S13.1-3 PRESENTATION MATERIAL OF 3RD JCC

PROJECT PROGRESS: 15 pilot projects and DMAs, AND Issues and Challenges.

3rd JCC Meeting
Date: 19 March 2015
Venue: Solomon Water Conference Room

Contents

- Achievements of the Projects in the 15 pilot areas.
- DMA Progress
- Issues Encountered when Implementing the Non Revenue Water Measures.

Achievement of Project Purpose - 15 Pilot Areas

- **Overall Goal:** SW's Service level are improved and SWs Revenue is Increase.
- **Project Purpose**: SW is assisted to achieve its target of reducing the NRW ratio in Honiara to 30% by 2015
  - **Indicator 1**: The NRW ratio is reduced by 30 points in each pilot project area, selected DMAs and/or LCZs
  - **Indicator 2** : Regarding the pilot project areas, selected DMAs, and/or LCZs where the NRW ratio before the implementation of NRW reduction measures are less than 30%, the NRW reduction measures are implemented in accordance with features of each area and/or zone, so that effectiveness of the NRW reduction measures are validated.

- All Pilot Areas achieved NRW reduction point of **30 points**.
- Lengakiki and Tuvaruhu 1 went through additional countermeasure to achieve 30 points reduction.
- Mbaranamba Case: NRW ratio before countermeasure was already less then 30 points.
- NRW reduction measure was implemented to satisfied indicator 2.

Output 1 – Planning process of SW for NRW Reduction is Systemized

- Indicator 1-1: Annual Budget for NRW is secured in the pilot project areas and LCZs.
  - Total Cost incurred by NRW in the 15 Pilot Areas is **SBD2.23 Million**.
    - Equate to SBD 148,800 per pilot area, or
    - SBD 152,500 per 100 household
    - SBD 100,400 per km of pipe (total pipe length of pilot area approx. 22km)
  - If converted to whole Honiara City (total pipe length approx. 178km), the total estimated cost is **SBD 17.87 M** in today's value.

- **Indicator 1-2: The strategic Implementation (rolling-out) plan for NRW reduction of approved by management of SW**
- Based on the result of the 15 pilot project, the preparation of rolling-out plan has commenced.

Increase in Revenue Water Volume as a result of NRW Reduction Activities in 15 Pilot Areas

- Total Revenue Water **before** NRW Reduction Activities is **1420.6 m3/day**
- Total Revenue Water **after** NRW Reduction Activities has increased to **2,845.4 m3/day**
- Daily increase of Revenue Water as a result of the Project is **1,424.8 m3/day**
- **Converting to Monetary Value**
  - Honiara's unit water supply price (not tariff price) is SBD 16.89/m3
  - The total annual revenue by the NRW Reduction is SBD 8.78 M
  - Annual Benefit by the NRW reduction is **SBD 6.55 M** (Total annual Revenue – Total cost incurred)

Output 2- The procedure for NRW reduction is established through the pilot areas and LCZs

- **Indicator 2-1: A manual for NRW reduction measures is prepared**
  - This manual will consist of 3 components; NRW Reduction Measures; Leakage Detection Techniques; and Update of Database.
  - Manual will be prepared to include forms that are already in use during Phase 4 (Apr 2015-Oct 2015)

- **Indicator 2-2: The number of authorizations and disconnections of illegal connections is increased in the pilot project areas and LCZs.**
- 140 Illegal connection found in 15 pilot areas (**See Table 5**). That is **9.6% of total HH**.
- As a result of project, 38 illegals converted to valid customers (27.1%).
- 102(**72.9%) was disconnected.**

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

Newly Connected Households

- Out of total HH (1464) in Pilot project area, 268 is unconnected. (Not connected to SW service line) =**18.3%** (See table 6)
- As result of the Project, 31 HH (11.6%)connected to SW service. **88.4% remained unconnected**

Installation of Customer Meters

(See Table 7)

- The Project installed 974 brand new meters to customers within Pilot areas from 1000 meters procured by JICA
  - **378 meters to unmetered customers**
  - **596 meters to replace faulty meters**.

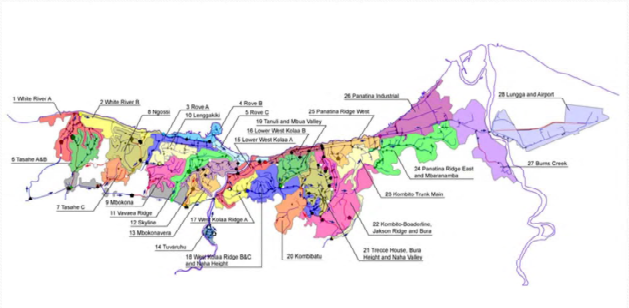
Output 3- NRW reduction is implemented in accordance with the procedure in pilot area and/or LCZ

- **Indicator 3-1: The number of pipe repairs is increased in the pilot project areas and LCZs**
  - Total of 191 leaks detected in Pilot areas and all of them fixed.
  - Before Project, rate of leak repair is 46 per month for whole Honiara (baseline).

Output 4- Water meter reading and billing process management are improved.

- **Indicator 4-1: Standard operating procedures (SOP) and training materials are formulated.**
  - Initial SOP for meter reading and billing system prepared in April 2013
  - This will be revised to include lessons learned through routine work.

Demarcation of DMAs- Honiara



District-Metered Area(DMA)

- Definition.
  - Its an isolated Metering Area where the Total flow into and out of the area is Monitored for DMA Management

Total No. Of DMA

- Twenty Eight(28) DMA
  - Six (6)DMA with Pressure Management.
  - Twenty two(22) DMA with out Pressure Management.

DMAs- in Progress

- Two DMAs
  - Tasahe A & B- With Pressure Control
  - West Kola ridge A- with Out Pressure Control

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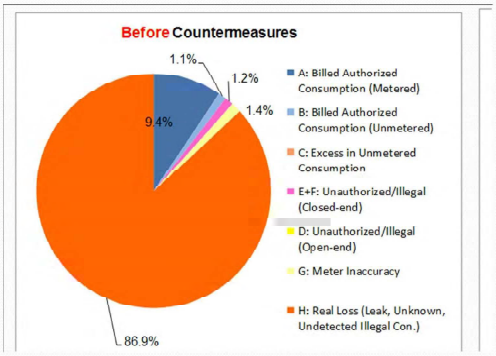
Base Line Data – Tasahe A & B



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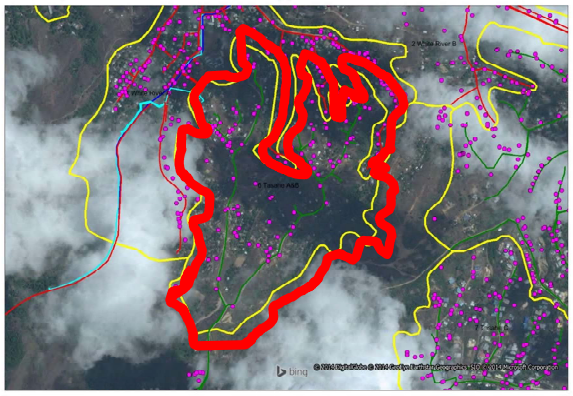
Example of a DMA Setting- Tasahe A & B



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DMA- West Kola ridge A

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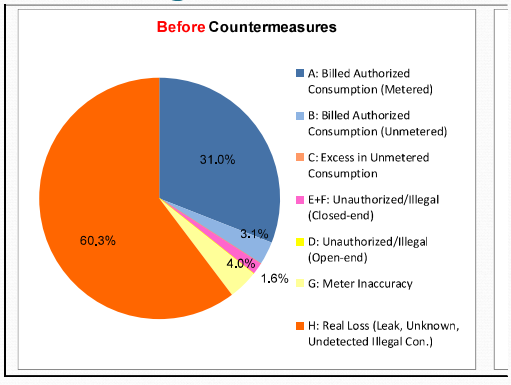
West Kolaridge A – NRW Base Line



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Issues and Challenges- cont.

Leakages Detections and effective Use of Equipments.

- Most pilot projects & DMA leakages detected by Visual checks and hence pipe routes deep cover with vegetations and hilly terrains.

Remedial.

Effective use of Leakages Detection in areas in town DMAs.(Listening Acoustic Mechanical & electronic & Correlator)

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Issues & Challenges

Legalisation of Illegal Connections & New Services and Reconnection & Decrease in Customers – Pilot sites.

- Less customers legalised – 27.1% legalised
- Only 11.6 % of 268 Create new accounts or Reconnected
- 8.4% of the total customers were disconnected in the 15 Pilot.

Remedial.

- Awareness of water Tarrif frequent increase to customers
- Use of beneficiary pay principles.
- User pay policy(pay first before delivery of service)

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Issues and Challenges- cont.

NRW Reduction in DMAs and DMA Management.

We have 28 DMA for NRW Reductions

- Challenges is DMA Management
  - Monitoring
  - Maintenance
- Process was not completed and the gap need to be closed to maintain the NRW reduction- Sustainability.
- Remedial.
  - Reorganisation of the Operations &(Finances & Customer Service Team) to do Monitoring and Maintenance of DMA.
  - JICA /DFAT to continue the support for - DMA Management

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S13.1-4 PRESENTATION MATERIAL OF 4TH JCC

The Project for Improvement of NRW Reduction Capacity for SW

4th JCC

(Project Briefing)

26 August 2015

Contents

- Brief of the Project
- Collaboration between Two-Year Plan and JICA Project
- Framework of the Project
- Project Design (1) to (3)
- Trend of NRW Ratio and Other Factors in the Whole Honiara

Brief of the Project

Counterpart: Solomon Water

Project Period: November 2012 to November 2015

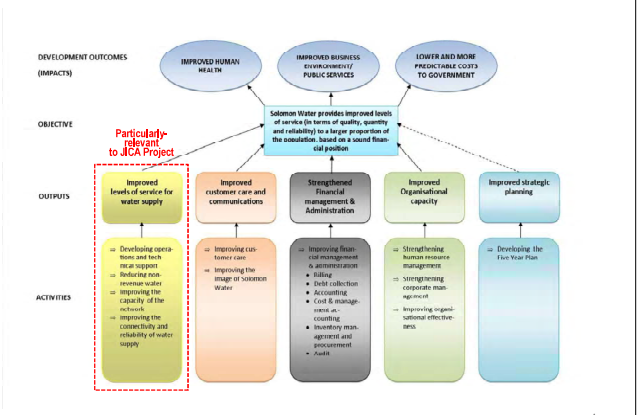
Collaboration: Two-year Plan of SW sponsored by DFAT

Joint Coordinating Committee (JCC)

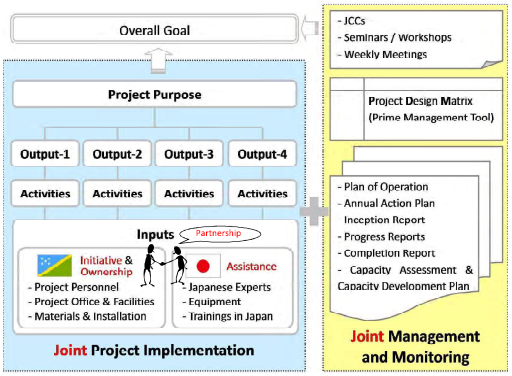
Roles and Responsibilities
- Coordination between Solomon Islands and Japan
- Deliberation of major issues and provision of advice
- Monitoring and evaluation of the Project

Previous/Scheduled JCCs
- 1st JCC Meeting on 24 April 2013
- 2nd JCC Meeting on 27 November 2013
- 3rd JCC Meeting on 19 March 2015
- 4th JCC Meeting on 26 August 2015 (Terminal Evaluation)

Collaboration between Two-Year Plan and JICA Project



Framework of the Project



Project Design (1)

Overall Goal

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

- Objectively Verifiable Indicators:
  - The NRW ratio in Honiara City is reduced to 20% by 2018.
  - Ratio of operational revenue-to-expenditure is sustained at greater than 100%.

Project Purpose

SW is assisted to achieve its target of reducing the NRW ratio in Honiara to 30% by 2015.

- Objectively Verifiable Indicators:
  - The NRW ratio is reduced by 30 points in each pilot project area, selected DMAs and/or LCZs.
  - Regarding the pilot project areas, selected DMAs, and/or LCZs where the NRW ratio before the implementation of NRW reduction measures are less than 30%, the NRW reduction measures are implemented in accordance with features of each area and/or zone, so that effectiveness of the NRW reduction measures are validated.

Project Design (2)

Outputs

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.

Project Design (3)

Inputs

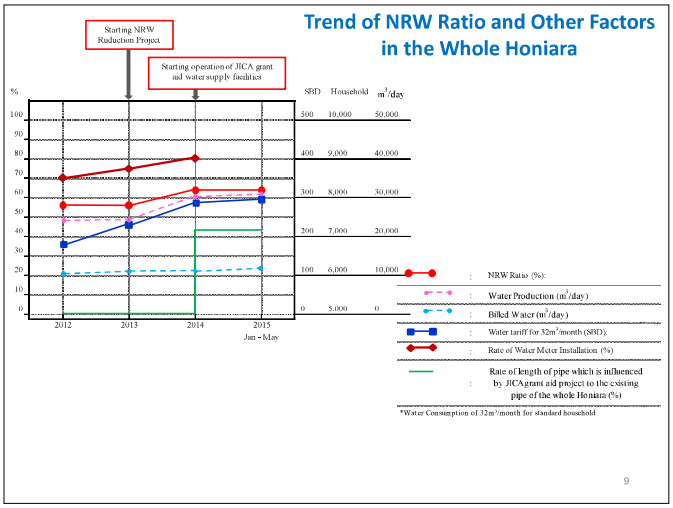
Solomon Islands side

- **Personnel**: 25 members (NRW Management Team: 5, NRW Action Team: 20)
- **Project office and facilities** for the project implementation, including office furniture, electricity and communication equipment
- **Pipes, fittings and other materials** for NRW reduction measures such as repair and meter installation
- **Installation** of flow meters and customer meters, and repair works

Japanese side

- **Expert**: 8 experts
- **Equipment**: bulk flow meters, sluice valves for isolation, ultrasonic flow meters, data loggers, leakage detection equipment, GPSs, office automation equipment, customer meters, pickup trucks, an excavator and etc.
- **Training in Japan**: 3 times for 12 trainees in total (April and October 2013, and June 2014), and also group trainings

Trend of NRW Ratio and Other Factors in the Whole Honiara



*Water Consumption of 32m³/month for standard household

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NRW BRIEF ON DMA PROGRESS- ISSUES AND CHANLLENGES .

Date: 15TH February 2015

Venue: Solomon Water Conference Room

Project Structure

Joint Coordinating Committee (JCC)

[Chairperson] : Project Director / SW General Manager

[Solomon Islands Side]
- Project Manager / SW Operation &Technical Manager
- SW Finance & Administration Manager
- SW Human Resources Manager
- SW Service Delivery and Communications Manager
- Representative of SW Board
- Representative of MMERE

[Japanese Side]
- JICA Expert Team
- JICA Solomon Islands Office
- Mission and others from JICA Headquarter
- Representative of Embassy of Japan (Observer)

[Donors]
- Representative of DFAT of Australian Gov.
- Representative of SPC

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 members

[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

Contents

- Achievements
- Findings
- Acceleration of DMA creation
- Organisational Reform for DMA

1. Background – Information

NRW Team with the JICA Counter Part :

1. Did 15 pilot projects for NRW Reduction – Capacity Building for the Task Force Team Members
2. Manuals Leakage and NRW Reductions and SOP for Meter reading and Billing.
3. Developed a strategic Plan for Roll Out of NRW activities for whole of Honiara
4. Project Design Matrix (PDM4)- Indicators
5. Creation of the 28 DMA and Pressure Management Areas(2yp).
6. Currently we completed 4 DMA and Monitored on adhoc bases

2. Achievements Reduction Point of NRW Ratio – 4 DMA

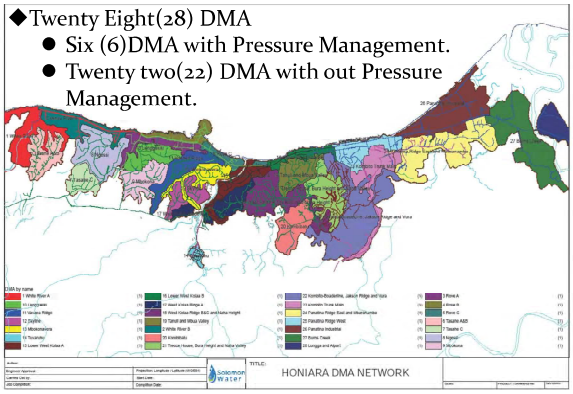
1. Pilot 15 pilots we achieved 30 Point Reductions
2. Two DMA -one for Pressure Management and on Non -Pressure Management – Under JICA Project -30 Points Reduction Achieved.
3. Two other DMA for Non Pressure SW Team NRW Practices.

Selection of DMA

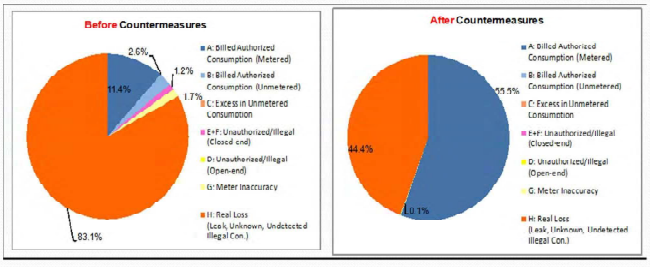
- Based on Network Configuration that maximise water supply. Longer network tends to decrease efficiency in water supply- determined based on current knowledge and modelling.
- Possible to Isolate
- Terrain
- As much as possible limit cascading areas to easily manage.

Demarcation of DMAs- Honiara

- Twenty Eight(28) DMA
  - Six (6)DMA with Pressure Management.
  - Twenty two(22) DMA with out Pressure Management.

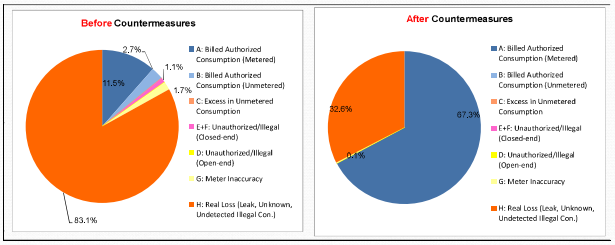


Base Line Data and Counter measures – Tasahe A & B

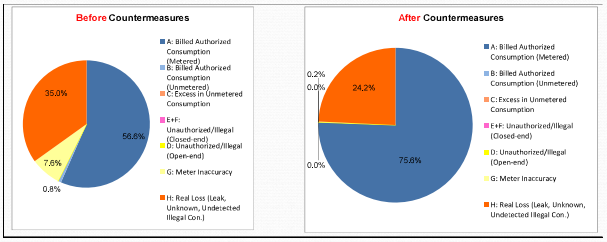


Pressure Control has not been done yet.

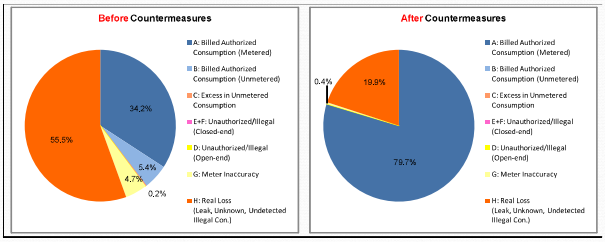
Base Line Data and Counter measures – Tasahe A & B



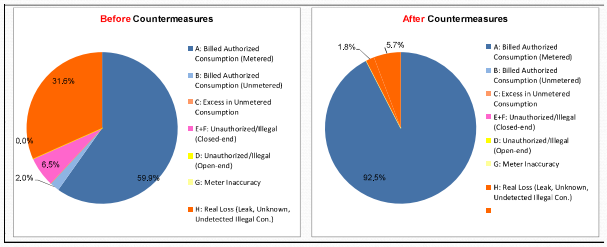
Lengakiki DMA before and After Counter Measures .



West Kolaridge A – before and After counter measures

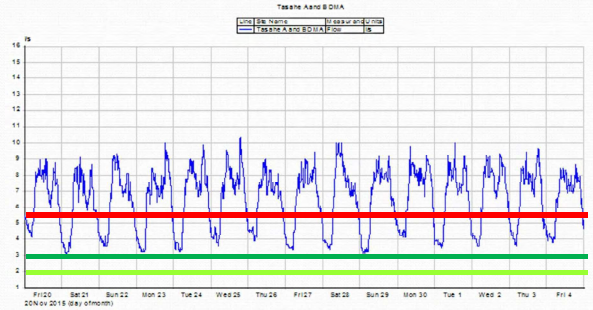


Tasahe C DMA Before and After Counter Measures



NRW Monitoring of DMA Performance

- Using MNF data for daily & Week Checks.



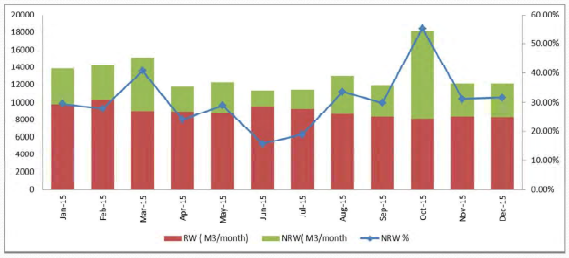
3. Acceleration of DMA

We have 28 DMAs for NRW Reductions

- Challenges are DMA Management
  - Monitoring
  - Maintenance
- Remedy.
  - Reorganisation of the Operations &(Finances & Customer Service Team) to do Monitoring and Maintenance of DMA.
  - JICA /DFAT to continue support for - DMA Management
  - In-built NRW reduction team with clear job description.
  - NRW reduction team scope of work will include implementation of NRW reduction activities, monitoring of customers and network systematically, performance of other monitoring work upon requests from customer care and service connections.

NRW Monitoring – Performance Cont..

- Measure NRW on Monthly Bases- Lengakiki DMA



Organisational Reform for DMA Monitioring

- Background
  - New Approaches by DMA Management (Monitoring and Maintenance).
  - Reform Operations Department to target NRW Reduction and Management in DMA
  - Currently we are formulating Six teams to target Six DMA at Once.

4. Issues Slowing progress of NRW Reductions in DMA

- Procurement of necessary fittings for DMA installation of Flow Meters and Metering .
- Construction of Chambers for Flow meters and PRV
- A Dedicated Monitoring and Maintenance of the Completed DMA.
- Illegal connections and disconnections.

DMA for 2016

- 12 DMAS according to schedule.

Current DMAs

- Skyline DMA
- Mbokona DMA
- Vavaya Ridge DMA
- Naha Sub-DMA
- Mbokona Vera DMA
- Ngossi DMA

Plan for this this Year 2016

	DMAs	Estimated Cost (SBD)
6	No.21 Treece House, Bura Height and Naha Valley	(952,674)
7	No.13 Mbokonavera	(688,680)
8	No.12 Skyline	(413,208)
9	No.11 Vavaea Ridge	(638,912)
10	No.9 Mbokona	(587,291)
	Sub total cost from 2014 to 2015	**(5,673,958)**
11	No.18 West Kolaa Ridge B&C and Naha Height	1,230,059
12	No.23 Kombito Trunk Main	373,035
13	No.2 White River B	690,593
14	No.20 Kombibatu	518,123
15	No.26 Panatina Industrial	594,913
16	No.15 Lower West Kolaa A	705,897
17	No.1 White River A	705,897
18	No.27 Burns Creek	296,515
19	No.28 Lungga and Airport	189,387
20	No.8 Ngossi	642,768
21	No.14 Tuvaruhu	86,085
22	No.19 Tanuli and Mbua Valley	715,162
	Sub total cost for 2016	**6,749,064**

Proposed Plan for Monitoring and Maintenance

- One of the current six teams to become the Monitoring and maintenance team headed by the Taskforce Team Leader. Currently the sixth team is working at Naha Sub-DMA.
- One Team from Network Maintenance will do main pipe lines and hence reservoirs monitoring and maintenance for water loss.

THANK YOU

PROJECT PROGRESS: 15 pilot projects and DMAs, AND Issues and Challenges.

Date: 26th of August 2015

Venue: Solomon Water Conference Room

Contents

- Achievements
- Findings
- Delay in PRV – Related Procurement
- Acceleration of DMA creation
- Organisational Reform for DMA Monitoring and Maintenance

1. Achievements Reduction Point of NRW Ratio

No	Area No	Area Name	NRW Ratio (%)		Reduction Point
			Before	After	
1	No.9	White River- Namo Ruka	86.5	32.2	54.3
2	No.10	Independence Valley	57.7	9.9	47.9
3	No.3	Lenggakiki	62.0	33.2	28.8
		After additional Countermeasures		14.7	47.3
4	No.5	Mbokonavera-1	53.1	14.7	38.5
5	No.14	Tuvaruhu-1	65.4	41.4	24.0
		After additional Countermeasures		11.0	54.4
6	No.15	Tuvaruhu-2	67.2	20.5	46.7
7	No.6	Vavaea Ridge	63.1	27.2	35.8
8	No.4	Mbokona	50.2	19.2	31.0
9	No.8	Mbaranamba	23.2	3.5	19.7
10	No.2	Mbua Valley	50.9	6.8	44.1
11	No.11	Bahai Kukum	58.6	16.2	42.4
12	No.7	Panatina Valley	37.9	6.7	31.2
13	No.12	Naha 2	51.7	15.6	36.1
14	No.13	Naha 3	60.9	25.8	35.1
15	No.1	FFA Kola Road	47.1	14.9	32.2
16	No.6	Tasahe A&B (DMA)	86.0	44.5	41.5
		After Pressure Control		Not-yet	Not-yet
17	No.17	West Kolaa Ridge A (DMA)	60.4	49.7	10.7
		After additional Countermeasures		20.3	40.1

Output 1 – Planning process of SW for NRW Reduction is Systemized

- **Indicator 1-1: Annual Budget for NRW is secured in the pilot project areas and LCZs.**
  - Total Cost incurred by NRW in the 15 Pilot Areas is **SBD2.23 Million**.
    - Equate to SBD 148,800 per pilot area, or
    - SBD 152,500 per 100 household
    - SBD 100,400 per km of pipe (total pipe length of pilot area approx. 22km)
  - If converted to whole Honiara City (total distribution & transmission pipe length about 220km), the total estimated cost is **SBD 22.30 Million** in today's value.

Increase in Revenue Water Volume as a result of NRW Reduction Activities in 15 Pilot Areas

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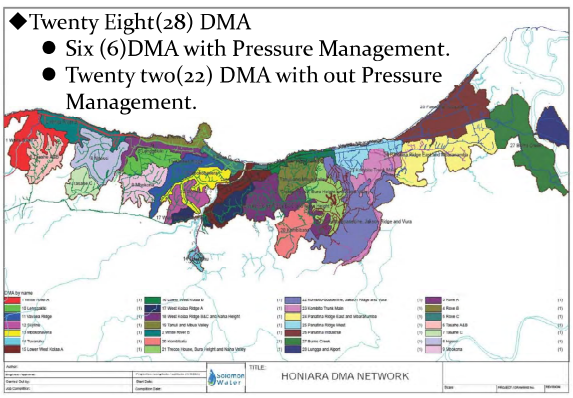
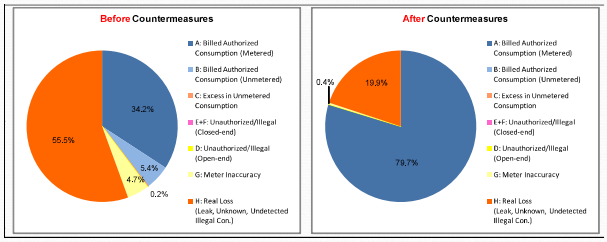
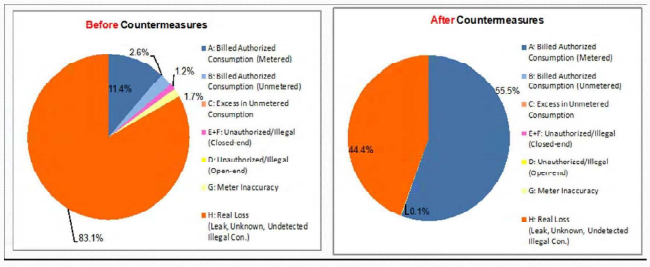


West Kolaridge A – before and After counter measures



Base Line Data and Counter measures – Tasahe A & B



Pressure Control has not been done yet.

2. Finding from Pilot Projects

Legalisation of Illegal Connections & New Services and Reconnection & Decrease in Customers – Pilot sites.
- Less customers legalised – 27.1% legalised
- Only 11.6 % of 268 Create new accounts or Reconnected
- 8.4% of the total customers were disconnected in the 15 Pilot.

Remedial.
- Awareness of water Tarrif frequent increase to customers
- Use of beneficiary pay principles.
- User pay policy(pay first before delivery of service)

3. Delay in PRV – Related Procurement

- Procurement of necessary fittings for DMA has been subjected to unforeseen circumstances therefore it was delayed by months.
- Procurement of PRVs started before June last year by program coordinator under the advice of Hydraulic technical adviser.
- Hydraulic technical adviser and program coordinator resigned in July 2014 and November 2014 respectively. However, without proper handover notes from hydraulic technical adviser, Solomon Water picked up on the procurement in January 2014.

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4. Acceleration of DMA

We have 28 DMAs for NRW Reductions

- Challenges are DMA Management
  - Monitoring
  - Maintenance
- Remedy.
  - Reorganisation of the Operations &(Finances & Customer Service Team) to do Monitoring and Maintenance of DMA.
  - JICA /DFAT to continue support for - DMA Management
  - In-built NRW reduction team will clarify job description.
  - NRW reduction team will flexibly work on not only their original work but also other monitoring required on behalf of customer care & service division.

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Organisational Reform for DMA Monitioring

- Background
  - New Approaches by DMA Management (Monitoring and Maintenance).
  - Reform Operations Department to target NRW Reduction and Management in DMA
  - Currently we are formulating Six teams to target Six DMA at Once.

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Project Design Matrix (PDM_4)

Project Title: The Project for Improvement of Non-Revenue Water Reduction Capacity for Solomon Islands Water Authority in Solomon Islands **Version 15**

Target Area: Honiara City **Target Group: SW Staff** **Project Period: October 2012 to June 2016 (3 years and 9 months)** **Date: 30 October 2015**

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal SW's service levels are improved and SW's revenue is increased. (*1)	1. NRW reduction activities are carried on by Task Force composed of relevant Departments or Units.	1. SW Annual Operation Report	
Project Purpose SW is assisted to achieve its target of reducing the NRW ratio in Honiara to 30% by 2015. (*2)	1. The NRW ratio is reduced by 30 points in each pilot project area, selected DMAs and/or LCZs. (*3) 2. Regarding the pilot project areas, selected DMAs, and/or LCZs where the NRW ratio before the implementation of NRW reduction measures are less than 30%, the NRW reduction measures are implemented in accordance with features of each area and/or zone, so that effectiveness of the NRW reduction measures are validated.	1. Project Reports 2. Project Reports	
Outputs			
1. Planning process of SW for NRW reduction is systematized.	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 and reviewed as when it is necessary by management of SW.	1-1. Annual Budget Plans 1-2. Strategic implementation (rolling-out) plan for NRW reduction	Budgetary and human resources necessary for stable water supply are continuously allocated by SW. SW staff trained by the Project continue to work in their respective positions. Natural disasters do not give a profound effect to the project activities.
2. The procedure for NRW reduction is established through the pilot areas and LCZs.	2-1. Manuals for NRW reduction measures are prepared and revised as when it is necessary, including workflow of DMA-based monitoring and maintenance for inproved NRW ratio. 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.	2-1. Project Reports 2-2. Project Reports 2-3. Project Reports	
3. NRW reduction is implemented in accordance with the procecure in pilot areas and/or LCZs in the selected DMAs, and then inproved NRW ratio is monitored and maintained.	3-1. The number of pipe repairs is increased in the pilot project areas and LCZs. 3-2. Data and records of DMA-based monitoring and maintenance for improved NRW raio are accumulated to sustain NRW reduction activities in the selected DMA.	3-1. Project Reports 3-2. Project Reports	
4. Water meter reading and billing process management are improved.	4-1. Standard operating procedures (SOP) and training materials are formulated.	4-1. Project Reports	

Activities

1-1. Establish the NRW Management Team in SW.
1-2. Review the current NRW reduction activities done by SW.
1-3. Assist in hydraulic analysis including identification of problems in the existing network.
1-4. Select pilot project areas and DMAs.
1-5. Formulate an annual action plan on NRW reduction in the pilot project areas and LCZs.
1-6. Monitor the progress of NRW reduction activities in the pilot project areas and LCZs.
1-7. Analyze cost-effectiveness of NRW reduction activities.
1-8. Prepare strategic implementation (rolling-out) plan for NRW reduction in the whole Honiara City.
1-9. Feedback the results of DMA-based NRW reduction activities, including monitoring and maintenance for improved NRW ratio, to strategic implementation (rolling-out) plan, and then provide assistance in review of the plan as when it is necessary.

2-1. Establish the NRW Action Team in SW.
2-2. Check existing flow meters and replace the malfunctioning meters with new ones at all the water sources.
2-3. Conduct training on NRW reduction for the NRW Action Team.
2-4. Provide assistance in the preparation of workflow for DMA-based monitoring and maintenance for improved NRW ratio, based on action criteria such as NRW ratio and DMA's features.
2-5. Feedback the results of DMA-based NRW reduction activities, including monitoring and maintenance for improved NRW ratio, to manuals, and then provide assistance in review of the manuals as when it is necessary.

3-1. Provide assistance in the definition and creation of discrete DMA's and their boundaries.
3-2. Provide assistance in the creation of LCZ within the DMAs.
3-3. Update existing water distribution network drawings by using GIS in the pilot project areas and DMAs.
3-4. Install necessary valves for isolation of the pilot project areas and DMAs, install flow meters, and measure the NRW ratio before implementation of the pilot project.
3-5. Identify the causes of NRW (water leakage, illegal connections and meter-related losses) in the pilot project areas and DMAs through the OJT.
3-6. Implement NRW reduction measures such as legalization of users, leakage detection, leakage repair, water meter installation and optimization of water pressure in the pilot project areas and DMAs, and measure the NRW ratio after implementation of the pilot projects .
3-7. Prepare reports of results including cost and benefit.
3-8. Provide advice for the improvement of pipe system design, installation and network operation.
3-9. Convene the workshops to share the experiences, outcomes and etc. of the pilot projects.
3-10. Provide capacity development and training using the DMA's and LCZ's as the basis for NRW reduction activities.
3-11. Provide technical assistance in DMA-based monitoring and maintenance for improved NRW ratio after initial NRW reduction activities.

4-1. Formulate the work schedule and staff assignment plan for water meter readers.
4-2. Conduct training on water meter reading and reporting methods for anomalies and illegal connections for water meter readers.
4-3. Promote PR activities on water conservation and saving, and water tariff for the customers.
4-4. Monitor the water meter reading and billing activities.
4-5. Report the monitoring results, such as anomalies and illegal connections, to the responsible sections.

Inputs

Solomon Islands Side

1. Personnel
   - Project Director
   - Project Manager
   - NRW Management Team (5 members)
   - NRW Action Team (19 members)
     Technical Sub-Team (8 members)
     Customer Services Sub-Team (6 members)
     GIS Sub-Team (2 members)
     Leakage Detection Sub-Team (3 members)
2. Creation of discrete DMAs
3. Provision of the project offices and facilities necessary for the project implementation
4. Expenses for implementing pilot projects in Honiara City:
   - Provide the necessary valves, meters, pipes fittings and other materials.
   - Provide labor to implement the project including PR resources.
   - Provide management support to facilitate successful implementation of the pilot project
5. Administrative and operational expenses
   - Electricity, water, communication, etc.
   - Local traveling costs and daily subsistence allowance (DSA) for counterpart personnel
   - Others as necessary

Japanese Side

1. Expert
   - Leader / Water Supply Planning, Operation and Management
   - Deputy Leader / NRW Reduction Measures -1
   - NRW Reduction Measures -2
   - Leakage Detection Technology
   - GIS
   - Customer Services & Public Relations
   - Coordinator
   - GIS Adviser

Japanese Side (continued)

2. Training of counterpart personnel in Japan
3. Provision of machinery and equipment
   <Equipment by JICA Expert Team>
   - Ultrasonic flow meter
   - Data logger
   - Water leak detector (Leak noise correlator)
   - Water leak detector (Acoustic type)
   - Metal locator
   - Non-metal pipe locator
   - Distance meter
   - Hammer drill
   - Drill bits
   - Boring bar
   - Generator
   - Acoustic rods
   - Residual chlorine analyzer
   - Bulk flow meters
   - Sluice valves (To isolate pilot areas)
   - Test meter
   - Handy Terminals (Data recorder of meter reading)
   - GPSs
   - Personal computers
   - Plotter
   - Printer
   - Multifunction copier

   <Equipment by JICA offices>
   - Small-size excavator
   - Pick-up trucks
   - Data loggers
   - Customer meters
4. Local expenses for the project activities
   - Teaching materials for training and workshops
   - Others

Precondition

Note: Pilot Project includes NRW reduction activities not only in Pilot Area but also in DMAs.

(*1) SW is the abbreviation of Solomon Water Islands Authority. Previously, abbreviation was SIWA. (*2) Indicators are based on SW's Two-year plan (2013-2015) target. (*3) DMA is the abbreviation of District Metered Area, and LCZ is the abbreviation of Leakage Control Zone.