurement. As of January 2018, the procurement for 1st Group Pilot WSPs (Kisumu, Nakuru, Nyahururu & Ruiru-juja) is expected to complete by the end of April 2018. According to the NRW Unit of MWI (before a JICA expert in charge of leakage detection comes to Kenya in May 2018). The procurement for Leading WSPs (Meru & Embu) and 2nd Group Pilot WSPs (Mavoko, Eldoret & Kilifi-mariakani) are expected to delay further because additional budget has to be sent to their corresponding WSBs for the procurement (to be allocated from the budget of NRW Unit, MWI for the financial year 2018/19). Moreover, part of the assistance from JICA experts planned to support their implementation in Phase 1 (part of some trials on wider GIS applications and pressure management at Meru and Embu WSPs) has been postponed to Phase 2 due to the repeated presidential election.

In June and July 2017, a JICA expert spend three weeks in Embu and Meru WSPs to conduct part of the trial for wider GIS applications in NRW management using free software (Trial 2-a) with the counter parts. The trial use of smartphones and tablets for wider GIS applications [e.g. for identifying priority target customers in the field (Trials 2-b & 5-c), preparation of a portable work flow management tool (i.e. a ODK form) for customer meter accuracy check, identification of illegal connections and facilitation of leakage detection using listening sticks (Trial 4-a), pressure measurement over a large are using many pressure gauges with max pointer and mobile GIS (Trial 4-c), etc.] went successful and well-received by the counterparts in Meru and Embu WSPs. Some discussions on the improvement of

zoning and NRW monitoring using free cloud-based software on smartphones, were also held between the JICA expert and the counterparts in Embu WSP during this period (Trials 3-a & c). Although these trials have not been completed in Phase 1, the preliminary results of these trials have become the foundation for the proposed Work Flow Approach (see 3.2.4 for the explanation of the approach) and the reorganization of TA components for detailed scheduling of Phase 2 in accordance with this approach.

**(5) Each pilot WSP evaluates and analyses implementation results and revises the plan (Activity 4-6) and, each pilot WSP produces the NRW reduction activity report annually (Activity 4-7)**

(i) Status of achievement:

Activities 4-6 and 4-7 are scheduled to be implemented in Phase 2 onwards.

(ii) Actual performance of activities:

These activities are linked with Activity 4-5.

The Pilot WSPs are expected to complete the annual revision of their plans by June, every year and the preparation of a report for the previous year by July at earliest or later.

**(6) Each Pilot WSP holds regular NRW reduction meetings attended by relevant departments of WSP (Activity 4-8)**

(i) Status of achievement:

The Pilot WSPs are expected to hold the meetings more regularly in Phase 2 onwards.

(ii) Actual performance of activities:

The communication between WSP staff involved in NRW reduction including those belonging to the commercial department has increased through the participatory planning (Trial 1-a) at several pilot WSPs and especially at the two leading WSPs, to which the JICA experts provided additional assistance in late June and July, 2017. The Work Flow Approach developed at the beginning of Phase 2 based on the results in Phase 1 is designed partly to facilitate the preparation of materials to be used in the monthly meetings between relevant departments and sections.



**2.1.5 Experiences and knowledge of NRW reduction activities are shared among Urban WSPs (Output 5)**

**(1) MWI NRW Unit organizes NRW related regular meetings in cooperation with other relevant organizations (Activity 5-1)**

**(i) Status of achievement**

The MWI NRW Unit concluded a Framework of Cooperation (FoC) on the cooperation in information dissemination with WASPA and developed such a cooperation system.

**(ii) Actual performance of activities:**

As the presentation on this activity is scheduled to be made at a regular meeting with WASPA after Output 4 has been realised, it shall be made in Phase 2 onwards. MWI NRW Unit and WASPA concluded a FoC (Framework of Cooperation) on 12<sup>th</sup> May 2017 to build an official cooperative relationship.

**(2) WASREB compiles case studies/lessons learnt about NRW reduction activities (Activity 5-2)**

**(i) Status of achievement:**

The activity is planned to be implemented in Phase 2 onwards.

**(ii) Actual performance of activities:**

This activity is linked with Activity 2-2 and the results of activities for Output 4.

**2.2 Other Activities**

**2.2.1 Training in Japan**

During Phase 1 of this project, a training course for the Management team was conducted in Japan in June 2017. During Phase 2, a training course for the Action Team is scheduled for June 2018. Personnel selection and the contents of the training course will be finalized in consultation with the relevant C/Ps. Table 2.4 describes the outline of the first training in Japan.

Table 2.4 Outline of the Training in Japan

	Period	Intended participants	Number of participants	Training subjects	Training outputs
First training	12 <sup>th</sup> – 23 <sup>rd</sup> June, 2017	Project management team	13	<ul style="list-style-type: none"> <li>• History of and current problems in the water supply service in Japan.</li> <li>• Measures to improve business management, financial management, organizational structure, facilities and customer service that have been taken by the Bureau of Waterworks, Tokyo Metropolitan Government.</li> <li>• Field inspection of the water sources, water treatment plants, water supply and distribution facilities, etc. required for maintaining stable supply of safe water in the water supply and distribution system in Tokyo.</li> <li>• Field inspection of water meters, service pipes and water supply facilities installed in the water supply and distribution networks to reduce NRW.</li> <li>• Exchange of opinions with the staff of the bureau.</li> <li>• Presentations by the participants.</li> </ul>	<ul style="list-style-type: none"> <li>• The participants have created a consensus on NRW reduction in the group discussion on “approaches to the Project” and “cooperation among organizations” and the preparation of the presentations.</li> <li>• The participants presented the report on the training in the fourth PIC meeting.</li> </ul>

### 2.2.2 Procurement of Equipment

Tables 2.5 shows the equipment required to be procured for the implementation of the Project. The equipment to be used in the training of the pilot WSPs for Output 4 was selected based on the analysis of the baseline survey results on the items described in R/D. The contents of the equipment to be procured in this project selected by the JICA experts were finalized with the approval of the MWI NRW Unit.

- Survey of Training courses and equipment for KEWI for the achievement of Output 3 (Completed)
- Provision of equipment for instruction at WSPs for the achievement of Output 4 (Importation in September 2017, Inspection of equipment to be carried out in early Phase 2)

Table 2.5 Equipment to be procured (1)/Equipment to be provided to C/P Organization

Organisation	Description of items	Quantity	Country to source	Status
Equipment for KEWI	Notebook PC	1	Kenya	Procured (February/2017) Managed by Expert team and lent out as necessary.
	Multi-purpose photocopier machine	1		
	Digital camera	1		
	Overhead projector	1		
Survey equipment for Pilot WSPs	Portable ultrasonic water meter	1	Japan	Procurement: in progress (Scheduled to arrive on site September /2017) After the arrival equipment will be managed by Expert team.
	Pressure logger	10		
	Portable checker of water meter	2		
	Leak noise correlator	1		
	Electronic leak detector	1		
	Metal locator	1		
	Listening stick (1.5m & 1.0m lengths)	4 each		

As described in 2.1.1 (3), there was a plan for the local procurement of equipment with budget allocated by MWI to assist activities of the pilot WSPs. However, it became impossible to obtain the equipment and materials to be procured due to miscommunication between MWI and WSBs, which were responsible for the procurement of equipment and materials. MWI plans to procure the equipment and materials concerned with its budget for the next financial year.

## Chapter 3 Phase 2 Activity Plan

### 3.1 PDM Review

The PDM indicators and activity outputs shall be verified for relevance by checking the progress of full-fledged activity assistance to the pilot WSPs implemented in Phase 2. Therefore, the timelines shown in Table 3.1 are assumed for the PDM review policies. Changes in the PDM will be officially approved at the JCC.

Table 3.1 Setting Policies for PDM Indicator Values

Narrative Summary	Objective Verifiable Indicators	Setting Policies for Indicator Values
<b>【Overall Goal】</b> Under NRW reduction support mechanism, Urban WSPs enhance NRW reduction activities.	<u>Indicator 1</u> X of Urban WSPs participate in knowledge sharing activities established by the Project.	Shall be set to the timing when an agreement is reached on a platform to be constructed on the assumption that many WSPs will participate.
	<u>Indicator2</u> X of pilot Urban WSPs continue achieving target(s) set by the annual NRW reduction plan.	Shall be set by the second half of Phase 2 (August 2019) based on the establishment status of the assistance activities to the pilot WSPs.
	<u>Indicator3</u> NRW annual report is continuously produced and disseminated.	The current indicator has been agreed upon.
<b>【Project Purpose】</b> A NRW reduction support mechanism is established for Urban WSPs to implement NRW reduction activities.	<u>Indicator</u> X of pilot Urban WSPs continue achieving target set by the annual NRW reduction plan for two years.	Shall be set by the first half of Phase 2 (September 2018) based on the establishment status of the assistance activities to the pilot WSPs.
<b>【Output 1】</b> Promotion and coordination of NRW reduction activities by MWI NRW Unit are strengthened.	<u>Indicator1</u> All County representatives participate in NRW related seminar(s).	The current indicator has been agreed upon.
	<u>Indicator2</u> NRW reduction campaigns are conducted semi-annually.	The current indicator has been agreed upon.
	<u>Indicator3</u> NRW reduction annual reports are produced.	The current indicator has been agreed upon.
<b>【Output 2】</b> Use of NRW reduction standards by Urban WSPs are promoted by WASREB.	<u>Indicator 1</u> NRW reduction standards are revised by year X.	Shall be set in the next JCC. X shall be 2020.
	<u>Indicator2</u> Revised NRW reduction standards are disseminated to all Urban WSPs through workshop(s).	The current indicator has been agreed upon.

Narrative Summary	Objective Verifiable Indicators	Setting Policies for Indicator Values
<p><b>【Output 3】</b> NRW related training capacity of KEWI is strengthened.</p>	<p><u>Indicator 1</u> KEWI conducts NRW reduction courses with contents incorporating on-site training and revised course materials.</p>	<p>The current indicator has been agreed upon.</p>
	<p><u>Indicator2</u> Evaluations by the NRW course participants are higher than before the revision of course materials.</p>	<p>The current indicator has been agreed upon.</p>
	<p><u>Indicator3</u> X % of NRW course participants formulate the work plans.</p>	<p>A "work plan" is an overall plan of a WSP. An "action plan" is appropriate for the one to be prepared by an individual course participant. The indicator value shall be set to the middle of Phase 2 (December 2018).</p>
<p><b>【Output 4】</b> NRW planning and/or implementation capacity of pilot Urban WSPs is enhanced.</p>	<p><u>Indicator 1</u> More than X of pilot Urban WSPs continuously make the annual NRW reduction plan based on the review of previous year's implementation.</p>	<p>Shall be set by the second half of Phase 2 (around August 2019) based on the progress status of the assistance activities by Phase 2. The number of target WSPs shall be six.</p>
	<p><u>Indicator2</u> More than X of pilot Urban WSPs continuously implement the annual NRW reduction plan formulated in 4-1.</p>	
	<p><u>Indicator3</u> More than X of pilot Urban WSPs are able to implement skills and activities that pilot Urban WSPs were not able to adopt prior to the Project.</p>	
	<p><u>Indicator4</u> More than X of pilot Urban WSPs are able to implement priority activities indicated in the NRW reduction plan.</p>	
	<p><u>Indicator5</u> More than X of pilot Urban WSPs train all personnel of NRW reduction section.</p>	
<p><b>【Output 5】</b> Experiences and knowledge of NRW reduction activities are shared among Urban WSPs.</p>	<p><u>Indicator 1</u> Case study and lessons learnt of Output 4 and other NRW activities are compiled and disseminated.</p>	<p>The current indicator has been agreed upon.</p>
	<p><u>Indicator2</u> Regular meeting(s) of NRW is/are organized three times a year.</p>	<p>The current indicator has been agreed upon.</p>

### **3.2 Activities related to Outputs**

Activities of each outcome in Phase 2 will be planned as follows based on the results of activities for each outcome of Chapter 2.

#### **3.2.1 Promotion and coordination of NRW reduction activities by MWI NRW Unit are strengthened (Output 1)**

(1) Production of non-revenue reduction annual report including data on non-revenue reduction with cooperation of WASREB (Activity 1.1 related)

Annual report on Non-revenue water reduction will be finalized by MWI, WASREB and other CP organizations, and the first version will be completed by May 2018. Based on the finalized project plan, the MWI Non-Revenue Water Unit will prepare an annual report on non-revenue water reduction and will distribute it to relevant organizations (WASREB, KEWI, Counties, Urban WSPs etc.). Upon completion, dissemination will be planned through seminars, regular WASPA meetings as well as publication on the website and so on.

(2) Sensitization activities and campaigns about NRW reduction planning and implementation for pilot WSPs and County governments (Activity 1.2, 1.3 related)

Sensitization activities and educational seminars for County governments (management level) will be planned annually in Phase 2 in coordination with the Council of Governors (CoG). Based on the Activity Plan prepared in Phase 1, the budget for these activities will be secured by the MWI. Based on the implementation status of sensitization activities to the counties, the NRW reduction campaigns will be conducted twice a year in cooperation with the WSPs in consideration of the characteristics of the regional water problem. Relevant events such as the Water Week in Kenya and the International World Water Day will be considered as other occasions to implement sensitization activities.

(3) Review of NRW activities of KEWI and WASREB (Activity 1.4, 1.5 related)

A review report on the first joint training implemented by KEWI in the first phase will be finalized at the beginning of Phase 2. Subsequently, the MWI's NRW unit is planning to recommend improvements to the next joint training to be conducted by KEWI.

In addition, after completion of the survey on the usage of the current NRW reduction standards (related to Activity 2.1), which WASREB has been implementing from Phase 1, the NRW unit shall review the results, recommend improvements and formulate revision procedures for the NRW standards.

### **3.2.2 Use of NRW reduction standards by Urban WSPs are promoted by WASREB (Output 2)**

#### **(1) Survey on usage status of NRW reduction standards (Activity 2.1 related)**

At the beginning of Phase 2, results of the survey on the status of usage of the current NRW reduction standards will be finalized. Based on these results, a future survey of the standards will be considered (from January 2018).

#### **(2) Revision of NRW reduction standards based on usage of current situation survey and Output 4 and 5 (Activity 2.2 related)**

Based on the result of 1) above, the challenges for revision of the NRW standard will be understood, while the implementation method and necessity for additional survey at the national level will be confirmed. Furthermore, the results of activities of Output 4 and 5 which will be fully implemented in Phase 2 will also be reflected in the revision of NRW standards. In order to revise the NRW standards, we propose that a revision committee consisting of technical experts from C/P institutions such as KEWI, WASPA, pilot WSPs and other WSPs be involved. During Phase 2, this revision committee will hold ongoing consultations on matters such as the method of NRW standards revision, establish the timeline for revision and other related matters.

#### **(3) Incorporation of the results of the NRW reduction activities review to be implemented by MWI NRW unit in WASREB's activities (Activity 2.4 related)**

Utilization of the recommendations (related to Activity 1.5) by the MWI NRW unit as described in (1) 4) above in the activities of Phase 2.

#### **(4) Concerning other activities**

In addition, "Promotion of use of the revised standards for reducing non-revenue water (Activity 2.3 related)" and "Summarizing monitoring and evaluation results related to utilization of this standard (Activity 2.5 related)" will be implemented in Phase 3.

### **3.2.3 NRW related training capacity of KEWI is strengthened (Output 3)**

#### **(1) Identification of problems in the current NRW reduction course (related to Activity 3.1), review of the strategy and contents of the training course (related to Activity 3.2), and joint training with the leading WSPs (Activity 3.3 related).**

During Phase 2, 4 more joint training courses are planned based on the review of the first joint training implemented in Phase 1. Therefore, during Phase 2, improvements of problems identified in the first joint training will be made, review of strategies and training contents, with the aim of further improving the level of joint training. As part of the PDCA cycle, this work will be continued and systematized in every joint training to be held in Phase 2.

(2) Improvement of the content of KEWI's NRW reduction course and the teaching materials based on the results of joint training (Activity 3.4 related).

Based on the first joint training course, problems identified will be addressed in the subsequent joint training courses. Meanwhile, the teaching materials for KEWI's long-term course shall be improved as well as the training facilities at KEWI's campus related to the NRW reduction course in order to fully respond to training needs of WSPs. This includes improvement of piping network yard, leakage detection platform, maintenance of water meter inspection tester, etc.

(3) Incorporation of the results of MWI NRW unit review of the NRW reduction course (Activity 3.5)

Utilize the recommendations (related to Activity 1.5) by the MWI NRW unit as described in 3.2.1 (3) above and apply them to activities in Phase 2.

(4) Implementation of trace studies for students of the non-revenue reduction course (Activity 3.6).

For students who participated in the first joint training, self-evaluation of the outcome of the joint training in the activities of their own WSP will be conducted through filling out questionnaire sheets. Additionally, evaluation by their senior employees and MDs will be conducted in order to confirm the self-evaluation results of the trainees. Such surveys will be carried out approximately every six months after training by the KEWI lecturers. This method will also be implemented after each joint training as part of the PDCA cycle.

### 3.2.4 NRW planning and/or implementation capacity of Pilot WSPs is enhanced (Output 4)

Fig. 3.1 shows a location map of the selected nine Pilot WSPs including two Leading WSPs and the main Pilot WSPs targeted for the technical assistance (TA) in each phase of this project. This figure highlights the location of the six Pilot WSPs targeted mainly in Phase 2.

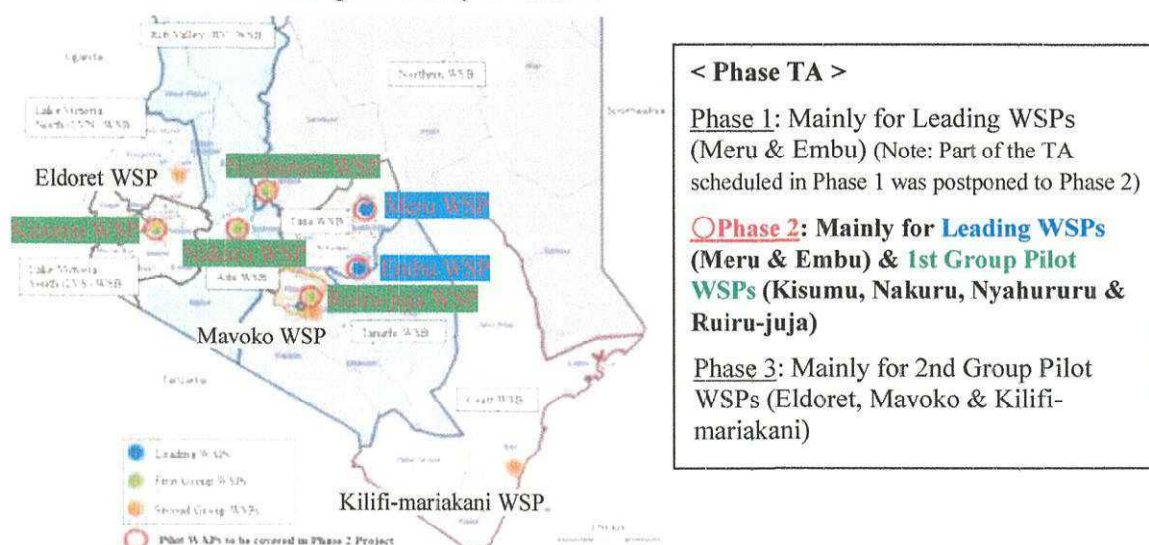


Fig. 3.1 Location Map of the Six Pilot WSPs targeted mainly in Phase 2



(1) Supporting the PDCA cycle of each Pilot WSP (Activity 4-3 to 8)

As explained in 2.1.4 (3), many of the Leading & other Pilot WSPs formulated their initial NRW reduction plans in Phase 1 and some of the Pilot WSPs have been implementing the plans. Their implementation will be reviewed and their plans will be revised for the next fiscal year at the end of every fiscal year in Phase 2. Moreover, the PDCA cycle including monthly check and adjustment will be gradually reinforced during Phase 2 based on the Work Flow Approach explained below in (2). JICA experts will visit the eight Pilot WSPs (other than Kilifi-mariakani WSP) for supporting their PDCA cycle every fiscal year in Phase 2 while remote Kilifi-mariakani WSP will be mainly supported through discussions during and after JCCs and workshops to be held in Nairobi (if circumstances allow) due to the time constraint of Phase 2. The timing of visits for supporting their PDCA cycle in Phase 2 is shown in Section 4 of Annex 2. Kilifi-mariakani WSP will be focused in Phase 3.

(2) Supporting the Adoption of New Skills and Activities suitable for Each Pilot WSP through the Work Flow Approach of NRW Management proposed at the beginning of Phase 2 (Activity 4-3 to 8)

Currently most of the pilot WSPs have difficulties to continue even basic NRW reduction activities such as checking the accuracy of installed customer meters with calibrated buckets. Therefore, it is quite important to establish a sustainable workflow management system for NRW reduction which can cover all the service areas and prioritizes low-cost activities having high effects.

The Work Flow Approach of NRW management is proposed by JICA experts at this beginning of Phase 2 based on the following perspectives of Output 4 (Pilot WSPs).

- Sustainable application of knowledge & technical skills in a real work environment of WSP (i.e. NRW Management)
- Starting with easy & highly effective activities
- Trying to avoid components which will or may cause a significant delay in the implementation of NRW reduction activities (e.g. a large facility investment)
- Importance of work flow management for NRW reduction (e.g. use of free Open Data Kit (ODK))

Fig. 3.2 shows the Work Flow Approach of NRW management and its four activity groups. This approach enables [1] multiplex targeting (i.e. not only by area such as targeting a certain DMA having a high NRW ratio, but also by other conditions such as consumption level of customers for targeting very large customers first) and [2] easy implementation of activities over all the service areas, using a work flow management system (consisting of free software such as mobile GIS and ODK, cloud server, smartphones etc.) in order to reduce the overall NRW ratio of each WSP. As seen in this figure, the base of this Work Flow Approach is the activities for the establishment of PDCA cycle (Activity Group [A]), which is explained above in (1) of 3.2.4. Among the various activities required for NRW reduction, 1st priority is given to the NRW reduction activities around customers (Activity Group [B]) such as checking [1] meter accuracy with bucket/portable tester, [2] surface leakage from service connections, [3] underground leakage with listening stick, [4] illegal connection, [5] faulty fitting, and follow-up [6]

meter replacement & [7] pipe/fitting repair, etc. The customers consuming a lot of water should be targeted first in this group of activities for the efficient NRW reduction. As seen in Fig. 3.3, free software programs of Android smartphone/tablet applicable for multiplex targeting (i.e. MAPinr) and workflow management (i.e. ODK) were selected for this activity group based on the findings through some trials conducted in Phase 1. The red arrows in this figure shows the flow of activities and data.

Customized multipurpose forms of ODK can be prepared not only for the workflow management of Activity Group [B] but also for the pipeline-related activities of Activity Group [D]. A single ODK form can guide field workers through various activities included in the same activity group simultaneously and can record and submit the results of activities (with GeoODK Collect) to a cloud-based server (where ODK Aggregate is installed) easily through the Internet. The submitted results can be filtered in the cloud server and exported as a table or map for the follow-up activities such as replacement of faulty customer meters and pipe repair.

2nd priority is given to Activity Group [C] which includes NRW monitoring activities using bulk meters such as [1] monthly calculation of NRW ratio in each distribution zone and DMA and [2] continuous monitoring of abnormal flow at each bulk meter. This activity group involves zoning of distribution network (i.e. establishment of distribution zones and DMAs), which often requires procurement of expensive equipment and pipe materials and construction of meter chambers, etc. The planning and implementation of zoning often causes a significant delay of NRW reduction activities. Therefore, this activity group was not set as a precondition of basic NRW activities, by giving 2nd priority instead of 1st priority unlike a DMA-based pilot project which often have to start with isolation of a DMA and the establishment of its baseline NRW ratio. As shown in Fig. 3.4, a free software program (Google Sheet on Google Drive) was selected for this activity group as another workflow management tool. The spread sheets prepared using this software are viewable and editable simultaneously from multiple smart phones at site through the Internet. Although zoning of distribution network and installation of bulk meters are ongoing at some Pilot WSPs, these Pilot WSPs has not established a continuous and reliable NRW monitoring system yet. Therefore, the software side of NRW monitoring (not facility improvement which often become expensive) will be focused in this TA.

3rd priority is given to Activity Group [D] which includes other NRW reduction activities such as [1] those along pipe lines (e.g. surface leak patrol, underground leakage, line survey and repair of bursts and leaks), [2] pressure management, [3] long-term GIS improvement, etc.

The monthly results of Activity Groups [B] to [D] can be used for the monthly discussion between different units and sections relevant to NRW management, which is part of Activity Group [A]. The submitted & reorganized results of Activity Group [B], especially a map created from the records of abnormal sound from customer meters (detected with listening sticks) suggesting the existence of underground leakage on service pipes or branch distribution pipes, will be useful for the underground leakage line survey included in Activity Group [D].

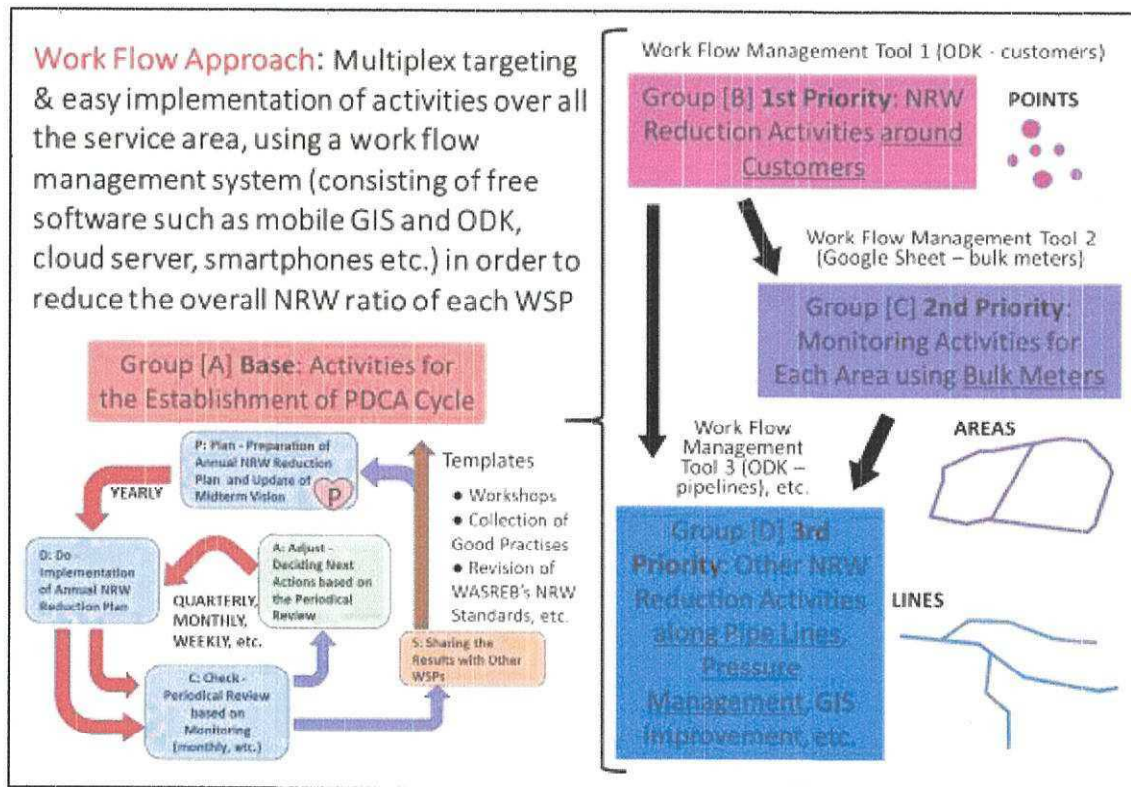


Fig. 3.2 Work Flow Approach of NRW Management and its Four Activity Groups

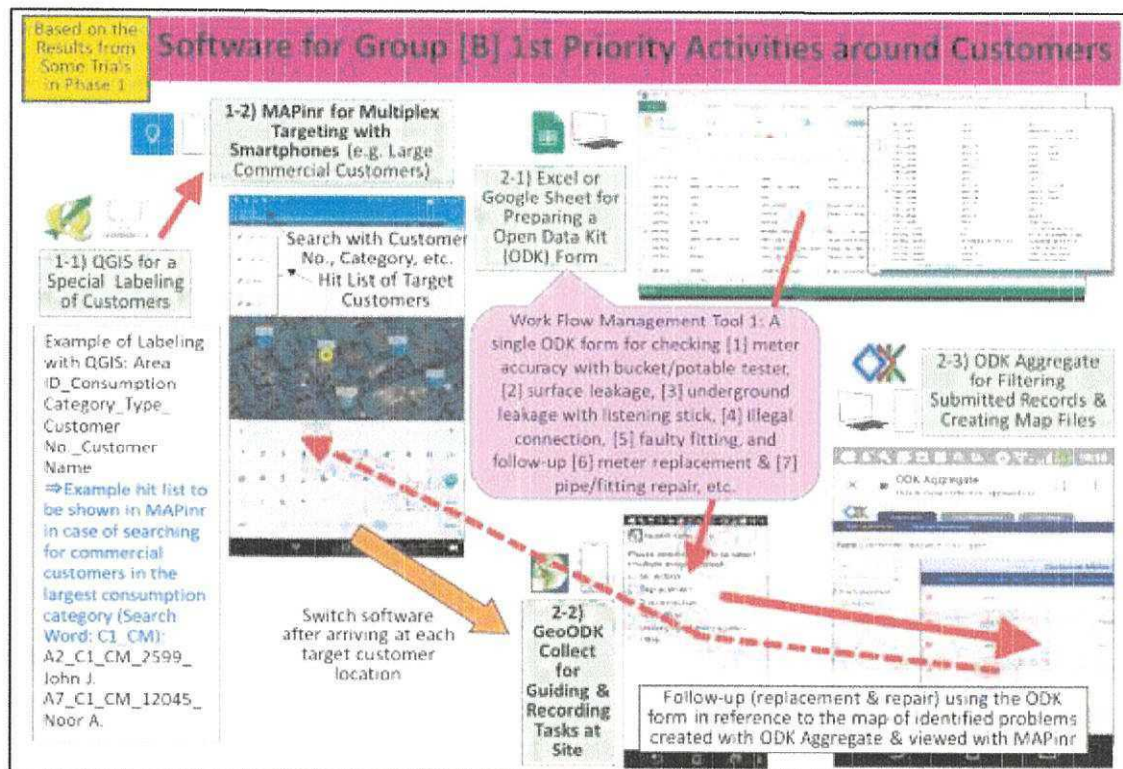


Fig. 3.3 Proposed Free Software for Group [B] 1st Priority Activities around Customers

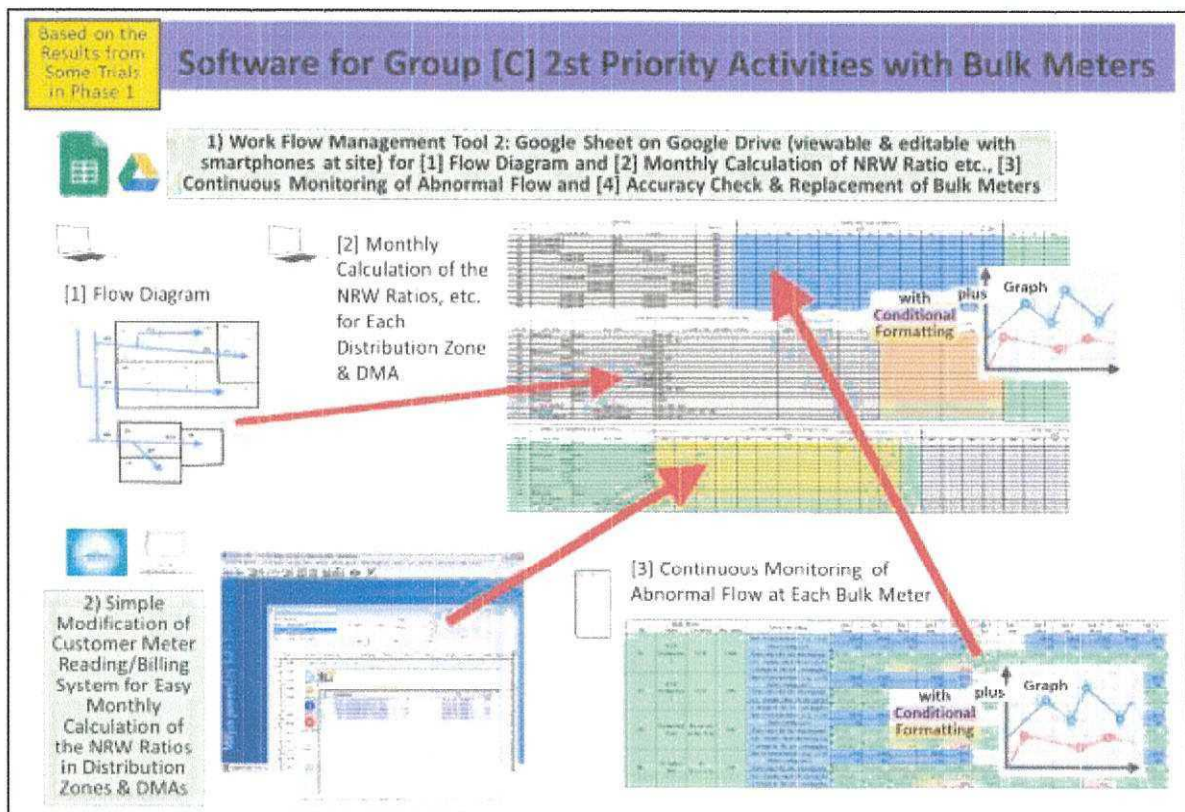


Fig. 3.4 Proposed Free Software for Group [C] 2nd Priority Monitoring Activities with Bulk Meters

Table 3.2 shows Embu WSP’s example of the trials under six aspects of NRW management from the previous TA Plan prepared through the baseline survey and used in the later half of Phase 1 (see Table 2.2 of 2.1.4 for the trials of all the Pilot WSP) and their corresponding activity groups of the Work Flow Approach (proposed later at the beginning of Phase 2). As seen in this table, some trials are related to multiple activity groups, which make an effective scheduling of TA based on the Work Flow Approach of NRW management quite difficult. Therefore, all the trials have been reorganized into the four activity groups for easy implementation of TA with clear steps based on this approach. Table 3.3 shows steps of TA for each activity group (i.e. components of the new TA plan) reorganized for Phases 2 & 3 (example of Embu WSP). The trials relevant to each step of the four activity groups are written after the name of each step in green within brackets [ ]. All the trials listed in the previous TA Plan prepared during the baseline survey in Phase 1 are included in one or multiple steps of the four activity groups. Each of the Activity Groups [B] to [D] has similar steps for i) preparing a draft work form or a draft calculation sheet, ii) improving the draft form or sheet through field trials, and iii) trying monthly discussion based on the results of implementing activities.

Expected outcomes from each step, which are potentially shareable with other WSPs as a good example or template, are also described in this table. Expected intensity of support required for each step is also shown in different filling colours.

An example of detailed TA schedule in Phase 2(for Embu WSP) is presented in Section 4 of Annex 2. The overall TA schedule for the six Pilot WSPs mainly targeted in Phase 2 is also presented along with the assignment schedule of the JICA experts supporting Output 4 in Section 4 of Annex 2. The steps of the detailed TA schedule under the Work Flow Approach for each of the targeted Pilot WSPs differs to some extent depending on the set of trials agreed to be conducted jointly in the previous TA Plan.

Table 3.2 Trials of the Previous TA Plan used in Phase 1 and their Corresponding Activity Groups of the Work Flow Approach (Example of Embu WSP)

Six Aspects and Trial Menu of the Technical Assistance		Intensity of Support	Grouping of the Trials for Easy Implementation			
1. Planning and Implementation of NRW reduction (yearly cycle based on a mid-term vision)	a) Participatory planning using sample templates and Google Drive	●	Planning (P)+DCA Cycle			
	b) Plan-do-check-adjust (PDCA) Cycle	●				
	c) Introduction of HDPE pipe and elimination of asbestos pipe, etc.	●	3rd Priority Activities (mainly related to pipelines and GIS improvement)			
	d) Setting priority activities to be completed without failure as commitment targets	●	Planning (P)+DCA Cycle			
	e) Inclusion of NRW-related training	●				
2. GIS Preparation and Applications	a) Open source utilization for fast GIS development and wider access/applications of GIS (including participatory mapping)	●	PDCA	1st	2nd	3rd
	b) Linking GIS with customer/billing data for special analysis on meter problems and illegal connections	●	1st Priority Activities (mainly related to customer meters)			
	c) Use of GIS for assessing pipe conditions including mapping of leaks, bursts and aged pipes	●	3rd Priority Activities			
3. Zoning and NRW Monitoring (monthly and weekly NRW management cycles)	a) Planning of strategic zoning to monitor NRW ratio of different areas and control pressure based on hydraulic analysis and field measurements	●	2nd Priority Activities (mainly related to bulk meters)			
	b) Confirmation of the isolation and inflow metering of each area and the consistency of the customers in each area between GIS and billing system	●				
	c) Establishment of easy and sustainable monitoring of NRW ratio, water balance (MNF), and abnormal flow using billing system, loggers, etc.	●				
	d) Periodical analysis and discussions to prioritize areas for different activities	●	PDCA	1st	2nd	3rd
4. Leakage Management	a) Spread of the daily use of listening sticks over many field staff against leakage	●	1st Priority Activities			
	b) Implementation of strategic track down of under ground leakage	●	3rd Priority Activities			
	c) Measurement and optimization of pressure distribution (other than zoning)	●				
	d) Reduction of spaghetti service connections	-				
	e) Pressure tests with hand pump for checking installation quality of service connections	-				
5. Customer Meter Management	a) Achieving 100% in metering ratio	-	1st Priority Activities			
	b) Preparation and implementation of meter replacement/relocation strategies	-				
	c) Focused management of large consumption customers with high accuracy meter, smart meter or additional meter.	●				
6. Illegal Use Management	a) Active patrol for finding illegal water use	●	1st Priority Activities		3rd Priority Activities	
	b) Inclusion of a penalizing mechanism against water theft in the county's water act	●				
	c) Enhancement of law enforcement against water theft with support from the county	●				

**These trials need to be reorganized into the Four Groups of Activities for Easy Implementation of TA with Clear Steps based on the Work Flow Approach of NRW Management**

NOTE: ● Trial agreed to carry out through discussion between each pilot WSP and JICA experts (● The trial which the JICA experts think would especially attract attention at each WSP).

Expected Intensity of Required Support: High Medium Low

Table 3.3 Steps of TA for Each Activity Group (New TA Plan) reorganized for Phases 2& 3(Embu)

Group of Activities	Steps of TA for Each Group of Activities [Relevant Trials from the Previous TA Plan used in Phase 1]	Potential Outcomes sharable with Other WSPs	Intensity of Support
[A] Planning & Implementation of NRW Reduction (PDCA Cycle including yearly cycle based on a mid-term vision, monthly cycle based on internal performance monitoring, and sharing of experiences with other WSPs)	1) Preparation of annual plan & update of mid-term plan (P: Plan) [related to Trials 1-a to e]	Realistic examples of NRW reduction plans	●
	2) Implementation of the annual plan (D: Do) [Trial 1-b]	Daily submissions of ODK-guided activity results	●
	3) Periodical (e.g. monthly) discussion on the progress (C: Check + A: Adjust) [Trials 1-b & 3-d]	Materials prepared for monthly discussion	●
	4) Review of the annual plan and reporting (C: Check) [Trial 1-b]	Annual review/report	●
	5) Sharing of the experiences with other WSPs (S: Share) [Trial 1-b]	Selected materials used for the activities & PPTs	●
[B] 1st Priority: Customer-related Activities such as checking meter accuracy, leakage, illegal connection, faulty fittings, etc. around customer meters. (mainly against commercial losses, with a least-required GIS data set for searching targets and a single ODK form)	1) Preparation of a ODK form for checking meter accuracy, leakage with listening stick, illegal connection, etc. and recoding repairs [Trials 1-c, 2-a, 4-a & b, 5-a to c & 6-a]	Draft ODK form for the activities around customers	●
	2) Confirmation of the consistency between their main metering strategies and the contents of ODK form [Trial 5-b]	List of their confirmed main metering strategies	-
	3) Preparation for prioritizing certain types of customers (by categorization) and searching their location using GIS labels [Trials 2-b & Trial 5-c]	Example of customer categorization and labeling	●
	4) Filed trials of the ODK form for the activities around customers (by relevant unit & sections) using ODK & MAPinr [Trials 1-c, 2-a & b, 4-a & b, 5-a to c & 6-a to c]	Improved ODK form for the activities around customers	●
	5) Trial for monthly reporting and discussion using the accumulated data downloaded from ODK Aggregate at the end of each month [Trials 1-b & 3-d]	Tables prepared for monthly discussion	●
[C] 2nd Priority: Bulk meter-related Activities such as zoning with minor network modification, accuracy check of bulk meters, monthly monitoring of NRW ratios, detection of abnormal flow (using Google Sheet mainly)	1) Preparation of a simple flow diagram for the consideration of a realistic zoning improvement [Trials 3-a]	Flow diagram	●
	2) Field work for zoning improvement (minor work including isolation check and bulk meter accuracy check at distribution zone level, etc.) [Trial 3-b & c]	List of main bulk meters checked and replaced	●
	3) Addition of one or two data fields in the existing billing system to enter hydraulically isolated areas' ID for each customer and the data entry [Trial 3-c]	The improved billing system	●
	4) Establishment of easy and accurate monthly NRW ratio calculation procedure for each area with Google Sheet. [Trial 3-c]	Google Sheet for monthly NRW ratio calculation	●
	5) Establishment of an easy bulk meter reading procedure for abnormal flow detection with Google Sheet (optional) [Trial 3-c]	Google Sheet for abnormal flow detection	●
	6) Trial for monthly reporting and discussion using the results of monthly NRW ratio calculation and abnormal flow monitoring [Trial 1-b & 3-d]	Note comparing the ratios and activities in the month.	●
[D] 3rd Priority: Other Activities (including General GIS Improvement and Pipe/Pressure-related Activities) (mainly against physical losses, various tools required)	1-1) Pressure measurement over a large area using pressure gauges with max pointer [Trial 4-c]	Map showing the pressure variation over the areas	●
	1-2) Consideration of minor facility modification for pressure reduction based on the pressure measurement, etc. [Trial 4-c]	Selection of improvement measure & priority location	●
	1-3) Scheduling of minor facility modification for pressure reduction (e.g. replacing some of the malfunctioning PRVs for boilers with BPTs) [Trial 4-c]	Schedule of minor facility modification	●
	2-1) Preparation of a ODK form for facility patrol along pipelines & underground line survey (for leak and illegal use) & follow-up repairs [Trials 4-b & d & 6-a]	Draft ODK form for the activities along pipelines	●
	2-2) Filed trials of the ODK form for the activities along pipelines (by NRW unit and O&M Section) using ODK software, QField/SW Maps, etc. [Trials 4-b & d & 6-a]	Improved ODK form for the activities along pipelines	●
	2-3) Trial for monthly reporting and discussion using the accumulated data downloaded from ODK Aggregate [Trials 1-b & 3-d]	Tables prepared for monthly discussion	●
	2-4) Trial for considering pipe replacement using the accumulated records of leakage, illegal connection & repair downloaded from ODK (optional) [Trials 1-c & 2-c]	Preliminary results of the consideration	●
	3) Conduct hand pump tests for leakage control on service connections [Trial 4-e]	Calculated pass rate	●
	4) Various GIS improvement for NRW reduction activities (pipe alignment, pipe attributes, valve location, etc.) with QField [Trial 2-a]	Improved GIS layers as good examples	-
5) Enhancement of cooperation with the county against illegal connections [Trials 6-b & c]	Examples of implemented cooperation	●	

NOTE: ● Trial agreed to carry out through discussion between each pilot WSP and JICA experts (● The trial which the JICA experts think would especially attract attention at each WSP).

Expected Intensity of Required Support:

High	Medium	Low
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**3.2.5 Experiences and knowledge of NRW reduction activities are shared among Urban WSPs (Output 5)**

(1) MWI NRW Unit organizes NRW related regular meetings in cooperation with other relevant organizations (Activity 5-1 related)

Presentations will be carried out at the regular meetings of WASPA or other workshops about the results of the support activities performed at the pilot WSPs and other useful information during Phase 2. JICA experts will cooperate with the C/P institutions to set themes according to the timetable and the host WSP.

(2) Compile and publish case studies and knowledge on NRW activities (Activity 5.2 related)

This activity will be implemented on a timely basis in Phase 2 in coordination with the results of Activities 2.2 and 4 above. As a method of public relations, same as in (1) above, such information will be published or shared at regular meetings and workshops or uploaded on WASPA's or WASREB's websites, through which many WSPs can freely access the information.

**3.3 Training in Japan**

During Phase 2, training in Japan will be conducted for staff members responsible for pilot WSP's NRW reduction activities and the training is aimed at practical experiential learning on Japan's water supply technology. The contents of the training (draft) are as shown in Table 3.3. The time of implementation is planned around December 2018.

Table 3.3 Training curriculum for Action Team (Draft)

Items of technical training	Training destination /Place to visit	Topics (lecture / training / discussion / site visit)	Venue for training	Days
Training guidance	JICA/TSS/TWI	Briefing on Life in Japan and Training Orientation	JICA/TSS	1
Water management training	Tokyo Waterworks Bureau/Its related facilities	<ul style="list-style-type: none"> <li>• Waterworks of Japan</li> <li>• Water supply management</li> <li>• Measures to reduce NRW</li> <li>• Water leakage detection technology</li> <li>• Introduction of the water supply equipment</li> <li>• Exercise of water leakage prevention technology</li> </ul>	Tokyo Waterworks Bureau/Its related facilities	1
Visit to water supply facilities	Tokyo Waterworks Bureau/Its related facilities	<ul style="list-style-type: none"> <li>• History of water supply</li> <li>• Customer service/ complaint management</li> <li>• Pipe laying work of distributing pipes and feeding pipes</li> <li>• Water production facilities</li> </ul>	Tokyo Waterworks Bureau/Its related facilities	3
Visit to water supply installation sites	Tokyo Waterworks Bureau/Its related facilities	<ul style="list-style-type: none"> <li>• Inspection, testing, network map management</li> <li>• Installation of the water supply equipment</li> <li>• Mapping system</li> </ul>	Related to construction office	2
Visit of a water pipe manufacturer	Manufacturer	<ul style="list-style-type: none"> <li>• Introduction of the pipes and fittings &amp; its quality control (lecture)</li> <li>• Visiting production process</li> <li>• Demonstration of piping installation</li> </ul>	Manufacturer	1
Visit of a valve manufacturer	Manufacturer	<ul style="list-style-type: none"> <li>• Introduction of branch saddles &amp; valves (lecture)</li> <li>• Visiting production process</li> </ul>	Manufacturer	1
Visit of a water meter manufacturer	Manufacturer	<ul style="list-style-type: none"> <li>• Introduction of water meters</li> <li>• Visiting production process</li> </ul>	Manufacturer	1
Holiday / travel days				4
			Total	14

### 3.4 Phase 2 Work Plan

Activities described above are planned as shown in Table 3.4 Work plan details (draft). As for the timing of detailed activities, the activities will be set flexibly in consideration of the implementation system and in consultation with each C/P.





Table 3.4 Work Plan (Draft) 2/2

Output	Activity	Timeline
Output 3	NRW related training capacity of KEWI is strengthened.	
	3.1 KEWI studies current status of NRW reduction courses and its challenges.	
	3.2 KEWI reviews NRW reduction training strategies and course contents.	
	3.3 KEWI, in collaboration with leading WSPs (Embu and Meru, etc.), conducts on-site NRW reduction trainings.	
	3.4 KEWI reflects on-site NRW trainings into NRW course contents and materials.	
	3.5 KEWI incorporates the results of review by MWI NRW Unit into NRW course contents.	
	3.6 KEWI conducts trace studies of NRW reduction course participants.	
Output 4	NRW planning and/or implementation capacity of pilot Urban WSPs is enhanced.	
	4.1 The Project team conducts a survey of Urban WSPs and selects pilot Urban WSPs.	
	4.2 Each Pilot WSP conducts analyses of current NRW reduction activities and identifies its challenges.	
	4.3 Each Pilot WSP identifies measures to solve challenges and formulates the NRW reduction plan.	
	4.4 Each Pilot WSP formulates the annual NRW reduction plan including financial schedule based on the NRW reduction plan.	
	4.5 Each Pilot WSP implements the annual NRW reduction plan.	
	4.6 Each Pilot WSP evaluates and analyzes implementation results and revises the plans.	
	4.7 Each Pilot WSP produces the NRW reduction activity report annually.	
	4.8 Each Pilot WSP holds regular NRW reduction meetings attended by relevant departments of WSP.	
	Experiences and knowledge of NRW reduction activities are shared among Urban WSPs.	
	5.1 MWI NRW Unit organizes NRW related regular meetings in cooperation with other relevant organizations.	
	5.2 WASREB compiles case studies/lessons learnt about NRW reduction activities.	

## **ANNEX 1: Complementary explanation about activities and achievement of Output 3 which KEWI is in-charge.**

### **1. Background**

From 2007 to 2008, the necessity to reduce NRW became the proposition of the Government of Kenya in order to realize effective utilization of water sources, to improve the stability of the water supply, and to reduce the water purification cost.

Under the request of the Government of Kenya, the Japanese government has been implementing technical support for NRW reduction projects as mentioned below.

### **2. Status of KEWI's NRW training course**

- "The Project for Management for Non-revenue Water", which had been implemented for 5 years from September 2010 to October 2014 (referred to as "the previous project")

#### **Main achievements of the previous project**

(1) NRW reduction capacity was strengthened in the 4-pilot WSPs (Embu, Meru, Narok, and Kapsabet).

(2) KEWI's short courses on NRW reduction were established

A series of standard short-term courses (Module - 1 - 2 for NRW Management and Module - 3 for GIS) was established. Then, Modules were Tailor-made and renamed in order to respond flexibly to the customer's request.

(3) Standards for NRW Management in Kenya, composed of 4 parts namely Guideline, Manual, Handbook, and Case study, were developed.

After the previous project, in September 2015, the Kenyan government added officially the NRW reduction course to the curriculum as an essential subject to be delivered to the Waterworks by KEWI.

#### **The number of people taking a non-revenue water course**

The number of NRW students including those taking long-term courses and short-term courses is about 400 or more per year (about 75 for the NRW short-term courses) and 500 or more GIS students per year (about 150 for short-term courses).

### **3. Present `project & achievement of Phase 1 (from October 2016 to August 2017)**

KEWI had been conducting regularly the courses in biannual interval for almost 4 years.

However, there are unfavorable opinions against the NRW management short course recently, such as emphasis on lecture oriented curriculum and the level of lecturer's teaching skills, lack

of training facilities for applicable and new technology, etc. Therefore, KEWI recognized necessity to improve the content of the current NRW short course and the lecturers' skills. Subsequently, KEWI has the opportunity to address these challenge in the present project. In accordance with the PDM and PO of the present project, achievements so far are as follows,

(1) Results of the baseline survey conducted from October 2016 to March 2017.

Depending on the baseline survey, the following issues were raised.

1) Necessity of review of KEWI training program / teaching materials

- ① improvement of textbooks (presentation materials, demonstration materials, textbooks for on-site training)
- ② Providing knowledge to deal with NRW activities on site (on job Training)
- ③ Introduction of new technology

2) Renovation of practical training facilities in KEWI

The following requests were raised from the WSPs.

- ① Practical OJT emphasis program corresponding to training items on site.
- ② Effective training facilities as an educational institution.
  - (a) Leakage Survey training Facility / Pipeline Survey Equipment
  - (b) Water leakage survey equipment (latest)
  - (c) Water meter inspection equipment (test bench) / meter repair equipment,
  - (d) Improve existing pipeline training equipment (platform)
  - (e) Pipe work / Plumbing workshop and etc.

3) Strengthening on-site water quality inspection through provision of equipment for water leakage / illegal connection survey like portable water quality analysis kits and analytical techniques

(2) Implementation of 1st joint training course in collaboration with the 2 Leading WSPs was conducted as a trial course in accordance with the program in Table 1 below.

**Table-1** Summary of the first joint training contents

Implementat ion date and time	Purpose of the program	Target	Days	No. of participant s	Characteristics of program / teaching material after review	Overall evaluation
June 5, 2017 (@ KEWI)	Sensitization of MD on NRW reduction	Invited participants WSP (Embu / Meru), MWI, WASREB, JICA, others	1	22	Keynote lecture by MERU GM / EMBU MD, other remarks & speeches	As a result of the questionnaire survey "Useful"
June 6 - 10, 2017 (@	Basic knowledge	Invited WSP: Embu / Meru	5	31	NRW overview, distribution analysis,	Implementation of questionnaire survey & a

KEWI)	training of NRW reduction staff	Other (self-sponsored): Eldoret, Machakos, Kiambu, Nanyuki, Thika, EPZ			leakage reduction measures, outline of water leakage exploration equipment, water quality analysis demonstration, exercises, group consultation, others	simple understanding test before and after training, "Overall 2.5% improvement in understanding level"
June 19th – 24, 2017 (@Embu)	Enhancement of On-site survey skill training for NRW reduction staff (OJT at Embu's 'DMA)	Invited WSP: Embu / Meru Other (self-sponsored): Machakos, Kiambu, Nanyuki, Thika,	6	20	Preliminary DMA survey, installation of ultrasonic flowmeter for nighttime minimum flow rate, performance check of using meter, handling of sound listening stick, survey of meter operation, measurement of water leakage, water quality analysis of leakage, water meter test bench etc.	a) Implementation of a questionnaire survey & a simple understanding test before and after the training, "Overall 3.4% improvement in understanding level"  b) In addition, the leak detection device was brought by 2- WSPs and KEWI, and OJT was carried out.

The 1<sup>st</sup> joint training was conducted successfully with positive evaluations from the participants. However, there were some significant opinions which should be considered for the implementation of the next joint training courses as follows;

- ① The work experience of the trainees consisted of persons in charge of NRW reduction and officials in other departments. So that understanding and interests of the trainees were variant and the speed of lecture was lowered on average to gain training effect. As a result, it was found to hinder the development of training efficiency
- ② The training ability of the KEWI's staff has been upgraded.
- ③ In particular, the following OJT training was not conducted adequately because of lack of performance of the training facilities in KEWI.
  - (a) Simple leakage calculation
  - (b) Data collection / analysis work by using water meter test bench, leakage water quality measurement, flow rate measurement, and so on.

A trial trace study for participants of the 1<sup>st</sup> joint training was held in Embu WSP on 7th December and in Meru on 8th December 2017. Data analysis is ongoing (3) Challenges for the future

### (3) Expected challenges

- ① Financial Assistance from MWI

In the 1<sup>st</sup> joint training, 24 people participated in the KEWI course for which MWI

covered the cost for the NRW staff of Embu WSP (2 people) and Meru WSP (2 people). The implementation of the joint training course without depending on the MWI's budgetary assistance will be an important challenge in the future.

②Necessity for Consideration of the Establishment of National Qualification System in NRW reduction

It is necessary to consider the strengthening of a qualification system as an example of measures to improve rapidly and continuously the impact of WSP's NRW reduction at present.

In the qualification system, KEWI / MWI / WASREB will be requested to provide a national level examination system (e.g. Professional engineer system, Skill-qualification system) for cultivation and /or training engineers who are familiar with water Engineering / Technology (e.g. Water supply system/ Distribution facility & NRW management, O / M, etc.)

In the future, it is expected that the number of qualified personnel will be required as a condition for granting WSPs licenses, thereby promoting the reform of the manager's awareness (NRW reduction, efficient business operation, etc.).

It is time to consider how the KEWI's NRW reduction courses can contribute to such direction.

**3. Activity policy for the activities in Phase2**

(1) Review of training materials

Based on the 1<sup>st</sup> joint evaluation report, training materials / programs will be reviewed.

(2) Schedule for implementation of joint training

- ①The 2<sup>nd</sup> joint training: between February and April 2018
- ②The 3<sup>rd</sup> joint training: between July and August 2018
- ③ The 4<sup>th</sup> Joint Training: between October and November 2018
- ④ The 5<sup>th</sup> Joint Training: during April 2019

(3) Preparation of KEWI's report

- ① Assessment report of joint training  
End of the joint training, it will be created as soon as possible
- ②Implementation of trace study  
Trace studies will be held between 6 months and 1 year after the joint training.

(4) Concept of KEWI's training facility development plan

- ① Improvement of KEWI's training facilities gives priority to two facilities that are

relatively urgent.

a) Leakage survey training facility: July – August 2018

b) Water meter test bench and Water meter repair facility: October -November 2018.

② Preparation of other facilities will be scheduled for the next fiscal year and beyond.

③ The preparation period is based on MWI's budgetary measures, and realization is unclear

## **ANNEX 2: Technical Assistance at Each Pilot WSP (Output 4)**

A detailed explanation of each trial shown in the tentative technical assistance (TA) plan covering the six significant aspects of NRW Management (Table A-1) is described below in Section 1. Section 2 of this annex explain the current situation and expected improvements to be made through the trials at each pilot WSP. These two sections are part of the results from the baseline survey. Section 3 shows an example of medium-term and annual NRW reduction plans from Nyahururu WSP. This example is part of the results of the trials conducted in the latter half of Phase 1. The trials listed in Table A-1 have been reorganized into 4 groups of activities at the beginning of Phase 2 to schedule the TA based on the Work Flow Approach (i.e. multiplex targeting and easy implementation with free mobile work flow management tools) (see 3.2.4). Section 4 shows the detailed schedule of TA for Embu WSP in Phase 2 as an example and the overall TA schedule for the Pilot WSPs targeted in Phase 2.



Table A-1: Tentative Plan of TA for Each Pilot WSP (prepared at the end of baseline survey)

	Category of Pilot WSP	Leading Pilot WSP		Preceding Pilot WSP				Following Pilot WSP			
	Timing of Conducting TA	Phases 1 and 2		Mainly Phase 2				Mainly Phase 3			
	WSB Area	Tana		LVS	RV	Athi	Northern	Tanathi	LVN	Coast	
	Pilot WSP	Meru	Embu	Kisumu	Nakuru	Ruiru-Juja	Nyahururu	Mavoko	Eldoret	Kisii-Mariakani	
Current Level of the 6 Key Aspects of NRW Reduction and Trials to be supported by JICA Experts	1) Planning and Implementation of NRW reduction (yearly cycle based on a mid-term vision)		5	4	5	3	3	5	4	5	4
	Trials	a) Participatory planning using sample templates and Google Drive	●	●	●	●	●	●	●	●	●
		b) Plan-do-check-adjust (PDCA) Cycle (mid-term, yearly, quarterly, monthly, weekly, etc.)	●	●	●	●	●	●	●	●	●
		c) Introduction of HDPE pipe and elimination of asbestos pipe, etc.	●	●	●	●	●	●	●	●	●
		d) Setting priority activities to be completed without failure as commitment targets	●	●	●	●	●	●	●	●	●
		e) Inclusion of NRW-related training	●	●	●	●	●	●	●	●	●
	2) GIS Preparation and Applications		4	4	4	4	4	1	2.5	3.5	1
	Trials	a) Open source utilization (QGIS, Google Earth, etc.) for fast GIS development and wider access/applications of GIS (including participatory mapping)	●	●	●	●	●	●	●	●	●
		b) Linking GIS with customer/billing data for special analysis on meter problems and illegal connections	●	●	●	-	●	-	-	-	-
		c) Use of GIS for assessing pipe conditions including mapping of leaks, bursts and aged pipes	●	●	●	-	●	-	-	●	-
	3) Zoning and NRW Monitoring (monthly and weekly NRW management cycles)		4	3	2.5	2.5	4	4	2.5	4	3
	Trials	a) Planning of strategic zoning (distribution/pressure zones → flexible DMA division from large to small for tracking down) to monitor NRW ratio of different areas and control pressure based on hydraulic analysis and field measurements	-	●	-	-	-	●	●	●	-
		b) Confirmation of the hydrological isolation and infowmeters of each distribution zone and DMA and the consistency of the existing customers in each zone and DMA between GIS and billing system.	-	●	-	●	-	●	●	-	●
		c) Establishment of easy and sustainable monitoring of NRW ratio, water balance (MNF), and abnormal flow due to burst using billing system, smart meters, remote monitoring, etc.	●	●	-	-	●	●	●	●	-
		d) Periodical analysis and discussions to prioritize areas for different activities	-	●	-	-	-	●	●	●	-
		e) Building capacity for NRW-related analysis at zone level for self-directive development of strategy to encourage inter-zone competition	-	-	-	-	-	-	-	-	-
	4) Leakage Management		5	3	2	4	2	2	2	3	1
	Trials	a) Spread of the daily use of listening sticks over many field staff against leakage	●	●	●	●	●	●	●	●	●
		b) Implementation of strategic track down of underground leakage (zoning → step test → listening stick → USF/leak detector/correlator)	●	●	●	●	●	●	●	●	●
		c) Measurement and optimization of pressure distribution (other than zoning)	●	●	●	-	●	-	-	-	-
		d) Reduction of spaghetti service connections	-	-	-	-	-	-	-	-	●
		e) Pressure tests with hand pump for checking installation quality of service connections	●	-	●	-	●	●	●	●	●
	5) Customer Meter Management		4	4	4	4	4	4	2.5	4	1
	Trials	a) Achieving 100% in metering ratio	-	-	-	-	-	-	●	-	●
b) Preparation and implementation of meter replacement/relocation strategies (monitoring of consumption with billing system, accuracy testing with bench, mobile tester and/or bucket, sizing specifications, etc.)		-	-	●	-	●	●	●	-	●	
c) Focused management of large consumption customers with high accuracy meter, smart meter or additional meter.		●	●	-	-	-	-	-	-	-	
d) Management of large residential buildings with customer identification survey and additional use of master meter.		-	-	-	-	-	-	-	-	-	
6) Illegal Use Management		5	3	1	3	3	3	4	3	2	
Trials	a) Active patrol for finding illegal water use (including use of chlorine DPD tablets, detecting equipment, etc.)	-	●	●	-	-	●	-	●	-	
	b) Inclusion of a penalizing mechanism against water theft in the county's water act	-	●	-	-	-	-	-	●	-	
	c) Enhancement of law enforcement against water theft with support from the county	-	●	-	-	-	-	-	●	-	

NOTE 1 to 5 Level of Key Aspect from the initial capacity assessment (5 as the highest level)  
 ● Trial agreed to carry out through discussion between each pilot WSP and JICA experts  
 ● The trial which the JICA experts think would especially attract attention at each WSP  
 Focus for Support: High Medium Low

## Section 1: Explanation of Each Trial shown in the Tentative TA Plan covering the Six Aspects (Part of the Results from the Baseline Survey)

[Significant Aspect 1] Formulation of better NRW reduction plans and improvement in the Implementation of the plans

Trial a) Participatory planning using Google Drive and template

As services of not only the Technical Department but the Commercial Department are required for the NRW reduction activities, it will be necessary to develop a system that enables participation of as many personnel involved in the reduction as possible in the formulation of NRW reduction plans. To develop such a system, the Japanese experts began providing assistance in the participatory planning using a free application, Google Drive that allows multiple users to edit the same document at the same time. In the trial, the Japanese experts are expected to facilitate information sharing and mutual learning among the pilot WSPs by developing an environment in which those involved in NRW reduction can share various information and data that can be used as reference materials in the planning and staff of a pilot WSP can consult the planning conducted in another pilot WSP with Google Drive. The JICA experts also provided the pilot WSP with a model template for the planning to facilitate it. This template is to be improved every year to make it more practical by incorporating good practices in the planning performed by the pilot WSPs.

Trial b) Assistance in the use of PDCA cycle

The Japanese experts will assist the pilot WSPs so that they can use the feedback from the PDCA cycle used in the implementation and management of medium-term, yearly, quarterly, monthly, weekly and other NRW reduction activities in the formulation and implementation of NRW reduction plans. The JICA experts will focus their assistance on the use of the PDCA cycle in the formulation, implementation and review of yearly NRW reduction plans, continuous monthly monitoring of NRW in water distribution areas and DMAs and use of the outcome of the monitoring.

Trial c) Replacement of asbestos pipes with HDPE pipes

The Japanese experts will assist the pilot WSPs so that they can consider including the replacement of pipelines on which leakage and burst have occurred frequently with HDPE pipes, which are effective in preventing leakage and theft, in the medium-term NRW reduction plans and conduct a study on a practical way to replace the faulty pipes.

Trial d) Setting commitment targets

It is necessary to not only formulate a practical yearly NRW reduction plan but prevent postponement of the implementation of most of activities in the plan till the next year for the timely implementation of this project. To prevent the postponement of the implementation of NRW reduction activities by a WSP whose NRW unit is not composed of full-time staff, the Japanese experts will assist such a WSP in setting clearly defined targets of NRW reduction

plans that must be achieved by all means, setting a scope of the priority activities that should be implemented in each year, at worst, as a commitment target and achieving the set targets.

Trial e) Planning of NRW-related training

The Japanese experts will assist the pilot WSPs so that in-house and external training leading to NRW reduction is to be included in NRW reduction plans and such plans are to be implemented.

[Significant Aspect 2] Development of GIS and facilitation of its applications

Trial a) Development of GIS with open source applications and low-end equipment and facilitation of its applications

The Japanese experts will facilitate the cost-efficient development of GIS and use of GIS maps for a wide variety of purposes by the pilot WSPs with free software such as QGIS and Google Earth, free GIS data available on the web and low-end equipment including smart phones, tablets and A3-printers/scanners. The experts will also assist the pilot WSPs in reducing the gap in the recognition of the current status of NRW between managerial staff and staff working on site and stimulating discussion on measures against NRW in the pilot WSPs with such activities as GIS mapping with free satellite imagery.

Trial b) GIS-based analysis of customer information (including data on meters and water consumption)

The Japanese experts will assist the pilot WSPs so that they can analyse the data that they have accumulated, including those of customer meters and water consumption, mainly for billing, with the conditional expressions and formatting of MS Excel, import the analysis results in GIS, use them in the spatial analysis, effective display of them and new studies on accuracy management of customer meters and measures against water theft.

Trial c) GIS-based analysis to detect faulty aging pipes

The Japanese experts will assist the pilot WSPs so that they can elucidate the condition of pipelines and conduct studies on effective ways to replace pipelines by analysing the record of locations of leakage and burst on pipelines, years of their installation and the state of corrosion on them using GIS.

[Significant Aspect 3] Improvement in zoning of water distribution facilities and NRW monitoring

Trial a) Study on strategic zoning of the water distribution facilities

The Japanese experts will provide the pilot WSPs with assistance in the planning and implementation of strategic and reasonable zoning that divides the entire water supply area of a WSP into distribution areas by water distribution system and pressure zones using pressure reducing valves and further divide the zones that have high NRW ratios or rates of leakage (large minimum night flows) into subzones (DMAs). The JICA experts are expected to give instruction on studies of zoning based on the analysis of contours and capacities of reservoirs

using GIS, in the practical work of measuring water pressure in distribution pipes and on simple hydraulic calculation with applications on smart phone and MS Excel to the staff of the pilot WSPs. The JICA experts are also expected to give them instruction on sophisticated hydraulic analysis of water distribution networks with GIS data as much as time permits. Meanwhile, the JICA experts shall make sure to recommend the use of a highly practical and relatively simple zoning method that allows hydraulic isolation within a water distribution network required for the establishment of distribution areas and DMAs, such as the maximum use of rivers and green belts as isolation boundaries, to the pilot WSPs.

**Trial b) Commencement of metering in each isolated distribution area and DMA**

Some of the pilot WSPs, such as Embu and Nakuru WSPs that have tried to establish medium to small-scale DMAs have failed to conduct DMA-based NRW monitoring because they had not verified the hydraulic isolation of each DMA or identified the customers in each DMA. As some pilot WSPs intend to begin their own DMA-based NRW monitoring, the Japanese experts will assist them so that they can perform their DMA-based NRW monitoring in a continuous manner.

**Trial c) Development of an easy-to-use and sustainable NRW monitoring system**

Ruiru-juja WSP is considering self-financing the installation of a distribution-area-based monitoring system using a telecommunication system such as GSM. As the installation of this system has the nature of a pilot project and Ruiru-juja WSP has requested assistance of the Japanese experts in its implementation, the JICA expert team has decided to provide indirect assistance in its planning and implementation.

However, Embu WSP has discontinued the use of a GSM-based remote monitoring system for NRW reduction in pilot DMAs because of the high cost of continuously charged communication fees. Therefore, the JICA expert team will recommend the pilot WSPs other than Kisumu and Nakuru WSPs, both of which have a particularly large service area, to install a relatively-inexpensive ultrasonic flow meter equipped with data logging function, which has been developed recently, at the inlet into each water distribution area and relatively large DMA as a bulk meter (master meter) for the improvement of NRW monitoring. The use of an ultrasonic flow meter, instead of a mechanical flow meter, the accuracy of which is likely to deteriorate, will facilitate the continuous accuracy management of the meter and the built-in data logging function will facilitate verification of the minimum night flow required for the estimation of the volume of leakage. If it has become possible to estimate the volume of leakage, as well as that of NRW, in each water distribution area and DMA, WSPs can prepare a more strategic plan for the underground leakage survey with the knowledge of focal areas for the survey. The use of such a plan will improve the effectiveness of the NRW monitoring. The step test is used for identifying a candidate branch water distribution pipeline for a large volume of water leakage. In the step test, changes in the minimum night flow are monitored while water flow into branch pipelines is shut off and opened up one after another. The built-in data logging

function of the meter will facilitate the test. Therefore, the installation of the bulk meters with data logging function is expected to help extend the use of the step test. The use of such meters is expected to facilitate detection of water theft which is likely to occur in the night as their data logging function facilitates detection of abnormal water flow.

Trial d) Study on strategic activities based on the results of the monitoring in each distribution area  
The Japanese experts will assist the pilot WSPs in strategic monthly, weekly and area-specific planning of NRW reduction activities with the results of the above-mentioned monitoring.

[Significant Aspect 4] Improvement in leakage management

Trial a) Making daily leakage survey using listening sticks part of routine work

In this project, listening sticks that are basic and inexpensive leakage detection devices, will be distributed to as many staff involved in the maintenance of water pipes as possible to improve the efficiency of underground leakage detection and make the leakage detection with the sticks a routine work. Some WSPs have not conducted underground leakage survey continuously despite having sophisticated and expensive leakage detectors provided by WSBs, etc. The inspection of leakage around underground water supply pipes and that of suspected leakage from water distribution pipes with listening sticks shall be made part of the routine work in WSPs by making the sticks available to many staff involved in the maintenance of water pipes. This routine inspection will improve the efficiency of leakage detection with more sophisticated equipment. In this way, not only the water leak survey or detection will become established but also the motivation of the staff working on site for the reduction of NRW and water leakage management will be improved.

The Japanese experts are planning a trial to be conducted in the water supply area of Meru WSP. In this trial, listening sticks will be provided to meter readers, in addition to technicians, so that they can check water supply pipes of customers with the listening sticks for abnormal sound indicative of water leakage after reading customer meters. If this attempt succeeds, it will be possible for NRW units to detect efficiently the locations of underground water leakage using other equipment.

Trial b) Step-wise identification of locations of underground leakage

The Japanese experts will provide support for staff of the pilot WSPs in order to teach them a strategic and efficient underground leakage detection method. In this method, the zoning and step test (which is conducted to elucidate the distribution of unknown water consumption by measuring a night flow rate in a water supply main pipe while closing/opening gate valves on branch lines one after another) are used to select priority survey areas in each water supply area and the acoustic leak detection survey with listening stick is conducted at each household in the priority area to narrow down candidate areas of leakage gradually. The JICA experts will also teach staff of the pilot WSPs how to select the equipment to be used for efficient detection of leakage from pipes in different conditions among the choices of ultrasonic flow meter,

electronic leak detector (or ground microphone) and leak noise correlator after the survey areas have been narrowed down in the household acoustic leak detection survey.

Trial c) Optimisation of water pressure in distribution pipes with measures other than zoning

The Japanese experts will conduct a study on elucidating the water pressure distribution in the water supply areas by measuring the water pressure with inexpensive analogue water pressure gauges and pressure data loggers that can record the maximum water pressure and improving the water supply facilities to optimise the water pressure in water supply areas. The JICA experts are expected to teach pilot WSP staff GIS-data-based hydraulic analysis of a relatively small area in which high water pressure has been observed, if such an area exists. The experts will also assist them in improving facility operation and maintenance by optimising the water pressure in the distribution pipelines with adjustment of the existing reducing valves on them to reduce pipe burst accidents and leakage.

Trial d) Reduction of spaghetti connections

Shortage of piping materials for branch water supply lines and shared-use service lines has led to the development of long and complicated distribution pipe networks (spaghetti connections). As water leakage (and water theft) is frequently observed from the spaghetti connections, the Japanese experts will teach pilot WSP staff appropriate ways to install water distribution pipes and a method to locate underground water pipelines (including those made of non-metal pipes) whose routes are not known.

Trial e) Verification of the quality of the installation work of water supply equipment with hand pump

The Japanese experts will provide the pilot WSPs with assistance in the adoption of the pressure test with hand pump to detect defects in the installation of water supply facilities. For example, each WSP shall conduct the pressure test on 100 water supply connections in its service area and the incidences of defective installation in the service areas of the WSPs will be compared in this assistance. Such a trial as this comparison will facilitate the improvement of the motivation of the staff of the WSPs for the improvement of the quality of their water supply pipe connection work. As different types of pipes, including PVC, PPR and HDPE pipes, are used in the existing water supply pipelines of Ruiru-juja WSP, a study is being conducted on a plan to conduct the pressure test on these different types of pipes to verify the effectiveness of HDPE pipes in leakage reduction.

[Significant Aspect 5] Improvement in customer meter management

Trial a) Achieving 100 % metering and replacement of degraded meters

Mavoko WSP has had difficulty in purchasing customer meters since the beginning of 2017 because the disbursement of the planned financial assistance from the county has been delayed and the user fee revenue has been reduced because of the reduction in the volume of water available for supply caused by the drought in the water source area. Therefore, the possibility

of purchasing customer meters (piston type flow meter for measuring small flow rates) for Mavoko WSP with the budget of The MWI NRW Unit for the financial year 2016/17 is being considered.

**Trial b) Establishment of explicit rules and method of customer meter management**

The Japanese experts will assist the pilot WSPs in the establishment of explicit rules and practical methods for the inspection and replacement of customer meters and the maintenance of the meters in accordance with the established rules and methods. Specifically, the JICA experts will provide assistance in the studies on the selection of water meters to be inspected (based on the results of the monitoring of water consumption of individual customers), on the selection of the inspection method (method using a test bench, mobile tester or graduated vessel), on the selection of a meter to be installed at a customer's site based on the type of the customer and customer's water consumption and on such a rule that a customer meter should be installed outside of his site for the improvement of the meter reading rate and in the establishment of rules on the collection of basic information regarding the customer meters (including the types of installed meters and years of their installation).

**Trial c) Centralised management of large consumers**

The measures for the management of water consumption by large consumers, such as those for the maintenance of meter reading accuracy and prevention of water theft, are among the highest priority measures for a WSP because of the high cost-efficiency expected from such measures. The Japanese experts are expected to assist the pilot WSPs in the study focused on the introduction of high-accuracy meters and smart meters (which have built-in data-logging, water theft prevention function, and remote meter reading function).

The MWI NRW Unit is studying the possibility of purchasing 10 and 20 smart meters (that have built-in ultrasonic flow meter, whose reading accuracy is not likely to deteriorate) to measure water consumption by large consumers for Meru and Embu WSPs, respectively, with its budget for financial year 2016/17. These smart meters can transmit data of cumulative water consumption via radio wave. The JICA expert team plans to develop a relatively inexpensive system to manage water supply to large consumers on a trial basis in this project. In this system, meter reading data transmitted by smart meters will be received by a special receiver and imported in a smart phone and the data collected in the smart phone will be transferred en masse to PC through such a medium as Wi-Fi. As full-scale installation of smart meters is in progress in the service area of Nairobi WSP, the lessons learned from its experience are used as reference in the study on the above-mentioned trial.

**[Significant Aspect 6] Improvement in illegal use management**

**Trial a) Active patrol for finding illegal connections with appropriate equipment**

The JICA expert team will assist the water theft detection by the pilot WSPs indirectly with the provision of DPD for the detection of residual chlorine in the tap water and equipment including

pipe locators.

Trial b) Measures against water theft by strengthening the bylaws of the county government

Heavier fines shall be imposed on illegal water use including that at general households. Because the large-scale water theft repeatedly committed by companies, farms and politicians reduces the water-theft-reduction effect of NRW reduction measures, measures against such theft should be reinforced. The Japanese experts will provide indirect assistance in the reinforcement by urging county governments to make prescribed penalties by the county bylaws more severe (including large fines).

Trial c) Measures against water theft in cooperation with counties

The Japanese experts will assist the pilot WSPs and the counties indirectly in the implementation of their joint patrol on water theft and awareness-raising activities for the residents to be conducted as an activity for Output 1. For example, such assistance is expected to be particularly effective when a WSP extends its water supply area into the surroundings or residential areas of poor people upon request from the county.



## **Section 2: Summary of Current Challenges and Expected Improvement through the Trials at Each Pilot WSP (Part of the Results from the Baseline Survey)**

### **A) Leading WSPs**

#### **(a) Meru WSP**

Meru WSP's water supply area is rugged terrain and therefore there are problems with water pressure control of the water distribution network. Through a Japan aided project, undertaking of systematic depressurization control had been implemented for the water distribution system. However, there are pipelines of which the water pressure cannot be lowered by stepwise vacuum tank arrangement. In addition, water pressure management is inadequate using pressure reducing valves whose capacities are uncertain. For this reason, the JICA experts are already undertaking a water pressure measurement survey using record-type water pressure gauges with an aim of strengthening the capacity of water pressure management. The JICA experts are also planning to support the study of improvement measures of the high water pressure problem through creation of the water pressure distribution map. In addition, since the officials in charge of water meter reading have offered cooperation for leakage investigation, the JICA experts will instruct the water meter readers to detect leakage from the water pipes and devices while meter reading by a basic method using listening sticks. Through this effort, it is expected that the discovery of the night time minimum flow rate measurement or step test conducted by Meru WSP is improved.

Furthermore, concerning quality control of construction for water leakage prevention, adoption of a pressure test using a hand pump apparatus at the site of pipe construction is strongly recommended. Additionally, effective countermeasures against leakage are also expected to be adopted by collection, analysis and confirmation of pressure test data.

#### **(b) Embu WSP**

In response to the request from the County government in recent years, Embu WSP has been expanding the water supply area to relatively low altitude areas. As a result, rupturing of the water distribution pipes caused by high water pressure frequently occur, and underground leakage also tends to increase. In addition, water theft occurs in the expanded water supply areas and therefore Embu WSP's overall NRW ratio has become significantly higher than before.

Despite these regional problems, the zoning of the water distribution system has not been carried out in stages, and strategic monitoring of NRW ratio as well water volumes for leakage in each zone has not been conducted. Also, many of the bulk meters provided by Tana WSB have problems of precision, which hinders NRW management for the entire water supply area.

During Phase 1, improvement of the NRW management system for each zone was planned using the budget of the MWI NRW unit for exchanging and maintaining the main bulk meters (Master meters). Since there are problems such as difficulties of distinction between the bulk meter and the sub-zone meter installed in the water supply area, and identifying the boundary of the water distribution sub-area

covered by each bulk meter, the plan is to strengthen the capacity of management of facility information through improvement of the accuracy of the GIS database. In addition, since input of the customer meters data in the customer management system has not been completed, the registered customers in each zone cannot be fully grasped, and consequently, it is impossible to calculate the NRW ratio on a zone to zone basis. Therefore, we encouraged the commercial department to develop customer information and support NRW management system for each zone.

Furthermore, the same as in Meru WSP, JICA experts will try to construct a systematic water leakage survey system by instructing meter readers in basic leakage detection method using listening sticks. By focusing on these items, the intention is to support Embu WSP to restructure their NRW management system for each zone.

#### B) First Group Pilot WSPs

##### (a) Kisumu WSP

In Kisumu WSP, many officials of the NRW unit, who had been trained for detecting underground water leakage, left their jobs, so it is currently difficult to continuously conduct water leakage survey. Since experience in leak detection is poor and understanding of how to use survey instruments is also insufficient, it is a policy to give priority to leakage management field.

Because Kisumu WSP is also a big city with the third largest water supply population in Kenya, JICA experts will also disseminate the basic leakage detection method, through OJT. In addition, the JICA Expert Team intends to hold a collective training by inviting members of other Pilot WSPs or local WSPs to Kisumu WSP, which is expected to perform as a regional base for water leak detection guidance.

##### (b) Nakuru WSP

In the Nakuru WSP, there are five water distribution areas. In three of the distribution areas, DMAs have already been formed with approximately 1,000 connections. However, the status of hydraulic separation of each DMA and the identification of customers within the boundary using GIS have not been completed, and continuous monitoring of the NRW ratio per DMA has not been realised.

There is a lot of incorrect pipeline data on the GIS and it seems that the cooperation between the staff involved in pipe maintenance and the GIS personnel is not sufficient because the GIS staff are only at internship level. The aim is to strengthen the system through development and usage of GIS, and to support improvement of NRW management system by zone.

In addition, as Nakuru WSP has many asbestos pipes and aged pipelines, and since continuous leakage survey is not being conducted, there is a possibility that there are many underground water leaks. Currently there is a tendency for water supply pressure in the water supply area to be low due to lack of water sources and restrictions on water supply time. Bulk water supply from nearby WSP where dam development was completed is expected in the next few years, and there is concern that there might be an increase in the amount of water leakage as the amount and the water supply time increases. For that

reason, the plan is to place priority on implementing technical assistance on water leakage detection for Nakuru WSP.

(c) Ruiru-Juja WSP

Ruiru-Juja WSP has two towns as a target area for water supply, and in recent years it is an area where population and water demand is rapidly expanding as a bed town for Nairobi. In the course of development, the water supply areas were separated into five hydraulic zones, and NRW management for each zone has already been implemented. However, despite water supply being nearly continuous, the night time minimum flow rate measurements have not been carried out, and therefore the water balance is not fully understood and the level of physical losses such as water leakage and commercial losses are not sufficiently clear. For this reason, JICA experts are considering introducing a remote monitoring system as a measure to strengthen NRW management.

Meanwhile, certain results have been achieved against commercial losses by introducing highly accurate meters for large customers, putting customer meters outside the premises as well as improving the rate of meter reading. However, since Ruiru-Juja WSP did not possess leak detection equipment until recently, experience of water leakage survey was poor, and it is expected that the ability to manage water leakage will be greatly improved by guiding the staff from basic technology to applicable construction method through this project. Therefore, the JICA experts are instructing the Ruiru-Juja WSP staff on leak detection technology, introducing pressure test using hand pump, and how to establish basic leak prevention technology in new connection work.

(d) Nyahururu WSP

Nyahururu WSP has not received any assistance from other donors so far. In terms of NRW management, the NRW team was formed three years ago comprising of only six members. However, the staff of the NRW team is concurrently engaged in maintenance work, and not concentrated on NRW reduction activities. Also, since many ground leaks are reported, the staff have been working on repairing ground leakage, but have no practical experience of detecting underground water leakage and do not understand planning for leakage survey.

In addition, GIS has not been developed and awareness of the status of the existing water supply system and its problematic points are not fully shared. The two persons in the IT Department that are responsible for GIS development have not received any training in GIS. Also, they do not possess equipment such as GPS, etc., which is necessary for GIS development. Furthermore, the efficiency of the method of checking the customer meter accuracy is poor, and the implementation structure is still weak. Therefore, there are many problems, and a wide range of technical assistance from the JICA experts is necessary. For Nyahururu WSP, since there is a great insufficiency of basic information, the JICA experts will support the establishment of GIS and incorporate it into its use, and prioritize the development of the GIS environment that contributes to NRW reduction activities.

C) Second Group Pilot WSPs

(a) Mavoko WSP

There is a special economic zone in the water supply area of Mavoko WSP, with many large customers that can be charged a comparatively high water charge. However, the quantity of water that can be taken from the existing dam and the capacity of the water treatment plant are limited, so the supply hours are short at 9 hours, and there is a chronic water shortage. Therefore, it is not possible to supply sufficient water to the large customers from which the water fees are expected. Dredging of the dam and construction of a water treatment plant are in progress in cooperation with the Belgian government, and it is likely that the water shortage will be resolved after one and a half years. It is expected that after completion of the construction, funds for activities such as replacement of old low accuracy customer meters will be obtained from the water fees revenue, in order to carry out NRW reduction measures on a full scale.

On the other hand, there are about 2,500 old customer meters remaining that were installed more than 11 years ago and whose accuracy has degraded. Because of the existence of these defective meters and customer meters that cannot be accessed for meter reading, water usage calculation for many customers is being made on the basis of an estimated value.

In the activities of Phase 1, JICA experts supported the planning of the provision of meters by using the budget of the MWI NRW unit. Although it takes time for MWI budget execution, procurement by WSB, and installation of the meters by Mavoko WSP, JICA experts aim to provide support to improve the situation before the start of the Phase 3. In addition to support for procurement of water meters, JICA experts will support capacity building regarding customer management and fee collection through introduction of simplified meter accuracy verification method and replacement of aging meters.

(b) Eldoret WSP

Of the 3 divided water distribution areas, in the southern area, which has the highest NRW ratio, efforts have been made to identify the locations where most of the NRW occurs by subdividing the water distribution network into DMAs. However, the work of identification of the customers within each DMA is not progressing, and it will require some more time and investment to realise NRW management at the DMA level.

On the other hand, although the NRW team performs patrols in the water distribution area, water leakage detection equipment is outdated and thus water leakage detection cannot be conducted and the staff can only respond to the above ground water leakage repairs. In the activities of Phase 1, JICA experts supported the planning of the provision of survey equipment using the budget of MWI NRW unit. JICA expert team aims to support provision of the equipment before the start of Phase 3.

For Eldoret WSP, the focus will be on technical guidance related to water leakage detection by using the provided survey equipment, periodical implementation of step test and leakage investigation plan by utilizing the management system of three divided water distribution areas.

(c) Kilifi-Mariakani WSP

Kilifi-Mariakani WSP is located in the city furthest from Nairobi and currently has security problems. It is expected that implementation of on-site guidance by OJT will be difficult unless the security situation improves in the future. Therefore, for Kilifi-Mariakani WSP, the plan is to invite the staff in charge of each support activity to participate in project activities to be conducted at other pilot WSPs.

As Kilifi-Mariakani WSP has not yet formulated a NRW reduction plan, it is necessary for the staff to participate in the activities for other WSPs to enable them to prepare the NRW reduction plan as soon as possible. Technically, Kilifi-Mariakani is the least developed in terms of NRW management among all the pilot WSPs. Even NRW reduction activities such as patrolling for ground leakage detection have not progressed. The water supply area is dispersed in a wider area than other pilot WSPs, which is also another factor behind the delay in implementation of NRW reduction activities, as there is a lack of clarity on the existing pipelines. Also, because the installation rate of the water meters has not reached 100%, the JICA Expert Team has planned to support the provision of water meters by using the budget of the MWI NRW unit in Phase 1.

The implementation of the above-mentioned support activities is a part of efforts to effectively use the limited JICA expert human resource, and the content of activities plan will be adjusted appropriately according to the activity targets to be achieved and the response of each WSP with flexibility. In the case of addition or review of support activities, the relevant WSPs consent will be obtained through joint monitoring.

**Section 3: Example of NRW Reduction Plan 2017/2018 from Nyahururu WSP**  
(with photo showing an attempt for improving the plans through demonstration at site)

Nyahururu Water and Sanitation Company Ltd.  
(NYAHUWASCO)

**Non-Revenue Water (NRW) Reduction Plan 2017-18**

(a draft version edited for reporting to JICA Headquarters on June 15)

May 2017

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## 1. Review of the Implementation of NRW Reduction Plan 2016-17

### 1.1 Continuity and Completion of the Planned Activities

The following activities were planned for the year 2016-17;

- Customer meter replacement
- Zoning of supply areas to be monitored
- Periodic reading of zonal meters
- Inspection and investigation of water theft in supply areas
- Establishment of pilot areas for conducting water balance activities
- Rerouting of water accounts (Classifying of accounts into their respective zones).
- Zonal metering analysis
- Customer identification survey

The company's supply area comprises of 4 major schemes namely;

- Nyahururu town
- Igwamiti
- Marmamet
- Rumuruti town

Zoning and related activities were conducted as follows

scheme	Achievement
Nyahururu town	<ul style="list-style-type: none"> <li>• 16 zones created.</li> <li>• 16 master meters installed.</li> <li>• 1600 customer meters replaced.</li> <li>• Periodic zonal meter reading ongoing.</li> <li>• Data analysis done on monthly basis.</li> <li>• Continuous inspection of installations and investigation of water theft.</li> <li>• Committee established to deal with water theft cases.</li> <li>• 20 customer meters relocated.</li> <li>• Installation of 10 check meters for large consumers.</li> <li>• Random customer meter checks done.</li> </ul>
Igwamiti	<ul style="list-style-type: none"> <li>• 18 zones created and equipped with meters.</li> <li>• Periodic zonal meter reading ongoing.</li> <li>• Customer identification conducted and data base updated.</li> <li>• Periodic lines patrols done.</li> <li>• Random customer meter checks done.</li> <li>• Data analysis done on monthly basis.</li> <li>• Continuous inspection of installations and investigation of water theft</li> </ul>
Marmamet	<ul style="list-style-type: none"> <li>• 10 zones created and ongoing.</li> <li>• Customer identification on going.</li> <li>• Periodic lines patrols done.</li> <li>• Customer meter replaced in 3 zones.</li> <li>• 2 zones established for water balance exercise.</li> <li>• Periodic zonal meter reading on going.</li> </ul>



	<ul style="list-style-type: none"> <li>• Data analysis done on monthly basis.</li> <li>• Continuous inspection of installations and investigation of water theft.</li> </ul>
Rumuruti town	<ul style="list-style-type: none"> <li>• 5 zones established and ongoing.</li> <li>• Continuous line patrol on going.</li> <li>• Customer identification on going</li> <li>• Periodic zonal meter reading on going.</li> <li>• Data analysis done on monthly basis.</li> <li>• Continuous inspection of installations and investigation of water theft</li> </ul>

### 1.2. Acquired Skills, Good Practices and Achievements

No formal training has been conducted. However, many lessons have been learnt through implementation and benchmarking such as proper meter installation, water theft detection, leak/burst reporting and need for regular customer meters inspection.

### 1.3. Difficulties and Adjustment

Difficulties	Adjustments
Vandalism of zonal meter by residents	Improvised protective chamber
Meter accuracy problems	Installation of check meters
Identification of illegal connections in paved areas	Installation of check meters
Frequent burst in high pressure zones	Installation of high pressure pipes
Inadequate facilitation	

## 2. Revised Mid-term Vision for the Next 5 Year

### 2.1. Discussion on Weakness and Improvement Measures

The following are the weaknesses encountered while carrying out NRW reduction and the improvements undertaken:

#### a) Commercial Losses

WEAKNESSES	IMPROVEMENTS
Unverified customer accounts database	Customer identification exercise including the coordinates
Meter reading and data capturing errors	Verification of meter readings and installation of new billing systems.
Difficulties in identification of illegal connections.	Need for ground pipe detectors
Faulty meters	Replacement
Unverified meter accuracy	Need for accuracy testing

#### b) Physical Losses

WEAKNESSES	IMPROVEMENTS
Aged infrastructures prone to damage	replacements
Excessive pressure in some zones	Need for high pressure pipes
Unidentified leaks	Need for leak detector
Long leak repair response time	Timely facilitation
Faulty ball valves in distribution tanks	replacement
Faulty valves	replacement

#### c) GIS, Zoning and Monitoring of Water Balance

WEAKNESSES	IMPROVEMENTS
Lack of GIS system	QGIS provided
Lack of GIS skills	Urgent training required
Lack of computer fit for GIS	Computer with high graphic specs required
Lack of GPS reader	GPS required
Inadequate knowledge of existing old pipe network	Establishment of mapping unit
Difficulty in separation of commercial and physical losses	Skills in leak calculation required.

#### d) Staffing, Awareness Raising and Training

The company has established NRW team. However, due to vastness of the supply area the team is overwhelmed by work. It is recommended that each scheme should have its own NRW team. The teams need to be trained on NRW reduction skills. All members of staff have been sensitized about NRW.

**Section 4: Technical Assistance (TA) Schedule of Phase 2 for Output 4**

**Table A-2: Detailed TA Implementation Schedule for Embu WSP**

Fiscal Year/ Year & Month	2007 / 08	2008 / 09	2009 / 10	2010 / 11	2011 / 12	2012 / 13	2013 / 14	2014 / 15	2015 / 16	2016 / 17	2018												2019																					
											1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9													
NRW (%)	58	57	55	41	40	41	36	49																																				
Group of Activities	Steps of TA for Each Group of Activities [Relevant Trials from the Previous TA Plan used in Phase 1]										Potential Outcomes shareable with Other WSPs	Intensity of Support	Implementation Schedule																															
[A] Planning & Implementation of NRW Reduction (PDCA Cycle including yearly cycle based on a mid-term vision, monthly cycle based on internal performance monitoring, and sharing of experiences with other WSPs)	1) Preparation of annual plan & update of mid-term plan (P: Plan) [related to Trials 1-a to e]										Realistic examples of NRW reduction plans	●																																
	2) Implementation of the annual plan (D: Do) [Trial 1-b]										Daily submissions of ODK-guided activity results	●	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→						
	3) Periodical (e.g. monthly) discussion on the progress (C: Check + A: Adjust) [Trials 1-b & 3-d]										Materials prepared for monthly discussion	●		→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→				
	4) Review of the annual plan and reporting (C: Check) [Trial 1-b]										Annual review/report	●									→	→																	→	→				
	5) Sharing of the experiences with other WSPs (S: Share) [Trial 1-b]										Selected materials used for the activities & PPTs	●											→																→	→				
[B] 1st Priority: Customer-related Activities such as checking meter accuracy, leakage, illegal connection, faulty fittings, etc. around customer meters. (mainly against commercial losses, with a least-required GIS data set for searching targets and a single ODK form)	1) Preparation of a ODK form for checking meter accuracy, leakage with listening stick, illegal connection, etc. and recoding repairs [Trials 1-c, 2-a, 4-a & b, 5-a to c & 6-a]										Draft ODK form for the activities around customers	●																																
	2) Confirmation of the consistency between their main metering strategies and the contents of ODK form [Trial 5-b]										List of their confirmed main metering strategies	-	→	→																														
	3) Preparation for prioritizing certain types of customers (by categorization) and searching their location using GIS labels [Trials 2-b & Trial 5-c]										Example of customer categorization and labeling	●	→																															
	4) Filed trials of the ODK form for the activities around customers (by relevant unit & sections) using ODK & MAPinr [Trials 1-c, 2-a & b, 4-a & b, 5-a to c & 6-a to c]										Improved ODK form for the activities around customers	●	→	→																→	→													
	5) Trial for monthly reporting and discussion using the accumulated data downloaded from ODK Aggregate at the end of each month [Trials 1-b & 3-d]										Tables prepared for monthly discussion	●					→	→																										
[C] 2nd Priority: Bulk meter-related Activities such as zoning with minor network modification, accuracy check of bulk meters, monthly monitoring of NRW ratios, detection of abnormal flow (using Google Sheet mainly)	1) Preparation of a simple flow diagram for the consideration of a realistic zoning improvement [Trials 3-a]										Flow diagram	●																																
	2) Field work for zoning improvement (minor work including isolation check and bulk meter accuracy check at distribution zone level, etc.) [Trial 3-b & c]										List of main bulk meters checked and replaced	●	→	→	→														→	→														
	3) Addition of one or two data fields in the existing billing system to enter hydraulically isolated areas' ID for each customer and the data entry [Trial 3-c]										The improved billing system	●	→	→																														
	4) Establishment of easy and accurate monthly NRW ratio calculation procedure for each area with Google Sheet. [Trial 3-c]										Google Sheet for monthly NRW ratio calculation	●	→	→																														
	5) Establishment of an easy bulk meter reading procedure for abnormal flow detection with Google Sheet (optional) [Trial 3-c]										Google Sheet for abnormal flow detection	●	→	→	→	→																												
	6) Trial for monthly reporting and discussion using the results of monthly NRW ratio calculation and abnormal flow monitoring [Trial 1-b & 3-d]										Note comparing the ratios and activities in the month.	●												→	→																			
[D] 3rd Priority: Other Activities (including General GIS Improvement and Pipe/Pressure-related Activities) (mainly against physical losses, various tools required)	1-1) Pressure measurement over a large area using pressure gauges with max pointer [Trial 4-c]										Map showing the pressure variation over the areas	●																																
	1-2) Consideration of minor facility modification for pressure reduction based on the pressure measurement, etc. [Trial 4-c]										Selection of improvement measure & priority location	●																																
	1-3) Scheduling of minor facility modification for pressure reduction (e.g. replacing some of the malfunctioning PRVs for boilers with BPTs) [Trial 4-c]										Schedule of minor facility modification	●																																
	2-1) Preparation of a ODK form for facility patrol along pipelines & underground line survey (for leak and illegal use) & follow-up repairs [Trials 4-b & d & 6-a]										Draft ODK form for the activities along pipelines	●																																
	2-2) Filed trials of the ODK form for the activities along pipelines (by NRW unit and O&M Section) using ODK software, QField/SW Maps, etc. [Trials 4-b & d & 6-a]										Improved ODK form for the activities along pipelines	●																																
	2-3) Trial for monthly reporting and discussion using the accumulated data downloaded from ODK Aggregate [Trials 1-b & 3-d]										Tables prepared for monthly discussion	●																																
	2-4) Trial for considering pipe replacement using the accumulated records of leakage, illegal connection & repair downloaded from ODK (optional) [Trials 1-c & 2-c]										Preliminary results of the consideration	●																																
	3) Conduct hand pump tests for leakage control on service connections [Trial 4-e]										Calculated pass rate	●																																
	4) Various GIS improvement for NRW reduction activities (pipe alignment, pipe attributes, valve location, etc.) with QField [Trial 2-a]										Improved GIS layers as good examples	-																																
5) Enhancement of cooperation with the county against illegal connections [Trials 6-b & c]										Examples of implemented cooperation	●																																	

NOTE: ●: Trial agreed to carry out through discussion between each pilot WSP and JICA experts (●: The trial which the JICA experts think would especially attract attention at each WSP).

Expected Intensity of Required Support: High Medium Low  
 Input of Japanese Experts: [Solid Black Box]  
 Continuous Activity by WSP alone: [White Box with Arrow]  
 Period completely without Japanese Experts: [Green Box]

Table A-3: TA Implementation Schedule for the Pilot WSPs mainly targeted in Phase 2

Year and Month		2018												2019										
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9		
Pilot WSPs	Leading WSPs	Meru WSP	[A] Planning & Implementation of NRW Reduction (PDCA Cycle)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→		
			[B] 1st Priority: Customer-related Activities (meter error, leakage on service connections, etc.)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	
			[C] 2nd Priority: Bulk meter-related Activities (monitoring of NRW ratio, abnormal flow, etc.)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
			[D] 3rd Priority: Other Activities (including GIS improvement and pipe & pressure-related activities)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
	Embudo WSP	[A] Planning & Implementation of NRW Reduction (PDCA Cycle)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→		
		[B] 1st Priority: Customer-related Activities (meter error, leakage on service connections, etc.)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	
		[C] 2nd Priority: Bulk meter-related Activities (monitoring of NRW ratio, abnormal flow, etc.)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	
		[D] 3rd Priority: Other Activities (including GIS improvement and pipe & pressure-related activities)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	
	1st Group Pilot WSPs	Kisumu WSP	[A] Planning & Implementation of NRW Reduction (PDCA Cycle)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	
			[B] 1st Priority: Customer-related Activities (meter error, leakage on service connections, etc.)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
			[D] 3rd Priority: Other Activities (including GIS improvement and pipe & pressure-related activities)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
		Nakuru WSP	[A] Planning & Implementation of NRW Reduction (PDCA Cycle)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
			[B] 1st Priority: Customer-related Activities (meter error, leakage on service connections, etc.)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
			[D] 3rd Priority: Other Activities (including GIS improvement and pipe & pressure-related activities)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
		Ruiru-Juja WSP	[A] Planning & Implementation of NRW Reduction (PDCA Cycle)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
			[B] 1st Priority: Customer-related Activities (meter error, leakage on service connections, etc.)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
			[D] 3rd Priority: Other Activities (including GIS improvement and pipe & pressure-related activities)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
		Nyahururu WSP	[A] Planning & Implementation of NRW Reduction (PDCA Cycle)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
			[B] 1st Priority: Customer-related Activities (meter error, leakage on service connections, etc.)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
			[D] 3rd Priority: Other Activities (including GIS improvement and pipe & pressure-related activities)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
	2nd Group Pilot WSPs	Mavoko WSP	[A] Planning & Implementation of NRW Reduction (PDCA Cycle)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	
			[B] 1st Priority: Customer-related Activities (meter error, leakage on service connections, etc.)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
			[D] 3rd Priority: Other Activities (including GIS improvement and pipe & pressure-related activities)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
		Eldoret WSP	[A] Planning & Implementation of NRW Reduction (PDCA Cycle)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
[B] 1st Priority: Customer-related Activities (meter error, leakage on service connections, etc.)			→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	
[D] 3rd Priority: Other Activities (including GIS improvement and pipe & pressure-related activities)			→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	
Kilifi-mariakani WSP		[A] Planning & Implementation of NRW Reduction (PDCA Cycle)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	
		[B] 1st Priority: Customer-related Activities (meter error, leakage on service connections, etc.)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	
		[D] 3rd Priority: Other Activities (including GIS improvement and pipe & pressure-related activities)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	

Year and Month		2018												2019								
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9
Planned Input of Japanese Experts for Output 4	Mori																					
	Sekimoto																					
	Takahashi																					
	Harada																					
	Kano																					

LEGEND  
 Input of Japanese Experts (Red square)      Input of Japanese Experts (Pink square)      Input of Japanese Experts (Purple square)      Input of Japanese Experts (Blue square)      Continuous Activity by (Arrow)      Input of Japanese (Black square)      Period completely without (Light Green square)

ANNEX 2:  
Project Monitoring Sheet  
Ver. 3

TO CR of JICA Kenya OFFICE

PROJECT MONITORING SHEET Ver.3

Project Title: THE PROJECT FOR STRENGTHENING CAPACITY IN NON-REVENUE WATER REDUCTION (Phase 2)

Version of the Sheet: Ver.3 (Term: June – December 2017)

Name: Masayuki TAGUCHI

Title: Chief Advisor

Submission Date: January 25, 2018

**I. Summary**

**1 Progress**

**1-1 Progress of Inputs (from 1<sup>st</sup> June to 31<sup>st</sup> December, 2017)**

Input by Japanese Side

Experts:

Mr. Taguchi: From 7th May to 17th Jun., from 29th Nov. to 21st Dec.

Mr. Mori: From 7th May to 5th Jun., from 27 Jun. to 24 Jul.

Mr. Sekimoto: From 29th Nov. to 21st Dec.

Mr. Shibazaki: From 7th May to 14 Jul., from 29th Nov. to 21st Dec.

Ms. Sugimoto: From 9th Jun. to 7th Jul., from 4th Dec. to 5th Dec.

Man Month (M/M) during the said period:

Experts: 8.64 M/M

Local staff: 10 M/M

Input by Kenyan Side

Project CPs: Number of Counterpart (CP) members that participated in the period is 34 representing the following organizations.

MWI (5), WASREB (5), KEWI (4), WASPA (3), Meru WSP (6), Embu WSP (11)

Facilities: Project office at MWI and KEWI as well as regular meeting rooms were provided. Vehicles for Kenyan C/Ps' field visits were provided.

Project implementation costs: The traveling costs and per diem for MWI/KEWI staff were provided by MWI.

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2-4 WASREB incorporates the review results of NRW reduction activities by MWI NRW Unit in their activities.	(Planned for May 2018)
2-5 WASREB monitors and evaluates the usage of revised NRW standards.	(Planned for Phase 3)
<b>Output 3</b>	
3-1 KEWI studies current status of NRW reduction courses and its challenges.	Activity was completed.
3-2 KEWI reviews NRW reduction training strategies and course contents.	Activity was completed.
3-3 KEWI, in collaboration with leading WSPs (Embu and Meru, etc.), conducts on-site NRW trainings.	1 <sup>st</sup> Joint Training was conducted in Phase 1 (June 2017). (2 <sup>nd</sup> Joint Training will be held in April 2018 depending on MWI's budgetary arrangement)
3-4 KEWI incorporates on-site NRW trainings into NRW course contents and materials.	Textbook for the on-site trainings was developed in Phase 1.
3-5 KEWI incorporates the results of review by MWI NRW Unit into NRW course contents.	Review of 1 <sup>st</sup> Joint Training was completed in Phase 1.
3-6 KEWI conducts trace studies of NRW reduction course participants.	Trace study for 1 <sup>st</sup> Joint Training was conducted in December 2017. (Analysis of the study is ongoing)
<b>Output 4</b>	
4-1 The Project team conducts a survey of Urban WSPs and selects pilot Urban WSPs.	Activity was completed in Phase 1.
4-2 Each Pilot WSP conducts analyses of current NRW reduction activities and identifies its challenges.	The JICA Experts shared the results of capacity assessments with the Pilot WSPs. JICA experts have assisted 8 pilot WSPs other than Kilifi-Maliakani WSP, which will be focused later to formulate their NRW reduction plans. Four of them completed or mostly completed the preparation of draft medium-term NRW reduction plans and five of them had completed the preparation of draft annual NRW reduction plans.
4-3 Each Pilot WSP identifies measures to solve challenges and formulates the NRW reduction plan.	
4-4 Each Pilot WSP formulates the annual NRW reduction plan including financial schedule based on the NRW reduction plan.	
4-5 Each Pilot WSP implements the annual NRW reduction plan.	Some of Pilot WSPs have started implementing their annual plans in Phase 1.

	There is a concern that the delay of procurement of equipment to be used in assisting activities for Pilot WSPs would affect the dispatching schedule of the JICA expert in charge. If the procurement is not completed by April 2018, his assignment would have to be changed since the planed assistance would not be carried out properly.
4-6 Each Pilot WSP evaluates and analyzes implementation results and revises the plans.	Planned for Phase 2. (Reviews of implementation of the plans for 2017/18 of each Pilot WSP will start around April 2018 and revision of the annual plans will be done subsequently)
4-7 Each Pilot WSP produces the NRW reduction activity report annually.	
4-8 Each Pilot WSP holds regular NRW reduction meetings attended by relevant departments of WSP.	Some Pilot WSPs started holding meetings attended by relevant department for NRW reduction.

**Output 5**

5-1 MWI NRW Unit organizes NRW related regular meetings in cooperation with other relevant organizations.	FoC with WASPA was signed in May 2017. (Regular meetings will be held in Phase 2. Information on case-study will be collected during activities of Output 4 in Phase 2)
5-2 WASREB compiles case studies/lessons learnt about NRW reduction activities.	

**1-3 Achievement of Output**

Output 1: Promotion and coordination of NRW reduction activities by MWI NRW Unit are strengthened.

1-1 All County representative participate NRW related seminar(s).	(1 <sup>st</sup> Sensitization to County's technical officers will be held in February 2018)
1-2 NRW reduction campaigns are conducted semi annually.	(1 <sup>st</sup> campaign will be conducted in March 2018)
1-3 NRW reduction annual reports are produced.	(Ver.1 of the annual report will be published in May 2018)

Output 2: Use of NRW reduction standards by Urban WSPs are promoted by WASREB

2-1 NRW reduction standards are revised by year X.	(X will be decided based on the result of the survey on usage of the standards, which is on going. Probably X will be 2020)
2-2 Revised NRW reduction standards are disseminated to all Urban WSPs through	(Activity is planned for Phase 3)



workshop(s).	
<b>Output 3: NRW related training capacity of KEWI is strengthened.</b>	
3-1 KEWI conducts NRW reduction courses with contents incorporating on-site trainings and revised course materials.	The 1 <sup>st</sup> Joint training was conducted in June 2017
3-2 Evaluations by the NRW course participants is higher than before the revision of course materials.	The evaluation of the 1 <sup>st</sup> Joint Training was conducted in Phase 1. ( The process for the final evaluation report is ongoing)
3-3 X % of NRW course participants formulate the work plans.	Same as 3-2 above.
<b>Output 4: NRW planning and/or implementation capacity of pilot Urban WSPs is enhanced.</b>	
4-1 More than X of pilot Urban WSPs continuously make the annual NRW reduction plan based on the review of previous years implementation.	X will be decided in the middle of Phase 2.
4-2 More than X of pilot Urban WSPs continuously implement the annual NRW reduction plan formulated in 4-1.	
4-3 More than X of pilot Urban WSPs are able to implement skills and activities that pilot Urban WSPs were not able to adopt prior to the Project.	
4-4 More than X of pilot Urban WSPs are able to implement priority activities indicated in the NRW reduction plan.	
4-5 More than X of pilot Urban WSPs train all personnel of NRW reduction section.	
<b>Output 5: Experiences and knowledge of NRW reduction activities are shared among Urban WSPs.</b>	
5-1 Case study and lessons learnt of Output 4 and other NRW activities are compiled and disseminated.	Activities will be conducted during Phase 2.
5-2 Regular meeting(s) of NRW is/are organized three times a year.	Activities will be conducted during Phase 2.

**1-4 Achievement of the Project Purpose**

Project Purpose: A NRW reduction support mechanism is established for Urban WSPs to implement NRW reduction Activities.	
Indicator	Achievement
X of Pilot Urban WSPs continue achieving target set by the annual NRW reduction plan for two years.	Pilot WSPs will set their own targets in early Phase 2. X will be determined in the middle of Phase 2.

FoC between County governments and the Pilot WSPs

FoC is expected to be signed after sensitization seminars to be conducted in late February or early March by MWI. NRW Unit shall carry out signing FoC smoothly between pilot WSPs and County governments right after the sensitization seminar.

**2 Delay of Work Schedule and/or Problems (if any)**

There are following delays of activities during the reporting period.

2-1 Detail	2-2 Cause	2-3 Actions Taken
Publishing of 1st Ver. of NRW annual report	The NRW Unit member responsible for this task was transferred to another organization.	Responsibility was transferred to another NRW member and JICA team will support him steadily. The report will be published in May 2018
Sensitization for County Government and Campaign for WSPs	Organization restructuring was done after Governors election.	1st sensitization seminar will be held in February 2018.
Foc between County Government and Pilot WSP	As mentioned in 1-8 above.	As mentioned in 1-8 above.
Procurement of the equipment required for the implementation of NRW reduction activates at Each WSP using the budget of NRW Unit, MWI.	It was decided to request WSBs to procure the equipment for their corresponding Pilot WSPs using the budget allocated from the NRW Unit, MWI to the respective WSBs. However, there was some miscommunication between the NRW Unit and the WSBs.	Many meetings have been held regarding this delay between JICA experts and the NRW Unit, MWI. In the last meeting held in January, 2018, an action was taken to try to secure the procurement for 1 <sup>st</sup> Group Pilot WSPs by the end of April 2018. The possible timing of the procurement for Leading WSPs and 2 <sup>nd</sup> Group Pilot WSPs is still unknown.

**2-4 Roles of Responsible Persons/Organization (JICA, GoK etc.)**

Indicated above.

**3 Modification of the Project Implementation Plan**

**3-1 PDM**

PDM ver.1 has been proposed in the 3<sup>rd</sup> JCC.

**3-2 Other modifications on detailed implementation plan**

*(Remarks: The amendment of R/D and PDM (title of the project, duration, project site(s), target group(s), implementation structure, overall goal, project purpose, outputs, activities, and input) should be authorized by JICA HDQs. If the project team deems it necessary to modify any part of R/D and PDM, the team may propose the draft.)*

No modification has been made in the reporting period.

**4 Preparation of GoK Outlook after completion of the Project**

No preparations have been discussed for after the Project.

ANNEX 3:  
Project Design Matrix (PDM)  
Ver. 1

## Project Design Matrix

Project Title: Project for Strengthening Capacity in Non-Revenue Water Reduction

Implementing Agency: MWI,WASREB,KEWI

Target Group:Urban WSPs

Period of Project:5 years from the date when the first JICA Expert is dispatched

Project Site: The entire country of Kenya

Version 1

Dated 25th January 2018

Pilot Site: Embu, Meru, and others

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
<b>Overall Goal</b> Under NRW reduction support mechanism, Urban WSPs enhance NRW reduction activities.	1. X of Urban WSPs participate knowledge sharing activities established by the Project. 2. X of pilot Urban WSPs continue achieving target(s) set by the annual NRW reduction plan. 3. NRW annual report is continuously produced and disseminated.	MWI NRW Unit annual reports Pilot WSPs annual NRW reduction plans	NRW reduction remains as priority of MWI and WSPs.		
<b>Project Purpose</b> A NRW reduction support mechanism is established for Urban WSPs to implement NRW reduction activities.	X of pilot Urban WSPs continue achieving targets set by the annual NRW reduction plan for two years.	NRW reduction plans Platform (online) Impact reports Project reports JCC meeting minutes	NRW reduction remains as priority of MWI and WSPs.		
<b>Outputs</b> 1. Promotion and coordination of NRW reduction activities by MWI NRW Unit are strengthened.	1-1 All County representatives participate NRW related seminar(s). 1-2 NRW reduction campaigns are conducted semi annually. 1-3 NRW reduction annual reports are produced.	Materials for County seminar List of seminar participants Campaign materials NRW reduction annual reports Project reports JCC meeting minutes	<b>Project budget of the CPs is secured.</b> NRW Unit staff positions are fulfilled.		
2. Use of NRW reduction standards by Urban W/APs are promoted by WASREB.	2-1 NRW reduction standards are revised by year <b>2020</b> . 2-2 Revised NRW reduction standards are disseminated to all Urban WSPs through workshop (s).	Revised NRW reduction standards Workshop program and list of participants Project reports JCC meeting minutes NRW reduction annual reports	Current WASREB's role and authority remains.		
3. NRW related training capacity of KEWI is strengthened.	3-1 KEWI conducts NRW reduction courses with contents incorporating on-site trainings and revised course materials. 3-2 Evaluations by the NRW course participants is higher than before the revision of course materials. 3-3 0% of NRW course participants formulate the workplans.	Revised course materials Revised course syllabus Course participants' evaluation sheets Project reports JCC meeting minutes NRW reduction annual reports Trace studies	KEWI continues to offer NRW short courses. <b>Project budget of the CPs is secured.</b>		
4. NRW planning and/or implementation capacity of pilot Urban WSPs is enhanced.	4-1 More than X of pilot Urban WSPs continuously make the annual NRW reduction plan based on the review of previous year's implementation. 4-2 More than X of pilot Urban WSPs continuously implement the annual NRW reduction plan formulated in 4-1. 4-3 More than X of pilot Urban WSPs are able to implement skills and activities that pilot Urban WSPs were not able to adopt prior to the Project. 4-4 More than X of pilot Urban WSPs are able to implement priority activities indicated in the NRW reduction plan. 4-5 More than X of pilot Urban WSPs train all of NRW personnel.	NRW reduction annual plans NRW reduction plans IMPACT reports Project reports JCC meeting minutes NRW reduction annual reports	Trained personnel do not leave WSPs Drastic climatic changes such as draught will not affect the water resources. <b>Project budget of the CPs is secured.</b>		
5. Experiences and knowledge of NRW reduction activities are shared among Urban WSPs.	5-1 Case study and lessons learnt of Output 4 and other NRW activities are compiled and disseminated. 5-2 Regular meeting(s) of NRW is/are organized three times a year. <b>5-3 Production of 3 brief notes</b>	Compiled lessons learnt NRW regular meeting minutes and list of participants Project reports JCC meeting minutes NRW reduction annual reports	NRW reduction remains as priority of WSPs.		
<b>Activities</b>					
1.1 MWI NRW Unit, in cooperation with WASREB, produces NRW annual reports which include NRW reduction data. 1.2 MWI NRW Unit plans and implements NRW reduction sensitization activities for the Counties. 1.3 MWI NRW Unit plans and implements NRW reduction campaigns. 1.4 MWI NRW Unit conducts reviews of KEWI NRW courses. 1.5 MWI NRW Unit conducts reviews of WASREB's NRW reduction activities. <b>1.6 MWI NRW Unit ensures the budget for the support mechanism based on its NRW reduction Mid-term vision.</b>					
2.1 WASREB conducts a survey of the usages of current NRW reduction standards. 2.2 Based on the survey result as well as Outputs 4 and 5, WASREB revises the NRW reduction standards. 2.3 WASREB promotes revised NRW reduction standards through workshop(s). 2.4 WASREB incorporates the review results of NRW reduction activities by MWI NRW Unit in their activities. 2.5 WASREB monitors and evaluates the usages of revised NRW standards.					
3.1 KEWI studies current status of NRW reduction courses and its challenges. 3.2 KEWI reviews NRW reduction training strategies and course contents. 3.3 KEWI, in collaboration with leading WSPs (Embu and Meru, etc.), conducts on-site NRW trainings. 3.4 KEWI reflects on-site NRW trainings into NRW course contents and materials. 3.5 KEWI incorporates the results of review by MWI NRW Unit into NRW course contents. 3.6 KEWI conducts trace studies of NRW reduction course participants.					
4.1 The Project team conducts a survey of Urban WSPs and selects pilot Urban WSPs. 4.2 Each pilot WSP conducts analyses of current NRW reduction activities and identifies its challenges. 4.3 Each pilot WSP identifies measures to solve challenges and formulates the NRW reduction plan. 4.4 Each pilot WSP formulates the annual NRW reduction plan including financial schedule based on the NRW reduction plan. 4.5 Each pilot WSP implements the annual NRW reduction plan. 4.6 Each pilot WSP evaluates and analyzes implementation results and revise plans. 4.7 Each pilot WSP produces the NRW reduction activity report annually. 4.8 Each pilot WSP holds regular NRW reduction meetings attended by relevant departments of WSP					
5.1 MWI NRW Unit organizes NRW related regular meetings in cooperation with other relevant organizations. 5.2 WASREB compiles case studies/lessons learnt about NRW reduction activities. <b>5.3 The Project team produces brief notes</b>					
		<b>Inputs</b>			
		<b>The Japanese Side</b>		<b>The Kenya Side</b>	
		1. Experts 2. Equipment/Tools/ Materials 3. Japan or third country training		1. Counterpart personnel 2. Equipment/Tools/ Materials 3. Facility/Office Space <b>4. Budget for activities</b>	
				<b>Pre-Conditions</b>	
				<b>&lt;Issues and countermeasures&gt;</b>	

Note: "X" is the indicator that will be decided after the project commencement.

ANNEX 4:  
List of Equipment and Materials  
for Pilot WSPs' activities in  
Phase 2

# ANNEX 4

## PHASE 2

List for Meru, Embu, Kisumu, Nakuru, Nyahururu and Ruiru-Juja WSPs

S/No.	Item Description	Unit Price	Quantity	Amount (Kshs.)
1	Pressure Logger	82,740	10	827,400
2	Programming Cable for the logger	62,800	3	188,400
3	Portable Ultrasonic Flowmeter	800,000	1	800,000
4	Portable Meter Tester	320,000	3	960,000
5	Hand Pump for leak check	35,000	6	210,000
6	Ground Microphone (Leak Detector)	530,000	2	1,060,000
7	Listening Stick	34,200	57	1,949,400
8	Leak Noise Correlator with Ground Microphone	1,897,120	1	1,897,120
9	Pipe Locator for Metal Pipes + Cable for Locating Plastic Pipes	697,450	2	1,394,900
<b>Sub-Total</b>				<b>9,287,220</b>
<b>VAT(16%)</b>				<b>1,485,955</b>
<b>TOTAL</b>				<b>10,773,175</b>

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ANNEX 5:  
Attendance List



## ANNEX 5

## ATTENDANCE LIST:

No.	Name	Position	Institution
1.	Prof. FRED SEGOR	PS	MWI
2.	Eng. LAWRENCE SIMITU	WS	MWI
3.	Eng. SAO ALIMA	DWSSD	MWI
4.	DAVID N. MABONGA	Coordinator, NRW Unit	MWI
5.	MERCY K. NJUNGE	NRW Unit	MWI
6.	ANDERSON KIOI	NRW Unit	MWI
7.	ONESMUS N. MWANGI	NRW Unit	MWI
8.	WILFRED OPUNDO	Intern, NRW Unit	MWI
9.	JACINTA NCOORO	OA	MWI
10.	FRANCIS MALUKI	TO	WASREB
11.	Dr. LEUNITA SUMBA	Director	KEWI
12.	WALTER M. MOSETI	NRW Coordinator	KEWI
13.	WAVAKA WAMBULWA	Comm/PR	KEWI
14.	SHINJIRO AMAMEISHI	Senior representative	JICA Kenya Office
15.	MASAHITO MIYAGAWA	Representative	JICA Kenya Office
16.	WATARU TAKASHIMA	Project formulation advisor	JICA Kenya Office
17.	JOHN GITAU	Program Officer	JICA Kenya Office
18.	NORHIRO OBITSU	Technical advisor	JICA HQ
19.	DAISUKE SAKAMOTO	Engineer	JICA HQ
20.	ANNE TEK	P.O.	COG
21.	ROBERT K. MIRURI	AG GM	MEWASS (Meru WSP)
22.	H.M. KARUGENDO	MD	EWASCO (Embu WSP)
23.	JIMMY KEMBOI	AG MD	ELDOWAS (Eldoret WSP)
24.	GILBERT K. MUTAI	AG TM	NAWASCO (Nakuru WSP)
25.	JAMES MUGO	FAM	NYAHUWASCO (Nyahururu WSSP)
26.	PETER MWANGI	TSM	NYAHUWASCO
27.	JESEE AMBUNDO	Technical manager	MAVOKO WATER
28.	MARY MWANGI	Technical manager	RUIRU WATER
29.	EMMANUEL KARAVINA	Technical manager	KIMAWASCO (Kilifi- Mariakani WSP)
30.	Eng. DAVID ONYANGO	MD	KIWASCO (Kisumu WSP)
31.	MASAYUKI TAGUCHI	Chief Advisor	JICA Experts Team
32.	NOBORU SAITO	Expert	JICA Experts Team
33.	SATOSHI SHIBAZAKI	Expert	JICA Experts Team
34.	NAOKI HARADA	Expert	JICA Experts Team
35.	SHINICHI SEKIMOTO	Expert	JICA Experts Team
36.	CHARLES MAINGI	NRW Expert	JICA Experts Team
37.	EVANS GITAHU	Coordinator	JICA Experts Team

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