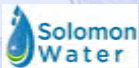


**S13.1-2 第 2 回 JCC の発表資料**





## The Project for Improvement of Non-Revenue Water Reduction Capacity for SIWA in Solomon Islands

### Progress -2 of the Pilot Project

27 November, 2013

### NRW Project Team

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## PHASE 1 INTRODUCTION Project Team Members

- Management Team (5), NRW Action Team(19), JICA Experts (8).

### Teams and Members for Project Implementation

#### [ NRW Management Team of SW ] \*5 members

- Project Director (General Manager)
- Project Manager (Operation & Technical Manager)
- Member (Finance & Administration Manager)
- Member (Human Resources Manager)
- Member (Service Delivery & Communications Manager)

#### [ NRW Action Team of SW ] \* 19 counterpart staffs

- Technical Sub-Team** (8 counterpart staffs)
  - Action Team Leader 1 / Sub-Team Leader and other 7 members
- Customer Service Sub-Team** (6 counterpart staffs)
  - Action Team Leader 2 / Sub-Team Leader and other 5 members
- GIS Sub-Team** (2 counterpart staffs)
  - Sub-Team Leader and other 1 member
- Leakage Detection Sub-Team** (3 staffs)
  - Sub-Team Leader and other 2 member

#### [ JICA Expert Team ] \* 8 experts

- Leader / Water Supply Planning, Operation and Management Deputy Leader / NRW Reduction Measures -1
- NRW Reduction Measures -2
- Leakage Detection Technology
- GIS
- Customer Service / PR
- GIS Advisor
- Coordinator

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## Contents

- PHASE 1 INTRODUCTION
- PHASE 2 INDIVIDUAL ACTION PLAN
- PHASE 3 ACTIVITIES FOR OUTPUT-1:  
*Planning Process of SW for NRW Reduction is systemized*
- PHASE 4 ACTIVITIES FOR OUTPUT-2:  
*Implementation Procedure of NRW Reduction is established through the Pilot Project*
- PHASE 5 ACTIVITIES FOR OUTPUT-3:  
*NRW Reduction is implemented in accordance with the Procedure of in the Pilot Projects and LCZs*
- PHASE 6 ACTIVITIES FOR OUTPUT-4: Water  
*Meter Reading and Billing Process Management are improved*
- PHASE 7 PROJECT OPERATIONS AND MANAGEMENT
- PHASE 8 FINDINGS FOR THE WAY FORWARD

## Achievement of the Project until October 2013

- Starting from early November 2012, the Project has conducted the following major activities:
  - Capacity Assessment and Formulation of Capacity Development Plan
  - Implementation of the pilot projects in six areas, namely White River- Namoruka, Independence Valley, Lenggakiki, Mbokonavera-1, Tuvaruhu-1 and Tuvaruhu-2
  - Training and lectures on NRW reduction measures and GIS
  - Preparation of Standard Operating Procedures (SOP) on water meter reading and billing, etc.
  - Preparation of Annual Action Plan 2013 on NRW reduction
  - Holding of the 1st JCC Meeting, and
  - Two Counterpart Trainings in Japan

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## PHASE 2 INDIVIDUAL ACTION PLAN Individual Action Plan

- Part of Ongoing Capacity Building and Assessment Program of the Project.
- Template of the IAP.

Main Activities	Verifiable Indicator	Methods of Implementation	Achievement
1. Contribution to water supply service of Solomon Water			
2. Contribution to the Pilot Project			
3. Challenging Target			
4. Enlightening Activity			

[Individual Action Plan Rev Mathew Mafe.pdf](#)

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## Time Frame for Six Pilot Project Areas.

- Proposed Timeline is 2 months per pilot. Namoruka, Independence and Lenggakiki (>3 months). Lost 2 months at the beginning but made up for it with introduction of two field teams. Average implementation timeframe for each pilot after that is 1.5 months.

Summary of NRW Reduction Pilot Project Timeline and Progress

Pilot Area	2013							
	April	May	June	July	Aug	Sep	Oct	Nov
1 No.9 Namoruka				Completed				
2 No.10 Independence Valley			Completed					
3 No.3 Lenggakiki					Completed			
4 No.5 Mbokonavera-1						Completed		
5 No.14 Tuvaruhu-1							Completed	
6 No.15 Tuvaruhu-2							Completed	
7 NO.6 Vavaea Ridge								On going
8 No.4 Mbokana								On going
9 No.8 Mbaranamba								On going

DMA

## PHASE 3 ACTIVITIES FOR OUTPUT-1:

*Planning Process of SW for NRW Reduction is systemize*

### Location of 15 Pilot Project Areas

- Names of Pilot areas

PILOT AREAS	STATUS
1 FFA Kola Road	Not started
2 Mbua Valley	Not started
3 Lenggakiki	Complete
4 Mbokona	Ongoing
5 Mbokona Vera 1	Complete
6 Vavaya Ridge	Ongoing
7 Fanatina Valley	Not started
8 Mbaranamba	Ongoing
9 Namoruka	Complete
10 Independence Valley	Complete
11 Bahai Kukum	Not started
12 Naha 2	Not started
13 Naha 3	Not started
14 Tuvaruhu 1	Complete
15 Tuvaruhu 2	Complete

- 6 Pilots Completed, 3 Ongoing, 6 Not yet started-As of October 2013

- [Completed\\_Sites\\_20131114.jpg](#)

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## Cost Incurred in each Pilot Project

- Total Cost incurred for 6 pilot project- \$ 500, 979
- Average Cost for each pilot - \$ 83, 500 (more for some pilots than others depending on pilot size).

No.	Item	Namoruka	Independence Valley	Lenggakiki	Mbokonavera -1	Tuvaruhu -1	Tuvaruhu -2	Total
1	Personnel cost	74,710	78,825	55,087	48,515	43,084	45,669	345,890
2	Consumable cost	2,306	2,207	971	269	884	942	7,579
3	Material & Equipment	22,673	32,889	59,810	32,138	0	0	147,510
	<b>Total Cost</b>	<b>99,689</b>	<b>113,921</b>	<b>115,868</b>	<b>80,922</b>	<b>43,968</b>	<b>46,611</b>	<b>500,979</b>

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## Increase Revenue Water Volume by NRW Reduction Activities for 6 pilots.

- Total volume increase after countermeasures is 619.18 m<sup>3</sup>/day or 3,096 Drums of water each day from 6 pilot areas.

Breakdown of total revenue water volumes before and after countermeasures

No	Item	Name Ruka	Independence Valley	Lenggakiki	Mbokomaversi	Tuvanuhu-1	Tuvanuhu-2	Total
1	Revenue Water Volume before countermeasure (m <sup>3</sup> /day): [A]	46.96	67.54	224.89	83.74	36.64	37.39	497.16
2	Revenue Water Volume after countermeasure(m <sup>3</sup> /day): [B]*	235.48	148.27	394.99	162.33	84.57	90.69	1,116.34
3	Increased Water Volume resulting from the NRW reduction activities(m <sup>3</sup> /day): [C] = [B]-[A]	188.52	80.73	170.10	78.59	47.93	53.30	619.18

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## Cost Benefit Analysis through Six Pilot Projects for Three Years.

- Revenue increase will be SBD 1,672,378.90 per year or SBD 5,017,135 for three years through the NRW reduction activities.
- IF** the condition of the water system in the pilots is maintained in the same condition as that after countermeasure
- Cost Benefit (A) > Cost of NRW reduction activities (B)

No	Item	Unit	Name Ruka	Independence Valley	Lenggakiki	Mbokomaversi	Tuvanuhu-1	Tuvanuhu-2	Total
1	Increased Revenue Water Volume	m <sup>3</sup> /day	188.52	80.73	170.10	78.59	47.93	53.30	619.17
		m <sup>3</sup> /3 years	206,429.40	88,399.35	186,259.50	86,056.05	52,483.35	58,363.50	672,991.15
2	Revenue increased at unit potential income of average revenue water (67.4 SBD/m <sup>3</sup> )	SBD/day	1,395.05	597.40	1,258.74	581.57	354.68	394.42	4,581.86
		SBD/3 years	1,527,578	654,155	1,378,320	636,815	388,377	431,890	5,017,135
3	Total Cost incurred in the pilot project*	SBD	99,689	113,921	115,868	80,922	43,968	46,611	500,979
4	Total cost incurred in three years*	SBD/3 year	199,378	227,842	231,736	161,844	87,936	93,222	1,001,958

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## Training 2: IWA Training

### Water Audit Table (IWA Water Balance)

Component	Initial Measurement				
	Q (m <sup>3</sup> /day)	Proportion			
RW	18.366	49.106	14.2%		
NRW	Billed Authorized Consumption	30.740	14.2%		
	Billed (Metered)	[A]			
	Billed (Unmetered)	[B]			
	Unbilled Authorized Consumption	0	0%		
	Unbilled Unmetered Consumption	20.140	43.180	12.5%	
Apparent Losses	Illegal use(Direct connection)	[F]+[F]			
	Illegal use for 24hr	[D]			
	Meter inaccuracy	[G]	3.910	1.1%	
Metering Inaccuracy	M I (Loss by unmetered rate)	[C]	75.720	21.8%	
	Used water for 24hr				
Real Loss	174.814	50.4%			
Total System Input Volume			346.730	100.0%	100.0%

## Training 3: Leakage detection Training

- How to use instruments to detect leakage.
- How to differentiate leakage from other sounds.
- Great emphasis placed on practice, practice, practice!!



S13.1-2-2

## PHASE 4 ACTIVITIES FOR OUTPUT-2: Implementation Procedure of NRW Reduction is established through the Pilot Project

Schedule for installation of bulk meters and chamber

No	System	Location	Item	Type	Qty	Start	End	Status
1	Water Meter Pumping	Thalaba Talo	200	PI	12	1	1	Completed
2	Water Meter Pumping	Thalaba Talo	225	PI	12	1	1	Completed
3	Water Meter Pumping	Thalaba Talo	225	PI	12	1	1	Completed
4	Water Meter Pumping	Thalaba Talo	100	GI	12	1	1	Completed
5	Water Meter Pumping	Thalaba Talo	120	LI	12	1	1	Completed
6	Water Meter Pumping	Thalaba Talo	200	PI	12	1	1	Completed
7	Water Meter Pumping	Thalaba Talo	225	PI	12	1	1	Completed
8	Water Meter Pumping	Thalaba Talo	200	PI	12	1	1	Completed
9	Water Meter Pumping	Thalaba Talo	200	PI	12	1	1	Completed
10	Water Meter Pumping	Thalaba Talo	225	PI	12	1	1	Completed
11	Water Meter Pumping	Thalaba Talo	225	PI	12	1	1	Completed
12	Water Meter Pumping	Thalaba Talo	225	PI	12	1	1	Completed

Legend:   
 Construction of Chamber:   
 Installation of Bulk Meter:   
 Completed:   
 Consented:



## PHASE 5 ACTIVITIES FOR OUTPUT-3: NRW Reduction is implemented in accordance with the Procedure of in the Pilot Projects and LCZs

### Training 1: Identifying NRW components for Solomon Water

#### Identify causes of NRW

Category of Connections	Nos. of HHs	Q (m <sup>3</sup> /day)	Description
A	Registered users with meter (Working)	12 18.366	Metered quantity by meter readers
B	Registered users without meter (Malfunctioning)	29 30.740	Unmetered quantity (Assumed quantity of 32m <sup>3</sup> /month/household in flat rate)
C	Registered users without meter and faucet used for 24hrs	(B)* 75.720	Water has been flowing for 24hrs. Water quantity per minute (m <sup>3</sup> /min) is measured in households concerned by using a cup and converted to daily quantity (m <sup>3</sup> /day). 22m <sup>3</sup> /month should be deducted from the measured quantity.
D	Unregistered users use water for 24 hrs. (Without Faucet)	3 23.040	This is water quantity consumed in illegal connections. Water has been for 24hrs. Water quantity per minute (m <sup>3</sup> /min) was measured in households concerned by using a cup and converted to daily quantity (m <sup>3</sup> /day).
E	Unregistered users	6 8.400	This is water quantity in illegal connections. It is assumed that water of 32m <sup>3</sup> /month in their household is consumed.
F	Households pay to registered neighbor, but neighbor only pay for one.	11 11.000	Households do not connect to SW's service lines but rely on neighbor households who connect to SW's service lines. However, neighbor household only pay for their own tariff in flat rate. It is assumed that water of 32m <sup>3</sup> /month for each household who rely on neighbor, is consumed.
G	Meter Inaccuracy	- 3.910	This is checked by using Test-meter.12
H	Real Loss	- 174.814	Water leakage.

## Training 4: Leakage detection Training in the field

### Action 2-2

#### Valve locating and Pipe locating at the pilot area



#### Valve locating

#### Pipe locating

#### Take action

#### Using Equipment

- Burred valve locating ⇒ Metal Locator
- Unclear pipe locating ⇒ Metal Pipe Locator
- Updating on the GIS ⇒ GPS

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## Training 5: GIS training in the office & practice in the field using GPS



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## Location Map of PRVs- Honiara



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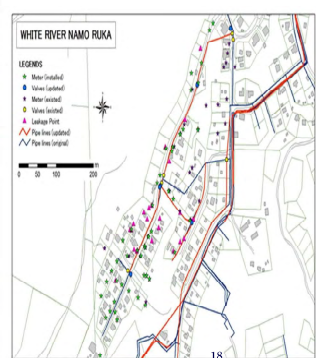
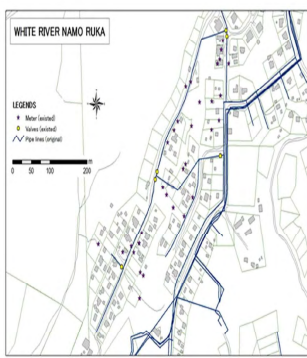
## Causes of Leakages

Materials , Places & Condition of facilities

Category	Causes	Rate (%)
Material	Polyethylene pipe	67
Location	Connection	50
Condition	Loose	50
Cause	Wrong connection	67

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## Update of Existing Network drawings in Pilot sites. Namuruka Pilot sites - Updates



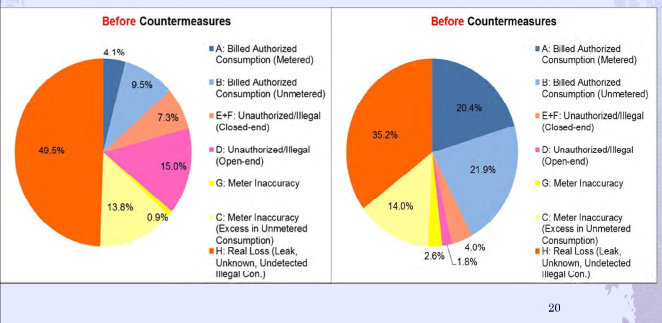
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## Identifying the Causes of NRW

◆ Estimation of Initial NRW Ratio.

◆ Namuruka

Independence valley



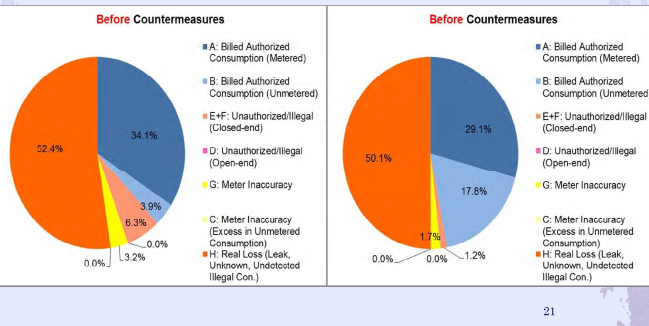
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## Identifying the Causes of NRW

◆ Estimation of Initial NRW Ratio.

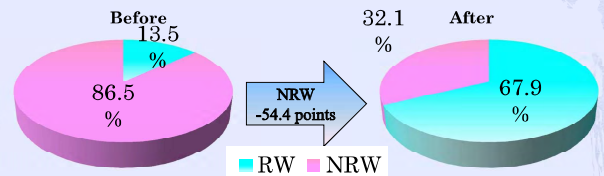
◆ Lenggakiki

Mbokonavera 1

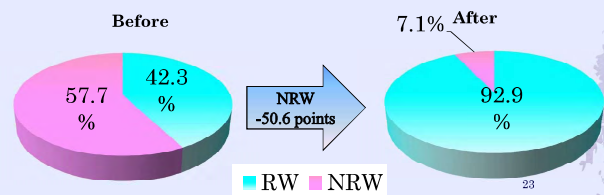


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## White River – Namoruka



## Independence Valley



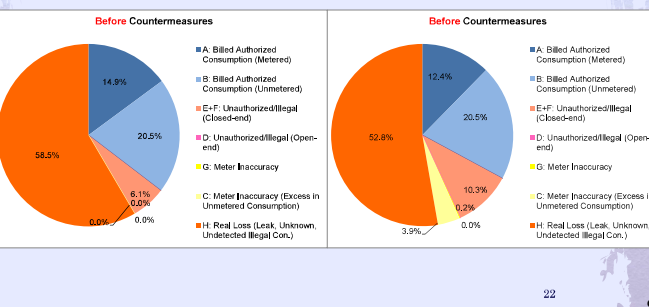
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## Identifying the Causes of NRW

◆ Estimation of Initial NRW Ratio.

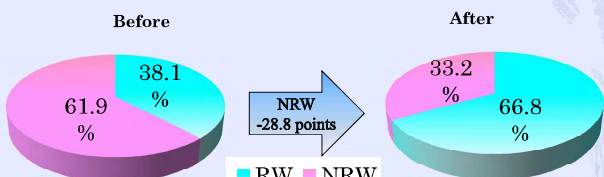
Tuvaruhu 1

Tuvaruhu 2

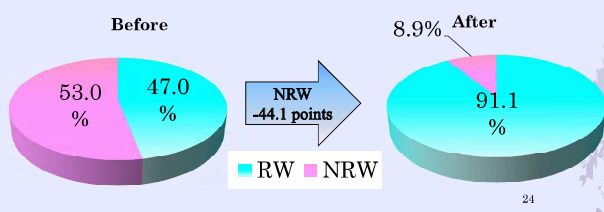


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## Lenggakiki



## Mbokonavera



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## **Lessons learned**

- ◆ NRW Action Team has learnt the following viewpoints through the pilot projects.
  - ◆ Sense of responsibility of each staff member will take effect on the project.
  - ◆ It is important to coordinate customers' list properly for IWA water balance analysis.
  - ◆ It is important to have communication between sub-teams continuously.

# The Project for Improvement of Non-Revenue Water Reduction Capacity for SIWA in Solomon Islands

## District Metered Area (DMA)

27 November, 2013

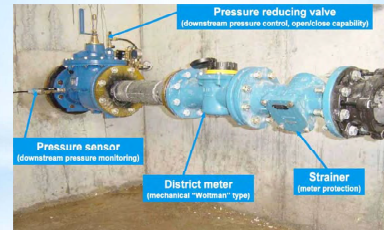
NRW Project Team

### Contents

1. Definition of the DMAs
2. Purpose of the DMAs
3. Image of DMAs
4. Location of the Pressure Reducing Valves (PRVs)
5. Prioritizing the DMAs
6. Resource for Activities in DMAs
7. Timeline for Procurement and Installation of Pressure Reducing Valves ( PRV ) and Creation of DMA s.
8. Summary of Activities in the DMAs

### 1. Definition of the DMAs

- Defining about 15 DMAs in Honiara city
  - With Pressure Management
  - Without Pressure Management
- Installing about 13 Pressure Reducing Valves (PRVs)

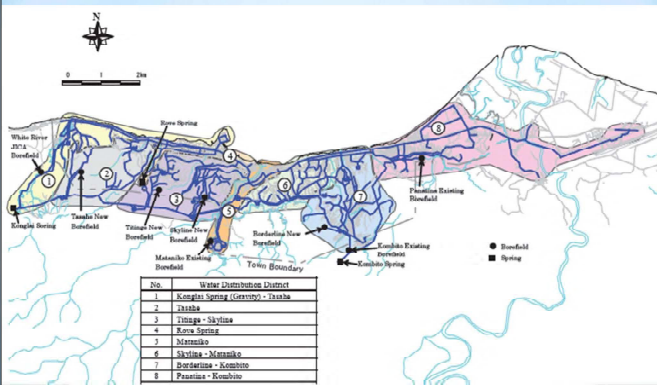


Source: Best Practice Strategies to Leakage Management IWA Water Loss Task Force

### 2. Purpose of the DMAs

- Managing pressure control, water quality and NRW reduction in networks
- Reducing real losses to an economic level and maintaining this level
- Comparing levels of leakage in the different districts to assess where it is most beneficial to undertake leak location activities

### 3. Image of Water Supply Zone



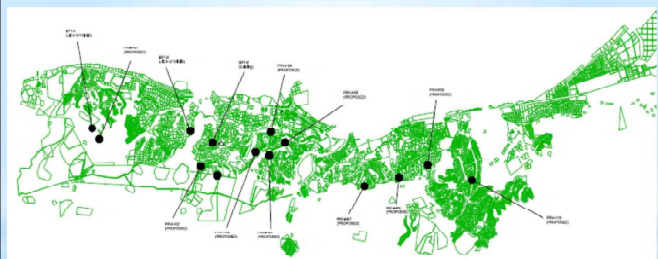
Source: JICA Master Plan 2006

### 5. Prioritizing the DMAs

DMAs will be prioritized to be implemented in the following points :

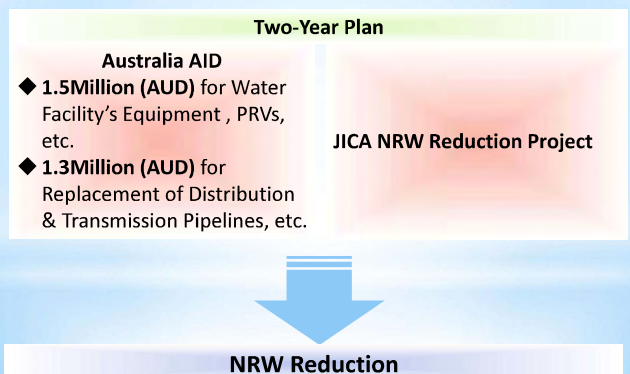
- Areas in NRW serious situation (Illegals, leakages, direct connections, frequent bursts)
- Defective hydraulic condition of pipes
- Hydraulic design of network (more simple, dendritic, raising capacity)
- Number of beneficiaries
- Cost of water

### 4. Location of the Pressure Reducing Valves (PRVs)



Source: Solomon Water Short Term Recovery Strategy and action Plan Water Supply Network management and Information Adviser

### 6. Resource for Activities in DMAs





## 7. Timeline for Procurement and Installation of Pressure Reducing Valves ( PRV ) and Creation of DMA s.

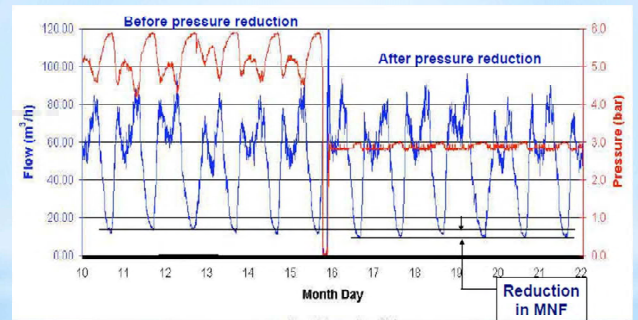
- Order all PRV's ,flow meters and data loggers in December
- Schedule of pipes and special fittings tendered in December
- Civils and construction tendered in December
- Expected start date will be February 2014
- Expected completion in May 2014

## 8. Summary of Activities in the DMAs

- Water leakage detection
- Convert Illegal connection to registration
- Disconnection of illegal connections
- Installation and or replacement of water meters
- Water pressure management (see next Figure)

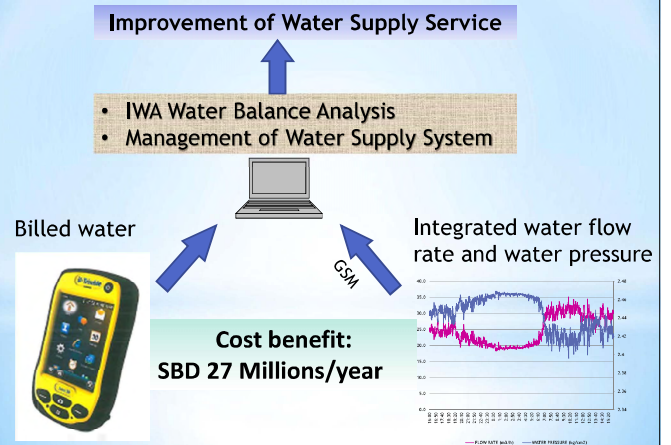
**NRW Reduction**

## 8.1 Water Pressure Management



Source: Best Practice Strategies to Leakage Management  
IWA Water Loss Task Force

## 8.2 Optimize Water Supply System



**THE PROJECT FOR IMPROVEMENT OF  
NON-REVENUE WATER REDUCTION  
CAPACITY  
FOR SIWA IN SOLOMON ISLANDS**

**PDM2**

27 November, 2013

**NRW Project Team**

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## 1. Key Points changed on PDM2

- Numerical verifiable indicators for Overall Goal was indicated.
- Numerical narrative summary and verifiable indicators for Project Purpose were indicated.
- Assistance in the definition and creation of LCZs and DMAs was added.
- NRW reduction activities including water pressure management to be conducted in DMAs were added.
- Advice for the improvement of pipe system design was added.

## Contents

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1. Key Points changed on PDM2
2. Overall Goal
3. Project Purpose
4. Outputs
5. Activities

4

## 2. Overall Goal

### Narrative Summary

**PDM2:** SW's service levels are improved and SW's revenue is increased.

#### VERSE

**PDM1:** SIWA's service levels are improved and SIWA's revenue is increased.

## 2. Overall Goal

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### Objectively Verifiable Indicators

#### PDM2

1. The NRW ratio in Honiara City is reduced to **20%** by 2018
2. Ratio of **operational revenue-to-expenditure is sustained at greater** than 100%

#### PDM1

1. **Water supply hours become longer.**
2. The NRW ratio in Honiara City is reduced to **XX %** by 2018
3. **Ratio of current expenses to current income becomes more** than 100% by 2018.

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## 3. Project Purpose

### Objectively Verifiable Indicators

#### • PDM2

1. The NRW ratio is reduced by **30 points** in each pilot project area, **selected DMAs and/or LCZs.**

#### • PDM1

1. The NRW ratio is reduced to **XX%** in each pilot project area and **the NRW ratio in Honiara City is reduced to XX%**

## 3. Project Purpose

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### Narrative Summary

**PDM2:** SW is assisted to achieve its target of reducing the NRW Ratio in Honiara to **30%** by 2015.

**PDM1:** Non-revenue water(NRW) ratio in Honiara City is reduced.

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## 4. Outputs

### Narrative Summary

#### PDM2

1. Planning process of SW for NRW reduction is systematized.
2. The procedure for NRW reduction is established through the pilot areas and LCZs.
3. **NRW reduction is implemented in accordance with the procedure in pilot areas and/or LCZs**
4. **Water meter reading** and billing process management are improved.

#### PDM1

1. **The** planning process for NRW reduction is systematized.
2. **The implementation** procedure of NRW reduction is established through the pilot projects.
3. Billing process management is improved.

## 4. Outputs

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### Objectively Verifiable Indicators

#### PDM2

1-1 Annual budget for NRW reduction is secured in the pilot project areas and LCZs

1-2. The strategic implementation (rolling-out) plan for NRW reduction is approved by management of SW.

2-1. A manual for NRW reduction measures is prepared.

2-2. The number of authorizations and disconnections of illegal connections is increased in the pilot project areas and LCZs.

2-3. The number of new service connections and replacement of malfunctioning customer meters is increased in the pilot project areas and LCZs.

3-1. The number of pipe repairs is increased in the pilot project areas and LCZs.

4-1. Standard operating procedures (SOP) and training materials are formulated.

#### PDM1

1-1. Annual budget for NRW reduction is secured in the pilot project areas.

1-2. The strategic implementation (rolling-out) plan for NRW reduction is approved by the executive board of SIWA.

2-1. A manual for NRW reduction measures is revised.

2-2. The number of pipe repairs is increased in the pilot project areas.

2-3. The number of authorizations and disconnections of illegal connections is increased in the pilot project areas.

2-4. The number of new service connections and replacement of malfunctioning customer meters is increased in the pilot project areas.

3-1. Standard of procedures (SOP) and training materials are formulated.

## 5. Summary of Activities

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### Output-3

#### PDM2

- Creation of LCZ & DMA
- Carry out base line data activities for NRW
- Conduct counter measure activities for NRW Reduction
- Provide Training OJT.

### Output-4

- Meter reading schedules & Reporting & Training
- PR awareness on Tariff, water usages and reporting
- Monitoring Meter reading and billing

## 5. Summary of Activities

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### Output-1

#### PDM2

- Establish Management team in SW
- Review current practises of NRW Reduction
- Hydraulic Analysis Network Distribution
- Formulate plan for Selected DMA
- Monitor NRW reduction activities in Pilot sites & LCZ
- Analysis of NRW cost & Benefit of NRW reduction activities.
- Create a roll out plan for whole of Honiara.

### Output-2

- Establish Action Team in SW
- Managed and Monitor flow meter at water sources.
- Conduct training for NRW Action team

### Key Points changed on PDM2

- Numerical verifiable indicators for Overall Goal was indicated.
- Numerical narrative summary and verifiable indicators for Project Purpose were indicated.
- Assistance in the definition and creation of LCZs and DMAs was added.
- NRW reduction activities including water pressure management to be conducted in DMAs were added.
- Advice for the improvement of pipe system design was added.

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