S13.3-24 WORKSHOP (HYDRAULIC ANALYSIS OF DMAS IN HONIARA)

Hydraulic Analysis of DMAs in Honiara

Purpose .

To Identify specific location which to Installed PRV Devices in Selected DMA with Pressure control and also to determine the sizes of the PRV .

Also to give raise to concerning about the existing pipe capacity which might give Negative Pressure to parts of the DMAs.

1

Section of Supply Network

Process of idenitfy of pipe Network- for each DMA.

- A tentative DMA is selected base on the Network configuration and polygon was drawing to identify it as one DMA.
- The isolated DMA with its network was exported to water Gem with all its characteristics and Elevation (from Contours)Profile for Network Modelling.

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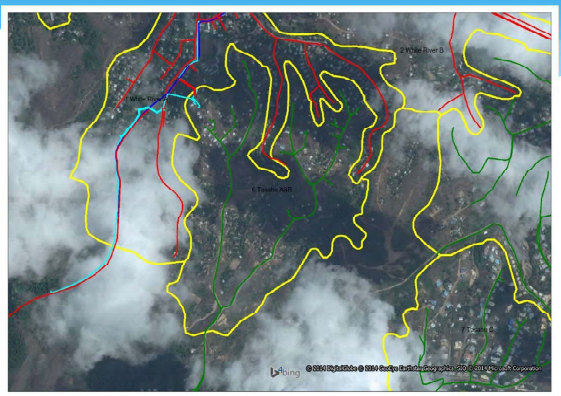
Polygon Boundary isolating a Supply Zone



Process of Acquiring of Consumption Data

- All customers in each DMA have their co-ordinates been taken and can be feature in the GIS System.
- Imported consumption data(1 year) from NCS and average taken for each customer meter in the DMA to provide bases for DMA water Demand projection
- This can take a day to compile and pass it to Hydraulic Engineer for Analysis (for at least 2 DMA)

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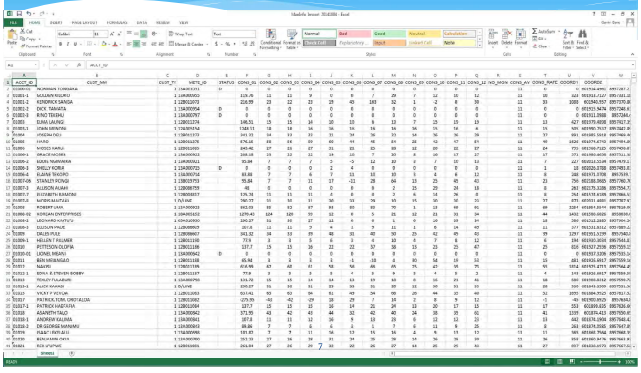
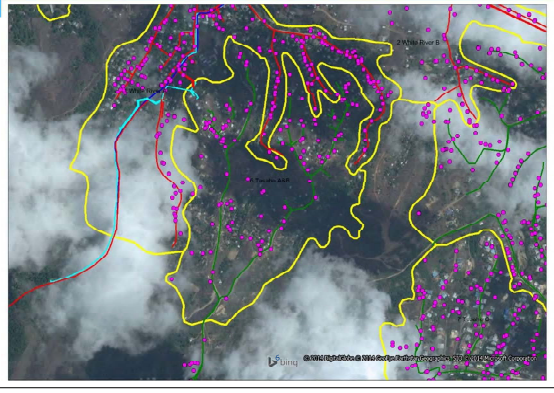
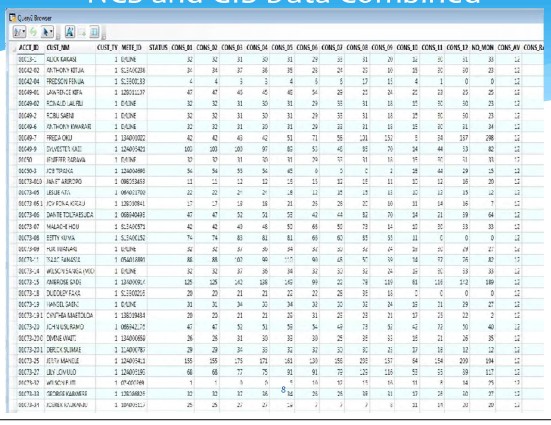
Imported Data from NCS



Customers within a Supply Zone



NCS and GIS Data Combined



Hydraulic Analysis of the existing distribution and Examination for PRV Specification

- Examination Process
- Water Demand Projection regarding DMAs with Pressure Control
- Clarification of Water flowing System for DMAs with Pressure Control
- Water Demand Allocation
- Development of Network Model and Analysis
- Specifying Location of PRVs
- Summary of PRVs and Bulk Flow Meters to be installed in DMAs with Pressure Control

Examination Process

1) Water Demand Projection regarding DMAs with Pressure Control

2) Clarification of Water flowing System for DMAs with Pressure Control

3) Water Demand Allocation

4) Development of Network Model and Analysis

5) Specifying Location of PRVs

Water Demand Projection regarding DMAs with Pressure Control

- The following are the design criteria for water demand projection:
  - Estimating based on the billed water consumption in the past one year.
  - In addition to the above billed water consumption, considering the number of illegal connections based on experienced results of pilot project as this will affect the flow quantity and hence Available Heads(effective Pressure)
  - Applying growth rate of 3.1% based on Master Plan (2006) for water demand for the next five years.
  - Applying 30% of NRW ratio based on overall goal shown in PDM.
  - Applying 0.6* and 1.4 of low and peak hourly factor respectively
  - * Factor of 0.6 was applied for verification of a flow range of PRVs.

Water Demand Projection regarding DMAs with Pressure Control

I. Calculation Statement of Water Demand in DMAs with assumed Pressure Control (NRW Ratio: 30%) — Attachment-1

DMAs with Pressure Control	Actual Average Customer Consumption in Oct. 2013 to Sep. 2014 (m^3/month)	Daily Water Consumption Rate (LCD)	Ratio of Illegal Connection (%)	Assumed Water Consumption of the Total existing Households (m^3/month)	Predicted Water Consumption after Five Years*1	NRW Ratio for Future (%)	Predicted Water Demand (m^3/month)	Predicted Water Demand (m^3/day)	Range of Flow Rate (m^3/hr) Min. (x0.6)	Range of Flow Rate (m^3/hr) Max. (x1.4)	Remarks (Estimated Water Demand (m^3/day) based on Number of Customers)
	a)	-	b)	c)=a)/((100-b)/100)	d)=c)x(1+0.031)^5	e)	f)=d)/((100-e))/100	g)=f)/30	h)=g)x 0.6/24	i)=g)x 1.4/24	
No.6 Tasahe A&B	3,991	172	20	4,989	5,812	30	8,303	277	6.9	16.2	212
No.8 Ngossi	13,118	195	10	14,576	16,980	30	24,257	809	20.2	47.2	624
No. 9 Mbokona	12,548	191	5	13,208	15,386	30	21,980	733	18.3	42.8	604
No.11 Vavaca Ridge	12,981	192	10	14,423	16,802	30	24,003	800	20.0	46.7	907
No.13 Mbokonavera	12,971	178	10	14,412	16,789	30	23,983	799	20.0	46.6	669
No.19 Tamili & Mbua Valley	11,468	151	10	12,742	14,843	30	21,204	707	17.7	41.2	698
No.22 Kombito Bouderiline, Jakson Ridge & Bara	13,003	132	20	16,251	18,931	30	27,044	901	22.5	52.6	907
Total	80,078	173		90,601	105,543		150,775	5,026	126	293	4,622

Note: *1: Suject to the constant daily water consumption rate, annual population growth rate of 3.1% was tentatively applied for future water consumption.

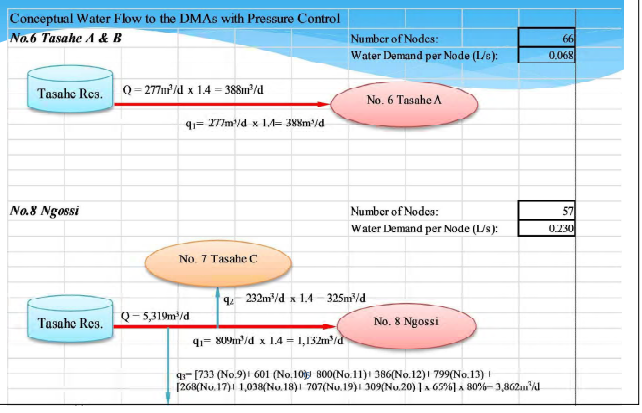
Water Demand Projection regarding DMAs without Pressure Control

Calculation Statement of Water Demand in DMAs without Pressure Control related to DMAs with Pressure Control (NRW Ratio: 30%) — Attachment-1

DMAs with Pressure Control	Number of Customers in DMAs with Pressure Control in Aug. 2014	Actual Average Customer Consumption in Oct. 2013 to Sep. 2014 (m^3/month)	Daily Water Consumption Rate (LCD)	Ratio of Illegal Connection (%)	Assumed Water Consumption of the Total existing Households (m^3/month)	Predicted Water Consumption after Five Years*1	NRW Ratio for Future (%)	Predicted Water Demand (m^3/month)	Predicted Water Demand (m^3/day)	Range of Flow Rate (m^3/hr) Min. (x0.6)	Range of Flow Rate (m^3/hr) Max. (x1.4)	Remarks (Estimated Water Demand (m^3/day) based on Number of Customers)
		a)	-	b)	c)=a)/((100-b)/100)	d)=c)x(1+0.031)^5	e)	f)=d)/((100-e))/100	g)=f)/30	h)=g)x 0.6/24	i)=g)x 1.4/24	
No. 7 Tasahe C	176	3,768	122	10	4,187	4,877	30	6,967	232	5.8	13.5	-
No.10 Longgakiki	208	9,743	208	10	10,826	12,611	30	18,016	601	15.0	35.1	-
No.12 Skyline	175	5,564	143	20	6,955	8,103	30	11,574	386	9.7	22.5	-
No.17 West Kolna Ridge A	153	5,872	113	20	7,340	8,550	30	12,214	407	10.2	23.8	-
No.18 West Kolna Ridge B & C and Jubu Height	514	14,964	129	20	18,705	21,790	30	31,129	1,038	26.0	60.6	-
No.20 Kombitatu	315	4,454	96	20	5,568	6,486	30	9,266	309	7.7	18.0	-
No.21 Treeee House, Bara Height and Jubu Valley	448	11,625	115	10	12,917	15,047	30	21,496	717	17.9	41.8	-
Total	1,849	53,988	132		63,995	74,548		106,497	3,551	89	207	-

Note: *1: Suject to the constant daily water consumption rate, annual population growth rate of 3.1% was tentatively applied for future water consumption.

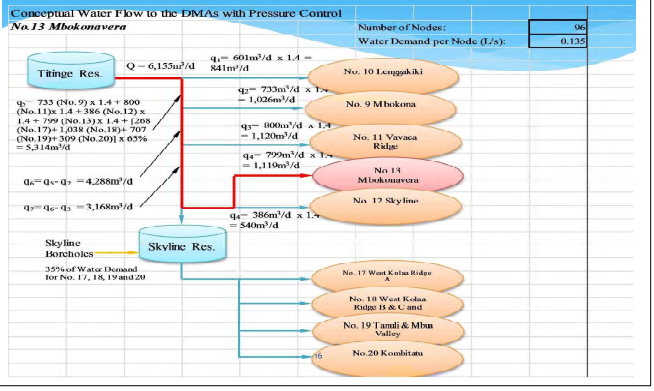
Clarification of Water flowing System for DMAs with Pressure Control



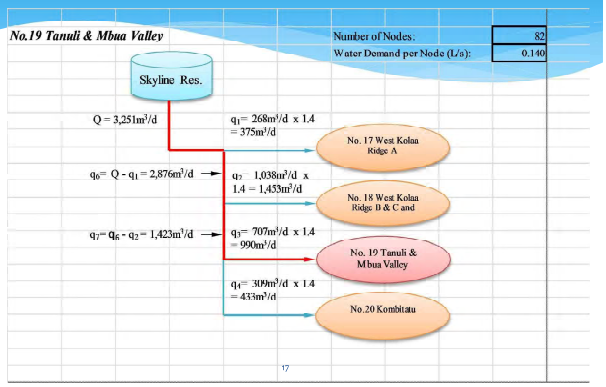
Clarification of Water flowing System for DMAs with Pressure Control

- In order to analyze distribution network of DMAs with pressure control, conceptual diagrams of water flowing system is illustrated in **Attachment-2**.
- Peak hourly factor of 1.4 is applied for hydraulic analysis of distribution network but not that of transmission lines.

System for DMAs with Pressure Control



Clarification of Water flowing System for DMAs with Pressure Control



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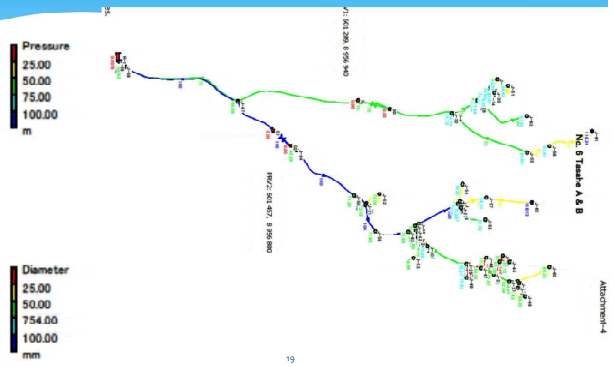
Water Demand Allocation



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Water Demand Allocation

- Water demand is allocated at each node experientially. Water demand per node for all is constant in a particular DMA but water demand per node depends on water consumed in each DMA .
- Nodes are created by Water Gems as Network was imported from GIS and then Verified by the Hydraulic Engineer with Consultation with the Network Engineer

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Water Demand Allocation

No. 6 Tasahe A & B
Network Table - Nodes

Node ID	Elevation	Base Demand	Head	Effective Pressure	Static Pressure	Effective Pressure	Static Pressure
	Result of analysis by using WaterGEM					With PRV	
	m	LPS	m	m	m	m	m
June J-1	55	0.068	114.4	59.28	97	42.28	60
June J-2	55	0.068	114.58	59.47	97	42.47	60
June J-3	50	0.068	114.55	64.42	102	47.42	65
June J-4	50	0.068	114.56	64.43	102	47.43	65
June J-5	72	0.068	148.86	76.70	80	27.7	28
June J-6	72	0.0689	148.85	76.70	80	27.7	28
June J-7	72	0.05	146.66	74.51	80	57.51	43
June J-8	72	0.05	146.65	74.50	80	57.5	43
June J-9	71	0.068	148.8	77.64	81	28.64	29
June J-10	71	0.068	148.8	77.64	81	28.64	29
June J-11	75	0.068	146.77	71.63	77	54.63	40
June J-12	75	0.068	146.77	71.62	77	54.62	40

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Development of Network Model and Analysis

- The existing distribution network drawn in MapInfo is exported to Water GEM for hydraulic analysis. The following are design criteria for hydraulic analysis of the distribution network.
  - Calculation Formula: Hazen-Williams
  - Static head: 70m or less
  - Velocity Coefficient (C) for Galvanized pipe & DI and PVC & polyethylene pipe: 100 and 110 respectively
  - Minimum Residual Pressure: 0.1Mpa at each node (except particular node)
- In the light of reducing pressure with PRVs, some existing pipelines in No.8 Ngossi, No.11 Vavaea Ridge and No.19 Tanuli & Mbua Valley must be replaced with a larger size of pipes because of the encounter of negative pressure.

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Development of Network Model and Analysis-Tasahe A & B

No. 6 Tasahe A & B
Network Table - Links

Link ID	Length	Diameter	Flow	Velocity	Unit Headloss
	m	mm	LPS	m/s	m/km
Pipe p-57	2	20	-0.27	0.87	83.15
Pipe p-38	2	30	-0.14	0.19	3.2
Pipe p-30	3	75	0.75	0.17	0.87
Pipe p-47	3	30	0.1	0.14	1.81
Pipe p-35	3	50	-0.2	0.1	0.56
Pipe p-11	3	100	1.63	0.21	0.9
Pipe p-44	3	30	-0.2	0.29	6.77
Pipe p-41	3	30	0.14	0.19	3.19
Pipe p-43	4	30	0.14	0.19	3.19
Pipe p-26	3	100	1.56	0.2	0.83
Pipe p-48	6	30	-0.14	0.19	3.2
Pipe p-16	6	75	0.2	0.05	0.08
Pipe p-6	8	100	-0.34	0.04	0.05
Pipe p-7	6	100	-0.07	0.01	0
Pipe p-25	7	75	1.49	0.34	3.11
Pipe p-5	8	100	-0.54	0.07	0.12
Pipe p-32	8	50	-0.14	0.07	0.27
Pipe p-36	8	50	-0.14	0.07	0.27
Pipe p-21	8	75	1.16	0.26	1.94

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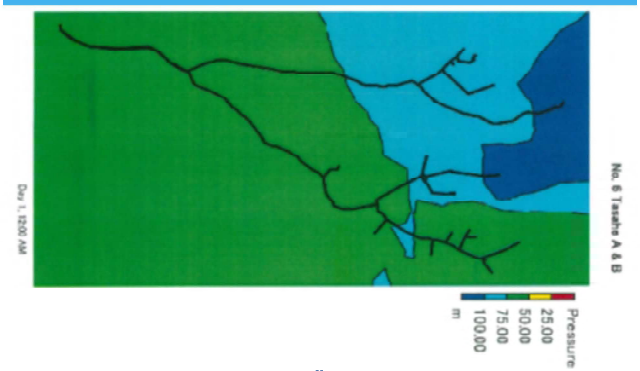
Development of Network Model and Analysis-Tasahe A & B



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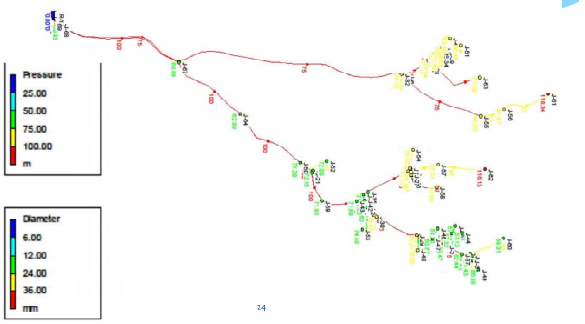
Development of Network Model and Analysis – Tasahe A & B Baseline



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Development of Network Model and Analysis – Tasahe A & B with PRV

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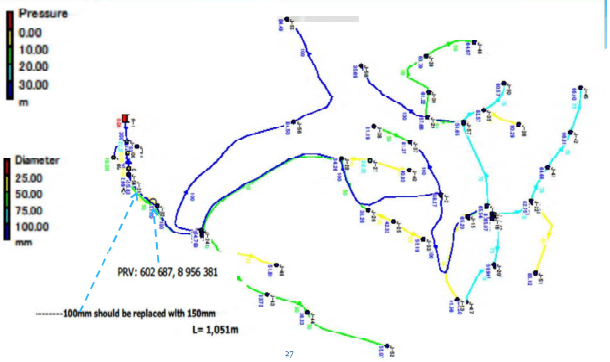
Development of Network Model and Analysis – Ngossi Base Line



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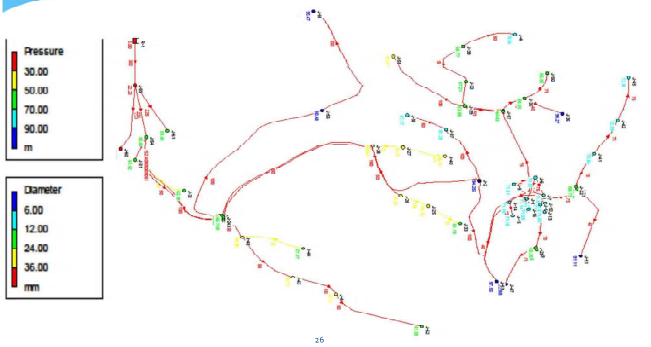
Development of Network Model and Analysis – Ngossi Base Line



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Specifying Location of PRVs

- After identifying location on the network model diagrams tentatively, NRW Action Team has the site reconnaissance to identify exact location of PRVs to be installed properly with GPS.
- Location of PRVs with coordinates measured by using GPS was plotted on the diagrams.

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Summary of PRVs and Bulk Flow Meters to be installed in DMAs with Pressure Control

- NRW Project Team suggested seven PRVs in six DMAs. Number of chamber as'Type-2' and 'Type-3'

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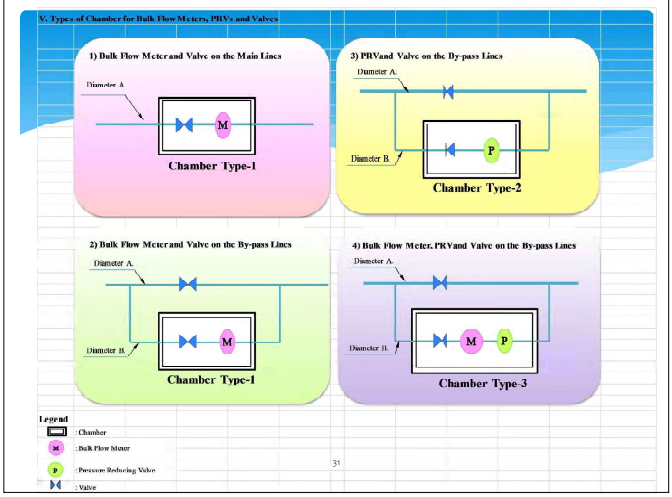

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Summary of PRVs and Bulk Flow Meters to be installed in DMAs with Pressure Control

III. Specidication of PRVs, Bulk Flow Meter and Chamber

DMAs	Area	Proportion of Population	Range of Flow Rate (m³/h) [in Case of NRW 30%]		ID No. of PRVs	Size of PRVs	Chamber Type	Existing Pipelines		By-pass Pipelines		Toe (Cast Iron)	90 Bend (PVC)	Bulk Flow Meter	Sluice Valve		Pressure Relief Valve & Manua	To be replaced with larger size pipes in the whole network		
		1)	2)	3)=1)x2)				Diameter A	Material	Diameter B	Material				On the Existing	On the By-pass	On the By-pass	Existing	to	New
No.6 Tasahe A&B	Tasahe A	35%	Min 6.9	2.4	PRV-H12	40mm x1	Type-2	80mm	PVC	40mm	PVC	80 x 40mm x2	40mm x2	-	80mm x1	40mm x1	40mm x1 (each)			
			Max. 16.2	5.7																
	Tasahe B	55%	Min 6.9	3.8	PRV-H01	40mm x1	Type-2	100mm	PVC	40mm	PVC	100 x 40mm x2	40mm x2	-	100mm x1	40mm x1	40mm x1 (each)			
			Max. 16.2	8.9																
No.8 Ngossi	All areas	100*	Min 20.2	20.2	PRV-H13	80mm x1	Type-3	100mm	PVC	80mm	PVC	100 x 80mm x2	80mm x2	80mm x1	100mm x1	80mm x1	80mm x1 (each)	100mm	-	150mm
			Max. 47.2	47.2														L=1,051m		
No. 9 Mbokona	All areas	30%	Min 18.3	5.5	PRV-H02	40mm x1	Type-2	80mm	PVC	40mm	PVC	80 x 40mm x2	40mm x2	-	80mm x1	40mm x1	40mm x1 (each)			
			Max. 42.8	12.8																
No.11 Vavaea Ridge	Upper area	85%	Min 20.0	17.0	PRV-H03	50mm x1	Type-2	100mm	PVC	50mm	PVC	100 x 50mm x2	50mm x2	-	100mm x1	50mm x1	50mm x1 (each)	100mm	-	150mm
			Max. 46.7	39.7														L=542m		
No.13 Mbokonavera	All areas	100*	Min 20.0	20.0	PRV-H05	80mm x1	Type-3	100mm*	PVC	80mm	PVC	100 x 80mm x2	80mm x2	80mm x1	100mm* x1	80mm x1	80mm x1 (each)			
			Max. 46.6	46.6																
No.19 Tanuli & Mbua Valley	Western area	100*	Min 17.7	17.7	PRV-H11	50mm x1	Type-3	100mm	PVC	50mm	PVC	100 x 50mm x2	50mm x2	50mm x1	100mm x1	50mm x1	50mm x1 (each)	25mm	-	50mm
			Max. 41.2	41.2														L= 161m		

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Result

DMAs	Area	Size of PRVs	Chamber Type*	Bulk Flow Meter	To be replaced with larger size pipes in the whole network		
					Existing	to	New
No.6 Tasahe A&B	Tasahe A Note: See the conceptual diagram shown in Attachment-2	40mm x 1	Type-2	-			
	Tasahe B	40mm x 1	Type-2	-			
No.8 Ngossi	All areas	80mm x 1	Type-3	80mm x 1	100mm	->	150mm
					L=1,051m (PVC)		
No. 9 Mbokona	Eastern at upstream	40mm x 1	Type-2	-			
No.11 Vavaea Ridge	Upper area	50mm x 1	Type-2	-	100mm	->	150mm
					L=542m (PVC)		
No.13 Mbokonavera	All areas	80mm x 1	Type-3	80mm x 1			
No.19 Tanuli & Mbua Valley	All areas	50mm x 1	Type-3	50mm x 1	25mm	->	50mm
					L= 161m (PVC)		

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Thank you

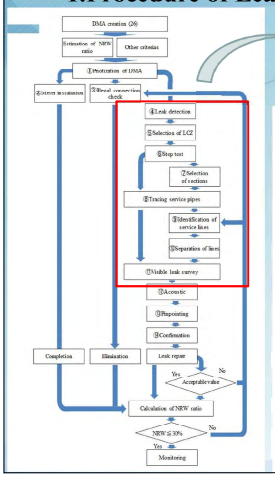
S13.3-25 FOLLOW-UP LECTURE ON THE LEAKAGE DETECTION METHOD IN DMAS

Changes of the Leak Detection Method in DMAs

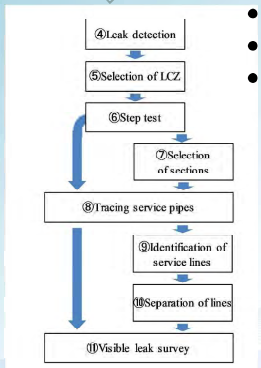
March 13, 2015

JICA Team
Akihiko OKAZAKI

1.Procedure of Leak Detection in DMAs

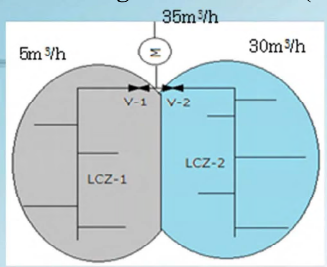


What is different from the pilot project?



- **Efficiency** (LCZ)
- **Effectiveness** (Step Test)
- **Detectability** (Separation of Service Lines)

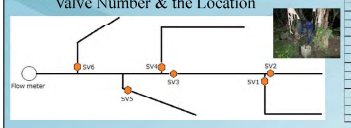
2. Selection of Leakage Control Zone (LCZ)



- NRW ratio is calculated by an inflow of a month and a billed consumption of a month. If MNF ratio is over 30%, leak detection and illegal connection check are to be planned immediately.
- MNF is measured by a bulk meter or an ultrasonic flow meter.
- LCZ with high flow volume is identified by closing value at the inlet point.
- Leak detection in LCZs is prioritized.

3.Step Test of Selected LCZ

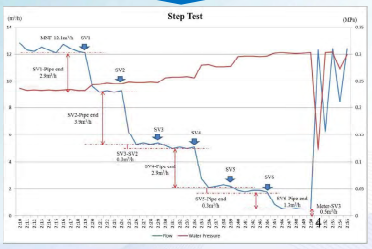
Valve Number & the Location



Valve Operation Sheet

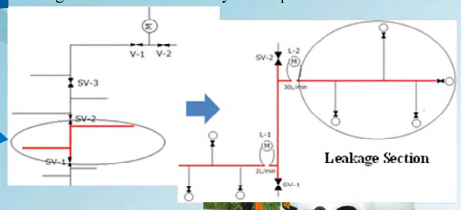
No.	Status	Valve No.	Operating Time	Flow rate (m³/h)	MNF (m³/h)	Remarks
1			2:10	12.8		Strat-Recording
2	MNF		2:15	12.1		
3	Close	SV1	2:20	9.2	2.9	SV1-Pipe end
4	Close	SV2	2:30	5.1	2.1	SV2-Pipe end
5	Close	SV3	2:30	5.0	0.3	SV3-SV2
6	Close	SV4	2:35	2.1	2.9	SV4-Pipe end
7	Close	SV5	2:40	1.0	0.2	SV5-Pipe end
8	Close	SV6	2:45	0.5	1.3	SV6-Pipe end
9		Meter			0.5	Meter-SV3
10	Open	SV1	2:50			
11	Open	SV2	2:51			
12	OPen	SV3	2:53			
13	OPen	SV4	2:55			
14	Open	SV5	2:58			
15	Open	SV6	3:00			

- In case there are no valves for the step test, this procedure will be skipped.
- Calculate the flow volume on each section from a change of flow.



4.Selection of Leakage Section

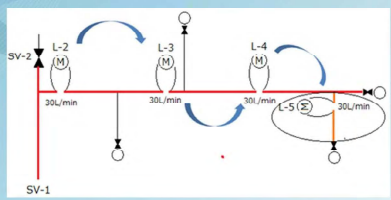
Leakage Section is Identified by the Step Test



Flow volume of each service line is measured by a standard water meter at branch points in the selected section.

A Standard Water Meter

5.Separation of Service lines



The selected service pipe is separated further at shorter dividable points where connection or branch point is located.

A service pipe is separated into several sections to identify the leakage line whether water flows or not by a standard water meter.

6. Tracing Service Pipes and Visible Leakage Check

- Most of leaks are found on service pipes.
- Most of leaks on service pipes are difficult to find because they are long with many branches, pipes go in another people's property and are covered with grass.
- Illegal connections and parasite water users to flat rate SW customers can be identified by tracing and checking service lines one by one.

7. Leak Detection by Equipment

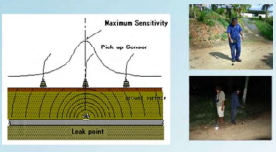
Acoustic Survey

Check a leak sound at water meter

Correlation Check

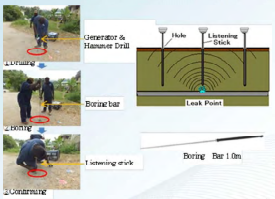
Check leaks on main pipes

Pinpoint Survey



Check a leak point from the ground

Confirmation



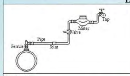
Identify the leak point exactly

8. Leakage Information Sheet

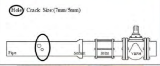
- Leakage information should be recorded on the leakage record sheet when leaks are repaired.
- Information of leakage and pipes are to be updated on GIS system.

Leakage Record Sheet			Leak No	3-8
Date of Survey:	25, November 2013	Street	Lengakiki	
Date of Repair:	7, December 2013	House No.	201	
Name of DMA	Lengakiki	Customer	In front of Mr David Akoea's house	
Main Pipe	1. CIP, 2. uPVC, 3. GP, 4. PE, 5. Others	Location	1. Pipe, 2. Connection, 3. Ferrule, 4. Valve, 5. Meter, 6. Tap, 7. Reservor Tank, 8. Others,	
Diameter	40 mm	Condition	1. Hole, 2. Crack, 3. Breakage, 4. Packing, 5. Loose Connection, 6. Over Flow, 6. Unknown, 7. Others ( )	
Service Pipe	1. PE, 2. uPVC, 3. GP, 4. Dux 5. Others( )	Cause	1. Corrosion, 2. Deterioration (Aging), 3. Traffic Load, 4. Wrong Construction, 5. Less Adhesive, 6. Pressure Fluctuation, 7. Defective Valve, 8. Vandalism, 9. Other Construction, 10. Unknown, 11. Others( )	
Diameter	mm			
Depth/Distance	(90)cm/ (2.5m) from egg of road	Surface	1.Asphalt, 2.Concrete, 3.Gravel, 4.Grass, 5.Soil, 6.Others	
Leakage Size	1. Large, 2. Midium, 3. Small, 4. Drops, Measured or Estimatated(90)L/min	Detected Method	1. Patrol, 2. Customer Informing, 3. Acoustic, 4. Pinpoint,	

Leak Location



Hole / Crack Size:(7mm/5mm)



Location Map

Photo

Remarks:
Leak Flows into a Ditch

Information of Leak Repair

Excavation Size: 1.5 mX 1.0 mX 1.2 m=(1.8 m³)

	Unit price	Hour	Volume	Sub Total
Worker		2.0	3.0	
Plumber		2.0	2.0	
Supervisor		2.0	1.0	
Engineer		1.0	1.0	
Backhoe		2.0	1.0	
Generator		1.0	1.0	
Drainage Pump		1.0	1.0	
Lighting Equipment				
Sand			0.3	
Gravel			0.2	
Asphalt			1.5	
Total				

Used Materials

	Size/Type	Unit Price	Volume	Sub Total
Pipe-1	150 PVC		2.0	
Pipe-2				
Pipe-3				
Joint-1	150 Coupling		2.0	
Joint-2				
Joint-3				
Joint-4				
Joint-5				
Meter				
Packing				
Saddle				
Total				

9

S13.3-26 MINI-WORKSHOP (PRESENTATION ON AGENDA OF 3RD JCC AND NRW STRATEGIC IMPLEMENTATION PLAN

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**.

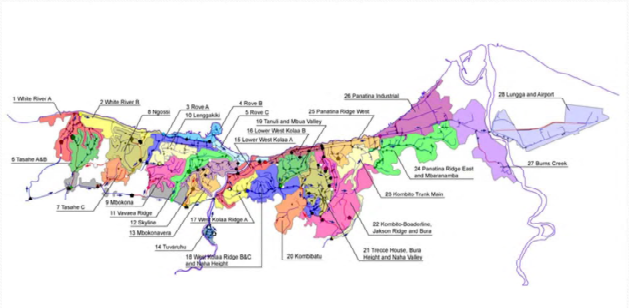
Output 3- NRW reduction is implemented in accordance with the procedure in pilot area and/or LCZ

- **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

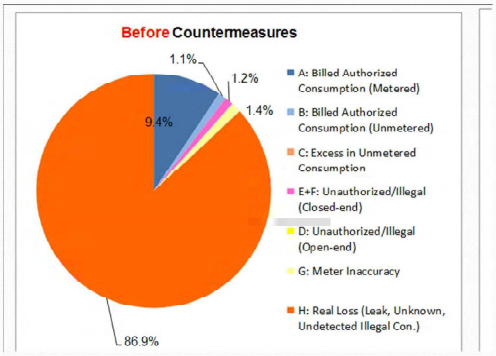
Total No. Of DMA

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

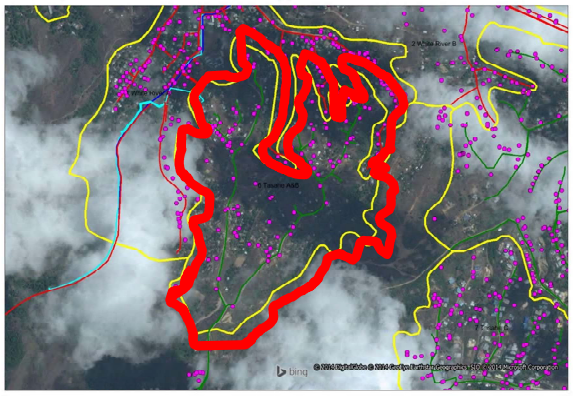
DMAs- in Progress

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

Base Line Data – Tasahe A & B

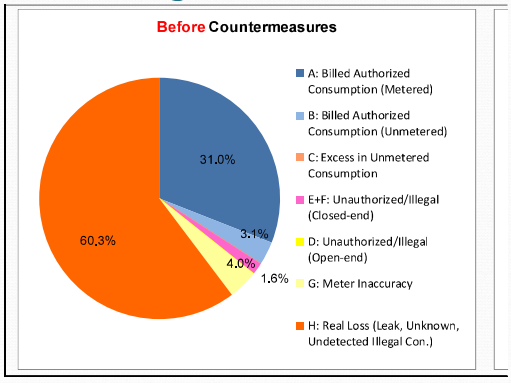


Example of a DMA Setting- Tasahe A & B



DMA- West Kola ridge A

West Kolaridge A – NRW Base Line



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)

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)

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