Annex -3 Training Materials (8)

⑤ Results of the Pilot Project Activities in Borella

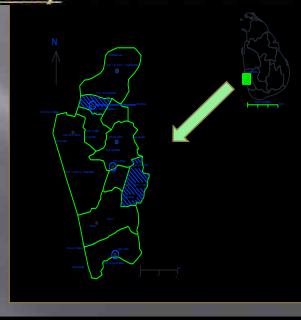
(8) Presentation Materials for Seminar Held on 28th February, 2012

THE CAPACITY DEVELOPMENT PROJECT FOR NRW REDUCTION IN COLOMBO CITY

Borella Area

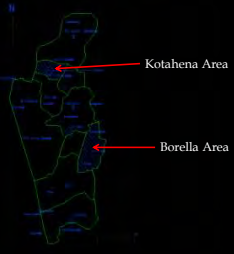
Present Situation of the Colombo City

- Area 37.4 Sqkm
- No of Connections as at 2010 120,000
- Administrative by Two Manager office , 4 AEE & 8 OICC with 24 Zone Officers
- NRW Percentage 49%



Purpose of the Project & Project Area

- NWSDB Capacity to implement NRW reduction activity in Colombo City is Strengthened
- Borella Pilot Zone
  - Area nearly 4 Sqkm
  - Total Connections 5000
  - Length of Pipe network - 32 km
  - Community consists of Domestic, Commercial & Tenement Gardens

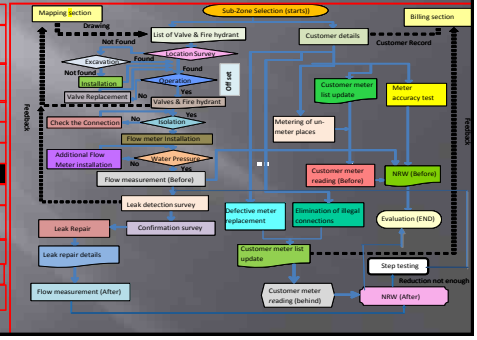


Objective of the Project

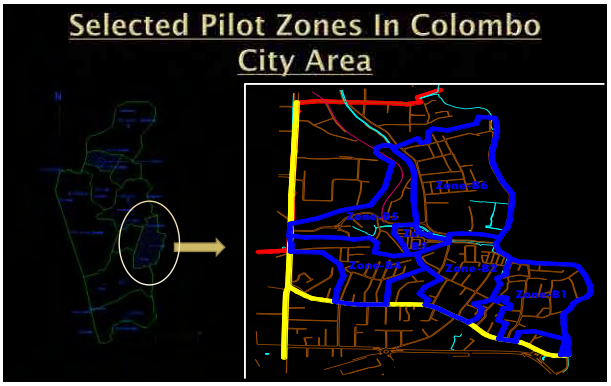
- Management Capacity of Senior Officers of RSC (W-C) to Plan and Supervise NRW Reduction Activities is Enhanced.
- Technical and Operational Capacity to Conduct NRW reduction activities by officer/Staff of RSC (W-C) is Developed.
- Maintaining of achieve improvements and further development of NRW reduction activities.

Work Flow of Activities

- Sub Zone selection
- Valve Locating & Sub Zone Isolation
- Meter Installation & Initial Inflow
- Consumer Survey
- Meter Accuracy Test
- Leak Detection
- Leak Repair
- Free Water metering
- Further reduction of NRW (Step testing)
- ACTIVITIES & OBSERVATIONS
- Achievements
- PROJECT OUTCOME



Selected Pilot Zones In Colombo City Area

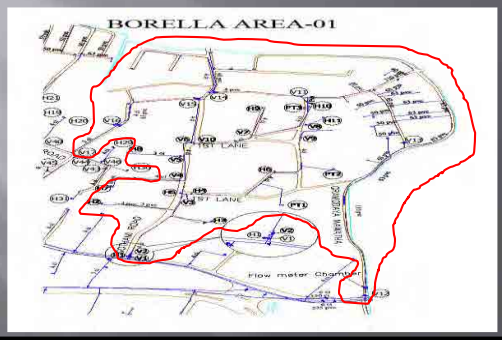


Annex -3 Training Materials (8)

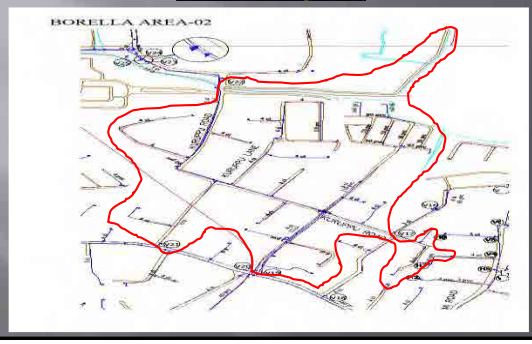
⑤ Results of the Pilot Project Activities in Borella

(8) Presentation Materials for Seminar Held on 28th February, 2012

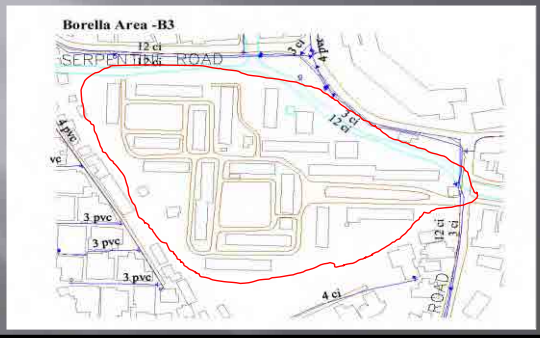
Zone Map-B1



Zone Map-B2

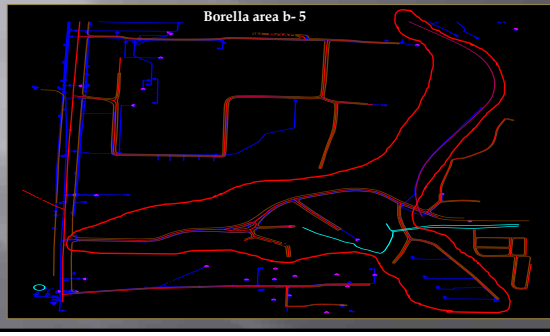


Zone Map-B3

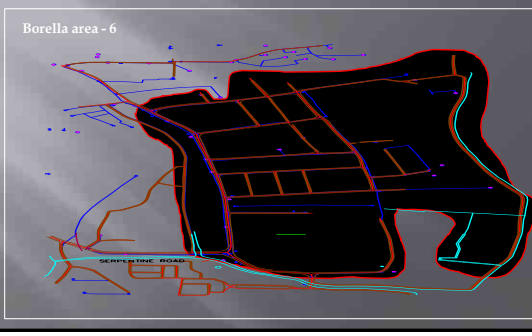


Zone Map-B4

Zone Map-B5



Zone Map – B6



Annex -3 Training Materials (8)

⑤ Results of the Pilot Project Activities in Borella

(8) Presentation Materials for Seminar Held on 28th February, 2012

Zone Map – B7

Key Details of Covered Area

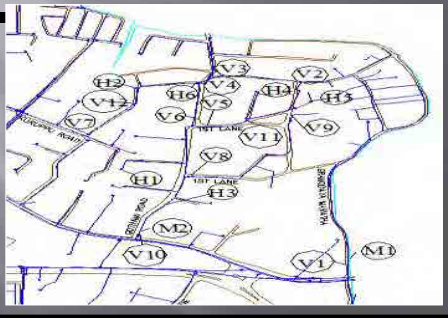
Zone Name	No of connections covered
Zone – B1	584
Zone – B2	624
Zone – B3	360
Zone – B4	453
Zone - B5	814
Zone – B6	1109
Zone – B7	307
Total	4252

Valve installation & placing

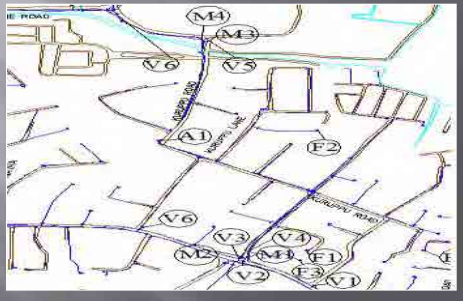
- Condition of boundary valves which are needed for the Isolation of the sub zone were checked.
- If they cannot completely close, they were replaced.
- Installed additional valves when required.
- Data sheet shall be filled.
- Valves detected by using valve locator, Metal pipes by using Pipe locator & PVC pipes by using leak detection instrument.

Detecting buried lines & valves by using metal locator and pipe locator

Identification of Valves – (Borella-1)



Identification of Valves – (Borella-2)

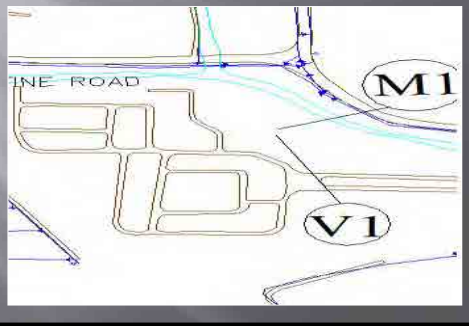


Annex -3 Training Materials (8)

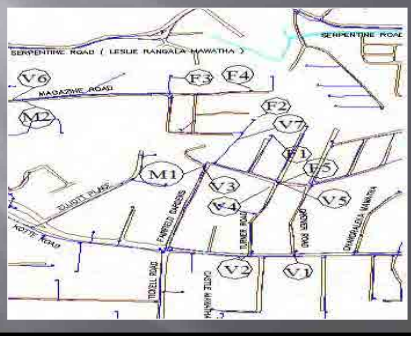
⑤ Results of the Pilot Project Activities in Borella

(8) Presentation Materials for Seminar Held on 28th February, 2012

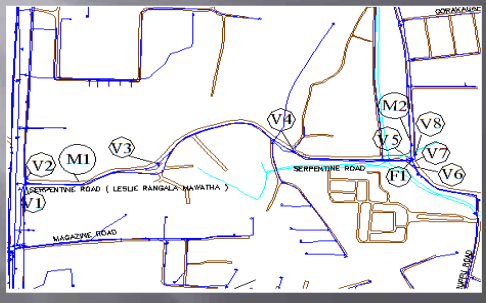
Identification of Valves – (Borella-3)



Identification of Valves – (Borella-4)



Identification of Valves – (Borella-5)



Identification of Valves – (Borella-6)

Valve Installation & Zone Isolation

Valve condition survey

Valve condition checking list

Name of Pilot area:
Name of Sub zone :

Item	No.	Size(mm)	Pipe material	Condition: Location (Existence, Buried)	Valve cover (OK, Non.)	Direction (Clockwise, Anticlockwise)	Operable (C, NC)	Number of rotation to be closed	need for a replacement	Remarks
Valve	V-1									
	V-2									
	V-3									
	V-4									
	V-5									
	V-6									
	V-7									
	V-8									
	V-9									
	V-10									
Fire hydrant	H-1									
	H-2									
	H-3									
	H-4									
	H-5									
	H-6									
Wash out	W-1									
	W-2									
	W-3									
	No.	Size	Material	Meter(Y, N)	Condition	Remarks				
Stand post	PT-1									
	PT-2									
	PT-3									

All valves, fire hydrant,

Annex -3 Training Materials (8)

⑤ Results of the Pilot Project Activities in Borella

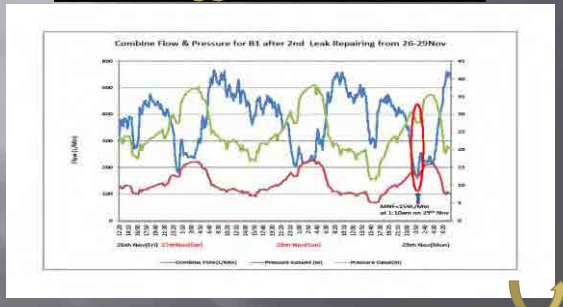
(8) Presentation Materials for Seminar Held on 28th February, 2012

Isolation & Metering

- Some selected valves will be closed(without interrupting water to zone) to minimized the feeding points.
- All feeding point are metered or converted in to an accessible positions(Installation of meter chamber) to fixed mobile meters(Ultrasonic meters) when it is required.

Initial Inflow & Pressure

Obtain logger measurements



Preparation of customer list

- Prepare the customer list of sub zone including the customer name, customer-ID, address and meter-conditions.
- Customer meter condition were checked one by one house based on the customer list.

Customer list

Customer meter check list

Name of Pilot area
Name of Sub zone

No	Customer name	Customer ID	Road name / House No	Record: Previous month consumption (m3)	Record: Meter condition (W, N, U, I, NA, O)	Survey: Family's Number	Survey: Number of tap	Survey: Tank Overhead, Ground (Y, N)	Survey: Meter condition (W, N, U, I, NA, O)	Remarks
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

W: Working
N: Non-working
U: Unmetered
I: Illegal Connection
NA: Not Access
O: Others

Customer list should be prepared and all meter condition should be checked.

Customer List and Meter Condition Survey

Annex -3 Training Materials (8)

⑤ Results of the Pilot Project Activities in Borella

(8) Presentation Materials for Seminar Held on 28th February, 2012

Meter testing

- Out of total, at least 10% of water meters will be tested randomly at site with the help of calibrated(50l) bucket (Ex. 60 meters for zone B1)
- Additionally, another few meters (mostly doubted once) will be checked through meter testing unit

Meter Accuracy test (on field)


Meter Accuracy test (At laboratory)


Key items of leak detection

- The portion between ferrule to house meter point will be checked by using **Eco-stick.**
- All other areas will be checked by using **Leak Detection Instrument.**
- Pin-point or confirmation survey can be introduces if required.

Leak Detection



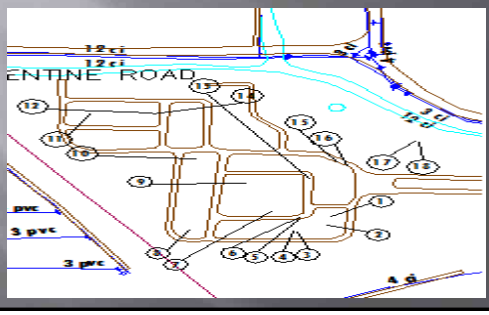

Leak map in zone B1

Annex -3 Training Materials (8)

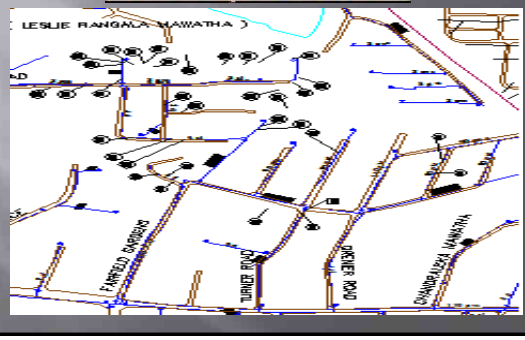
⑤ Results of the Pilot Project Activities in Borella

(8) Presentation Materials for Seminar Held on 28th February, 2012

Leak map in zone B3



Leak map in zone B4

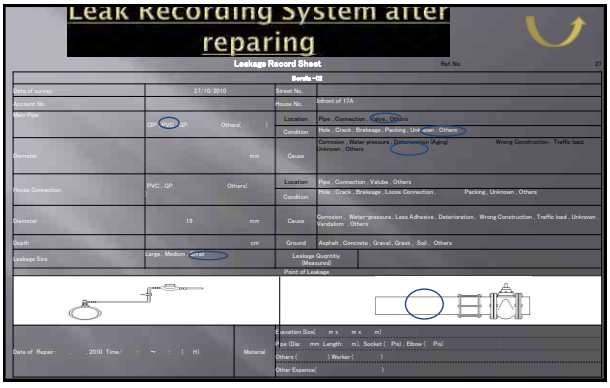


Situation of other pilot zones

- Zone B2 Leak detection completed confirmation still to be done
- Zone B5 & B6 Acoustic survey started

Leak Repairing

Leak Recording System after reparing



Meter Installation for Stand Post

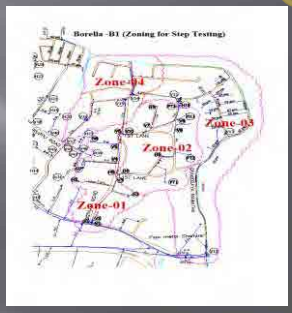
Annex -3 Training Materials (8)

⑤ Results of the Pilot Project Activities in Borella

(8) Presentation Materials for Seminar Held on 28th February, 2012

Further Reduction of Leakages

- Step Testing
- Results
  - Minimum Night Flow(MNF)
  - Zone 01 –56 l/Min
  - Zone 02 –24 l/Min
  - Zone 03 –108 l/Min
  - Zone 04 –100 l/Min
- Observations
  - No. of leaks-06(within zone-03 & 04)



Old pipe replacement work

Finding of burried meter & Valve

Recent situation of old pipes & valves

12" CI Pipe at Serpentine Road

4" CI Pipe at Pelangasthuduwa Road

Details of NRW reduction in B1

Customer	Stand post	Replacement/ Non-working meter	Elimination /Illegal connection	Leak repair	Action	Initial	After "Primary Activities"	Second "Primary Activities"
584	2 (1/2)	Non_working (7/7) Unmetered (9/12)	8/6	1st (10/34) 2nd (0/12) Total (10/46)		It has done for the intial rate of NRW in the subzone.	It has done after leak repair and meter replacement.	It has done after leak detection by the step test and repaired.
					Date:	June 3-12,2010	Aug25-Sep2,2010	Feb 2,2011
					Initial (m3/d)	653.13	579.64	549
					Consumption (m3/d)	390.12	449.35	449.35
					Customer tap (m3/d)	12	12	7
					NRW (l/day)	312	249	206
					NRW ratio (%)	40.27	22.48	16.31

Details of NRW reduction in B2

Customer	Stand post	Replacement/ Non-working meter	Elimination /Illegal connection	Leak repair	Action	Initial	After "Primary Activities"	Second "Primary Activities"
624	6 (0/6)	Nonworking (3/3) Unmetered (3/2)	15/0	Still not confirmed		It has done for the intial rate of NRW in the subzone.	It has done after leak repair and meter replacement.	It has done after leak detection by the step test and repaired.
					Date:	16th Feb 2012		
					Initial (m3/d)	1154		
					Consumption (m3/d)	441.86		
					Customer tap (m3/d)	10.6		
					NRW (l/day)	655		
					NRW ratio (%)	61		

Annex -3 Training Materials (8)

⑤ Results of the Pilot Project Activities in Borella

(8) Presentation Materials for Seminar Held on 28th February, 2012

Details of NRW reduction in B3

Customer	Stand post	Replacement/ Non-working meter	Elimination /Illegal connection	Leak repair	Action	Initial	After "Primary Activities"	Second "Primary Activities"
						It has done for the intial rate of NRW in the subzone.	It has done after ball valve replacement.	It has done after leak detection by the step test and repaired.
					Date:	Nov 18-19,2010	Jan20-21,2011	Sep20,2011
360	-	Non_working (7/7) Unmetered (9/12)	8/8	1st (10/34) 2nd (0/12) Total (10/46)	Inflow(m3/D)	1183	376.83	282
					Consumption (m3/D)	186.19	186.19	201.29
					Common tap (m3/D)	-	-	-
					NRW (L/Min)	106	-	54.53
					NRW ratio (%)	84.26	50.59	28.62

Details of NRW reduction in B4

Customer	Stand post	Replacement/ Non-working meter	Elimination /Illegal connection	Leak repair	Action	Initial	After "Primary Activities"	Second "Primary Activities"
						It has done for the intial rate of NRW in the subzone.	It has done after leak repair and meter replacement.	It has done after leak detection by the step test and repaired.
					Date:	Oct.27-28,2011	Jan 18-19, 2012	
453	25 (25/25)	Non_working (15/15) Unmetered (17/16)	13/0	1st (34/32)	Inflow(m3/D)	987	707	653
					Consumption (m3/D)	353	353	353
					Common tap (m3/D)	76	76	76
					NRW (L/Min)	366	252	223
					NRW ratio (%)	64.24	50.07	41.8

Details of NRW reduction in B5

Customer	Stand post	Replacement/ Non-working meter	Elimination /Illegal connection	Leak repair	Action	Initial	After "Primary Activities"	Second "Primary Activities"
						It has done for the intial rate of NRW in the subzone.	It has done after leak repair and meter replacement.	It has done after leak detection by the step test and repaired.
					Date:	12 Feb 2012		
814	Not finalized	Not finalized	Not finalized	Not detected	Inflow(m3/D)	1351		
					Consumption (m3/D)	510		
					Common tap (m3/D)	N/C		
					NRW (L/Min)	862		
					NRW ratio (%)	62		

Work summery

zone name		Borella 1	Borella 2	Borella 3	Borella 4	Borella 5	Borella 6
No. of consumers		584	624	360	453	814	1109
Commen taps	No. common taps	2	6	0	25		
	consumption(m3/day)	12	10	0	76		
No. of working meters		543	596	289	435		
No. of unmeter detected		12	3	1	17		
No. of defective detected		15	2	13	15		
No. of difficult to read		0	0	2	0		
No. of disconnected premises		0	0	3	0		
No. of houses closed		7	23	47	12		
No. of illegal rectified		8	15	25	13		190
No. of service leaks found		35	N/C	16	26		
No. of main leaks found		12	N/C	2	8		

Accomplishment

- B1 - Initial & Final NRW determined
- B2 - Initial NRW established & improvements are now in Progress
- B3 - Initial & Final NRW determine
- B4 - Initial & interim NRW established
- B5 - Initial NRW established & improvements are now in Progress
- B6 - Initial NRW to be finalized & improvements are now in Progress
- B7 - Initial NRW still not established

Comparison with Program

·2009Commencement of Project Nov. 2009
·Physical Progress 55%

Out Come of the Project

Physical progress

Zone		B1	B2	B3	B4	B5	B6
No of illegal connections removed		8	15	25	13		25
No. of leaks repaired	Main	10	43(N/C)	2	8		
	Service	46		19	26		
Over flow from tank		1	_	1	0		
No of unmeterd places metered		9	5	14	16		
No. of defective meters changed		7	_	14	15		
No of commen taps removed		1	_	0	_		
No. of new conections given		8	_	3	_		
Meter sealing proceses		550	_	350	_		

Annex -3 Training Materials (8)

⑤ Results of the Pilot Project Activities in Borella

(8) Presentation Materials for Seminar Held on 28th February, 2012

Physical progress continued…..

zone name		Borella 1	Borella 2	Borella 3	Borella 4	Borella 5	Borella 6	Total
No. of sluse-valves & wash-out(FH) trace & surfaced	12"ϕ		2			1		3
	6"ϕ							0
	4"ϕ	8	3		4	5	7	27
	2"ϕ	1						1
No. of new sluse-valves & wash-out(FH) installed	6"ϕ			1			5	6
	4"ϕ	5	5		2	2	4	18
	2"ϕ	2					3	5
Length of newly layed commen mains (m)	3"ϕ		90				200	290
	2"ϕ	60					400	460
Meter Chambers installed		2	4	1	2	4	3	16
No. of connections transferred		3	21				125	149
Replaced length of bunddle pipes(m)		15	840				4800	5655
Double line disconnection work (No. of houses subjected)							450	450
Elimination length of CI line from our system(4"ϕ) in meters		100					2000	2100

Out Come of the Project

Commercial progress (using billing details)

Zone		B1	B2	B3	B4	B5	B6
Consumption Vareation(In m3/month) Before and after the project	2010 (Before)	2964.45	n/c	4760	n/c	n/c	n/c
	2011 (After)	3108.79	n/c	5470.83	n/c	n/c	n/c
Gain(m3/month)		144.34	n/c	710.83	n/c	n/c	n/c
Revenue Vareation(In Rs./month) Before and after the project	2010 (Before)	77388.54	n/c	67521.5	n/c	n/c	n/c
	2011 (After)	98474.33	n/c	91767.67	n/c	n/c	n/c
Gain (Rs./month)		21085.79	n/c	24246.17	n/c	n/c	n/c
Amount of water saved (m3/day)		100	n/c	501	334	n/c	n/c
Amount of Money Saved (Rs./day)		2,704.00	n/c	21,436.00	8,684.00	n/c	n/c
Inertial completion date		02/11/2011	n/c	20/9/2011	20/2/2012	n/c	n/c
Savings up to now (In Thousnd Rs.)		1014	n/c	3678	61	n/c	n/c

Summery of Out Come

Amount of water saved m^3/day	1339
Amount of Money Saved per year Rs.	12.7 million

Problems Encountered

- Inaccuracy of the current drawings
- Lack of valve location details
- Burried and non function condition of the existing valves
- Difficulty of gaining approval from local authorities (Presently RDA not giving approval to excavate their roads)
- Consumer relation problems
- Old & complicated service Distribution & High Leak System
- Scaling of old Distribution network
- Work with restriction due to Motor Traffic and City Congestion

How to Overcome

- Use of modern equipment (used to find burried valves and leaks)
- Regular meeting helps to share the experience, gain new knowledge and change bad attitudes
- Consumer related problems minimized by acknowledging the community about NRW activities
- Initiation of a leak detection and repairs
- Programme for routine night survey
- Implementation of meter sealing process (to minimized illegal activities)

Obtain benefits

- **Findings further considered for ,**
  (1) NRW engineering study, master plan update (JICA)
  (2) Colombo water supply service improvement project (ADB)

- Methodical approach to identify the way of reduction of NRW.
- Use of modern equipment for asset management.
- Pressure improvements(in B1, some area's pressure increase from 2m to 6m)
- Significant reduction of NRW
- Capacity development of engaged personnel.

Contd.

- Able to implement new re-numbering system to valve network , starting of maintaining valve tie-measurements and updating of existing drawings.
- Encourage an improved service level to consumer.
- Able to include new consumers in to the billing system (By eliminating common taps and giving new connections to surround people as well as elimination of illegal connections).
- Improvement of consumer satisfaction as well as their relationship.
- Control of illegal connections, vandalism and misuse of supply.

Reasons for success of the project

- Team Work & Commitment
- Given valuable guidance by the JICA
- Scope of the project able to tackle both Real & apparent losses (↑)

The effort implement during last two years

Engage personnel (both O&M and NRW sections), who spent their valuable time for the success of the project with their normal daily routine works.

Future Expectations

- Regular night survey for identification of visibal leaks
- Implementation of same procedure for other areas which are not covered through this project.
- Implementation of regular monitoring activities for minimized estimated bills.
- Introduction of valve operating routine system, specially for washouts.
- Implementation of Meter sealing work for other areas which are still not covered.
- Regular monitoring system of NRW variation in completed sub-zones.

Lesson Learn

It is found that the major reason for the NRW is due to the leaks of the existing pipe network

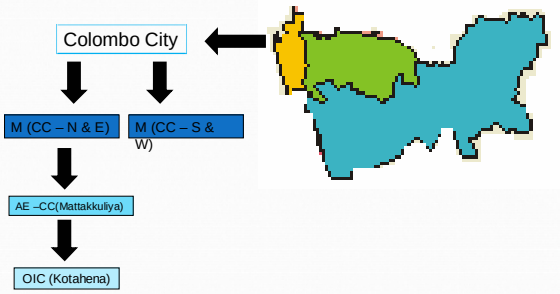
- Systamatic night leak survey is very important
- Rapid engagement to leak repair works is a must

Thank You

(8) Presentation Materials for Seminar Held on 28th February, 2012

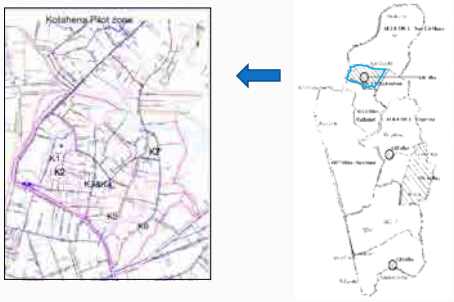
⑥: Results of the Pilot Project Activities in Kotahena

Western Central Region



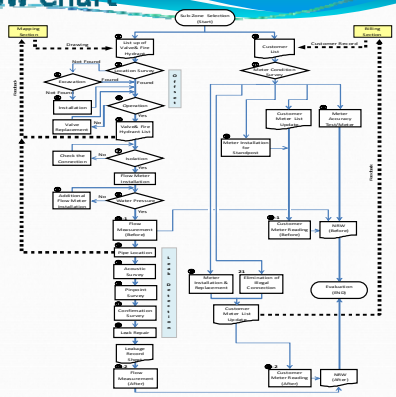
Pilot Zone - Kotahena

Introduction – Pipe born system commence in 1886 which is one of the oldest pipes system in Colombo city.



Activities Implemented Under JICA Project in Kotahena Pilot Zone

Work Flow Chart



Development of Sub Zones

- Sub Zone K1
  - Number of Customers 397
  - Distribution Length - 3"CI - 155.2 m
    4"CI - 253 m
    5"CI -298.9 m
    160 mm PVC - 716.7 m
- Sub Zone K2
  - Number of Customers 410
  - Distribution Length 3"CI - 61.7 m
    4"CI -742.2 m
    5"CI -397.3 m
    63 mm PVC - 245.1 m

Work Flow of Activities

- Sub Zone Isolation
- Map Updating
- Consumer Survey
- Leakage Management
- Development of Further Sub Zones

(8) Presentation Materials for Seminar Held on 28th February, 2012

⑥: Results of the Pilot Project Activities in Kotahena

Sub Zone Isolation in Kotahena

- Identification of Pipe Lines and Valve
  - Valve Tracing
  - Valve Condition Survey
  - Valve Repair if Any or New Valve Installation
- Bulk Meter Installation
- Isolation Confirmation Test

Activities..... (with using equipment's by JICA)

Valve Tracing

Valve Surfacing

Line Tracing

Searching buried valves…

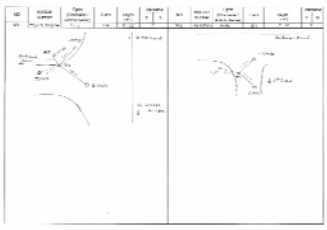
Scaled cast Iron line..

Isolation of Pilot Zone

Bulkmeter installation

Map Updating

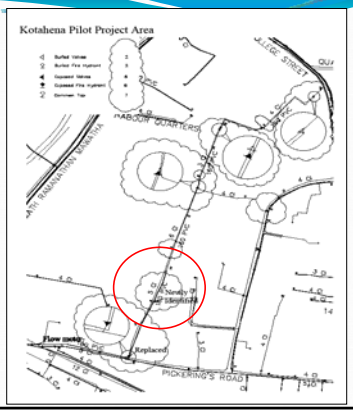
- Size and Material of Pipe line
- Side of the Pipe Lines
- Location of Valve
- Insert New Valves & Pipes



Tie measurements for valve locations.

Con ....

Map updating by field survey



Consumer Survey

- Meter Condition
- Meter Accuracy Test
- Collection of Consumer details
- Acoustic Survey for service leak detection
- Checking and Legalizing of Illegal connections
- Metering of Unmeter Connections
- Defective meter replacement

(8) Presentation Materials for Seminar Held on 28th February, 2012

⑥: Results of the Pilot Project Activities in Kotahena

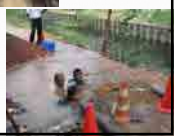
Flow Measurement Survey Before the Activities

Measure the flow in the sub zone for 24 hours or more days.
In the mid night, flow rate will be minimum. It may be close to leak volume.

Water Leakage Management

- Visual Leak Repairs
  - Day and Night Appeared Leaks
    - Pin Points
    - Confirmation
- Active Leak Detection
  - Night Leak survey by Using Instruments
  - Step Testing

- **Problems in Leakage Management**
  - Defective valves
  - Pervious Repairs not properly done
  - Less Cover in Service Lines
  - Bundle Pipes
  - Poor Workmanship in Illegal tapping
  - Behaviors of Other Utility Agencies in Construction



Abandoning of CI line

Measuring of Free Water Supply

- Identification of Out Lets

Common Outlet	14

- Metering of Out Lets

Common Outlet	14

- Details of Consumption m³

Common Outlet	4m³/outlet/day

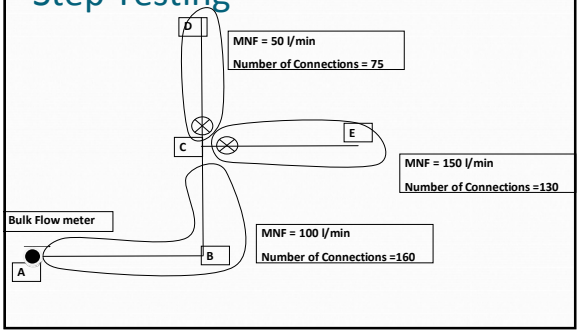
Summary of Work Implemented in K1

Component	Water Balance Initially	After Activity 1	Leak Repair service leaks 14 main leaks 1	4" CI pipe abondond connection transferred to PVC	Service leaks 15 repaired	Bundle pipes removed in 17 locations	Bundle pipes removed in 11 locations & 6 connections given
Total System Input (m3/d)	1295	1041	918	925	869	585	571
Billed Authorized consumption (m3/d)	190.88	248.29	248	248	248	248	248
NRW %	85.26	76.15	72.98	73.19	71.46	57.61	56.57
MNF (l/min)	690	480	330	330	300	120	120

(8) Presentation Materials for Seminar Held on 28th February, 2012

⑥: Results of the Pilot Project Activities in Kotahena

Step Testing



Parallel Execution

- Works in K_3,K_4,K_5 K_6 & K_7 Sub Zones were Started in Simultaneously

Summary of Work Implemented

Zone	Sub Zone	No of customers	Initial Flow (m3/Day)	Final Flow(m3/Day) - After completing NRW activities	Amount of Saving (m3/ Day)	Initial NRW %	Final NRW (After completing NRW reduction activities) %
Kotahena	K-1	397	1295	571	724	85.00	51.00
	K-2	426	1245	1058	187	78.00	73.00
	K-3 &K4	1370	-				
	K-5	-	-				
	K-6	-	1727				

Benefits

- Pressure Improvement in Kotahena Area
- Familiarizing with New Technology
- Methodical approach to address Water Loss Management
- Team Work Effects
- Sharing Knowledge With Japanese Experts
- In depth information about the existing system
- Supplying a good service for consumers

Saved 911 m3/day equivalent to LKR 8.98m/year

Learning....

- Importance of Valve and its Workability
- Importance of Realistic Map
- Leak Repair is not effective in a deteriorated system.
  - Replace Bundle Pipes
  - Replace Deteriorated CI Pipes
- Abundant pipe to be Completely Removed
- House to house survey gave more information for O&M activities
- Effectiveness of Weekly Meeting

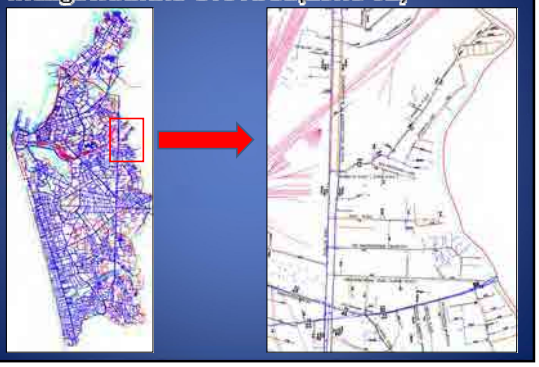
(8) Presentation Materials for Seminar Held on 28th February, 2012

⑦: Similar Activities in Other Areas

SIMILAR ACTIVITIES IN OTHER AREAS UNDER CAPACITY DEVELOPMENT PROJECT FOR NON REVENUE WATER (NRW) REDUCTION IN COLOMBO CITY

ARAMAYA ROAD

Maligawaththa OIC Area(Zone 02)



Main Work Flow

- Sub zone Isolation
- Map Updating
- Consumer Survey
- Leak Management

SUB ZONE ISOLATION AT ARAMAYA ROAD

Identification of pipe lines According to existing drawings. There are two Nos. of 4" Dia CI lines and 4" Dia PVC line.

After the Physical survey we found that 6" PVC main and 2 Nos. of 4" Dia PVC and CI Mains

Length of Main Line : 4.5 Km No of Connections : 895

Total Consumptions :15400 m^3

Identification of valves

drawing shows 2 Nos.of main vales at the starting point.

Only one valve could be found at the starting point.

We used valve tracing equipments to locate the valves.

VALVE CONDITION

We operated the valve and check the working Condition.
It was satisfied

Bulk Meter Installation

3" Water meter was fixed at the
starting point of the 4" Dia PVC main for Aramaya place.

We have scheduled to fix a 4" water meter to 4" CI line

FUTURE WORK PLAN FOR MONTH OF MARCH 2012

Hydraulic Isolation

Flow measurement

Consumer Survey

Repairing of visual leaks

Leak detection using pin point survey

We hope to continue our work with the guidance and direction of pilot zone officers and JET.

THANKING YOU

(8) Presentation Materials for Seminar Held on 28th February, 2012

⑧: PR Activities

Capacity Development Project for
Non Revenue Water Reduction in
Colombo City Area

Public Relations Activities in Selected Schools

National Water Supply & Drainage Board
Regional Support Centre (Western – Central)

hy Public Relations Activities in Schools?

- To educate the future generation
- To make them a part of this project
- To send the message to their homes

Activity 01

Poster Competition

How we selected the schools ?

- 5 schools - within the pilot area.
- 5 schools - outside the pilot area

5 schools from the pilot area.

01. *C. W. W. Kannagara Maha Vidyalaya - Borella*
02. *Ratnaweli Balika Vidyalaya - Borella*
03. *Carey College - Borella*
04. *Yashodhara Balika Vidyalaya - Borella*
05. *Wesley College - Kotahena*

5 schools from outside the pilot area.

01. *Rajasinghe Maha Vidyalaya - Dematagoda*
02. *St. Anthonies Balika Vidyalaya - Dematagoda*
03. *St Mathews Vidyalaya - Dematagoda*
04. *Gothami Balika Maha Vidyalaya - Maradana*
05. *Anurudda Balika Vidyalaya - Dematagoda*

How we made them to draw POSTERS?

We made aware the school children on Non Revenue Water reduction with the support of Principals & Art Teachers of the respective schools

(8) Presentation Materials for Seminar Held on 28th February, 2012

⑧: PR Activities

JICA provided valuable drawing-kits for all students participated

What they Created?

What children gained?

- *Awareness on water coservation*
- *Knowledge on Reduction of Non Revenue Water*

How we appritiated them ?

- *Participatory Certificates & Drawing -kits.*
- *Special Certificates & gifts for winners.*

Selecting winners

Judges from the University of Kelaniya selected the winners.

3rd Place

Chansu Vimukthi of Carey College

2nd Place

Anupa Gunawardena of WesleyCollege

1st Place

S. K. Sadini Mekela of Ratnawali Balika Maha Vidyalaya

(8) Presentation Materials for Seminar Held on 28th February, 2012

⑧: PR Activities

Activity 02

Special School Activity

We selected two schools in pilot areas.

- S. W. R. D. Bandaranayaka Vidyalaya - Borella
- St. Benadict's College - Kotahena

Awareness Programs conducted in Relation to;.

- Water Purification / Cost of water/ Water conservation for the future and Non Revenue Water issues.

- *All the participants were given the opportunity to create drawings on given themes.*
- *Drawing materials were provided by JICA*

We allowed the children to come out with their own ideas.

Water Board & JICA

Achivements

- ***Knowledge given to children.***
- ***We got the opportunity to send the good message to their homes & schoolmates.***
- ***Opportunity to display the winning posters in public places & schools with a message from the Water Board & JICA.***

Thank you.

Presented by;
Shiromi Karunarathne
Senior Public Relations Officer
Regional Support Center (Western - Central)

THE CAPACITY DEVELOPMENT PROJECT
FOR NRW REDUCTION IN COLOMBO CITY

Dissemination of the Activities

28 February 2012

S. Kobayashi
JICA EXPERT TEAM

1

Two Major Issues for Dissemination of the Activities

1. Draft Execution Plan

2. Capacity Development
(Please Join Pilot Area Activities)

2

1. Draft Execution Plan

will be prepared by the Management Team
to disseminate the NRW reduction activities
to entire Colombo city

considering finding in the Project.

3

Management Team

- **Project Leader, AGM (NRW)**
- **AGM (O&M)**
- **AGM (Development)**
- **Manger (NRW)**
- **Manager (O&M)**
- **Manager (Development)**
- **Manager (Colombo City – N/E)**

4

Major Findings through the Pilot Area Activities

By NRW Reduction Activities

- **Kotahena (Very old system)** :
  Difficult to reduce NRW ratio drastically without pipe replacement
- **Borella (Relatively better system)** :
  NRW ratio was reduced by the PA Activities
  (eq.B1 40.3%→22.5% →16.3%)
  – under collection of further information

5

Areas Similar to Borella

- **Pilot Area Activities are effective but not practical**
  since they require lots of input and long period
  Mainly due to difficulties of isolation

⇓

- **Modification of the Activities**
  for disseminating to the other similar areas
  trial of modified activities – introduction of sample zone for isolation

6

Areas Similar to Kotahena

- **High priority of pipe replacement**
- **Activities to contribute NRW reduction before replacement**
  - Repair ball tap on Sump
  - Leak detection and quick repair
  - Bundle pipe replacement (under checking the contribution)
  - etc

7

2. Please Join Pilot Area Activities

In order to realize the Draft Execution Plan, skilled EAs are required in all the OIC areas in addition to good AEs.

⇓

EAs from each OIC are expected to Join the Pilot Activities

8

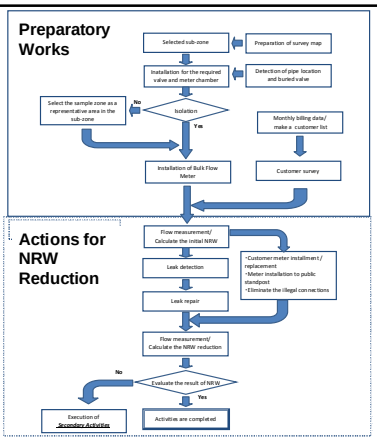
Pilot Area Activities - Major works

- Preparatory Work
  (Detection of Pipe Location and buried valves, Collection of Customer's Information, Preparation of flow measurement)
- Replacement/installation of customer meter
- Finding of Illegal connection
- Leak detection
- Leak Repair
- Evaluation of the activities (Flow Measurement)

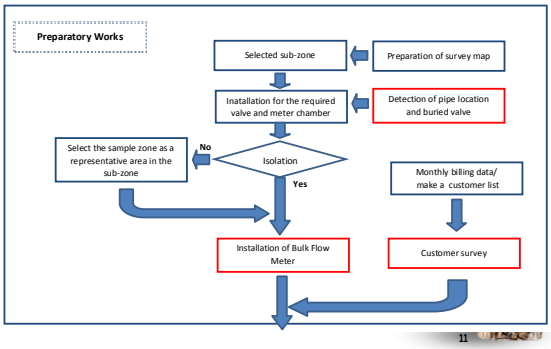
9

Flow chart of Pilot Area Activities

In a Systematic Manner



Preparatory Works



11

Detection of Pipe Location and Buried Valves

12

(8) Presentation Materials for Seminar Held on 28th February, 2012

⑨: Dissemination of Activities to the Other Areas

Records for Valve Condition

Valve condition checking list

Name of Pilot area:
Name of Sub zone :

Item	No.	Size(mm)	Pipe material	Condition						
				Location (Existence, Buried)	Valve cover (OK, Non.)	Direction (Clockwise, Anticlockwise)	Operable (C, NC)	Number of rotation to be closed	Need for a replacement	Remarks
Valve	V-1									
	V-2									
	V-3									
	V-4									
	V-5									
	V-6									
	V-7									
	V-8									
	V-9									
	V-10									
Fire Hydrant	H-1									
	H-2									
	H-3									
	H-4									
	H-5									
	H-6									
Wash out	W-1									
	W-2									
	W-3									
	No.	Size	Material	Meter(Y, N)	Condition	Remarks				
Stand post	PT-1									
	PT-2									
	PT-3									

13

Site survey and Customer Survey




14

Customer list

Customer meter check list

Name of Pilot area:
Name of Sub zone:

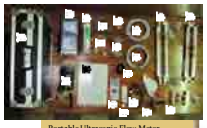
No	Customer Name	Customer ID	Road name /House No.	Record: Previous month consumption (m3)	Record: Meter condition (W, N, U, I, NA, O)	Survey: Family's Number	Survey: Number of tap	Survey: Tank Overhead /Ground (Y, N)	Survey: Meter condition (W, N, U, I, NA, O)	Remarks
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

W: Working
N: Non-working
U: Unmetered
I: Illegal Connection
NA: Not Access
O: Others

15

Flow Meter Installation

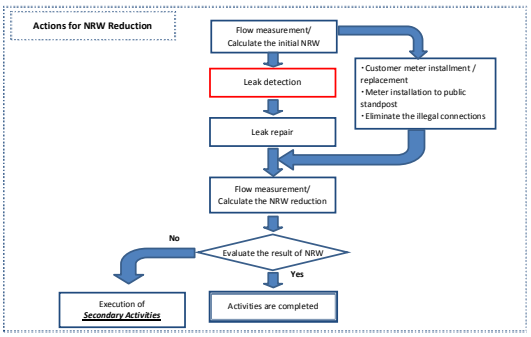


Portable Ultrasonic Flow Meter

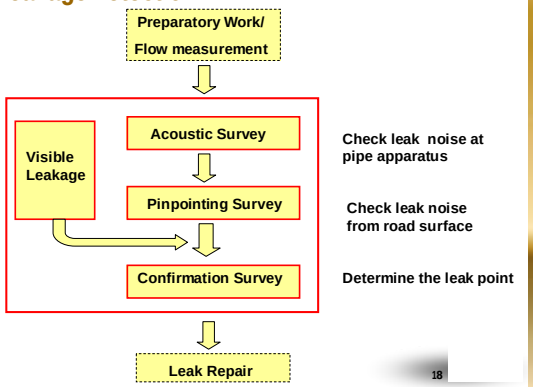
16

Actions for NRW Reduction



17

Leakage Detection



18

(8) Presentation Materials for Seminar Held on 28th February, 2012

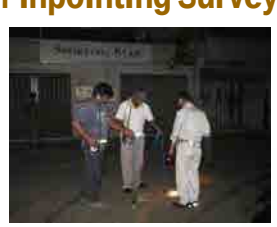
⑨: Dissemination of Activities to the Other Areas

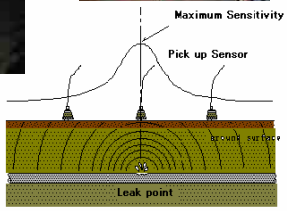
Acoustic survey

Check each customer meter and valve for finding leak by the listening stick

19

Pinpointing Survey

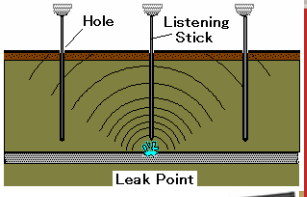




Water leak Detector

20

Confirmation Survey



Boring bar 1m type

21

Please Join

- **Weekly Meeting**
  to know systematic ways of NRW reduction

and

- **Filed Activities**
  to get skills of effective reduction of NRW.

22

Thank you

23

(9) Presentation Materials for Public Seminar Held on 15th October, 2012

Training Materials

List of Materials

①: Briefing of the Project and Results and Findings
②: Pilot Activities in Borella
③: Pilot Activities in Kotahena
④: Outline of Execution Plan and Recommendation
⑤: Improvement of GIS for O&M in entire CMC
⑥: Reduction of Real Losses (Leakage)
⑦: PR Activities
⑧: Recommended Action Plan

Annex -3 Training Materials (9)

THE CAPACITY DEVELOPMENT PROJECT FOR NRW REDUCTION IN COLOMBO CITY

BRIEFING OF THE PROJECT AND RESULTS/FINDINGS

S.G.G RAJKUMAR
ASSISTANT GENERAL MANAGER
(WATER LOSS MANAGEMENT SECTION)
B.SC. ENG.(HONS), C.ENG.,FIE (SL),
M.SC. (DENMARK). MBA (PIM - USJ), M.ENG (MORATUWA)

Purpose of the Project

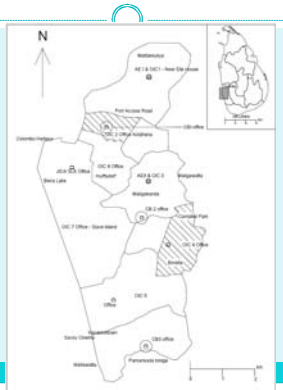
- NWSDB Capacity to implement NRW reduction activity in Colombo City is Strengthened

Outcome of the Project

- Management Capacity of Senior Officers of RSC (W-C) to Plan and Supervise NRW Reduction Activities is Enhanced
- Technical and Operational Capacity to Conduct NRW reduction activities by officer / Staff of RSC (W-C) is Developed

PLANNING

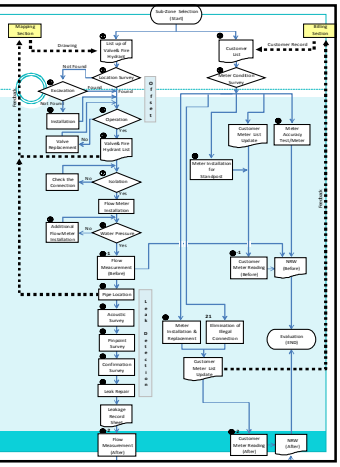
Location of Pilot Project Area



Presentation Material for Public Seminar Held on 15th October, 2012

1. Briefing of the Project and Results and Findings

Work Flow of Activities



Borella

Kotahena

Methodology

- Selection of small segment of distribution for close activity for reduction of losses
- Isolation of the section having one or two inflows
- Collection of Available customer information within the area
- Visit each premises and verify legal consumption, leaks, check administrative errors

NRW Reduction Activity

- Regular meeting to encourage interaction between field staff and managerial staff
- Confirm the available information on valves, pipelines at site
- Locate leaks visually and by using equipment
- Updating of Maps
- Measurement of Initial Pressure

MONITORING

Presentation Material for Public Seminar Held on 15th October, 2012

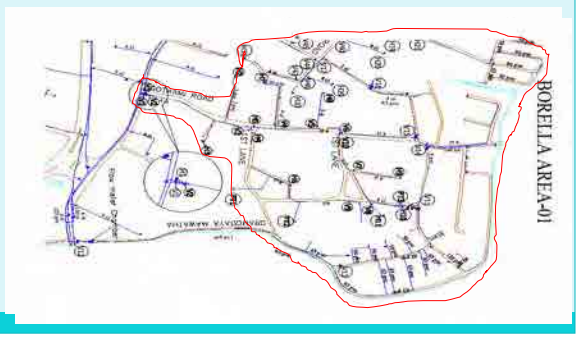
1. Briefing of the Project and Results and Findings

Weekly Meeting



BASE DATA COLLECTION

Zone Map-B1



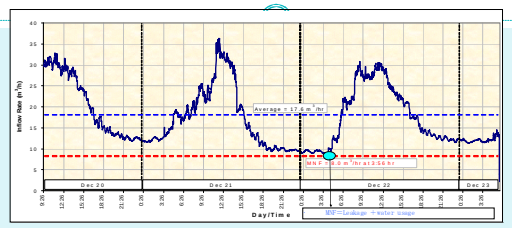
On Site Water Meter Accuracy Check

Initial Inflow & Pressure


Bulk meter readings


Pressure measurements

Flow Measurement Survey Before the Activities



Measure the flow in the sub zone for 24 hours or more days.
In the mid night, flow rate will be minimum. It may be close to leak volume.

Site Observations

Contd.. - Distribution Pipe under Houses

REDUCTION OF LOSSES

Rectification

- Identification of leaks and repairs
- Replacement of defective meters
- Regularization of unauthorized connections
- Replacement of bundle pipes
- Reduction of free water outlets
- Installation of meters to free water outlets

Bundle Pipe Replacement

Meter Sealing

Presentation Material for Public Seminar Held on 15th October, 2012

1. Briefing of the Project and Results and Findings

Leak map in zone B1

EVALUATION

Outcome Borella

Sub Zone	Length of Main Pipe (m)			No of coustomers	Initial Flow (m3/d)	Final Flow (m3/d) - After completing NRW activities	Amount of Saving (m3/ d)	Initial NRW (%)	Final NRW (%)	Number of Leaks		
	Material	Length	Total Length							Main	Service	Total
B1	PVC	853	2,333	584	653	549	104	40	18	14	33	47
	CI	1,480										
B2	PVC	194	2,962	624	1,154	-	-	62	-	0	31	31
	CI	2,768										
B3	PVC	1,009	2,397	360	1,183	282	901	84	29	1	18	19
	CI	1,388										
B4-FF	PVC	1,010	1,789	453	376	226	150	60	27	1	4	5
	CI	779										
B4-Mgz	PVC	762	1,462	291	529	427	102	62	52	3	26	29
	CI	700										
B5	PVC	460	2,031	840	1,351	-	-	62	-	13	23	36
	CI	1,571										
B6	PVC	3,280	5,720	1,117	1,504	1,227	277	50	28	4	27	31
	CI	2,440										

Contd..

Sub-zone	B1	B2	B3	B4-FF	B4-MGZ	B5	B6	B7	B8	B9	B10
Nos of service leaks per 100 connection	5.7	5.0	5.0	2.5	8.9	2.7	2.4	4.0	2.7	11.0	0.5
Identified illegal connection	8	15	19	0	13	9	21	0	2	-	1

Outcome Kotahena

Sub Zone	Length of Main Pipe			No of coustomers	Initial Flow (m3/d)	Final Flow (m3/d) - After completing	Amount of Saving (m3/ d)	Initial NRW (%)	Final NRW (%)	Number of Leaks		
	Material	Length	Total Length							Main	Service	Total
K1	PVC	692	1,399	397	1,295	571	724	85	56	4	86	90
	CI	707										
K2	PVC	0	1,468	426	1,245	933	312	78	72	0	93	93
	CI	1,468										
K3&K4	PVC	173	7,333	1,383	4,240	3,989	251	73	71	7	29	36
	CI	7,160										

Contd...

Sub-zone	K1	K2	K3&K4	K5	K6	K7	K8	K9	K10
leaks per 100 connection	21.7	21.8	2.1	7.0	-	1.7	8.7	5.0	3.7
Identified illegal	53	23	5	1	-	0	-	1	-

Savings

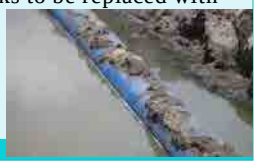
- Amount of Water Saved 2,928 m3/day (0.64 mgd)
- Equivalent in Rs 45 million/year

Constraints Encountered

- Existing Drawings not Accurate
- Lack of valve location details
- Buried and non function condition of the existing valves
- Consumer relation problems
- Old & complicated service Distribution
- Scaling of old Distribution network
- Work with restriction due to Motor Traffic and City Congestion
- Existence of unknown/unexpected pipes
- Some Houses Connected to numerous distribution pipes
- Houses constructed above the pipes
- Low Pressure in the system

Conclusion

- Suggest to use PE pipe for service connection to reduce service leaks & Unauthorized Connections
- Solution to Each Area has to be Case by Case Basis
- Replacement of Pipe has to Ensure Old System is Fully Discontinued by use of Pipe Material that is not Used Presently (Blue Colour PE pipe is suggested)
- Bundle pipe service connections avoided
- PVC pipe which show more leaks to be replaced with increased cover



FURTHER IMPROVEMENT

Geographic information system (GIS)

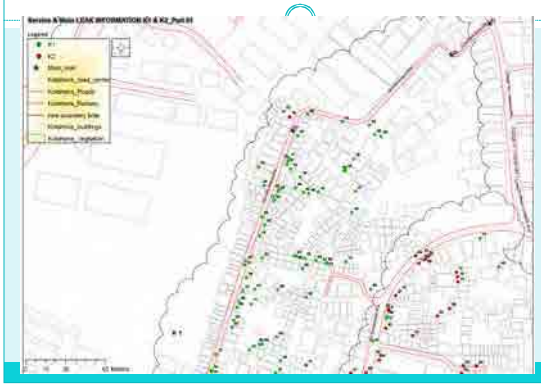
- Update Base Maps
- Location of Customer Meter
- Asset Management
- Record Leak Repair
- Record Unauthorized Consumption
- Use/update of GIS by Zone officers

Field information on Base map

Presentation Material for Public Seminar Held on 15th October, 2012

1. Briefing of the Project and Results and Findings

Leak Repair Marked in maps



Location of Stand post

Public Relation Activity

- Creation of Awareness of the Project to Residence
- Discourage Unauthorized Consumption Explain the Penalty
- Discourage Customer Rearrange Service Connection
- Reduction of Wastage in Free Water Outlet
- Educate the school Children

School Program




School Poster Competition

Public Cooperation

Audio Visual

Obtained benefits

- Team gained practical experience to address on reduction of losses
- Able to update existing drawings
- Increase in system Pressure
- Improved service level to customers
- Minimized billing errors
- Increasing of customer relationship
- Control of illegal connections, vandalism and misuse of supply
- Increasing of customer satisfaction

Thank You

- END

- Customers being aware on conservation of water
- NWSDB staff attitude change
- Updated map

GIS (Since Dec 2011)

- Base Map preparation using Satellite Image Completed
- Field Data Collection and entering
  - Borella 70%
  - Kotahena 40%
  - Thimbrigasaya Initiated
- Inclusion of Free Water Outlets and Leak locations in progress

Presentation Material for Public Seminar Held on 15th October, 2012

1. Briefing of the Project and Results and Findings

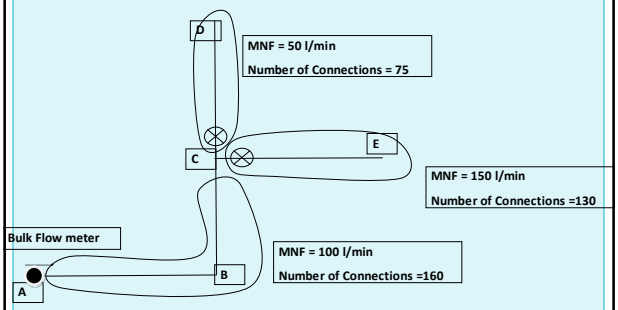
Outside Areas

Zone	Sub Zone	No of coustomers	Initial Flow (m3/Day)	Final Flow(m3/Day)- After completing NRW activities	Amount of Saving (m3/ Day)	Initial NRW %	Final NRW %
Kent Road		216	334	256	78	53.00	38.00
Handala Frerry Road		219				18.00	
Kirullapone		537	456	427	29	19.00	7.00

Savings

- Amount of Water Saved 0.64 mgd (2,928 m3/day)
- Equivalent in Rs 25.8 million/year

Contd.



Valve Condition Survey

- **Condition of boundary valves which are needed for the Isolation of the sub zone were checked.**
- **If they cannot completely close, they were replaced.**
- **Installed additional valves when required.**
- **Data sheet shall be filled.**

Typical Distribution Arrangement

Distribution length: 1,360m
Number of House connection: 320