

**(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



1. Briefing of the Project and Results and Findings

## THE CAPACITY DEVELOPMENT PROJECT FOR NRW REDUCTION IN COLOMBO CITY

## BRIEFING OF THE PROJECT AND RESULTS/FINDINGS

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### Purpose of the Project

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

### Outcome of the Project

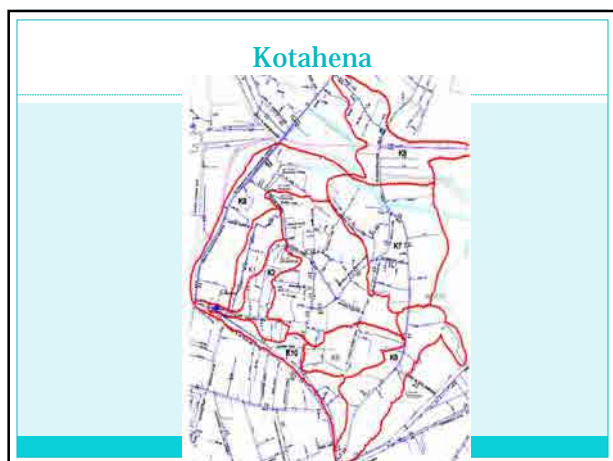
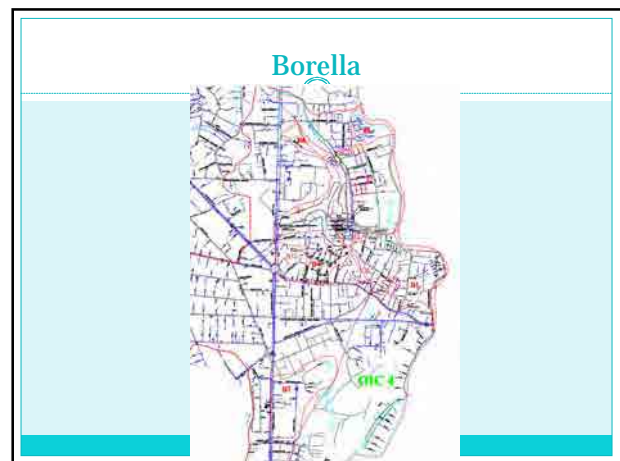
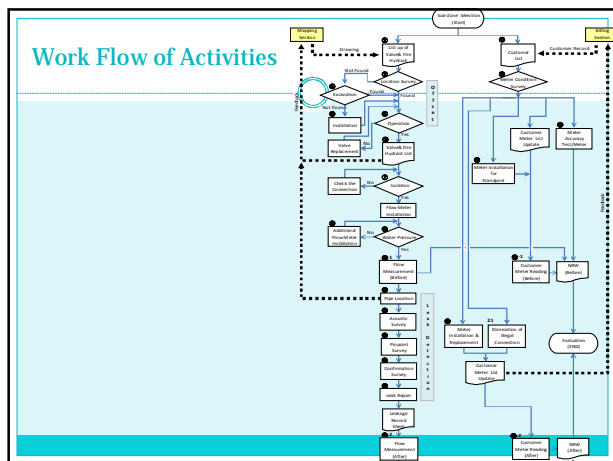
- Management Capacity of Senior Officers of RSC (W-C) to Plan and Supervise NRW Reduction Activities is Enhanced
- Technical and Operational Capacity to Conduct NRW reduction activities by officer / Staff of RSC (W-C) is Developed

## PLANNING

### Location of Pilot Project Area



## 1. Briefing of the Project and Results and Findings



## 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

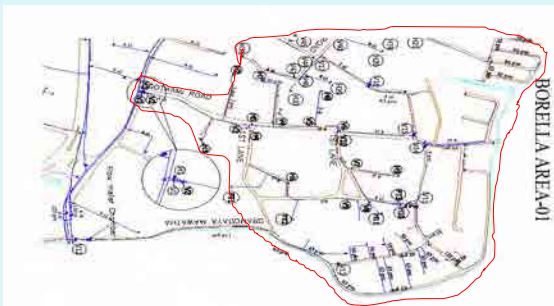
1. Briefing of the Project and Results and Findings

### Weekly Meeting



## BASE DATA COLLECTION

### Zone Map-B1



### On Site Water Meter Accuracy Check



### Initial Inflow & Pressure

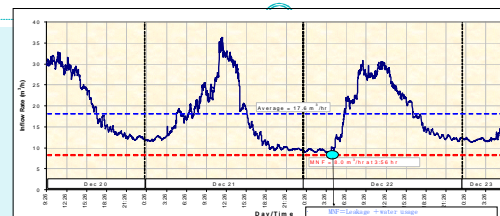


Bulk meter readings



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.

1. Briefing of the Project and Results and Findings

### 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



## 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 customers | Initial Flow (m <sup>3</sup> /d) | Final Flow (m <sup>3</sup> /d) - After completing NRW activities | Amount of Saving (m <sup>3</sup> /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                      | 1,483  |              |                 |                                  |  |                                      |                 |               |                 |         |       |
| B2       | PVC                     | 194    | 2,962        | 624             | 1,154                            | -  | -                                    | 62              | -             | 0               | 31      | 31    |
|          | CI                      | 2,768  |              |                 |                                  |  |                                      |                 |               |                 |         |       |
| B3       | PVC                     | 1,003  | 2,397        | 360             | 1,183                            | 282  | 901                                  | 84              | 29            | 1               | 18      | 19    |
|          | CI                      | 1,394  |              |                 |                                  |  |                                      |                 |               |                 |         |       |
| B4-FF    | PVC                     | 1,010  | 1,789        | 453             | 376                              | 226  | 150                                  | 60              | 27            | 1               | 4       | 5     |
|          | CI                      | 779    |              |                 |                                  |  |                                      |                 |               |                 |         |       |
| B4-Mgr   | 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                     | 3,283  | 5,726        | 1,117           | 1,504                            | 1,227  | 277                                  | 50              | 28            | 4               | 27      | 31    |
|          | CI                      | 2,443  |              |                 |                                  |  |                                      |                 |               |                 |         |       |

## Contd..

| Sub-zone                                | B1  | B2  | B3  | B4-FF | B4-MG2 | 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 customers | Initial Flow (m <sup>3</sup> /d) | Final Flow (m <sup>3</sup> /d) - After completing | Amount of Saving (m <sup>3</sup> /d) | Initial NRW (%) | Final NRW (%) | Number of Leaks |         |       |
|----------|---------------------|--------|--------------|-----------------|----------------------------------|---|--------------------------------------|-----------------|---------------|-----------------|---------|-------|
|          | Material            | Length | Total Length |                 |                                  |   |                                      |                 |               | Main            | Service | Total |
| K1       | PVC                 | 692    | 1,393        | 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   | -   |

1. Briefing of the Project and Results and Findings

### Savings

- Amount of Water Saved 2,928 m<sup>3</sup>/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

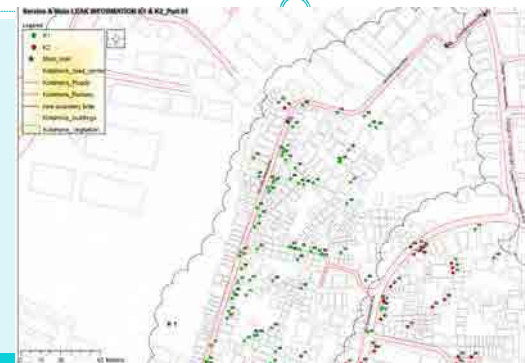
Field information on Base map



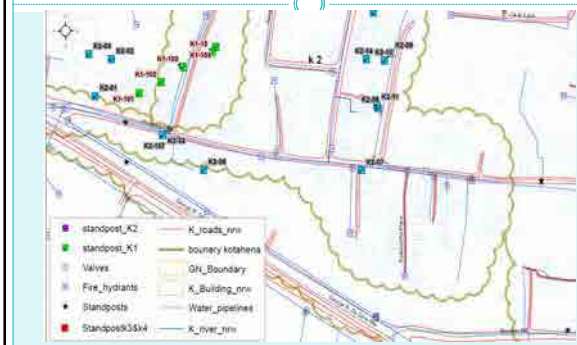


1. Briefing of the Project and Results and Findings

### 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



1. Briefing of the Project and Results and Findings

### 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

1. Briefing of the Project and Results and Findings

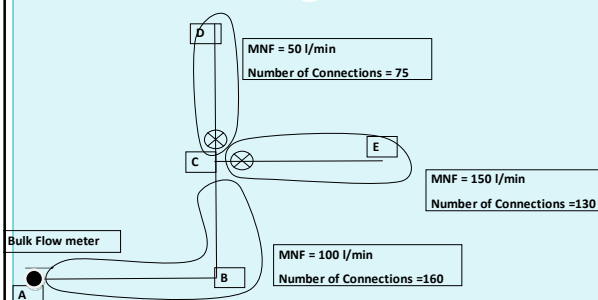
### Outside Areas

| 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 % |
|---------------------|----------|-----------------|-----------------------|---|----------------------------|---------------|-------------|
| 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



2. Pilot Activities in Borella

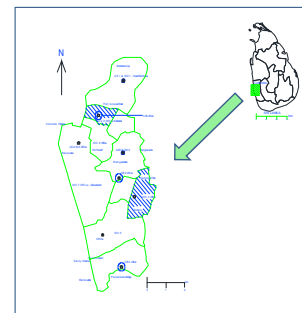
# **THE CAPACITY DEVELOPMENT PROJECT FOR NRW REDUCTION IN COLOMBO CITY**

## **Borella Area**

Presented by  
D.H.R. Hettiarachchi  
(Zone officer Borella area)  
B.Sc. (Phy), NDES(Civil)  
IESL(Part2)

## **Present Situation of the Colombo City**

- Area 37.4 Sqkm
- No of Connections as at 2011 128,000
- Administrative by Two Manager office , 4 AEE & 8 OICC with 24 Zone Officers
- NRW Percentage 49%

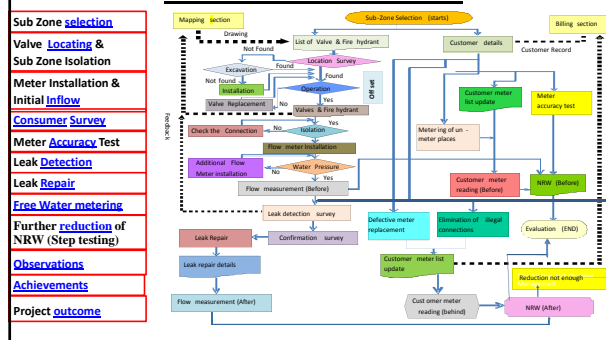


## **Purpose of the Project & Project Area**

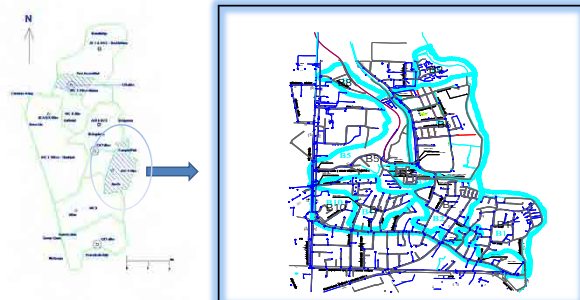
- NWSDB Capacity to implement NRW reduction activity in Colombo City is Strengthened
- Borella Pilot Zone
  - Area nearly 4 Sqkm
  - Total Connections 5000
  - Length of Pipe network - 32 km
  - Community consists of Domestic, Commercial & Tenement Gardens



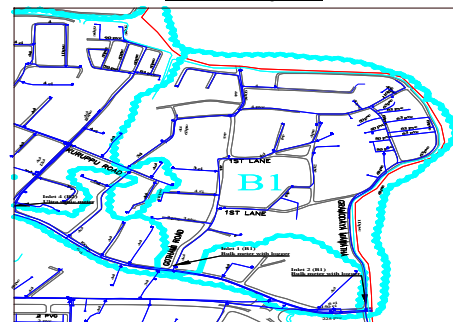
## **Work Flow of Activities**



## **Selected Pilot Zones In Colombo City Area**



## **Zone Map-B1**



## 2. Pilot Activities in Borella

### 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                       |
| Zone – B8  | 186                       |
| Zone – B9  | 623                       |
| Zone – B10 | 191                       |
| Total      | 5251                      |



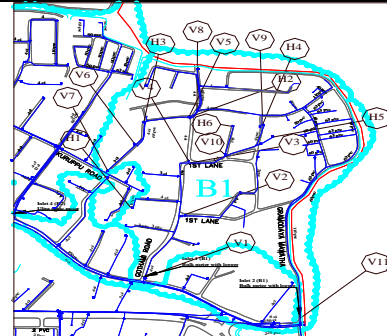
### Valve installation & placing

- 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 or Dalsin equipment.

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



### Identification of Valves – (Borella-1)



### Valve Installation & Zone Isolation



### Valve condition survey

Valve condition checking list

| Item       | No.  | Size(mm) | Pipe material | Location<br>(Existence, Buried) | Valve cover<br>(OK, Not) | Direction<br>(Clockwise, Anticlockwise) | Condition           |                                       |                           | Remarks |
|------------|------|----------|---------------|---------------------------------|--------------------------|---|---------------------|---------------------------------------|---------------------------|---------|
|            |      |          |               |                                 |                          |   | Operable<br>(C, NC) | Number of<br>rotation to be<br>closed | Need for a<br>replacement |         |
| Valve      | V-1  |          |               |                                 |                          |   |                     |                                       |                           |         |
|            | V-2  |          |               |                                 |                          |   |                     |                                       |                           |         |
|            | V-3  |          |               |                                 |                          |   |                     |                                       |                           |         |
|            | V-4  |          |               |                                 |                          |   |                     |                                       |                           |         |
|            | V-5  |          |               |                                 |                          |   |                     |                                       |                           |         |
|            | V-6  |          |               |                                 |                          |   |                     |                                       |                           |         |
|            | V-7  |          |               |                                 |                          |   |                     |                                       |                           |         |
|            | V-8  |          |               |                                 |                          |   |                     |                                       |                           |         |
|            | V-9  |          |               |                                 |                          |   |                     |                                       |                           |         |
|            | V-10 |          |               |                                 |                          |   |                     |                                       |                           |         |
| Hydrant    | H-1  |          |               |                                 |                          |   |                     |                                       |                           |         |
|            | H-2  |          |               |                                 |                          |   |                     |                                       |                           |         |
|            | H-3  |          |               |                                 |                          |   |                     |                                       |                           |         |
|            | H-4  |          |               |                                 |                          |   |                     |                                       |                           |         |
|            | H-5  |          |               |                                 |                          |   |                     |                                       |                           |         |
|            | H-6  |          |               |                                 |                          |   |                     |                                       |                           |         |
|            | H-7  |          |               |                                 |                          |   |                     |                                       |                           |         |
|            | H-8  |          |               |                                 |                          |   |                     |                                       |                           |         |
|            | H-9  |          |               |                                 |                          |   |                     |                                       |                           |         |
|            | H-10 |          |               |                                 |                          |   |                     |                                       |                           |         |
| Water out  | No.  | Size     | Material      | Meter(Y, N)                     | Condition                | Remarks                                 |                     |                                       |                           |         |
|            | W-1  |          |               |                                 |                          |   |                     |                                       |                           |         |
| Stand post | No.  | Size     | Material      | Meter(Y, N)                     | Condition                | Remarks                                 |                     |                                       |                           |         |
|            | SP-1 |          |               |                                 |                          |   |                     |                                       |                           |         |

All valves, fire hydrant,



## 2. Pilot Activities in Borella

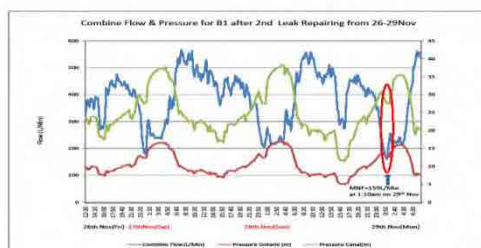
### Isolation & Metering

- Some selected valves will be closed (without interrupting water to zone) to minimize the feeding points.
- All feeding points are metered or converted into 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 Plot area |         |
|---------------------------|---------------|-------------|-----------------------|--|---|-------------------|---------|
| House                     |               |             |                       |  |   | Sub zone          |         |
| No.                       | Customer name | Customer ID | Road name / House No. | Previous month consumption (m <sup>3</sup> ) | Meter condition (OP, IR, U, I, NAB, CO) | Family's Number   | Remarks |
| 1                         |               |             |                       |  |   |                   |         |
| 2                         |               |             |                       |  |   |                   |         |
| 3                         |               |             |                       |  |   |                   |         |
| 4                         |               |             |                       |  |   |                   |         |
| 5                         |               |             |                       |  |   |                   |         |
| 6                         |               |             |                       |  |   |                   |         |
| 7                         |               |             |                       |  |   |                   |         |
| 8                         |               |             |                       |  |   |                   |         |
| 9                         |               |             |                       |  |   |                   |         |
| 10                        |               |             |                       |  |   |                   |         |
| 11                        |               |             |                       |  |   |                   |         |
| 12                        |               |             |                       |  |   |                   |         |

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

### Customer List and Meter Condition Survey

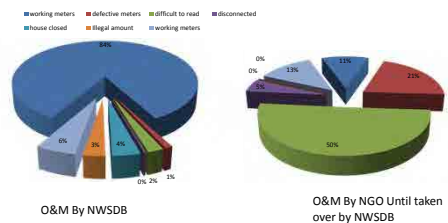




## 2. Pilot Activities in Borella

**Summery of the Survey**

| zone name                    | B1  | B2  | B3  | B4  | B5  | B6   | B7  | B8  | B10 | Total | %        | B9  |
|------------------------------|-----|-----|-----|-----|-----|------|-----|-----|-----|-------|----------|-----|
| No. of consumers             | 584 | 624 | 360 | 453 | 814 | 1109 | 307 | 186 | 191 | 4628  | 100      | 623 |
| Commen taps                  | 2   | 6   | 0   | 27  | 11  | 7    | 1   | 2   | 0   | 56    |          | 2   |
| No. of working meters        | 543 | 596 | 289 | 435 | 762 | 891  | 287 | 160 | 164 | 4127  | 89.17459 | 77  |
| No. of unmeter detected      | 12  | 3   | 1   | 17  | 6   | 9    | 0   | 1   | 3   | 52    | 1.123596 | 148 |
| No. of defective detected    | 15  | 2   | 13  | 15  | 28  | 25   | 5   | 4   | 3   | 110   | 2.376837 | 360 |
| No. of difficult to read     | 0   | 0   | 2   | 0   | 4   | 5    | 0   | 2   | 0   | 13    | 0.280899 | 38  |
| No. of disconnected premises | 0   | 0   | 3   | 0   | 12  | 155  | 3   | 12  | 9   | 194   | 4.191876 | 0   |
| No. of houses closed         | 7   | 23  | 47  | 12  | 8   | 24   | 12  | 7   | 12  | 152   | 3.284356 | 0   |
| No. of illegal rectified     | 8   | 15  | 25  | 13  | 14  | 190  | 1   | 9   | 4   | 279   | 6.028522 | 90  |

**Graphical representation of Survey data****Meter testing**

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

**Meter Accuracy test****Key items of leak detection**

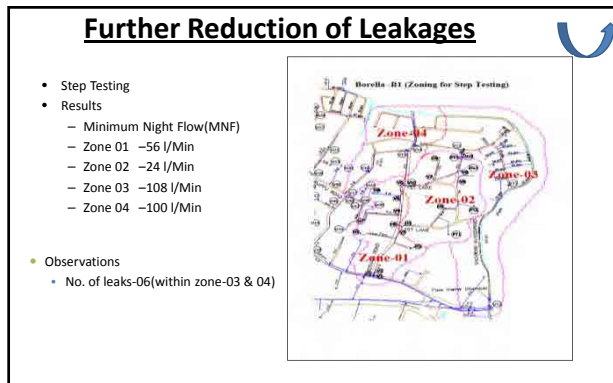
- The portion between ferrule to house meter point will be checked by using **Eco-stick**.
- All other areas will be checked by using **Leak Detection Instrument** some times by correlator.
- Pin-point or confirmation survey can be introduces if required.

**Leak Detection**



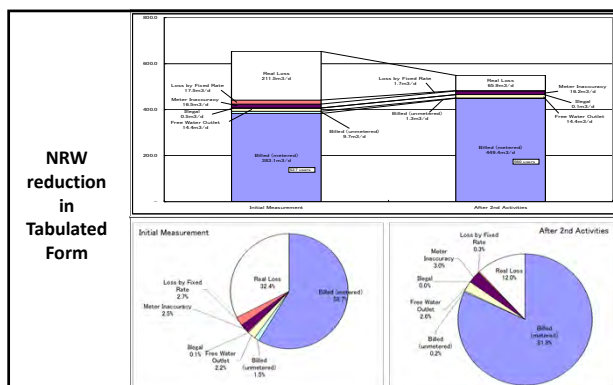


2. Pilot Activities in Borella



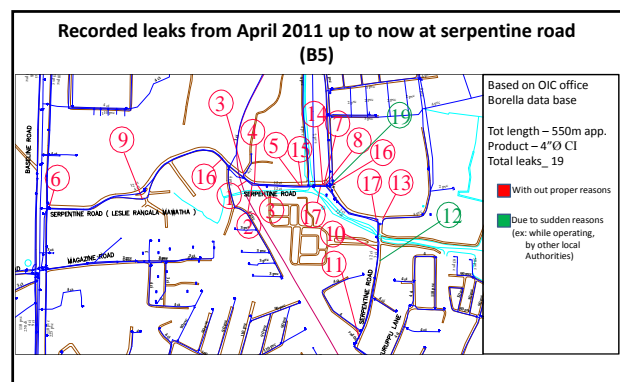
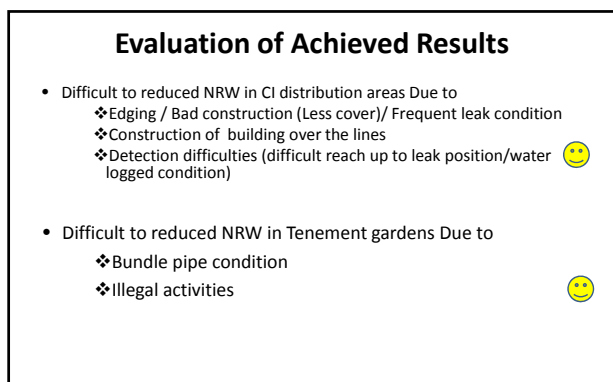
### Details of NRW reduction in B1 (According to IWA water balanced sheet)

| B1 Initial Measurement         |                      |                      |                      | B1 After 2nd Activities        |                      |                      |                      |
|--------------------------------|----------------------|----------------------|----------------------|--------------------------------|----------------------|----------------------|----------------------|
| System Input Volume            | 463.1 m <sup>3</sup> | 463.1 m <sup>3</sup> | 463.1 m <sup>3</sup> | System Input Volume            | 463.1 m <sup>3</sup> | 463.1 m <sup>3</sup> | 463.1 m <sup>3</sup> |
| Authorized Consumption         | 407.1 m <sup>3</sup> | 407.1 m <sup>3</sup> | 407.1 m <sup>3</sup> | Authorized Consumption         | 407.1 m <sup>3</sup> | 407.1 m <sup>3</sup> | 407.1 m <sup>3</sup> |
| Unauthorized Consumption       | 56.0 m <sup>3</sup>  | 56.0 m <sup>3</sup>  | 56.0 m <sup>3</sup>  | Unauthorized Consumption       | 56.0 m <sup>3</sup>  | 56.0 m <sup>3</sup>  | 56.0 m <sup>3</sup>  |
| Billed Metered Consumption     | 383.1 m <sup>3</sup> | 383.1 m <sup>3</sup> | 383.1 m <sup>3</sup> | Billed Metered Consumption     | 383.1 m <sup>3</sup> | 383.1 m <sup>3</sup> | 383.1 m <sup>3</sup> |
| Billed Non-metered Consumption | 9.7 m <sup>3</sup>   | 9.7 m <sup>3</sup>   | 9.7 m <sup>3</sup>   | Billed Non-metered Consumption | 9.7 m <sup>3</sup>   | 9.7 m <sup>3</sup>   | 9.7 m <sup>3</sup>   |
| Revenue Water                  | 392.7 m <sup>3</sup> | 392.7 m <sup>3</sup> | 392.7 m <sup>3</sup> | Revenue Water                  | 392.7 m <sup>3</sup> | 392.7 m <sup>3</sup> | 392.7 m <sup>3</sup> |
| Water Losses                   | 14.4 m <sup>3</sup>  | 14.4 m <sup>3</sup>  | 14.4 m <sup>3</sup>  | Water Losses                   | 14.4 m <sup>3</sup>  | 14.4 m <sup>3</sup>  | 14.4 m <sup>3</sup>  |
| Apparent Losses                | 14.5 m <sup>3</sup>  | 14.5 m <sup>3</sup>  | 14.5 m <sup>3</sup>  | Apparent Losses                | 14.5 m <sup>3</sup>  | 14.5 m <sup>3</sup>  | 14.5 m <sup>3</sup>  |
| Meter Inaccuracy               | 16.5 m <sup>3</sup>  | 16.5 m <sup>3</sup>  | 16.5 m <sup>3</sup>  | Meter Inaccuracy               | 16.5 m <sup>3</sup>  | 16.5 m <sup>3</sup>  | 16.5 m <sup>3</sup>  |
| Loss by Fixed Rate             | 17.5 m <sup>3</sup>  | 17.5 m <sup>3</sup>  | 17.5 m <sup>3</sup>  | Loss by Fixed Rate             | 17.5 m <sup>3</sup>  | 17.5 m <sup>3</sup>  | 17.5 m <sup>3</sup>  |
| Road Losses                    | 211.5 m <sup>3</sup> | 211.5 m <sup>3</sup> | 211.5 m <sup>3</sup> | Road Losses                    | 211.5 m <sup>3</sup> | 211.5 m <sup>3</sup> | 211.5 m <sup>3</sup> |



### Detail of NRW reduction in Borella

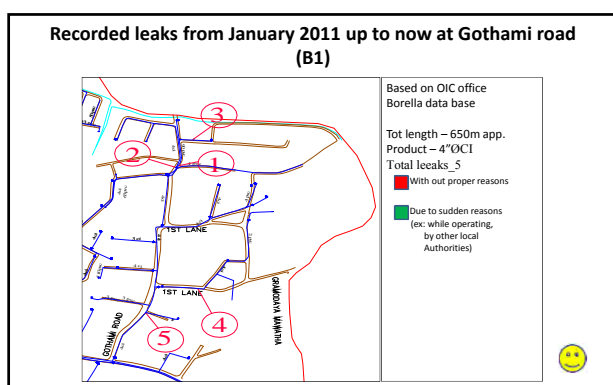
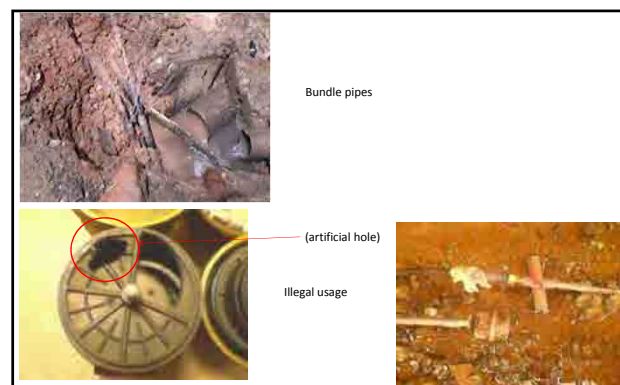
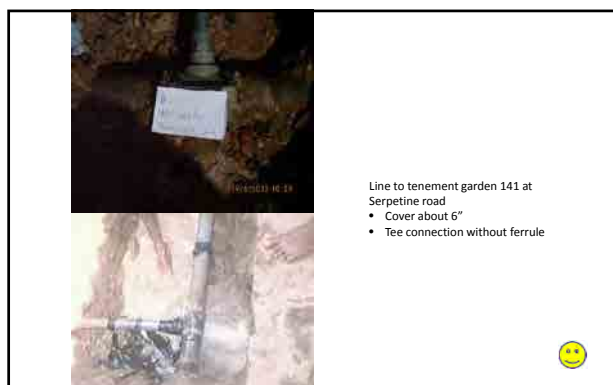
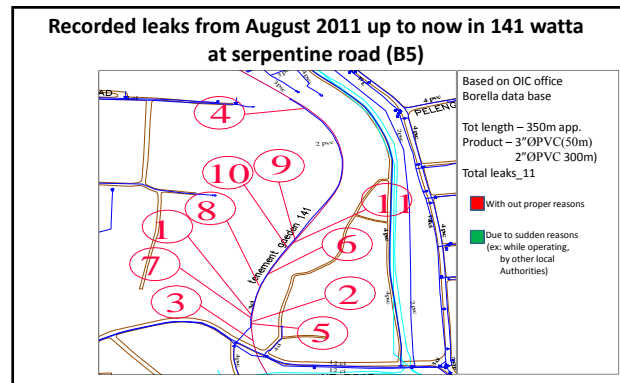
| Zone | Initial Amount in % | Final Amount in % |
|------|---------------------|-------------------|
| B1   | 39.9                | 17.9              |
| B2   | 61.7                |                   |
| B3   | 84.1                | 28.6              |
| B4   | 60.74               | 26.5              |
| B5   | 62.3                | 52.4              |
| B6   | 49.5                | 28.5              |
| B7   | 30                  |                   |
| B8   | 28                  |                   |
| B9   | 62                  | 37                |
| B10  | 75.6                | 9.7               |



## Annex -3 Training Materials (9)

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

### 2. Pilot Activities in Borella



| Out Come of the Project           |     |    |     |    |    |     |    |    |     |     |       |
|-----------------------------------|-----|----|-----|----|----|-----|----|----|-----|-----|-------|
| Physical progress                 |     |    |     |    |    |     |    |    |     |     |       |
| Zone                              | B1  | B2 | B3  | B4 | B5 | B6  | B7 | B8 | B9  | B10 | Total |
| No of illegal connections removed | 8   | 15 | 25  | 13 | 14 | 190 | 1  | 9  | –   | 4   | 279   |
| Rectification of Over flow tanks  | 1   | 12 | 1   | 0  | –  | –   | –  | –  | –   | 12  | 26    |
| No of unmetered places metered    | 9   | 3  | 1   | 17 | 6  | 9   | 0  | 1  | 120 | 2   | 168   |
| No. of defective meters changed   | 15  | 2  | 13  | 15 | 28 | 25  | 5  | 4  | 360 | 3   | 470   |
| No of common taps removed         | 1   | –  | 0   | 2  | 2  | 2   | 0  | 0  | 0   | 0   | 7     |
| No. of new connections given      | 8   | –  | 3   | –  | –  | –   | –  | –  | –   | –   | 11    |
| Meter sealing proceses            | 550 | –  | 350 | –  | –  | –   | –  | –  | –   | –   | 900   |

## 2. Pilot Activities in Borella

| Physical progress continued.....                    |      |     |    |    |    |      |    |    |    |     |       |
|---|------|-----|----|----|----|------|----|----|----|-----|-------|
| zone name   | B1   | B2  | B3 | B4 | B5 | B6   | B7 | B8 | B9 | B10 | Total |
| No. of sluse-valves & wash-out(FH) trace & surfaced | 12"φ | 2   |    |    | 1  |      |    |    | 1  |     | 3     |
|   | 6"φ  |     |    |    |    |      |    |    |    |     | 1     |
|   | 4"φ  | 8   | 3  | 2  | 4  | 7    | 9  | 1  | 1  | 1   | 37    |
| No. of new sluse-valves & wash-out(FH) installed    | 2"φ  | 1   |    |    |    |      |    |    |    |     | 1     |
|   | 6"φ  |     |    |    |    | 5    |    |    |    |     | 5     |
|   | 4"φ  | 6   | 5  |    | 6  | 4    | 4  | 1  |    | 1   | 27    |
| Length of newly layed commen mains (m)              | 2"φ  | 2   |    |    |    | 3    |    |    |    |     | 5     |
|   | 3"φ  |     | 90 |    |    | 200  |    |    |    |     | 290   |
|   | 2"φ  | 60  |    |    |    | 450  |    |    |    |     | 510   |
| Meter Chambers installed                            | 2    | 4   | 1  | 2  | 2  | 2    | 1  |    |    | 1   | 15    |
| No. of connections transferred                      | 3    | 21  |    |    |    | 125  |    |    |    |     | 149   |
| Replaced length of bunddle pipes(m)                 | 15   | 840 |    |    |    | 4800 |    |    |    |     | 5655  |

## Summery of Out Come

|  | B1    | B3    | B4    | B6    | B9    | B10 | Total   |
|--|-------|-------|-------|-------|-------|-----|---------|
| Amount of water saving (m <sup>3</sup> /day) | 104.1 | 901.0 | 252.0 | 277.0 | 101.0 | 0.3 | 1,635.4 |

## 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 some of 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


- 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.
- 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.

## 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.

2. Pilot Activities in Borella

# Schedule of FH/WO flushing



| Zone | Wash out no. | Year    |        |        |        |         |        |        |        |
|------|--------------|---------|--------|--------|--------|---------|--------|--------|--------|
|      |              | Month 1 |        |        |        | Month 2 |        |        |        |
|      |              | Week 1  | Week 2 | Week 3 | Week 4 | Week 1  | Week 2 | Week 3 | Week 4 |
| B11  | F141         | ✓       |        |        |        |         |        |        |        |
|      | F142         | ✓       |        |        |        |         |        |        |        |
|      | F143         | ✓       |        |        |        |         |        |        |        |
|      | F144         | ✓       |        |        |        |         |        |        |        |
| B12  | F145         | ✓       |        |        |        |         |        |        |        |
|      | F146         | ✓       |        |        |        |         |        |        |        |
|      | F147         | ✓       |        |        |        |         |        |        |        |
|      | F148         | ✓       |        |        |        |         |        |        |        |
| B13  | WO1          | ✓       |        |        |        |         |        |        |        |
|      | F149         | ✓       |        |        |        |         |        |        |        |
|      | F150         |         |        |        |        | ✓       |        |        |        |
|      | F151         |         |        |        |        | ✓       |        |        |        |
| B14  | F152         |         |        |        |        | ✓       |        |        |        |
|      | F153         |         |        |        |        | ✓       |        |        |        |
|      | F154         |         |        |        |        | ✓       |        |        |        |
|      | F155         |         |        |        |        | ✓       |        |        |        |
| B15  | F156         |         |        |        |        | ✓       |        |        |        |
|      | F157         |         |        |        |        | ✓       |        |        |        |
|      | F158         |         |        |        |        | ✓       |        |        |        |
|      | F159         |         |        |        |        | ✓       |        |        |        |
| B16  | F160         |         |        |        |        | ✓       |        |        |        |
|      | F161         |         |        |        |        | ✓       |        |        |        |
|      | F162         |         |        |        |        | ✓       |        |        |        |
|      | F163         |         |        |        |        | ✓       |        |        |        |
| B17  | F164         |         |        |        |        | ✓       |        |        |        |
|      | F165         |         |        |        |        | ✓       |        |        |        |
|      | F166         |         |        |        |        | ✓       |        |        |        |
|      | F167         |         |        |        |        | ✓       |        |        |        |
| B18  |              |         |        |        |        |         |        |        |        |
| B19  |              |         |        |        |        |         |        |        |        |
| B20  | F168         |         |        |        |        | ✓       |        |        |        |

| Scheduled Night Leak Survey |         |         |         |         |         |         |         |         |         |          |          |          |
|-----------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|
| Night leak Survey           | Year    |         |         |         |         |         |         |         |         |          |          |          |
|                             | Month 1 | Month 2 | Month 3 | Month 4 | Month 5 | Month 6 | Month 7 | Month 8 | Month 9 | Month 10 | Month 11 | Month 12 |
|                             | Week 1  | Week 2  | Week 3  | Week 3  | Week 3  | Week 3  | Week 3  | Week 3  | Week 3  | Week 3   | Week 3   | Week 3   |
| B1                          | ✓       |         |         |         |         |         |         |         |         |          |          |          |
| B2                          |         | ✓       |         |         |         |         |         |         |         |          |          |          |
| B3                          |         |         |         |         |         |         |         |         |         |          |          |          |
| B4                          |         |         |         | ✓       |         |         |         |         |         |          |          |          |
| B5                          |         |         |         |         | ✓       |         |         |         |         |          |          |          |
| B6                          |         |         |         |         |         | ✓       |         |         |         |          |          |          |
| B7                          |         |         |         |         |         |         | ✓       |         |         |          |          |          |
| B8                          |         |         |         |         |         |         |         | ✓       |         |          |          |          |
| B9                          |         |         |         |         |         |         |         |         | ✓       |          |          |          |
| B10                         |         |         |         |         |         |         |         |         |         | ✓        |          |          |
| Remaining area              |         |         |         |         |         |         |         |         |         |          | ✓        |          |
| Remaining area              |         |         |         |         |         |         |         |         |         |          |          | ✓        |

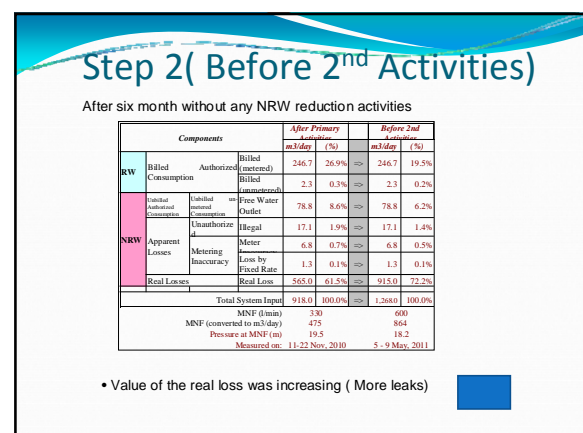
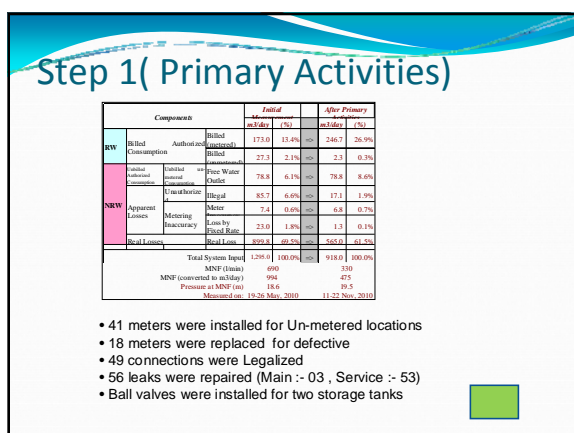
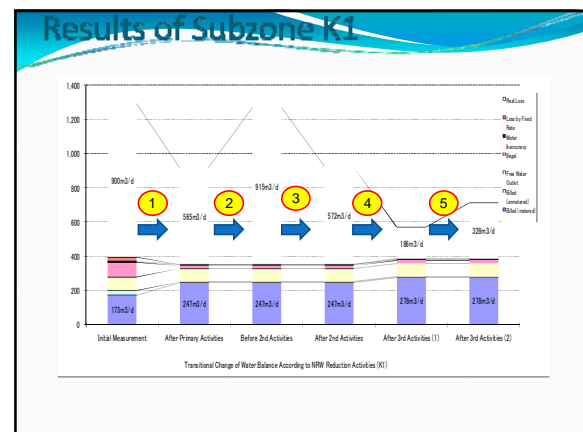
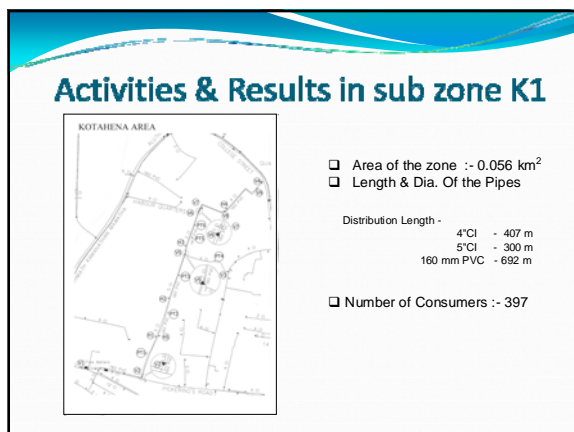
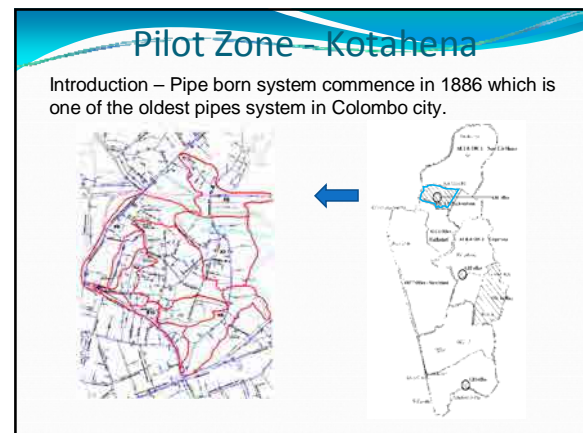
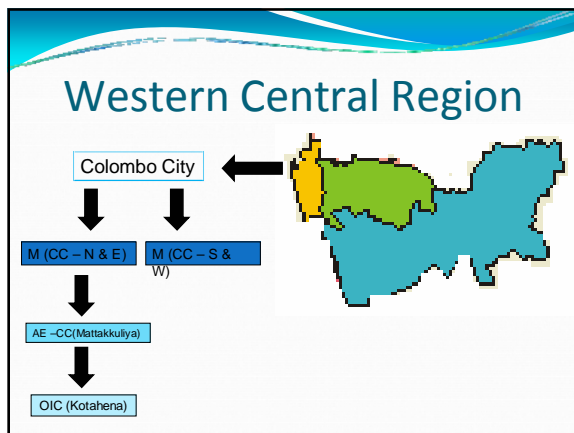
## Lesson Learn

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

- o Systematic night leak survey is very important
- o Rapid engagement to leak repair works is a must
- o Replacing of old CI lines as well as selected PVC line will be very important

Thank You

### 3. Pilot Activities in Kotahena

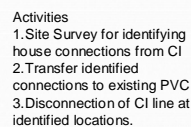


#### Step 4 ( After 3<sup>rd</sup> Activities(1))

| Components                   |                     | After 2nd<br>miller (Ct) | After 3rd<br>miller (Ct) |
|------------------------------|---------------------|--------------------------|--------------------------|
| RW                           | Billed Consumption  | 266.7                    | 278.3                    |
|                              | Unauthorized        | 2.3                      | 2.3                      |
|                              | Unmetered           | 0.0                      | 0.0                      |
| NRW                          | Apparent Losses     | 78.8                     | 78.8                     |
|                              | Metering Inaccuracy | 17.1                     | 17.1                     |
|                              | Real Losses         | 6.8                      | 6.8                      |
| Total System Input           |                     | 925.0                    | 1000.0                   |
| MNF (min)                    |                     | 330                      | 120                      |
| MNF (converted to kWh)       |                     | 475                      | 173                      |
| Pressure at MNF (psi)        |                     | 18.3                     | 17.1                     |
| Measured on: 24-26 Jun, 2011 |                     |                          |                          |
| 26-27 Oct, 2011              |                     |                          |                          |

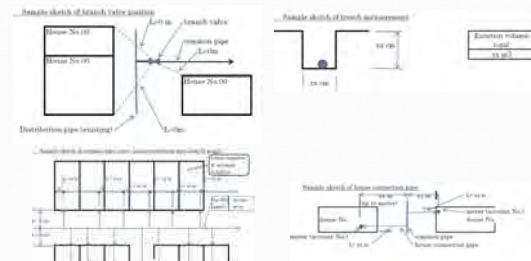
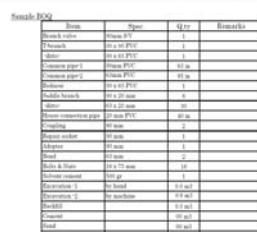
- ☐ Disconnection of bundle pipes at ferrule or nearest point
- ☐ Step testing and leak repairing

### Laying of common Pipes lines & Replacement of Bundle Pipe



- ### Preparation of Manual for bundle pipe replacement
- Preparation stage
    - \* Preparation of drawings & BOQ
  - Construction Stage
    - \* Installation of branch and Valve
    - \* Recording of valve & pipe positions
    - \* Laying of house connection pipes and take records
    - \* Disconnection of existing connection at ferrule or nearest point
    - \* Leak test
  - After Construction Stage
    - \* Preparation of as – built drawings

## Installation & Recordings





## 3. Pilot Activities in Kotahena

### Disconnection of Existing Connections

Method for working in long distance collection at lateral or segment point

Resident check list of old pipes cut, water stopped, new house connection

| House No. | Existing inside pipe cut | Confirmation of water stop | Connection from new mainline pipe | Remarks |
|-----------|--------------------------|----------------------------|-----------------------------------|---------|
| 1         | Confirmed                | Confirmed                  | Confirmed                         |         |
| 2         | Confirmed                | Confirmed                  | Confirmed                         |         |
| 3         | Confirmed                | Confirmed                  | Confirmed                         |         |
| 4         | Confirmed                | Confirmed                  | Confirmed                         |         |
| 5         | Confirmed                | Confirmed                  | Confirmed                         |         |
| 6         | Confirmed                | Confirmed                  | Confirmed                         |         |
| 7         | Confirmed                | Confirmed                  | Confirmed                         |         |
| 8         | Confirmed                | Confirmed                  | Confirmed                         |         |
| 9         | Confirmed                | Confirmed                  | Confirmed                         |         |
| 10        | Confirmed                | Confirmed                  | Confirmed                         |         |
| 11        | Confirmed                | Confirmed                  | Confirmed                         |         |
| 12        | Confirmed                | Confirmed                  | Confirmed                         |         |
| 13        | Confirmed                | Confirmed                  | Confirmed                         |         |
| 14        | Confirmed                | Confirmed                  | Confirmed                         |         |
| 15        | Confirmed                | Confirmed                  | Confirmed                         |         |
| 16        | Confirmed                | Confirmed                  | Confirmed                         |         |
| 17        | Confirmed                | Confirmed                  | Confirmed                         |         |
| 18        | Confirmed                | Confirmed                  | Confirmed                         |         |
| 19        | Confirmed                | Confirmed                  | Confirmed                         |         |
| 20        | Confirmed                | Confirmed                  | Confirmed                         |         |

### Step 5( After 3<sup>rd</sup> Activities(2))

| Components                |                              | After 3 <sup>rd</sup> Activity (m³/day) | After 3 <sup>rd</sup> Activity (%) | After 3 <sup>rd</sup> Activity (m³/day) | After 3 <sup>rd</sup> Activity (%) |
|---------------------------|------------------------------|---|------------------------------------|---|------------------------------------|
| RW                        | Billed Consumption           | 278.3                                   | 48.7%                              | 278.3                                   | 59.0%                              |
|                           | Authorized Consumption       | 2.3                                     | 0.4%                               | 2.3                                     | 0.3%                               |
| NRW                       | Isolated Illegal Consumption | 78.8                                    | 13.8%                              | 78.8                                    | 11.1%                              |
|                           | Free Water Outlet            | 17.1                                    | 3.0%                               | 17.1                                    | 2.4%                               |
|                           | Unauthorized Meter           | 6.8                                     | 1.2%                               | 6.8                                     | 1.0%                               |
|                           | Metering Inaccuracy          | 1.3                                     | 0.2%                               | 1.3                                     | 0.2%                               |
|                           | Loss by Fixed Rate           | 186.3                                   | 32.6%                              | 186.3                                   | 46.1%                              |
| Total System Input        |                              | 571.0                                   | 100.0%                             | 713.0                                   | 100.0%                             |
| MNF (liters)              |                              | 120                                     |                                    | 200                                     |                                    |
| MNF (converted to m³/day) |                              | 173                                     |                                    | 288                                     |                                    |
| Pressure at MNF (m)       |                              | 17.1                                    |                                    | 22.9                                    |                                    |
| Measured on:              |                              | 26-27 Oct, 2011                         |                                    | 10-12 May, 2012                         |                                    |

The flow measurement was conducted after Six month

### Parallel Execution

- Works in other sub zones up to K10 were completed
- Due to difficulty of isolation, the sample zone was selected for some zones by considering easy isolation

### Summaries of the zones

| Zone | Area(m²) | No of consumers | Main Pipe length(m) |      |     |       | No of free water outlet | Implemented Activities | Isolation Method |
|------|----------|-----------------|---------------------|------|-----|-------|-------------------------|------------------------|------------------|
|      |          |                 | PVC                 | CI   | GI  | Total |                         |                        |                  |
| K1   | 0.056    | 391             | 685                 | 701  |     | 1386  | 14                      | Primary & 2nd Activity | Full Zone        |
| K2   | 0.066    | 426             |                     | 1469 |     | 1469  | 23                      | Primary                | Full Zone        |
| K3&4 | 0.258    | 1283            | 177                 | 7265 |     | 7442  | 18                      | Primary                | Full Zone        |
| K5   | 0.093    | 115             |                     | 867  |     | 867   | 4                       | Primary                | Sample           |
| K6   | 0.15     | 559             | 338                 | 2307 |     | 2645  | 3                       | Primary                | Full Zone        |
| K7   | 0.238    | 1545            | 262                 | 4617 | 304 | 5183  | 3                       | Primary                | Sample           |
| K8   | 0.138    | 769             | 776                 | 1668 | 269 | 2713  | 3                       | Primary                | Sample           |
| K9   | 0.196    | 201             | 114                 | 3665 | 881 | 4670  | 3                       | Primary                | Sample           |
| K10  | 0.38     | 303             | 65                  | 2163 |     | 2228  | 3                       | Primary                | Sample           |

\* Primary Activity :- Customer survey  
Acoustic Survey  
Prepaid survey  
Confirmation survey  
Leak repairing

2nd Activities  
Step testing  
Leak repairing  
CI Pipe replacement  
Bundled pipe replacement

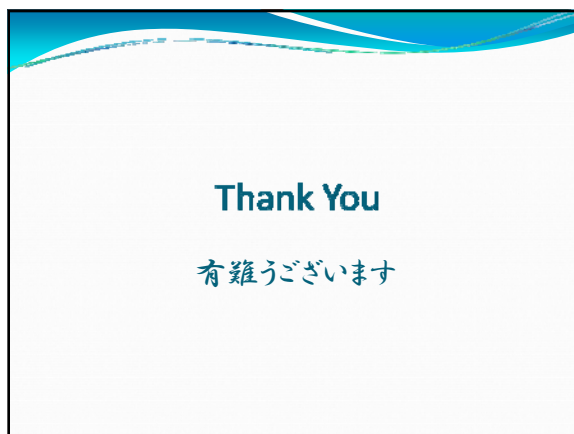
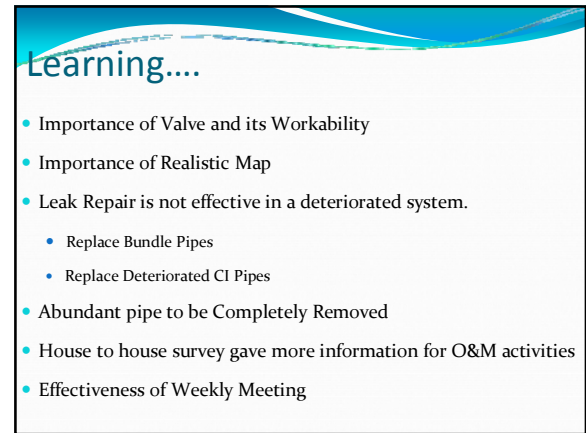
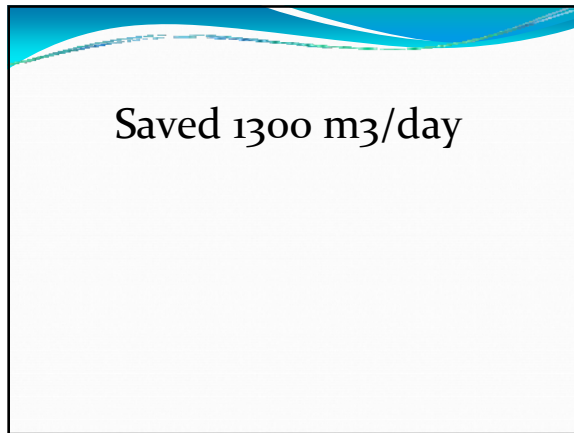
### Results of the zones

| Zone | Initial Flow (m³/Day) | Final Flow (m³/Day) | Initial NRW | Final NRW | Saving Amount (m³/Day) | Method of Isolation | Activity               |
|------|-----------------------|---------------------|-------------|-----------|------------------------|---------------------|------------------------|
| K1   | 1295                  | 571                 | 85%         | 56%       | 724                    | Full                | Primary & 2nd Activity |
| K2   | 1245                  | 933                 | 78%         | 72%       | 312                    | Full                | Primary                |
| K3&4 | 4240                  | 3989                | 73%         | 71%       | 251                    | Full                | Primary                |
| K5   | 120                   | 115                 | 59%         | 55%       | 5                      | Sample              | Primary                |
| K6   | 1720                  |                     | 46%         |           |                        | Full                | Primary                |
| K7   | 201                   | 194                 | 65%         | 64%       | 7                      | Sample              | Primary                |
| K8   | 79                    |                     |             |           |                        | Sample              | Primary                |
| K9   | 473                   |                     |             |           |                        | Sample              | Primary                |
| K10  |                       |                     |             |           |                        |                     | Primary                |

### 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

3. Pilot Activities in Kotahena





## Outline of EXECUTION PLAN (Draft) on NRW Reduction in Colombo

October 2012  
NRW Reduction Management Team

1

General-1/7

## Execution Plan (Draft)

**Purpose:**

- ◆ To disseminate the NRW reduction activities to entire Colombo City based on the findings obtained through the Project.

**Discusses on:**

- ◆ Old & deteriorated pipes must be replaced ASAP, but they cannot be replaced at once. It will take years.
- ◆ This plan intends to discuss what we can do to reduce NRW while waiting for pipe replacement.
- ◆ And activities mentioned in this Plan will be also useful for O&M for new system.

2

General-2/7

## Prepared by NRW Reduction Management Team

(with assistance of JICA Expert Team)

- AGM (NRW) as the Project Leader
- AGM (O&M)
- AGM (Development)
- Manager (NRW)
- Manager (O&M)
- Manager (Development)
- Manager (Colombo City – N/E)

3

General-3/7

## Contents of Execution Plan

- Part A
  - Outline of the Project
  - Findings of the Project
- Part B
  - Execution Plan

4

General-4/7

## PART A: CAPACITY DEVELOPMENT PROJECT

**Chapter A1 Outline of the Project**  
⇒ (explained by AGM-NRW)

**Chapter A2 Findings in the Project**  
**Chapter A3 Water Audit**  
⇒ (explained by OIC Kotahena & Borella)

5

General-5/7

## PART B: EXECUTION PLAN

**Chapter B1 Policy and Target of NRW Reduction**  
**Chapter B2 Improvement of Measurement System**  
**Chapter B3 Unbilled Authorized Consumption**  
**Chapter B4 Reduction of Apparent Losses**

**Chapter B5 Reduction of Real Losses** ⇒ (will be explained by Manager-NRW in detail)  
**Chapter B6 Improvement of GIS** ⇒ (will be explained by engineer for GIS in the Project)  
**Chapter B7 PR Activities** ⇒ (will be explained by PR Officer in detail)

**Chapter B8 Organizational Improvement**  
**Chapter B9 Evaluation and Monitoring of Implementation**

**Chapter B10 Other Recommendations** ⇒ (refer to the Execution Plan)

6

## 4. Outline of Execution Plan and Recommendation

| Supporting Report   |  | General-6/7 |
|---|--|-------------|
| <ol style="list-style-type: none"> <li>1: Results of Pilot Activities</li> <li>2: Manual for Bundle Pipe Replacement</li> <li>3: Manual for Operation Methods of Leakage Detection Equipment</li> <li>4: Leakage Recording System</li> <li>5: GIS Improvement Methods</li> <li>6: Cost and Benefit</li> </ol> |  | 7           |

| IWA's Terminology for NRW          |   |  |  |                              | General-7/7 |
|------------------------------------|---|--|--|------------------------------|-------------|
| System Input Volume<br><br>M³/year | Authorized Consumption<br><br>M³/year                   | Billed Authorized Consumption<br>M³/year   | Billed Metered Consumption   | Revenue Water<br>M³/year     |             |
|                                    |   | Unbilled Authorized Consumption<br>M³/year | Billed Non-metered Consumption   |                              |             |
|                                    | Water Losses<br><br>M³/year                             | Apparent Losses<br>M³/year                 | Unbilled Metered Consumption (water used for fire fighting, etc)       | Non-Revenue Water<br>M³/year |             |
|                                    |   |  | Unbilled Un-metered Consumption (free water distributed at standpipes) |                              |             |
|                                    |   | Real Losses<br>M³/year                     | Unauthorized Consumption   |                              |             |
|                                    |   |  | Metering Inaccuracies  |                              |             |
|                                    | Leakage or Transmission and/or Distribution Mains       |  |  |                              |             |
|                                    | Leakage and Overflows at Utility's Storage Tanks        |  |  |                              |             |
|                                    | Leakage on Service Connecting up to Customers' Metering |  |  |                              |             |

Note: Source - The categories of the international Water Association (IWA).

8

| Chapter B1 Policy and Target of NRW Reduction   | B1-1/2 |
|---|--------|
| <ul style="list-style-type: none"> <li>• <b>Fundamental solution:</b> <ul style="list-style-type: none"> <li>– Pipe Replacement / Rehabilitation is inevitable to reduce NRW</li> </ul> </li> <li>• <b>However, other activities are also necessary to bring down NRW to acceptable level such as:</b> <ul style="list-style-type: none"> <li>– Reduction of free water</li> <li>– Reduction of unauthorized consumption</li> <li>– Reduction of administration losses</li> <li>– Active Leakage Control</li> </ul> </li> </ul> | 9      |

| Execution Plan discuss the activities to be taken:   | B1-2/2 |
|--|--------|
| <ul style="list-style-type: none"> <li>• Before completion of pipe replacement / rehabilitation.</li> <li>• In the area where pipe replacement / rehabilitation takes time.</li> <li>• After pipe replacement.</li> <li>• This Execution Plan can be: effective not only to current system, but also to future new system..</li> </ul> | 10     |

| Chapter B2 Improvement of Monitoring/ Measurement System  | B2-1/1 |
|---|--------|
| <p>Measurement of Inflow to the system is a must to know the NRW.</p> <p>However it is very difficult and requires huge input to isolate the system, according to a finding/experience obtained by the Project. Therefore...</p> <p><b>Wait for Formation of DMA</b></p> <p>Monitoring of DMA will help selection of the problematic (priority) area and reduction of activities.</p> | 11     |

| Chapter B3 Unbilled Authorized Consumption  | B3-1/1 |
|---|--------|
| <ul style="list-style-type: none"> <li>• Findings in Pilot Areas:<br/>The more total NRW reduced, the more contribution of free water increase.</li> </ul> <p><u>It is important to encourage continuation / improvement of Current Program of Randiya Project and community formation.</u></p> | 12     |



B4-1/6

### **Chapter B4 Reduction of Apparent Losses**

#### 1. Unauthorized consumption

- Illegal connection

#### 2. Metering Error

- Inaccuracy of Meters
- Reading errors by meter readers
- Fixed rate

13

B4-2/6

#### 1. Reduction of Unauthorized Consumption

NWSDDB is undertaking inspection of illegal connection **at random base**.

Need for Improvement of Methods :

▣ **Alternative 1 (Highly recommended option):**

- Meter readers to collect customer information
- OIC office to analyze the data to find suspected houses.
- To inspect at suspected houses.

14

B4-3/6

#### 1. Reduction of Unauthorized Consumption (continued)

▣ **Alternative 2**

- If “Alternative 1” is difficult, suspicious users may be narrowed down with reference to existing data
  - Extremely low consumption user (by billing record),
  - Previous record of illegal case
  - Disconnected place
  - Area that free water outlet has been removed
- For the narrowing down suspicious users, above information can be overlaid on base map by using **GIS** database

15

B4-4/6

#### 1. Reduction of Unauthorized Consumption (continued)

▣ **Other effective methods to reduce unauthorized connection**

- **PEP is recommended for Service Connection** to prevent unauthorized connection. It will become difficult for customer to tamper PEP connection. (PEP will also contribute to reduction of leakage to a large extent.)
- **Meter sealing** will be efficient to prevent tampering of meters.
- **Education and PR activities;** Customers shall know that it is illegal to touch / repair service connections before customer meters.

16

B4-5/6

#### 2. Metering Inaccuracy

▣ **Recommendation to improve metering:**

- **Periodical replacement** of customer meters
- Periodical check of meter accuracy
- Preventative maintenance of bulk meters
- Improvement of **accessibility** to meters by relocating to outside the houses
- Enhancement the roles of **Meter Readers/** Education
- **Rotation** system of meter readers
- Application of **special (high) rates to continuous estimated (fixed) rates customers**

17

B4-6/6

#### 2. Metering Inaccuracy (continued)

▣ **Proposed Revised (new) Tasks of Meter Readers**

- Customer relation – Appeal “Call 1939”
- Read master meter and child meter
- Read public standpost reading
- Find and Inform visible leakage to OIC
- Customer survey: Requirement for the improvement
- Education / Training
- Uniform
- Rewarding (Giving recommendation)

18

B5-1/7

## Chapter B5 Reduction of Real Losses

- Real loss ⇒  
Most important factor to be tackled  
Details will be presented by Manager (NRW)
- In this presentation, cost vs. benefit by reduction of real loss is presented.

19

B5-2/7

## Cost vs. Benefit by Reduction of Real Loss

1. Estimate required cost for reduction of real loss
2. Estimate volume of water saving by NRW Reduction Activities
3. Compare required cost vs. benefit brought by NRW reduction activities

20

B5-4/7

### 1. Required Cost for Reduction of Real Loss (1/2)

- List up necessary works:
  - Sub-zone selection
  - Isolation & installation of chambers
  - Initial flow measurement
  - Establish initial NRW
  - Leak survey, repair work & recording into database
  - Flow measurement after repair
  - Establish NRW after repair
  - Further leak detection, repair & recording into database
  - Flow measurement after further repair
  - Establish NRW after further repair

21

B5-3/7

### 1. Required Cost for Reduction of Real Loss (2/2)

- Unit cost setting
  - NWSDB Rate Book (2011)
  - Interview with NWSDB
- Estimation of necessary quantities of works
  - Estimation of average number of leakages, based on the findings thru Pilot Activities
  - Estimated for two cases:
    - Borella-similar area (relatively better condition)
    - Kotahena-similar area (relatively poor condition)
- Then calculate total required cost.

22

B5-5/7

### 2. Water Saving by NRW Reduction Activities (1/2)

- Estimation of average water saving (m<sup>3</sup>/month)
  - Based on the findings thru Pilot Activities
  - Categorized in two cases:
    - Borella-similar area (relatively better condition)
    - Kotahena-similar area (relatively poor condition)

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B5-6/7

### 2. Water Saving by NRW Reduction Activities (2/2)

- Estimation of average water saving (m<sup>3</sup>/year)
  - Considers rebounding of real loss after repair, with reference to the result of Pilot Activities
    - Borella-similar area: 10% assumed to go back to original status in 11 months after repair
    - Kotahena-similar area: 20% assumed to go back to original status in 6 months after repair

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3. Cost vs. Benefit of Leak Detection/ Repair (1/1) B5-7/7

|                       | Required Cost per 5,000 Connections <sup>(*)</sup> | Benefit per 5,000 Connections  |  |                 |
|-----------------------|--|--|--|-----------------|
|                       | Cost (LKR/y)                                       | Saved Real Loss per 5,000 Connections (m <sup>3</sup> /d) <sup>(*)</sup> | Unit Rate for Water (LKR/m <sup>3</sup> ) <sup>(*)</sup> | Benefit (LKR/y) |
| Borella-similar Area  | 3,856,252  | 1,886.0  | 311,191.2  | 7,468,589       |
| Kotahena-similar Area | 5,030,460  | 1,855.4  | 166,988.4  | 4,007,721       |

\*5): Unit amount (LKR) per water loss (m3) specified by NWSDB for cost vs. benefit calculation.

- Saving volume at initial stage ⇒ no big difference b/w B-similar & K-similar
- Rebound rate in K-similar is higher than in B-similar
- If proper bundle pipe works can be done together with leak repair, rebounding rate may be moderated. ⇒ benefit in K-similar can be increased

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B6-1/1

## Chapter B6 Improvement of GIS

[Details will be presented by person in charge of GIS.](#)

## Chapter B7 PR Activities

[Details will be presented by PR Officer.](#)

26

B8-1/1

## Chapter B8 Organizational Improvement

*To do activities mentioned in the Execution Plan practically, following additional input may be required:*

- One GIS operator for GIS update + one Engineer to supervise
- Leak Detection Team**  
(6 month / team – one Zone officer area of 5,000 connections)  
1 team for 1 OIC - **8 Teams**
- A staff** for Leak Repair Record Keeping **at OIC office** (and customer data)
- Team for Customer Survey, if meter readers do not execute

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B9-1/1

## Chapter B9 Evaluation and Monitoring of Implementation

- Evaluation and monitoring committee to monitor the activities and evaluate the performance.
- Periodical water audit will be useful.

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B10-1/1

## Chapter B10 Other Recommendations

- ◆ For O&M improvement
- ◆ For system improvement
- ◆ For improvement of Water Act

*Refer to the Execution Plan for further detail..*

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# THANK YOU VERY MUCH

30

**Capacity Development Project  
For Non Revenue Water (NRW) Reduction  
In Colombo City.**

**PROPOSED GIS ACTIVITIES  
IN COLOMBO CITY**

D.T.S.U. Dissanayake  
Engineer O&M (C-S)

**Presentation content**

- **GIS Background and Resources in NWSDB**
- **About Pilot project**
- **Activities to be implemented on Colombo city**
- **Benefits associated with GIS ( According to Pilot project)**

**Presentation content**

- **GIS Background and Resources in NWSDB**
- About Pilot project
- Activities to be implemented on Colombo city
- Benefits associated with GIS ( According to Pilot project)

**Currently Available data at NWS&DB  
for Greater Colombo**

- **Base map**  
Developed under Norad Project using Year 2000 areal Photograph.
- **Water utility network**  
Developed under Norad Project using Norplan maps, As built data and field information. (2000 – 2006)

Base Map need to be updated due to rapid changes



Water utility network includes pipelines, Valves, Fire Hydrants, Standposts, Storages etc

There are several new objects and Information, which are not included in the GIS database and The database shall be updated.

**At the moment the GIS database is not using in O&M**

**NWSDB is going to use GIS database in O&M work**

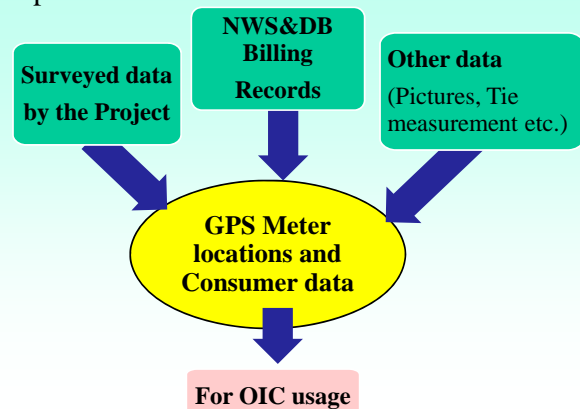
## Presentation content

- GIS Background and Resources in NWSDB
- **About Pilot project**
- Activities to be implemented on Colombo city
- Benefits associated with GIS ( According to Pilot project)

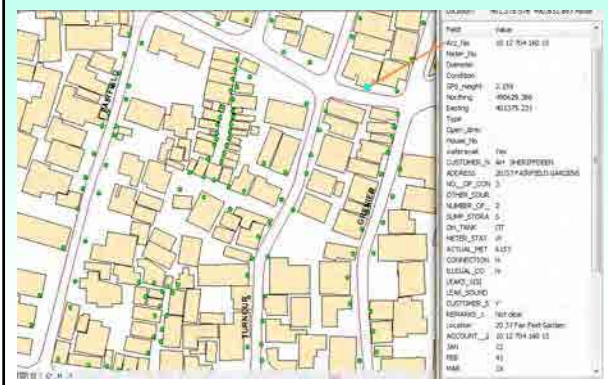
### About Pilot project

- **Area** :- Borella and Kotahena
- **Base map** :- Digitized infrastructures using high resolution satellite images.
- **Consumer locations** :- Field data collection using high accuracy GPS.
- **Other important locations** :- Field data collection using high accuracy GPS.
- **Data Entering** :- Using Arc GIS platform.
- **Product** :- Consumer database with survey and Billing data.

### Preparation final database



### Example of consumer database



### GIS usage under pilot project

**Each OIC has a computer and GIS software**

**O&M Staff already started bringing maps to the site**

**Findings at the field are inform to Maligakanda office for update of the database**



### Presentation content

- GIS Background and Resources in NWSDB
- About Pilot project
- **Activities to be implemented on Colombo city**
- Benefits associated with GIS ( According to Pilot project)

### Proposed execution plan for Colombo city

Update existing Base map using satellite images  
Collecting consumer information by field visit  
Locate consumers on the base map  
Preparation of Consumer database  
Carrying GPS field survey to locate valves, bulk meters, Free water outlets etc.  
Update water network database with collected data

### Major finding in pilot project

Locating consumers using GPS is a time consuming task

Modified and the simple alternative method Will be introduced

Details included in the execution plan  
Supporting report 5  
“GIS improvement for O&M”

### Presentation content

- GIS Background and Resources in NWSDB
- About Pilot project
- Activities to be implemented on Colombo city
- **Benefits associated with GIS ( According to Pilot project)**

### What we can do with GIS database ( According to Pilot project )

As an updated Base map

Overlay operation

Exploring pipe information, Valves, Standpost, ect

Selecting of High priority illegal connections

Asset management and  
Condition assessment

### What we can do with GIS database ( According to Pilot project )

Response to customer complain

Maintain Repair records

Frequent leakages

Selection of routes and cost estimation for new connections



5. Improvement of GIS for O&M in entire CMC

### Overlay operation



**Buildings**



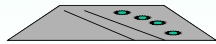
**Utility cables or pipes**



**Water bodies**



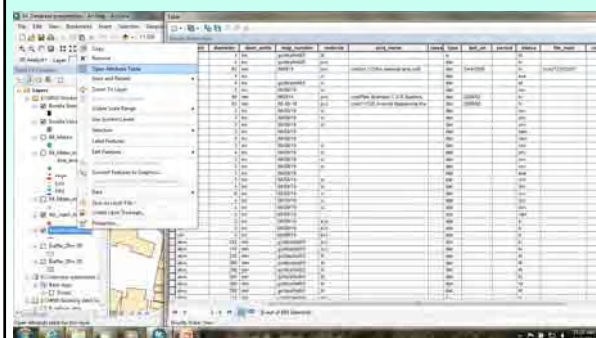
**Administrative data**



**Customer locations**

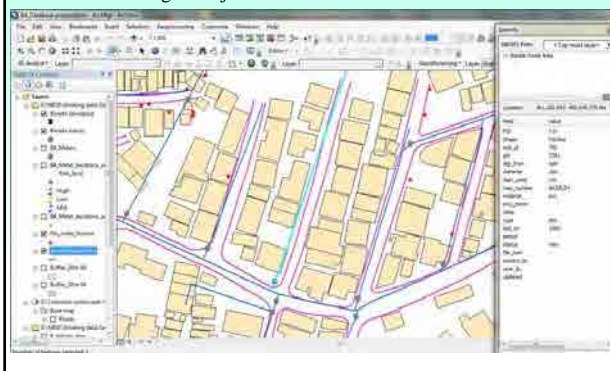
### Exploring pipe information

By attribute Table



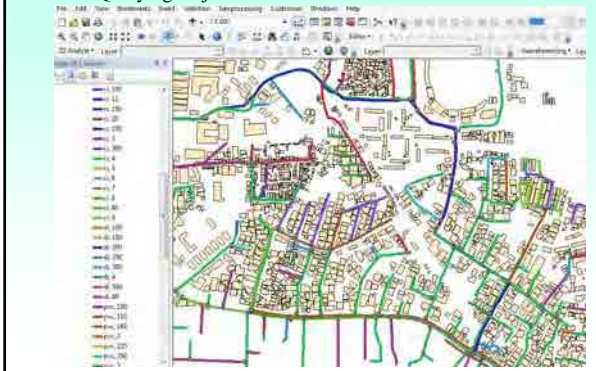
### Exploring pipe information

Selecting an object



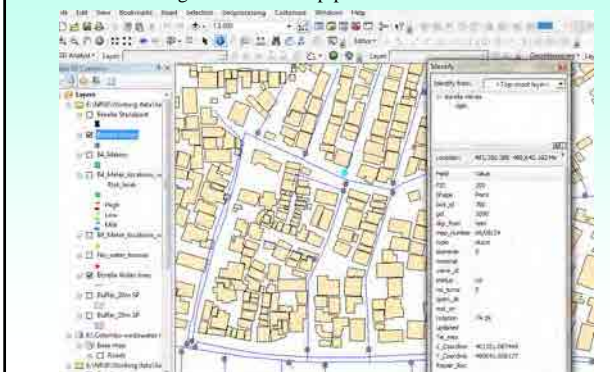
### Exploring pipe information

Querying Objects



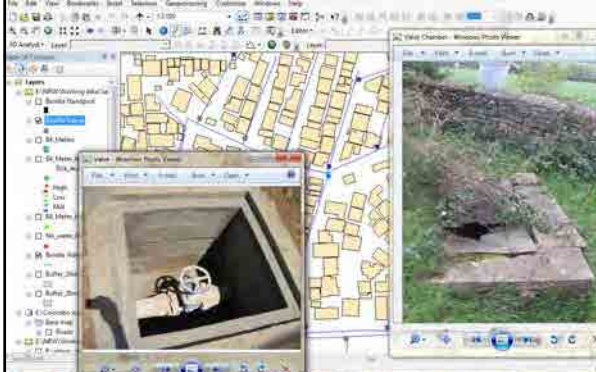
### Exploring Valve information

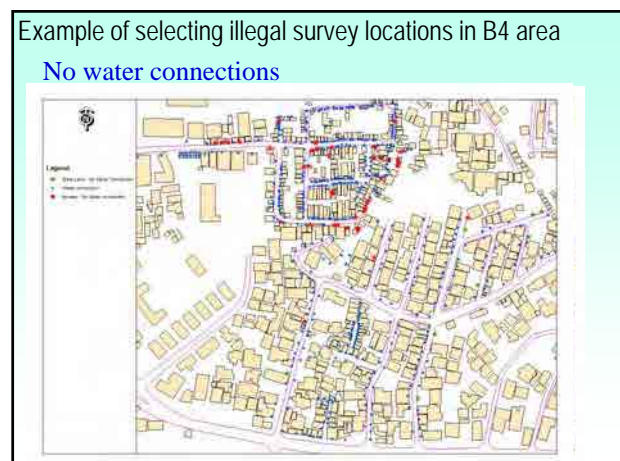
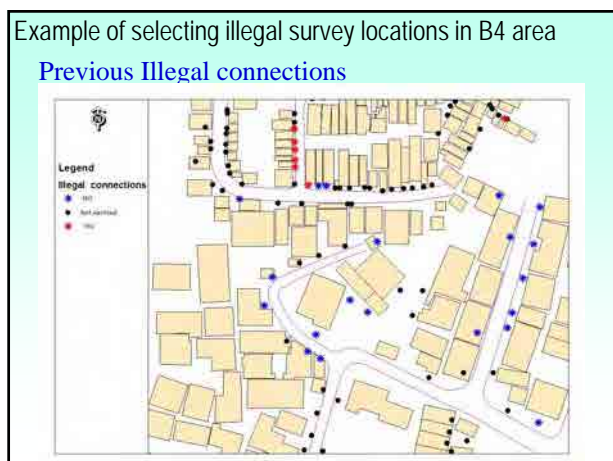
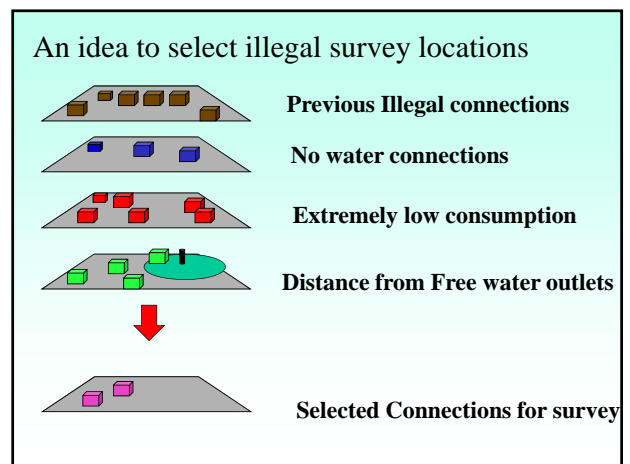
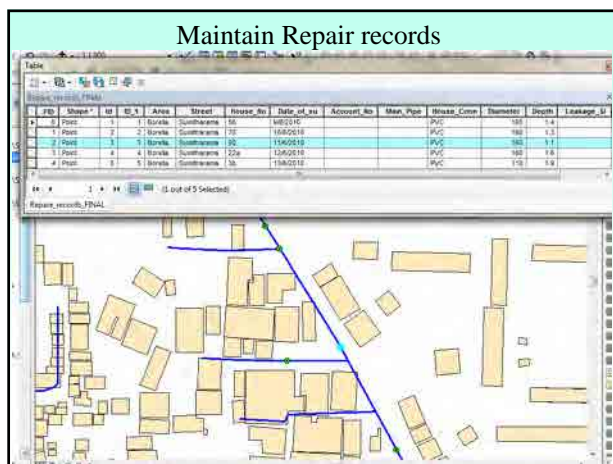
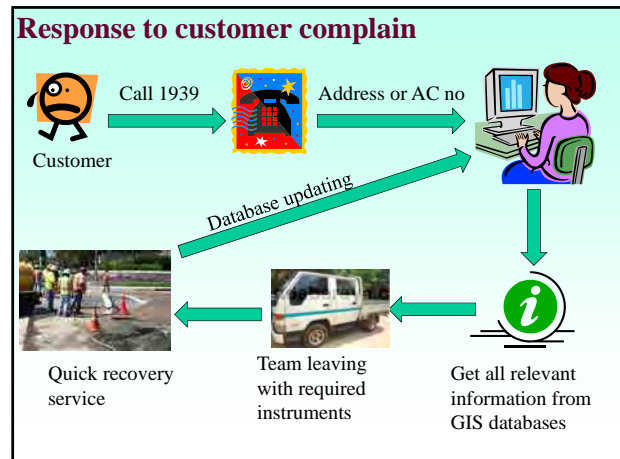
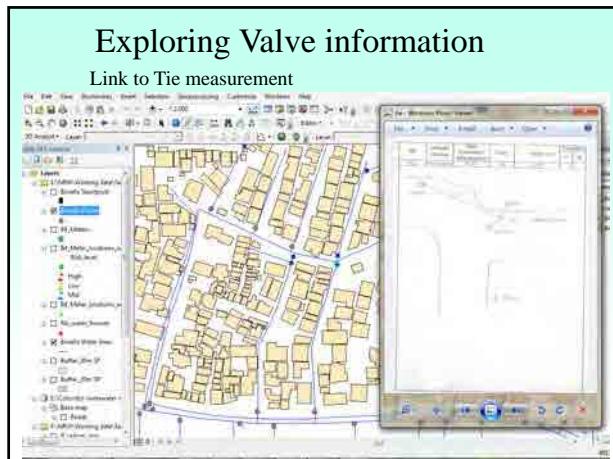
Same thing can be done as pipelines



### Exploring Valve information

Link to Documents & Pictures







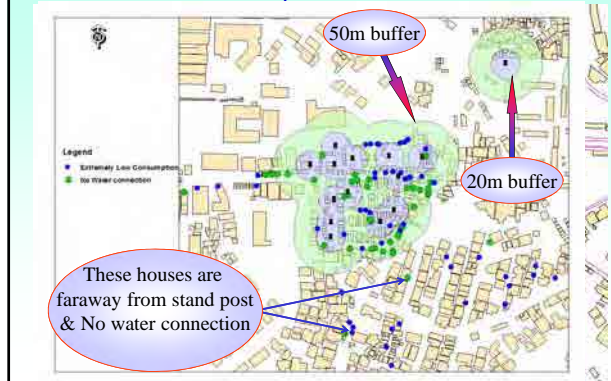
5. Improvement of GIS for O&M in entire CMC

Example of selecting illegal survey locations in B4 area

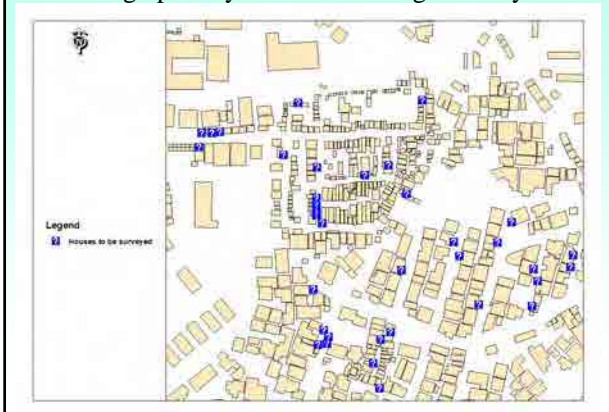


Example of selecting illegal survey locations in B4 area

Far from Public stand post



High priority location for illegal survey



Leak locations - Kotahena



Leak locations - Borella



## Benefits associated with GIS

- Improved quality of service to the consumer
- Improved field activities
- Reduced operating costs
- Security of data
- Map updating
- Production of hardcopy
- Avoided duplication / consistency of information

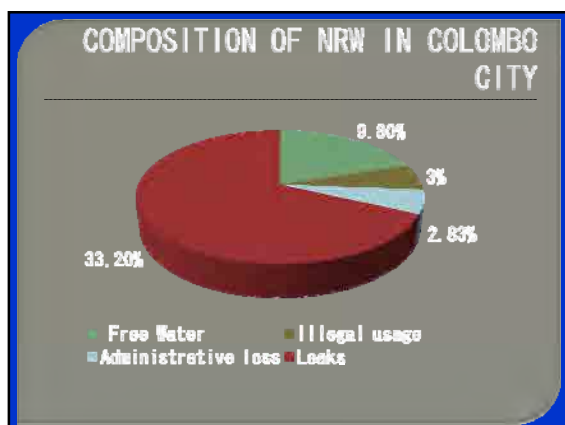
6. Reduction of Real Losses (Leakage)

## Reduction Of Real losses (leakage)

T.B.Heenkenda  
B.Sc.(Hons) & B.A.M.B.(P.O. Degree)  
Manager(WLM)

### Why should leakage be Reduced ?

- To meet increasing water demand in the country
- To avoid requirement of new water sources
- To avoid unnecessary production at plants
- To defer high capital cost for new water treatment plants
- To avoid tariff increase



### Real Losses

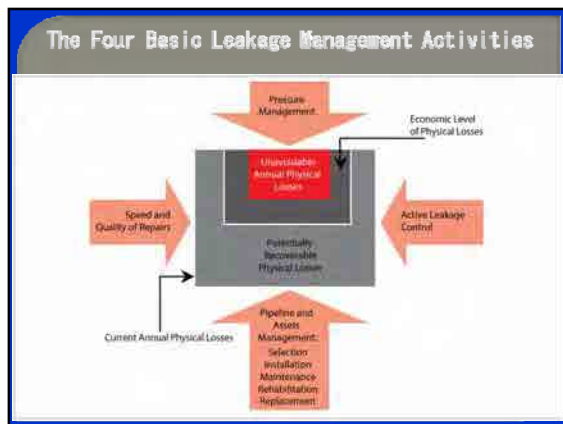
- Main Break or Pipe fracture
- Crack
- Pinhole
- Leakage on Packing Glands of pumps or valves
- Pipe joint leaks
- Leaking service connection pipe

- Reservoirs, sumps, overhead tank leaks and overflow
- Flushing hydrant
- Flushing main line
- Tank backwash

### Reasons for leakages

- Network deterioration
- Poor installation
- Inadequate cover
- Bundle pipe
- Incorrect material

## 6. Reduction of Real Losses (Leakage)



### Leakage Control Options

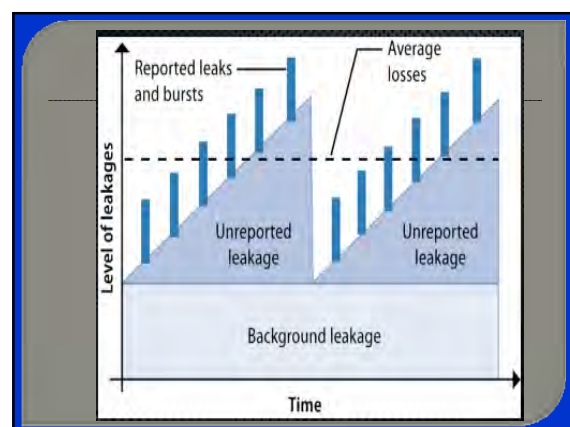
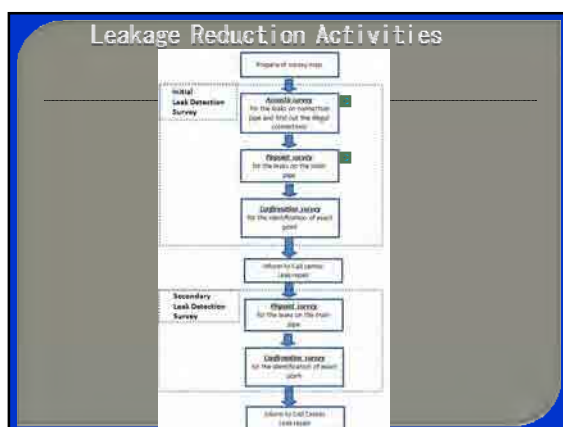
- **Passive control**
  - Respond only to reported faults (present policy)
  - Requires least effort but results in highest leakage levels
  - Normally only cost-effective where water is very cheap (little pumping and treatment)
- **Active control options**
  - Regular sounding
  - Zonal metering
  - Pressure control

### Active Policy Options

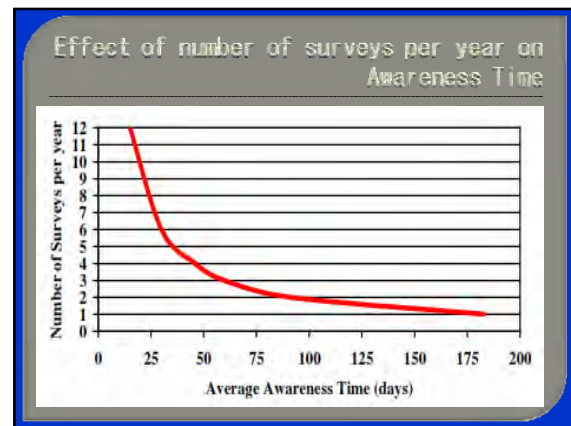
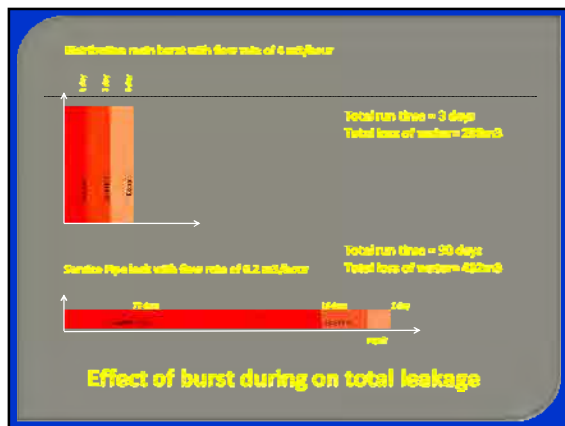
- **Pressure control**
  - Reduce pressure and leakage without affecting the supply to consumers
  - Location of leaks not required
- **Regular sounding**
  - Systematically sound pipes to locate leaks
  - Need many trained inspectors
  - Only cost-effective where the value of water is high
- **Zonal metering (District Metering Areas - DMA's)**
  - Regularly (weekly/monthly) monitor net zone inflow to determine flow characteristics and leakage level, identify the worst affected areas and undertake leakage detection surveys
  - cost-effective where the value of water is high

### Components of Real Losses or Leakage

- ▮ **Reported leaks and breaks**  
Typically high flow rates, short run-time notified to the water utility customers etc
- ▮ **Unreported leaks and breaks**  
Typically moderate flow rates, long run-time located by active leak control
- ▮ **Background leakage**  
(mostly at joints and fittings)  
flow rates too small to be detected if hidden generally



## 6. Reduction of Real Losses (Leakage)



| Kotahena Pilot Zone                              |           |       |       |         |       |       |       |       |      |        |
|--|-----------|-------|-------|---------|-------|-------|-------|-------|------|--------|
| Sub Zone   |           | K1    | K2    | K3 & K4 | K5    | K7    | K8    | K9    | K10  | Total  |
| No of Connections                                |           | 397   | 476   | 1883    | 115   | 1545  | 769   | 201   | 301  | 8185   |
| Area (Km2)                                       |           | 0.056 | 0.066 | 0.256   | 0.091 | 0.239 | 0.138 | 0.196 | 0.08 | 1.122  |
| Length of pipe line (m)                          | CI        | 707   | 1488  | 7160    | 867   | 4617  | 1668  | 3669  | 2169 | 22,319 |
|  | DI        |       |       |         |       | 304   | 269   | 897   |      | 1,450  |
|  | PVC       | 692   |       | 173     |       | 282   | 778   | 114   | 65   | 2,082  |
| Sub Inspector                                    | Acoustic  | 52    | 36    | 17      | 8     | 3     | 59    | 10    | 8    | 176    |
|  | Pinpoint  | 33    | 37    | 8       | 1     | 13    | 6     | 0     | 2    | 100    |
|  | Visual    | 23    | 20    | 1       | 4     | 1     | 2     | 0     | 1    | 56     |
|  | Main leak | 1     | 0     | 1       | 1     | 2     | 3     | 2     | 0    | 19     |
| Total No of Service leak per 100 connection      |           |       |       |         |       |       |       |       |      | 6.40%  |
| No of service leak detected from acoustic method |           |       |       |         |       |       |       |       |      | 3.40%  |

| Borella Pilot Zone                               |              |           |       |       |       |       |       |       |       |       |        |     |
|--|--------------|-----------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-----|
| Sub Zone   |              | B1        | B2    | B3    | B4    | B5    | B6    | B7    | B9    | B10   | Total  |     |
| No of Connections                                |              | 504       | 634   | 569   | 453   | 840   | 1117  | 1003  | 594   | 191   | 4947   |     |
| Area (km2)                                       |              | 0.177     | 0.143 | 0.076 | 0.111 | 0.196 | 0.313 | 0.199 | 0.093 | 0.187 | 1.41   |     |
| Length of pipeline (m)                           |              | 1300      | 2760  | 1508  | 1379  | 1572  | 2790  | 1787  |       | 581   | 12,613 |     |
| DI   |              |           |       |       |       |       |       | 1/8"  |       |       | 1,401  |     |
| PVC  |              | 87%       | 94%   | 100%  | 100%  | 100%  | 100%  | 100%  | 100%  | 77%   | 12,125 |     |
| Leak Detection Method                            | Service leak | Acoustic  | 3     | 2     | 0     | 0     | 1     | 1     | 0     | 0     | 1      | 183 |
|  |              | Pipepoint | 0     | 0     | 2     | 13    | 7     | 8     | 0     | 0     | 0      | 37  |
|  |              | Visual    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0      | 18  |
|  | Main leak    | Pipepoint | 1     | 0     | 1     | 1     | 1     | 0     | 1     | 0     | 0      | 37  |
| Total No of Service leak per 100 connection      |              |           |       |       |       |       |       |       |       |       | 4.75%  |     |
| No of service leak detected from acoustic method |              |           |       |       |       |       |       |       |       |       | 3.64%  |     |

### Leak repair record

- Report all the leak to relevant OIC through Call centre
- Prepare Repair order sheet and give to Zone officer
- Repair leakage quickly and fill Repair order sheet
- Record information to data base and locate at GIS

| Leakage Record Sheet |            |          |          |          |         |              |         |         |         |
|----------------------|------------|----------|----------|----------|---------|--------------|---------|---------|---------|
| Date                 |            | Time     |          | Location |         | Leakage Type |         | Remarks |         |
| 1                    | 20/11/2018 | 10:30 AM | 11:00 AM | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 2                    | 20/11/2018 | 11:00 AM | 11:30 AM | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 3                    | 20/11/2018 | 11:30 AM | 12:00 PM | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 4                    | 20/11/2018 | 12:00 PM | 12:30 PM | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 5                    | 20/11/2018 | 12:30 PM | 1:00 PM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 6                    | 20/11/2018 | 1:00 PM  | 1:30 PM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 7                    | 20/11/2018 | 1:30 PM  | 2:00 PM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 8                    | 20/11/2018 | 2:00 PM  | 2:30 PM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 9                    | 20/11/2018 | 2:30 PM  | 3:00 PM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 10                   | 20/11/2018 | 3:00 PM  | 3:30 PM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 11                   | 20/11/2018 | 3:30 PM  | 4:00 PM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 12                   | 20/11/2018 | 4:00 PM  | 4:30 PM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 13                   | 20/11/2018 | 4:30 PM  | 5:00 PM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 14                   | 20/11/2018 | 5:00 PM  | 5:30 PM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 15                   | 20/11/2018 | 5:30 PM  | 6:00 PM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 16                   | 20/11/2018 | 6:00 PM  | 6:30 PM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 17                   | 20/11/2018 | 6:30 PM  | 7:00 PM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 18                   | 20/11/2018 | 7:00 PM  | 7:30 PM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 19                   | 20/11/2018 | 7:30 PM  | 8:00 PM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 20                   | 20/11/2018 | 8:00 PM  | 8:30 PM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 21                   | 20/11/2018 | 8:30 PM  | 9:00 PM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 22                   | 20/11/2018 | 9:00 PM  | 9:30 PM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 23                   | 20/11/2018 | 9:30 PM  | 10:00 PM | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 24                   | 20/11/2018 | 10:00 PM | 10:30 PM | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 25                   | 20/11/2018 | 10:30 PM | 11:00 PM | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 26                   | 20/11/2018 | 11:00 PM | 11:30 PM | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 27                   | 20/11/2018 | 11:30 PM | 12:00 AM | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 28                   | 20/11/2018 | 12:00 AM | 12:30 AM | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 29                   | 20/11/2018 | 12:30 AM | 1:00 AM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 30                   | 20/11/2018 | 1:00 AM  | 1:30 AM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 31                   | 20/11/2018 | 1:30 AM  | 2:00 AM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 32                   | 20/11/2018 | 2:00 AM  | 2:30 AM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 33                   | 20/11/2018 | 2:30 AM  | 3:00 AM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 34                   | 20/11/2018 | 3:00 AM  | 3:30 AM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 35                   | 20/11/2018 | 3:30 AM  | 4:00 AM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 36                   | 20/11/2018 | 4:00 AM  | 4:30 AM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 37                   | 20/11/2018 | 4:30 AM  | 5:00 AM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 38                   | 20/11/2018 | 5:00 AM  | 5:30 AM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 39                   | 20/11/2018 | 5:30 AM  | 6:00 AM  | Water    | Leakage | Water        | Leakage | Water   | Leakage |
| 40                   | 20/11/2018 | 6:00 AM  | 6:30 AM  |          |         |              |         |         |         |



## 6. Reduction of Real Losses (Leakage)

## Demarcation of Leak Repair Details



## Replacement of Bundle Pipe

- Installation of common pipe
- Meter installation near the main pipe
- Replacement with PEP

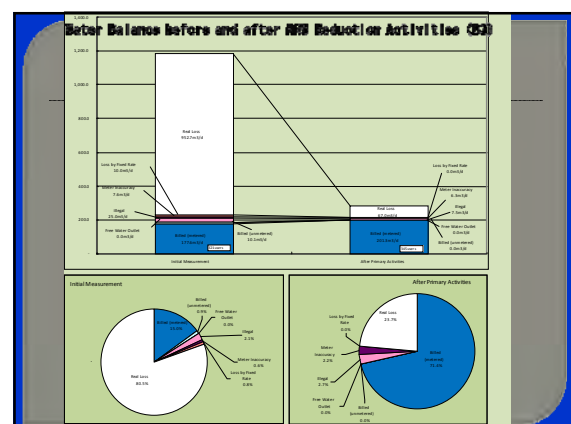


## Storage tanks

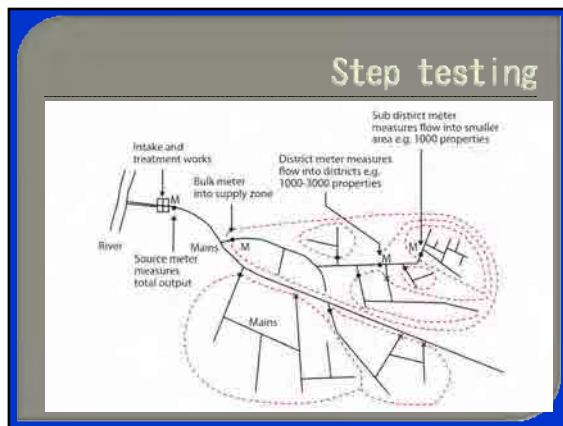


## Storage tanks

- Prepare list of tanks(sumps) and collect information
- Install bulk meter on all the inlet pipes
- The shortage to be arranged to charge from community or consumer

[illegible]

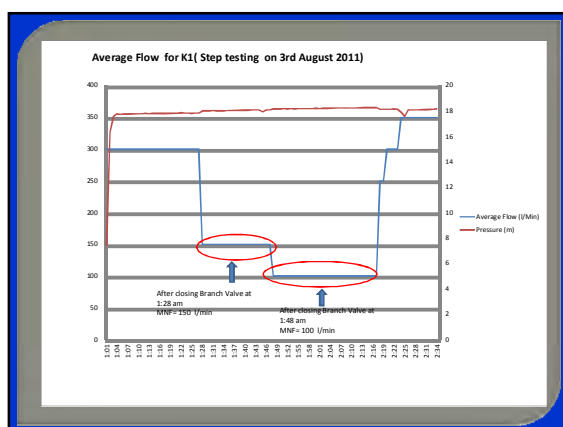
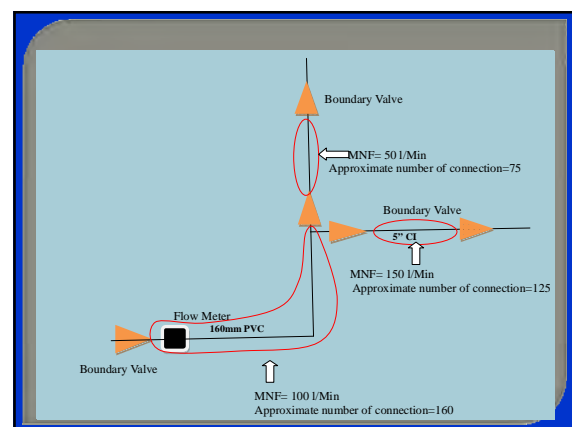
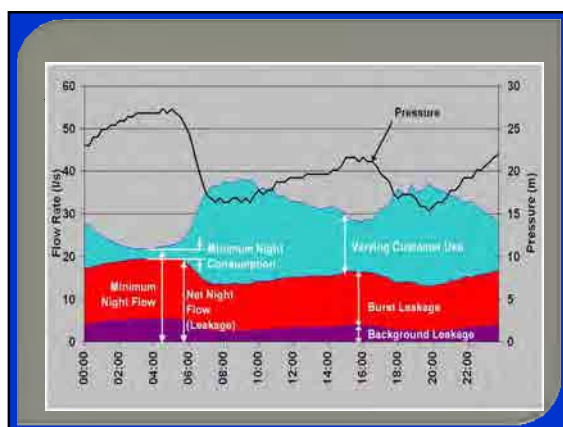
## 6. Reduction of Real Losses (Leakage)



## Implementing Leakage Control in District Meter Areas

### Step Testing

- Step testing is a technique used to locate the areas of greatest leakage within a zoned distribution system.
- The test is undertaken at night during the period of minimum demand when leakage rates are highest.
- The areas identified with high leakage levels can then be given priority attention for leakage surveys.



THANK YOU !



6. Reduction of Real Losses (Leakage)



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)

Why 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*



7. PR Activities

*JICA provided valuable drawing-kits for all students participated*



## What they Created?



## What children gained?

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

## How we appritiated them ?

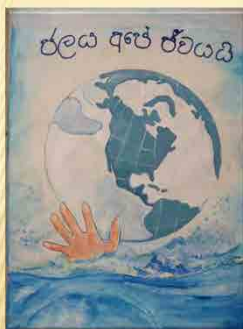
- *Participatory Certificates & Drawing -kits.*
- *Special Certificates & gifts for winners.*

## Selecting winners

*Judges from the University of Kelaniya selected the winners.*



3<sup>rd</sup> Place



*Chansu Vimukthi of Carey College*

2<sup>nd</sup> Place



*Anupa Gunawardena of WesleyCollege*

1<sup>st</sup> Place



*S. K. Sadini Mekela of Ratnawali Balika Maha Vidyalaya*



7. PR Activities

Activity 02

*Special School Activity*

***We selected five schools in Colombo.***

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



Ratnawali Balika Vidyalaya - Borella



St. Mathew's College - Dematagoda



St. Anthony's Balika Vidyalaya - Dematagoda



***Awareness Programs conducted in Relation to;***

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



7. PR Activities

- *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 Karunaratne**  
*Senior Corporate Communication Officer*  
*Regional Support Center (Western - Central)*

### Recommended Urgent Action Plan