




CONTROL SYSTEMS AT USUMA DAM WATER WORKS

A-MOTOR CONTROL CENTER (MCC)

B-DISPLAY / DATA MANAGEMENT SYSTEM (MIMIC BOARD)

C-SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) SYSTEM

WATER TREATMENT CHEMICALS AT USUMA DAM WATER WORKS






A-Alum

B-Chlorine (gaseous)

C-Lime

D-Chlorine (HTH)

PUMPING STATION AT USUMA DAM WATER WORKS







A-Raw Water pumps

B-Motive

C-Alum dosing pumps

D-Lime dosing

E-Polyelectrolyte dosing pumps

WATER TREATMENT PLANTS AT USUMA DAM WATER WORKS





A - FIRST TREATMENT PLANT (5000M³/H)

B - SECOND TREATMENT PLANT (5000M³/H)

C- THIRD (10000M³/H) AND FOURTH (10000M³/H) TREATMENT PLANTS

1987

2000

2014



LABORATORY AT LUD



LABORATORY AT USUMA DAM WATER WORKS



- A- LABORATORY 1
- B- LABORATORY 2 (PHYSIO-CHEMICAL)
- C- LABORATORY 2 (BACTERIOLOGICAL)

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5000m3 Capacity Treated Water Tank



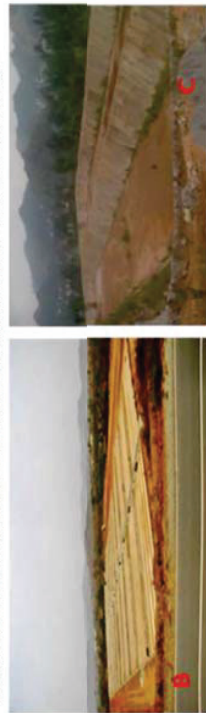
62



SLUDGE TREATMENT AT LUD



SLUDGE TREATMENT UNITS AT USUMA DAM WATER WORKS



- A- Gravity thickener
- B- Paved-drying bed
- C- Lagoon

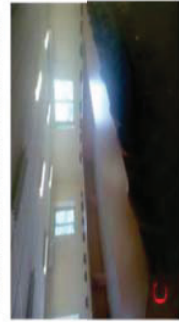
63



FCTWB WATER WORKS LUD



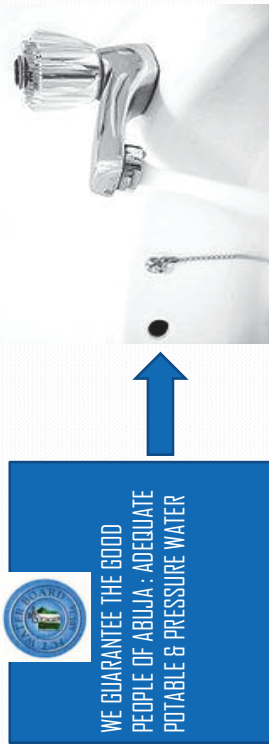
ADMINISTRATIVE BUILDING AT USUMA DAM WATER WORKS



- A-ADMINISTRATIVE BUILDING 1
- B-ADMINISTRATIVE BUILDING 2
- C-CONFERENCE HALL
- D-AUDITORIUM

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THANK YOU FOR YOUR ATTENTION AND LISTENING TO
OUR PRESENTATION.





The Federal Capital Territory Reduction of NRW Project

Outline of the Project

October, 2018

Engr. Aliyu Usman
Deputy Director, FCT Water Board

2018/10/22

Overall Goal, Project Purpose and Three Outputs

Overall Goal	Non-Revenue Water reduction activities are routinely implemented in the service area of FCTWB.
Project Purpose	Capacity of FCTWB for NRW reduction is strengthened.
Output-1	Level of NRW of both the service area of FCTWB and water distribution areas is monitored and estimated.
Output-2	Methods/operational procedures for effective NRW reduction are established through pilot projects at Pilot Metering Areas (PMAs) under pilot Area Offices.
Output-3	A medium-term strategic plan of FCTWB for NRW reduction is developed, utilizing the results of Output 1-2.

2018/10/22

Outline of the Project

Project Name

The Federal Capital Territory Reduction of Non-Revenue Water Project

Project Period

Phase-1: October 2014 to December 2016

Phase-2: January 2017 to September 2018

Project Areas

Federal Capital Territory (FCT)

Pilot Areas: Gudu, Jabi and Garki I

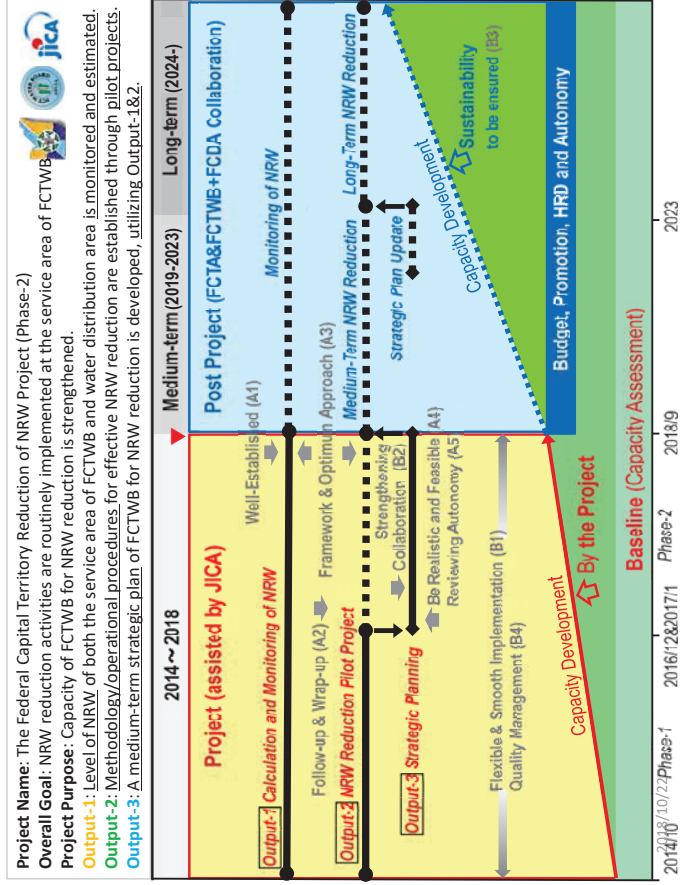
Nigerian Counterparts

Federal Capital Territory Administration (FCTA)

Federal Capital Territory Water Board (FCTWB)

2018/10/22

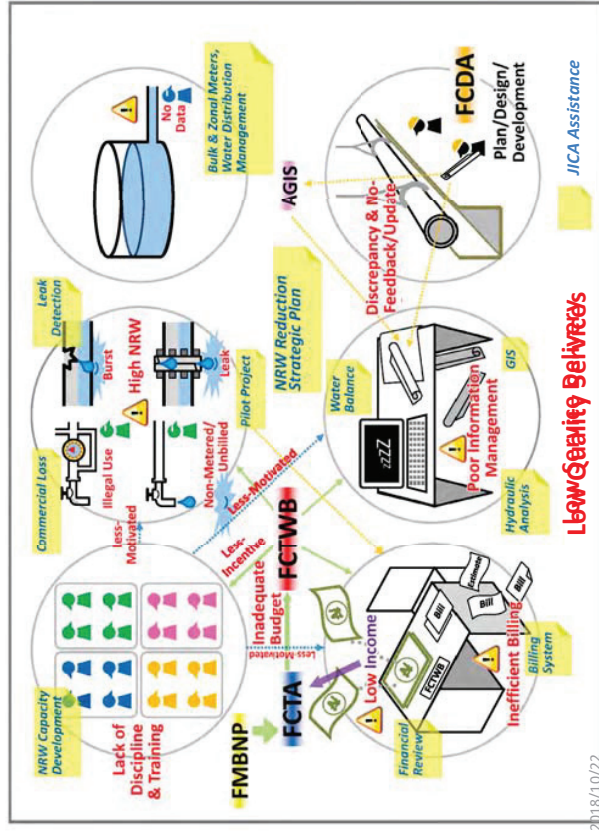
2



3

4

Challenges of FCTWB and the Project



2018/10/22

5

Inputs (Scope of Work)

Inputs from Nigeria

Project Personnel

- Project Director, Project Manager, Deputy Project Manager, Technical Managers, NRW Management Team, NRW Action Team.

Land, Building and Facilities

- Office spaces and necessary facilities at FCTWB

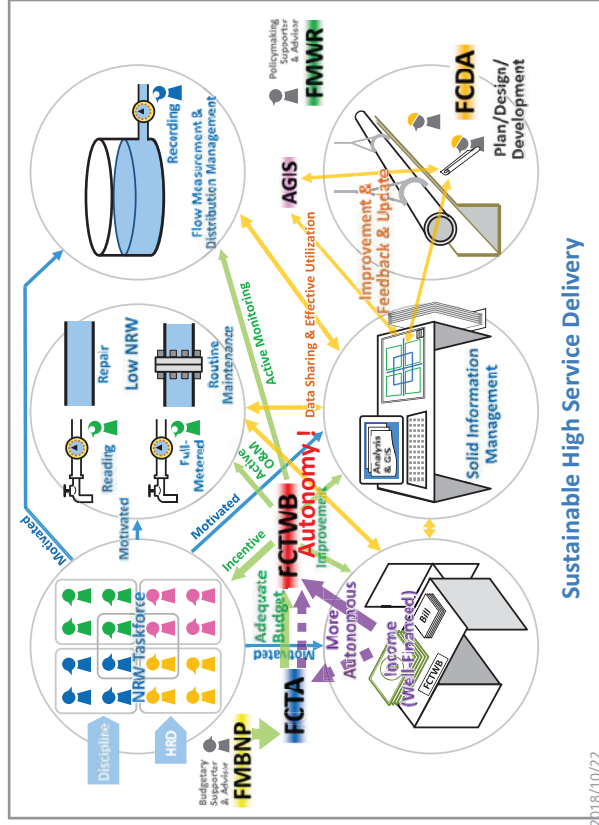
Local Cost

- Operation and maintenance of the provided equipment, and also administrative and operational costs for local traveling, demurrage and communication of telemetric device have been provided.
- However, the Project suffered from non or late release of Counterpart Fund.

2018/10/22

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Ideal Situation of Autonomous FCTWB



2018/10/22

6

Inputs (Scope of Work)

Inputs from Japan

JICA Experts :

- A Chief Advisor and members for nine areas of expertise

Equipment :

- Bulk and zonal meters, data loggers, telemetric monitoring system procured from Japan
- Solar powering systems for the above equipment
- NRW reduction-related equipment such as leak detectors,
- Flow meters, valves and water meters, etc.

Facilities

- Chambers for bulk and zonal meters
- Update of billing system , etc.

Training

- Training on GIS software
- 3 trainings in Japan for 18 officials

2018/10/22

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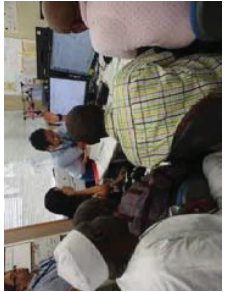
Training (other than On-the-Job Training)



GIS Training on Software in Abuja



1st Training in Japan (Lecture on Business Plan)



1st Training in Japan (Lecture on Mapping System)



2nd Training in Japan (Leakage Detection Survey)
2018/10/22



2nd Training in Japan (Meter Reading by using Handheld Device)



3rd Training in Japan (Meter Laboratory)

Purpose and Sessions in the Seminar

Purpose of the Seminar

Formation of shared awareness of project orientation and results, impact, findings, challenges and way forward

Session 1: The Medium-Term Strategic Plan for NRW Reduction (2019-2023)

Session 2: Results and Impact of the Federal Capital Territory Reduction of Non-Revenue Water Project

Session 3: Questions & Answers, Discussion and Way Forward

THANK YOU FOR YOUR ATTENTION



The Federal Capital Territory Reduction of NRW Project

Medium-Term Strategic Plan (2019 – 2023)

October, 2018

Engr. M. K. Rabi
HoU NRW, FCTWB

Introduction

- Preparation of Medium-Term Strategic Plan for Reduction on NRW for the year (2019-2023) is the Output 3 of the Project.
- The results of Outputs 1 & 2 were used to prepare the Medium-Term Strategic Plan with the primary aim of upscaling lessons learnt to the other service areas of the Board.
- NRW ratios in Garki I, Gudu and Jabi pilot areas ranges from 45.6% - 87.6% before and 12.1% - 34.7% after counter measures respectively.
- Cost of NRW reduction, estimated NRW ratio of 48.3% amongst others were used for the Medium-Term Strategic Plan.
- Based on the Medium-Term Strategic Plan, FCT Water Board will target NRW Ratio of 35.1% for the year 2023 on implementation of "Scenario-d" provisions.

Contents

1. Introduction
2. Assessment of the Pilot Project
3. Scenarios, Goal and cost-Effectiveness
4. NRW Reduction Operation Plan
5. Selected Scenario by the Board
6. Implementing schedule and Budget allocation
7. Staffing Plan and Responsibilities
8. Human Resources Development Plan
9. Recommendation

Introduction

- **Non-Revenue Water** is define as : "water which is being produced and lost before reaching customers.

IWA's Water Balance Sheet

System Input Volume (SIV)	Authorized Consumption	Billed Authorized Consumption	a. Billed Metered Consumption	Revenue Water
			b. Billed Unmetered Consumption	
			b. Billed Unmetered Consumption (Excess Use)	
	Unbilled Authorized Consumption	c. Unbilled Metered Consumption	Non- Revenue Water (NRW)	
		d. Unbilled Unmetered Consumption		
Water Losses	Commercial (Apparent) Losses	e. Unauthorized Consumption		Revenue Water (NRW)
		f. Customer Metering Inaccuracies and Data Handling Errors		
	Physical (Real) Losses	g. Leakage on Transmission and/or Distribution Mains		
		h. Leakage and Overflows at Utility's Storage Tanks	i. Leakage on Service Connections up to Point of Customer Use	

Introduction

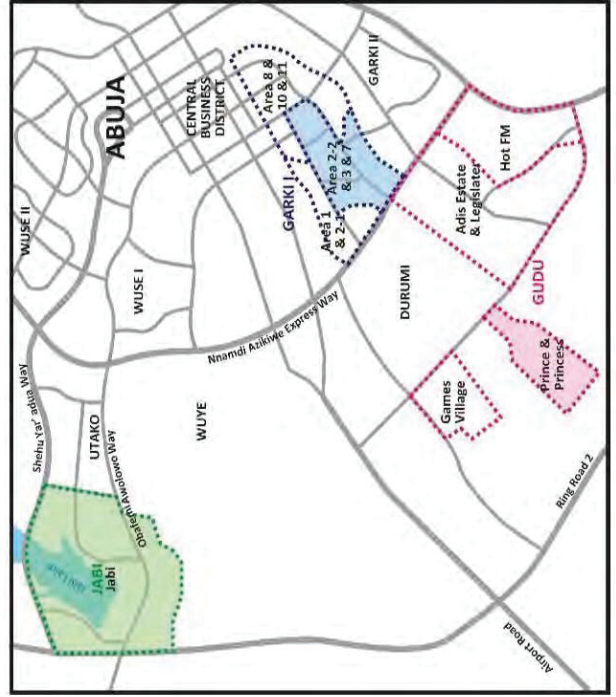
Impacts of NRW Reduction

- Reduction of Operation and Maintenance cost
- Contribute to Increase in Revenue Generation
- Contribute to Water Conservation
- Improvement in Efficiency and Financial Sustainability of Utility Organization
- Increase in Water Supply Coverage
- Improvement in Customer Satisfaction

Annex5-165

5

Location of the Pilot Projects



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Current NRW Situation in the FCT

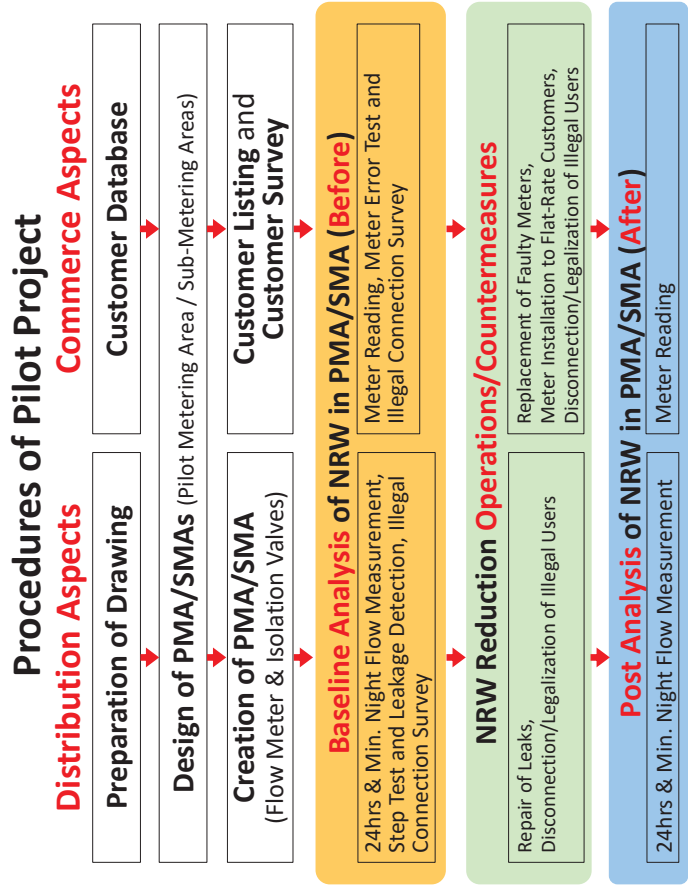
- System Input Volume: **113.38 million m³** per year
- Revenue Water: **58.63 million m³** per year
- Non-Revenue Water: **54.75 million m³** per year
- Non-Revenue Water Ratio: **48.3%**

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Features of The Pilot Metering Areas (PMA)

Pilot Area Office	No. of Customer in PMA	Max. Pipe Dia. (mm)	Total Distance of Pipes (m)	Number of In/out-flow (Places)	Predominant Type of Water Meters in PMA (% of the total installed water meters)
Gudu	784	DN200	14,150	1 / 0	Prepaid (83.0%)
Jabi	604	DN300	23,781	1 / 2	Conventional (96.5%)
Garki I	452	DN450	11,858	1 / 2	AMR (57.7%)
Total	2,001	-	49,789	-	-

8



Causes of NRW in PMAs

The following contribute to NRW:

- Billed unmetered consumption (excess use by flat-rate customers)
- Unauthorized consumption (illegal bypassing/connections), and
- Physical losses (surface/underground leaks) on network pipelines and service pipes

Results of the Pilot Project

NRW Ratio (%) in the PMAs

	Before (%)	After (%)	Reduction Point	Target (%)	Status	Initial Cost + Recurrent Cost (million/3yrs)	Estimated Revenue Increase (million/3yrs)
Gudu							
SMA-1	52.0	12.1	39.9	31.2	OK		
SMA-2	53.9	29.9	24.0	32.3	OK		
PMA	53.3	20.4	32.9	32.0	OK	N81.9	N100.6
Jabi							
SMA-2	45.6	21.1	24.5	27.4	OK		
SMA-3	87.6	42.6	45.0	52.6	OK		
PMA	70.0	30.9	39.1	42.0	OK	N95.0	N274.3
Garki I							
SMA-1	85.1	45.2	39.9	51.1	OK		
SMA-2	74.8	49.3	25.5	44.9	Non		
SMA-3	70.0	27.4	42.6	42.0	OK		
PMA	74.8	34.7	40.1	44.9	OK	N97.9	N112.4

Cost Effectiveness of the Pilot Project

PMA	1) Initial Cost incurred for the Pilot Project (K. NGN)	2) Initial & Recurrent Cost for NRW Reduction Operation* (K.NGN)	3) Estimated Revenue Increase for three years (K. NGN)	3) Cost Effectiveness (Dimensionless) 3) / 2)
Gudu	40,949	81,898	100,576	1.2
Jabi	47,498	94,996	274,317	2.9
Garki-I	48,937	97,874	112,426	1.1

Criteria for selecting Scenario of NRW Reduction Activity

- Early release and availability of budget
- Availability of well-trained staff for leakage survey
- Availability of trainers for analysis of NRW Ratio for Area Office's staff
- Availability of standard storage facility for equipment in Area Office
- Ensure availability of accurate existing pipeline information for creation of District Metered Area (DMA).

Implementation Schedule and Budget allocation

Scenario	Total Cost (mil. NGN)	2019	2020	2021	2022	2023
Scenario-a	883.3	241.7	185.4	178.1	139.7	138.4
	100%	27%	21%	20%	16%	16%
Scenario-b	804.5	225.2	169.0	161.7	123.8	124.8
	100%	28%	21%	20%	15%	16%
Scenario-c	326.9	115.8	59.3	50.7	50.7	50.5
	100%	35%	18%	16%	16%	15%
Scenario-d	222.7	34.1	34.6	50.7	51.4	52.0
	100%	15%	16%	23%	23%	23%
Scenario-e	123.5	14.2	14.7	30.9	31.5	31.2
	100%	12%	12%	25%	26%	26%

Cost-Effectiveness by Scenario

Items	Scenario				
	a	b	c	d	e
Cost (mil. NGN)	i.	882.2	804.5	326.9	222.7
Revenue yielded (mil. NGN)	ii.	4,822.6	4,752.6	3,636.9	4,198.4
Direct benefit (mil. NGN)	iii=ii.-i.	3,939.40	3,948.10	3,310.00	3,975.70
Cost-Effectiveness	iv. = ii./ i.	5.5	5.9	11.1	18.9
					13.8

Conditions for Preparing Financial Statement

- Baseline of NRW ratio: 48.3%
- On the basis of 5 Scenarios of NRW strategies
- Depreciation period/costs of WTP 3&4 and ongoing projects
- Investment (NGN673Mil) and depreciation costs of the Switch-over construction works that connect WTP III & IV to remote distribution pipes (increase of distribution: 150,000 m3/day)
- Tariff: weighted average between the domestic and commercial customers (N90/m³)
- Tariff collection ratio: 31.3%

Profit and Loss (P/L) Statement of the Year 2023 by Scenario (Million Naira)

Account Items	No Scenario	Scenarios				
		a	b	c	d	e
Revenues	7,829	10,306	10,239	9,547	9,824	8,668
Expenditures	2,799	2,895	2,886	2,844	2,824	2,815
P/L	5,030	7,411	7,353	6,703	7,000	5,853

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Items of NRW Reduction Operation

- (1) Network Drawings and Data
- (2) Customer Enumeration
- (3) DMA Design, Creation, Prioritization
 - (3)-1 DMA Design, Creation and Prioritization
 - (3)-2 DMA Prioritization in NRW Reduction
- (4) Zonal Prioritization
- (5) Field Inspection
- (6) Isolation by installing Flow-meters and Valves
- (7) Step-Test in DMA
- (8) Zonal Measurement
- (9) Leakage Detection
- (10) Patrol of Surface Leaks

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Cash Flow Statement of Year 2023 by Scenario (Million Naira)

Activities	No Scenario	Scenarios				
		a	b	c	d	e
Operational	714.5	1,451.3	1,434.6	1,220.4	1,325.0	965.1
Investment	0	- 100.0	- 91.0	- 18.9	- 38.4	- 20.5
Financial	0	0	0	0	0	0
Net C/F	714.5	1,331.3	1,343.6	1,201.5	1,286.6	944.7

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Items of NRW Reduction Operation

- (11)Repair of Leaks and Recording
- (12) Identification of Illegal Connections and Meter Inaccuracy
 - (12)-1 Identification of Illegal Connection
 - (12)-2 Identification of Meter Inaccuracy
- (13)Measures against Illegal Connection and Inaccuracy Meters
 - (13)-1 Measures against Illegal Connections
 - (13)-2 Measures against Meter Inaccuracy

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Items of NRW Reduction Operation

- (14)Data Collection of Monthly Billed Consumption
- (15)Data Collection of Monthly SIV
- (16)Monthly Water Balance Analysis
- (17)Measurement of One-week SIV
- (18)Installing Water Meters
- (19)Survey on Trunk, Distribution Mains and Reservoirs
- (20) Preparation for Pipe Replacement Plan

Selected Scenario by The Board

FCT Water Board should consider the following actions in order to maintain NRW reduction operations:

- Procure accurate water meters.
- Ensure adequate budget to develop meter laboratory.
- Calibrate test meters.
- Need to develop leakage training yard.

Selected Scenario by The Board

FCT Water Board selected “Scenario d”, considering **availability of limited number trained staff for leakage survey**, possibility of having enough budget of **N223million for five years** for allowance and equipment such as customer water meters, meter boxes, fuel, pipes, their fittings, etc.

The selected Scenario provides that FCTWB HQs will lead NRW reduction operations in collaboration of Area Offices such as **leakage survey, illegal connection survey and water meter survey systematically by zone** but NOT create District Metered Area (DMA). FCTWB will target on NRW ratio of **35.1% for the year 2023**

It should be noted that, implementation of NRW reduction operations may change from one scenario to the other for a certain period due to favourable circumstance of cash disbursement and move to higher scenario

Staffing Plan

Required Number of Staff by Scenario

Unit	2019					2020					2021					2022					2023				
HQs	a	b	c	d	e	a	b	c	d	e	a	b	c	d	e	a	b	c	d	e	a	b	c	d	e
NRW reduction	4	3	3	11	9	4	3	3	11	9	4	3	3	11	9	4	3	3	11	9	4	3	3	11	9
GIS	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Distribution	3	2	2	2	2	3	2	2	2	2	3	2	2	2	2	3	2	2	2	2	3	2	2	2	2
Billing	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Commerce	1	1	1	1	0	1	1	1	1	0	1	1	1	1	0	1	1	1	1	0	1	1	1	1	0
HQs Sub-total	13	11	11	19	16	12	10	10	18	15	12	10	10	18	15	12	10	10	18	15	12	10	10	18	15
Area Offices																									
Distribution	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
Commerce	2	2	1	1	1	2	1	1	1	2	2	1	1	2	2	1	1	2	2	1	1	2	2	1	1
Area Office Sub-total	8	8	7	7	7	8	8	7	7	8	8	7	7	8	8	7	7	8	8	7	7	8	8	7	7
Total	21	19	18	26	23	20	18	17	25	22	20	18	17	25	22	20	18	17	25	22	20	18	17	25	22

Human Resource Development (HRD) Plan on NRW Reduction

Training Curriculum on NRW Reduction

- Training Curriculum 1: Basic and Common Knowledge about NRW
- Training Curriculum 2: Management of Pipelines
- Training Curriculum 3: Management of Data
- Training Curriculum 4: Leakage and Illegal Connection Survey
- Training Curriculum 5: Streamlining of billing system and examination on unifying water meters
- Training Curriculum 6: Plumbing for repair and or replacing pipelines
- Training Curriculum 7: Basic operation of personal computer, graphing by using excel

Annex5-171

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Recommendation

Distribution

- ✓ Improvement in As-Built Drawings and Drawing Management
- ✓ Calibration of Customer Meters

Commerce

- ✓ Improvement in Update of Customer Database
- ✓ Streamlining of Customer Category
- ✓ Simplification of Customer Meter
- ✓ Elimination of Estimating Billing System
- ✓ Deactivation of Duplicated / Return Bills
- ✓ Simplification of Water Tariff
- ✓ Elimination of Unauthorized Consumption

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Training Schedule (Tentative)

Curriculums	2019				2020			
	1/4	2/4	3/4	4/4	1/4	2/4	3/4	4/4
Curriculum 1: Basic and Common Knowledge about NRW								
➢ Meaning of NRW								
➢ Outline of Water Balance								
➢ Outline of NRW Reduction								
➢ Outline of NRW Reduction Operation								
Curriculum 2: Management of Pipelines								
➢ Outline of GIS								
➢ Outline of Water Balance analysis								
➢ Outline of NRW Reduction Operation								
Curriculum 3: Management of Data								
➢ Meter Reading								
➢ Meter Test								
Curriculum 4: Leakage and Illegal Connection Survey								
➢ Kinds of Illegal Survey								
➢ Leakage Survey Methods								
➢ Illegal Connection Survey								
Curriculum 5: Streamlining of billing system and examination on unifying water meters								
➢ Examination on unifying water meters								
➢ Streamlining of Meter reading & billing								
➢ Development of customer data								
Curriculum 6: Plumbing for repair and or replacing pipelines								
➢ Repair planing for large scale								
➢ Laying pipelines								
➢ Install valves, flow-meters, saddle, etc.								
Curriculum 7: Basic operation of personal computer, graphing by using excel								
➢ PC operation								
➢ Calculation by using Excel								
➢ Drawing graph by using Excel								

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Recommendation

Finance

- ✓ Fixed asset management
- ✓ Water cost management

Administration

- ✓ Improvement in ICT System
- ✓ Improvement in Office Environment
- ✓ Human Resource Development

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The Federal Capital Territory Reduction of NRW Project

SYSTEM FOR NRW CALCULATION/ESTIMATION AND MONITORING

OCTOBER, 2018

ENGR. ABDULLAHI MAS'UD
AREA MANAGER (GWARINPA)

What is Non-Revenue Water?

NRW is an indicator of water supply management and O&M for actions to be taken, and also is supposed to be kept lower to improve efficiency of water supply services.

Authorized Consumption	Billed Authorized Consumption	Billed Metered Consumption		Revenue Water
		Unbilled Authorized Consumption	Billed Unmetered Consumption	
System Input Volume	Water Losses	Unbilled Authorized Consumption	Unbilled Metered Consumption	Non-Revenue Water (NRW)
		Commercial (Apparent) Losses	Unbilled Unmetered Consumption	
		Physical (Real) Losses	Unauthorized Consumption	
			Customer Metering Inaccuracies and Data Handling Errors	
			Leakage on Transmission and/or Distribution Mains	
			Leakage and Overflows at Utility's Storage Tanks	
			Leakage on Service Connections up to Point of Customer Use	

* "Un-accounted for Water (UfW)" is no longer common term.

Bulk Meters

Roles of Bulk Meters

- FCTWB needs to read bulk meters, located at outlet of LUD Water Treatment Plant, scientifically/quantitatively for
- Calculation of water production or water flow (system input volume) into the entire FCTWB's water supply system
- Analysis of IWA water balance, particularly NRW ratio of entire water supply system.
- Analysis of water loss along trunk mains, together with reading zonal meters as mentioned below.
- Analysis of daily maximum factor for water demand forecasting in water distribution management

Bulk Meters

Location of Bulk Meters

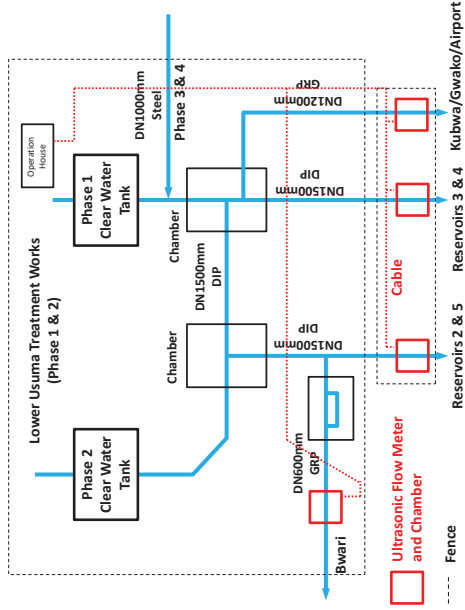
See the next slide.

- No.1: Transmission Main (DN600mm) to Tank Bwari
- No.2: Transmission Main (DN1500mm) to Tank 2 & 5
- No.3: Transmission Main (DN1500mm) to Tank 3 & 4
- No.4: Transmission Main (DN1200mm) to Tank Kubwa, Airport and Gwako

Procurement

- Chamber Construction for 4 locations (completed)
- 4 Ultra-sonic Flow Meters (completed)
- 1 Data Logger (completed)

Location of Bulk Meters



Zonal Meters

2.2 Location of Bulk Meters

See the next slide.

- Tank 2 (x2), Tank 3, Tank 3.1, Tank 3.2, Tank 4, Tank 4.1, Tank 4.1.1, Tank 4.2, Tank 5, Tank Bwari, Tank Kubwa, Tank Airport and Tank Gwako (DN250mm to DN1500mm)

2.3 Procurement

- Chamber Construction for 8 locations
- 14 Ultra-sonic Flow Meters
- 13 Data Logger
- 2 Telemetry System as a pilot
- 13 Solar Power System

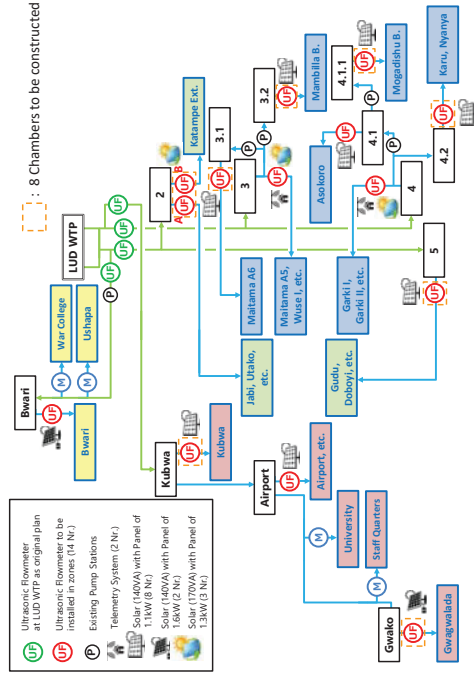
Zonal Meters

Roles of Zonal Meters

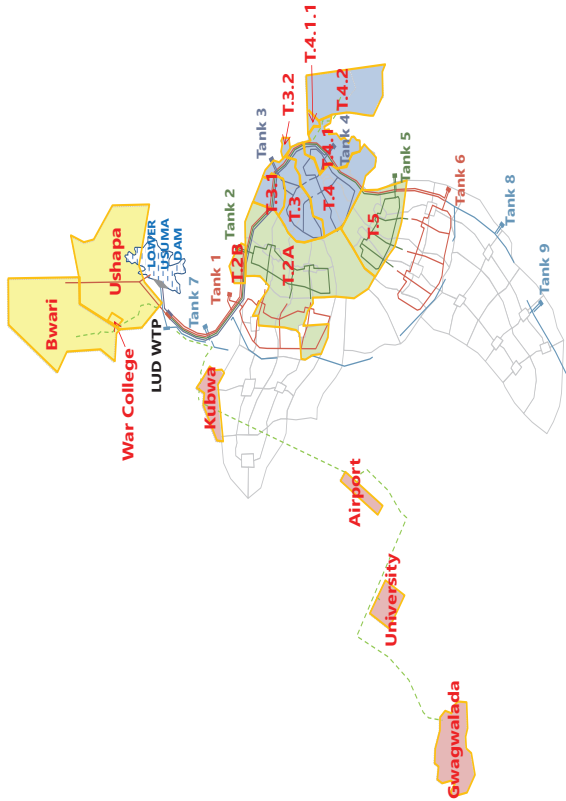
FCTWB needs to read zonal meters, to be located at outlet of the selected tanks, for

- Calculation of water flow (system input volume) into each water distribution zone under a tank.
- Analysis of IWA water balance, particularly NRW ratio of each water distribution zone under a tank.
- Prioritization and ensuring efficiency of NRW reduction operations by water distribution zone.
- Analysis of water loss along trunk mains, together with reading bulk meters as mentioned above.

Location of Bulk and Zonal Meters



Water Distribution Zones



Photos



Chamber Construction for Bulk Meters (Activity 1-1)



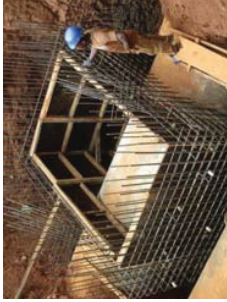
Chamber Construction for Bulk Meters (Activity 1-1)



Bulk Flowmeter Chamber and Fence (Bwari)



Discussion about Modification of Billing System (Activity 1-4)



Chamber Construction for Zonal Meters (Activity 1-6)



Chamber Construction for Zonal Meters (Activity 1-6)

Photos



Sensor Cable Installation



Data Logger for Bulk Flowmeters



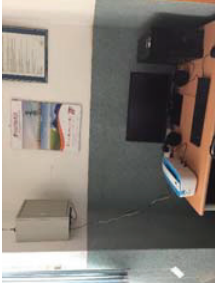
Installation of Zonal Meter's Main Unit (Ultrasonic Flowmeter)



Flowmeter Sensors



Solar Panels for Zonal Meter



Telemetry System (Monitoring PC)

THANK YOU
FOR
YOUR TIME



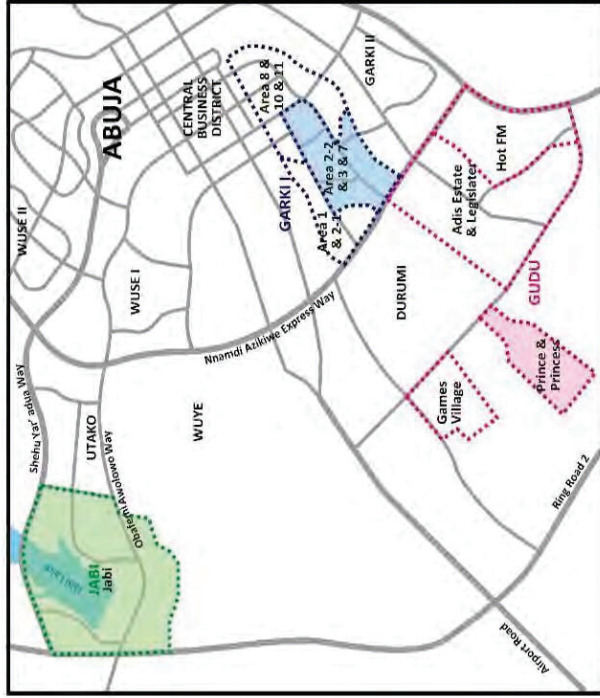
The Federal Capital Territory Reduction of NRW Project

Results of NRW Reduction Pilot Projects

October, 2018

ENGR. MOHAMMED ABDUL OZUMI
FCTWB

Location of the Pilot Projects



Districts in which the Pilot Projects were implemented

Gudu is a district under Abuja master plan's Phase 2 development which has been developed since 2000's as a dwelling area with Apo legislative quarters, some commercial facilities, public institutions and also informal settlements. Gudu PMA "Prince & Princess" is an estate developed by a private developer in which prepaid meters were installed through public-private partnership (PPP).

Jabi is a district under Abuja master plan's Phase 2 development which has been developed since 2000's as a dwelling area with Jabi Lake, a large shopping mall, some commercial facilities, public institutions and also informal settlements, sometime called villages. Jabi PMA "Jabi" is an area developed by FCDA in which conventional meters were installed.

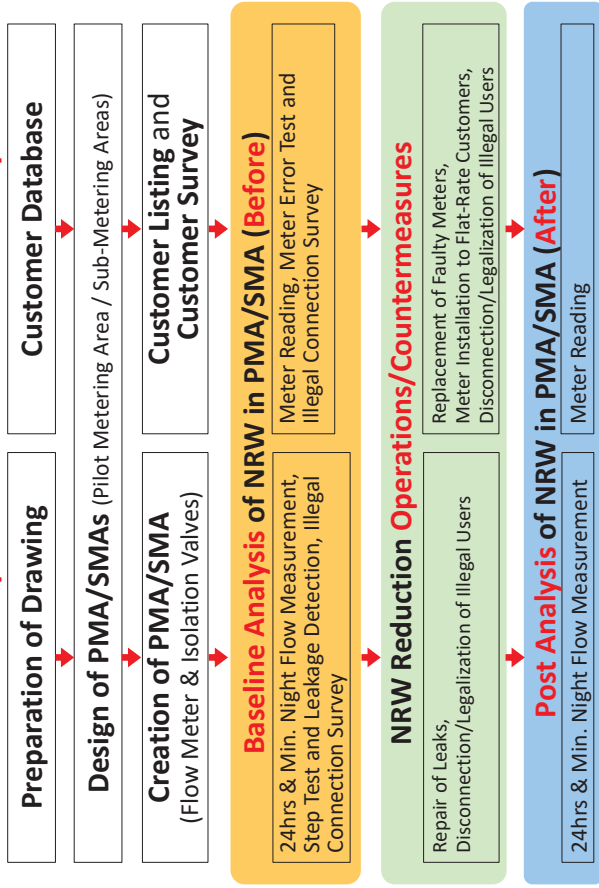
Garki I is a district under Abuja master plan's Phase 1 development which has been developed since 1980's as an administrative and commercial area with some public institutions and also dwellings. Garki I PMA "Area 2-2 & 7" is an area developed by FCDA in which AMR meters and conventional meter were installed.

Features of The Pilot Metering Areas (PMA)

Pilot Area Office	No. of Customer in PMA	Max. Pipe Dia. (mm)	Total Distance of Pipes (m)	Number of In/out-flow (Places)	Predominant Type of Water Meters in PMA (% of the total installed water meters)
Gudu	784	DN200	14,150	1 / 0	Prepaid (83.0%)
Jabi	604	DN300	23,781	1 / 2	Conventional (96.5%)
Garki I	452	DN450	11,858	1 / 2	AMR (57.7%)
Total	2,001	-	49,789	-	-

Procedures of Pilot Project

Distribution Aspects **Commerce Aspects**



NRW in the Pilot Projects (Before:Baseline)

Category	Gudu		Jabi		Garki I	
	m ³ /d	%	m ³ /d	%	m ³ /d	%
Revenue Water	1,414.0	44.0	2,327.8	27.6	409.3	12.8
Billed Authorized (Metered)	87.4	2.7	204.0	2.4	396.9	12.4
Billed Authorized (Flat Rate)	224.2	7.0	102.7	1.2	387.9	12.1
Nominal excess usage by flat-rate customers	104.0	3.2	172.1	2.0	41.0	1.3
Unbilled Authorized	25.7	0.8	-306.3	-3.6	167.2	5.2
Meter Accuracy	133.0	4.1	40.0	0.5	69.0	2.2
Unauthorized	641.2	19.9	0.0	0.0	342.0	10.7
Leakage (Distribution Pipe)	194.4	6.0	840.5	10.0	333.7	10.4
Leakage (Service Pipe)	392.1	12.2	5,064.2	60.0	1,050.0	32.8
Unidentified Loss	3,216.0	100	8,445.0	100	3,197.0	100
System Input Volume						
NRW Causes found						
Unbilled Authorized	1 school	Some public institutions and staff quarters				
Unauthorized (Illegal bypassing/connection)	33 places	10 places	23 places			
Leakage (Distribution Pipe)	30 points	0 points	4 points			
Leakage (Service Pipe)	40 points	37 points	39 points			

Results of the Pilot Project

NRW Ratio (%) in the PMAs

	Before (%)	After (%)	Reduction Point	Target (%)	Status	Initial Cost + Recurrent Cost (million/3yrs)	Estimated Revenue Increase (million/3yrs)
Gudu							
SMA-1	52.0	12.1	39.9	31.2	OK		
SMA-2	53.9	29.9	24.0	32.3	OK		
PMA	53.3	20.4	32.9	32.0	OK	N81.9	N100.6
Jabi							
SMA-2	45.6	21.1	24.5	27.4	OK		
SMA-3	87.6	42.6	45.0	52.6	OK		
PMA	70.0	30.9	39.1	42.0	OK	N95.0	N274.3
Garki I							
SMA-1	85.1	45.2	39.9	51.1	OK		
SMA-2	74.8	49.3	25.5	44.9	Non		
SMA-3	70.0	27.4	42.6	42.0	OK		
PMA	74.8	34.7	40.1	44.9	OK	N97.9	N112.4

NRW in the Pilot Projects (After:Ex-Post)

Category		Gudu		Jabi		Garki I	
		m³/d	%	m³/d	%	m³/d	%
Revenue Water	Billed Authorized (Metered)	2,373.7	76.5	4,883.0	68.6	1,580.2	55.4
	Billed Authorized (Flat Rate)	97.0	3.1	33.9	0.5	280.6	9.8
NRW	Nominal excess usage by flat-rate customers	199.6	6.4	19.7	0.3	135.2	4.7
	Unbilled Authorized	104.0	3.4	168.2	2.4	167.7	5.9
	Meter Accuracy	0.0	0.0	0.0	0.0	0.0	0.0
	Unauthorized	327.7	10.6	2,014.6	28.3	688.3	24.1
	Leakage (Distribution Pipe)						
	Leakage (Service Pipe)						
	Unidentified Loss						
System Input Volume		3,102.0	100	7,119.4	100	2,852.0	100

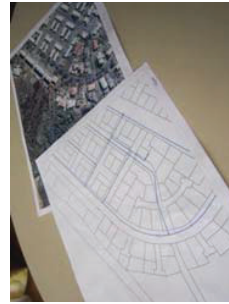
Estimated Revenue Increase based on the Pilot Project

Items	Gudu	Jabi	Garki I
a) NRW Ratio before Operations (%)	53.3%	70.0%	74.8%
b) NRW Ratio after Operations (%)	20.4%	30.9%	34.8%
c) Reduced NRW Ratio (%) (a)-(b)	32.9%	39.1%	40.0%
d) System Input Water Volume (m ³ /day)	3,102	7,119	2,852
e) Reduced NRW Volume (m ³ /day) (c)x(d)/100	1,021	2,784	1,141
f) Reduced NRW Volume (k. m ³ /year) (e)x 365/1000	373	1,016	416
g) Average Water Sales Price (NGN/m ³)	90	90	90
h) Expected Water Sales per year (k. NGN) (f)x(g)	33,525	91,439	37,475
i) Estimated Revenue Increase for Three Years (k. NGN) h) x three years	100,576	274,317	112,426

Annex5-177

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Photos



Preparation of Network Drawings
(Activity 2-4)



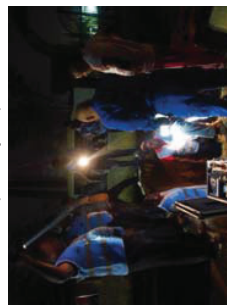
Physical Verification of Pipeline
(Activity 2-7)



Installation of Isolating Valve
(Activity 2-7)



24hrs Flow Measurement
(Activity 2-9)



Minimum Night Flow Survey and
Step Test (Activity 2-9)



Leakage Detection Acoustic Survey
(Activity 2-10)

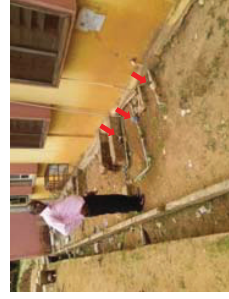
11

Cost Effectiveness of the Pilot Project

PMA	1) Initial Cost incurred for the Pilot Project (K. NGN)	2) Initial & Recurrent Cost for NRW Reduction Operation* (K.NGN)	3) Estimated Revenue Increase for three years (K. NGN)	3) Cost Effectiveness (Dimensionless) 3) / 2)
Gudu	40,949	81,898	100,576	1.2
Jabi	47,498	94,996	274,317	2.9
Garki-I	48,937	97,874	112,426	1.1

10

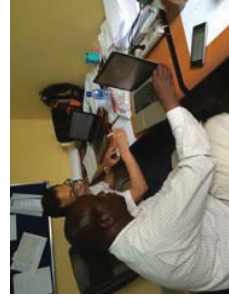
Photos



Different Types of Customer Meters
(AMR, several conventional meters)



Demonstration of Meter Error Test
(Activity 2-9)



Data Analysis of Meter Error Test
(Activity 2-9)



24hrs Customer Consumption
Survey (Activity 2-9)



Explanation of Meter Error Test to
Area Offices by HQs (Activity 2-9)



Illegal Connection Survey
(Activity 2-10)

12

Photos



Door-to-door Acoustic Survey in Gudu



Service Pipes to Villages in Jabi



Illegal Bypass in Gudu



Training on Correlator



24hrs Flow Measurement in Jabi



Re-check of Customer List in Garki I

THANK YOU FOR YOUR ATTENTION

The Federal Capital Territory Reduction of NRW Project (Phase-2)

Water Distribution Management

22nd October, 2018

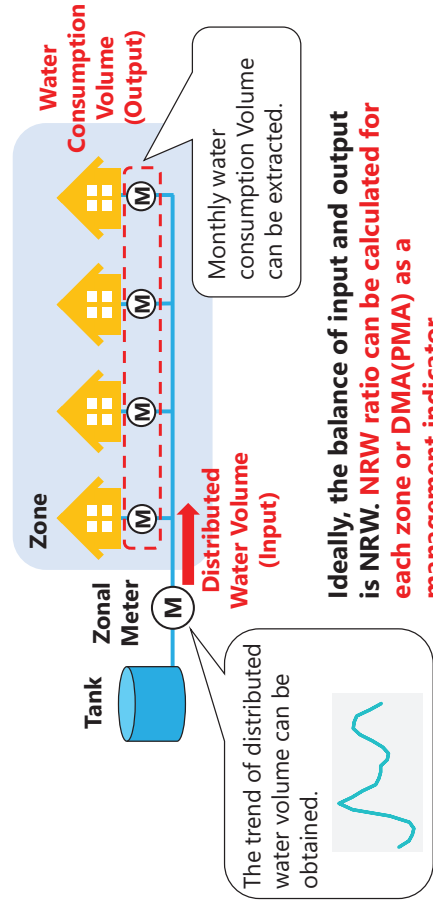
Engr. Abdulrahman Muhammed

S.E (NRW, FCTWB)

1

Water Volume Control

- The Project installed "bulk meters" and "zonal meters" (ultrasonic flow meters) to each outlet pipe from LUD and Tanks, as well as "PMA meters" in the pilot areas.



3

Concept of Water Distribution Management

Water supply utilities have to control **Water Volume**, **Water Pressure**, **Water Quality**.

Water Volume

Water supply utilities have to supply **necessary and sufficient quantity of water** even at peak hrs and in the future.

Water Pressure

Water supply utilities have to supply water **at proper water pressure** at each service point.

Water Quality

Water supply utilities have to supply **safe water** (Ensuring residual chlorine at each service point).

2

Water Pressure & Quality Control

- The Project procured "portable water pressure loggers" which can be used to measure water pressure at various points in the distribution system.
- It is necessary to measure the concentration of residual chlorine at several sampling points.

Based on accumulated data through these measurements, "**Water Pressure Map**" and "**Residual Chlorine Concentration Map**" can be created on the GIS.

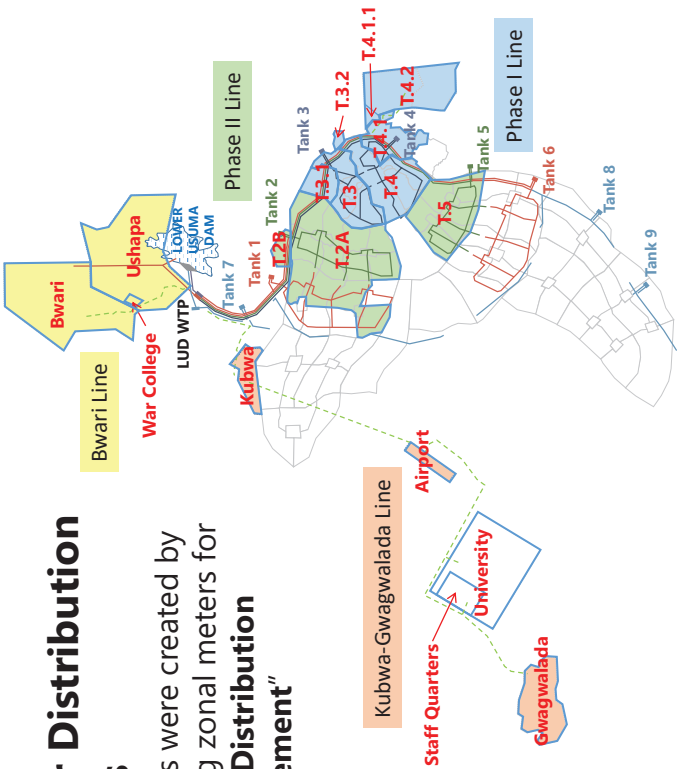


These information can be visually and scientifically monitored.

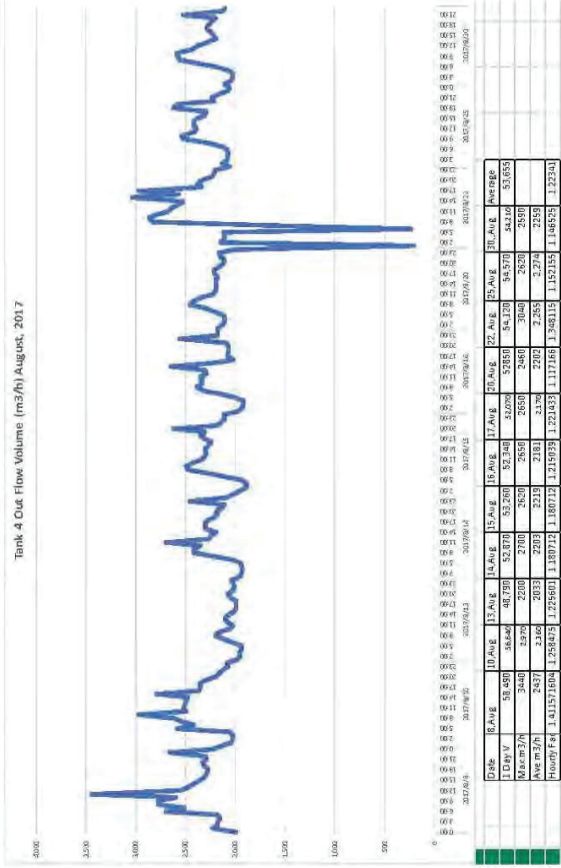
4

Water Distribution Zones

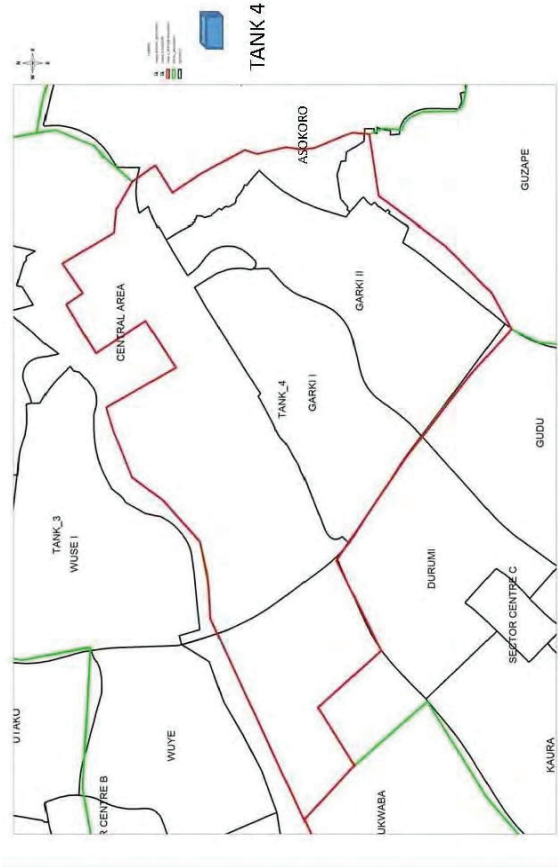
13 zones were created by installing zonal meters for "Water Distribution Management"



Water Volume measured (sample month)



Case Study for Distribution Management (Zone 4)



Water Volume

(NRW based on Recent Flow measurement and Billing Data)

	System Input Volume (m3/month)	Billed Consumption (m3/month)	NRW (m3/month)
Zone 4	1,609,650	860,474 (53%)	749,176 (47%)
Gudu	89,558	65,338 (73%)	24,220 (27%)
Jabi	390,892	132,809 (34%)	258,083 (66%)
Garki I	92,884	42,907 (46%)	49,977 (54%)

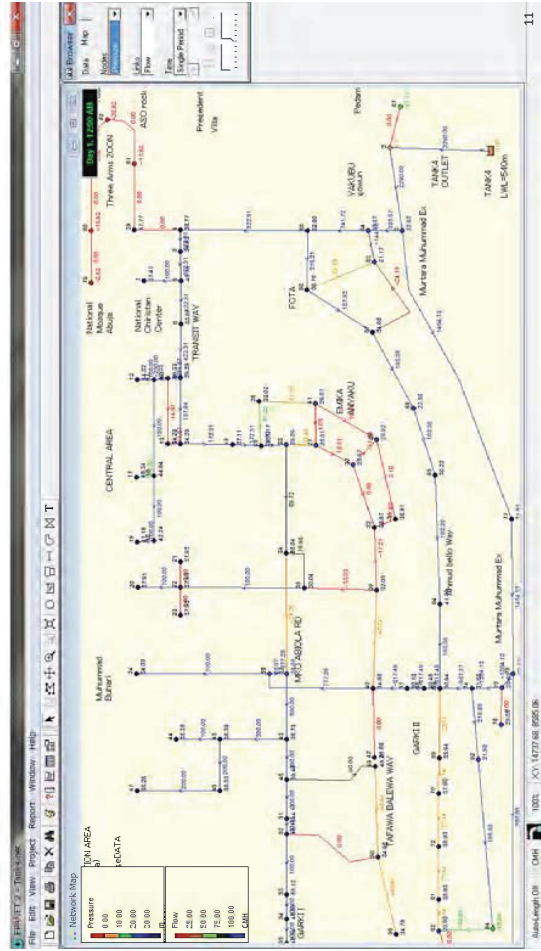
Water Pressure measured at some Points in Zone 4

Sampling Location

LOCATION	Garki II, Ladoke Akintola Boulevard Opp. Old CBN	Area 3, Orlu street close to FCTWB Headquarters	Area 1, Nasarawa street	Area 7, Tafawa Balewa Road
ELEVATION (m)	510	498	488	486
PRESSURE (bar)	2.2	1.5	3.8	4.3

Hydraulic Analysis

As a case study, the Project conducted Hydraulic Analysis in "Zone 4" based on GIS database update.



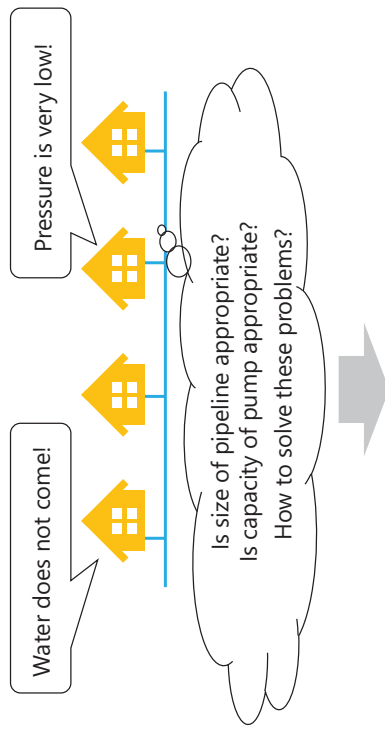
Concentration of Residual Chlorine at Different Sampling Points in the Distribution System

Sample collection site	Bakore Rd. BLK 204 Kubwa	PW Maroko Kubwa	Gwarinpa	Kado	Life Camp	Games village	Wuye	Wuse Zone1	Wuse Zone2
Date of coll./analysis	24/5/18	24/5/18	31/7/18	31/7/18	31/7/18	31/7/18	31/7/18	7/8/18	7/8/18
Residual Chlorine (mg/l)	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Sample collection site	Asokoro	Central Area	Garki 2	Tank 4	Area 1	Area 2	Area 3	Area 8	Area 11
Date of coll./analysis	14/8/18	14/8/18	14/8/18	14/8/18	14/8/18	14/8/18	14/8/18	14/8/18	14/8/18
Residual Chlorine (mg/l)	0.2	0.2	0.1	0.3	0.1	0.1	0.1	0.1	0.1

NB: WHO standard for Residual Chlorine : 0.2

How to solve a lot of problems?

The primary functions of water distribution system is to meet the water demand for users while maintaining acceptable pressure in the system and also supply water for fire protection at specific locations within the system while maintaining acceptable pressure. There are a lot of problems in attaining the stated demands.

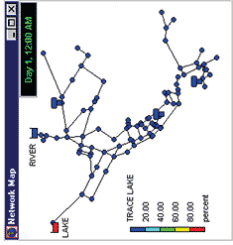


Hydraulic analysis is one of the methods that give the answers.

What is the hydraulic analysis?

Hydraulic analysis is one of the methods used for modeling water pipe network and simulating the flow of water in the pipe.

- EPANET: A computer programme that perform extended period simulation of hydraulics and water quality behavior within pressurized pipe network
- Others: WaterCad, EpaCad , Mike Urban etc.



Source: EPANET Website

Input

- Pipe information (location, size, material)
- Elevation
- Water demand (water consumption volume)

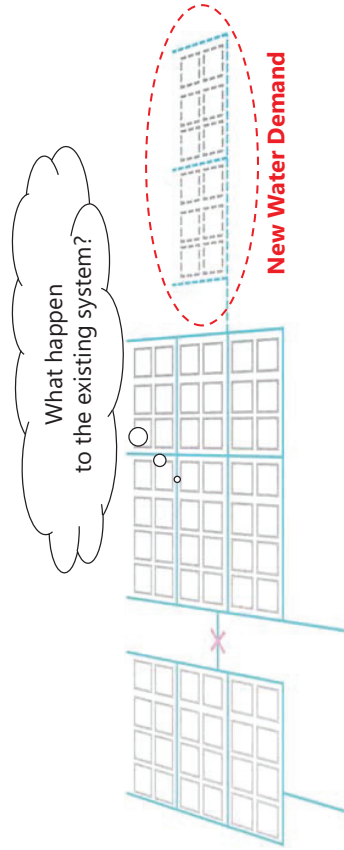
Analysis

- Flow volume
- Flow direction
- Flow rate (velocity)
- Water pressure, etc.

Output

(2) Consideration of the impact of new water demand

If the new water demand is added to the existing system, we can simulate the impact on it by carrying out the hydraulic analysis.

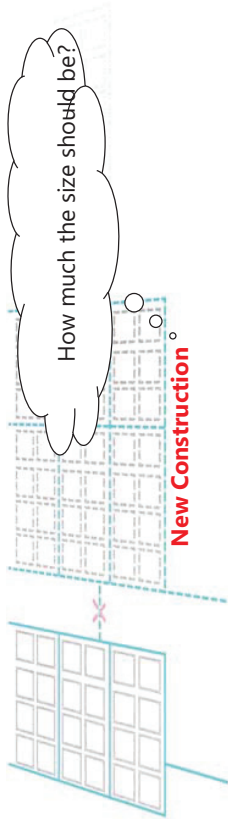


Utilization of Hydraulic Analysis

(1) Consideration of new pipeline installation

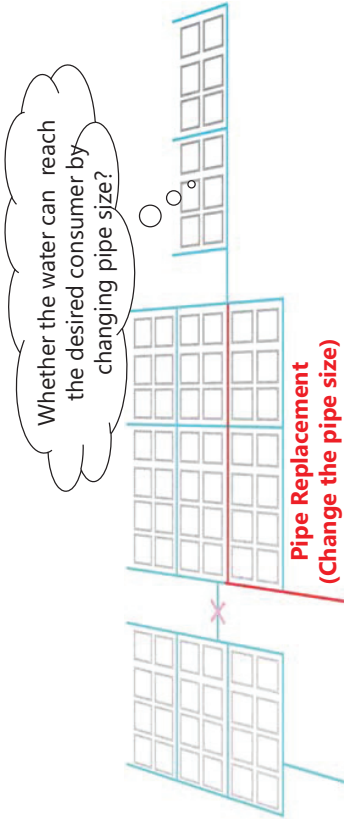
When constructing new pipeline network, we can simulate the proper pipe sizes by carrying out the hydraulic analysis before construction.

- A Network consist of pipes, nodes (pipe junctions), pumps, valves and storage tanks.
- The beauty of using EPANET software is that it tracks flow of water in each pipe, pressure at nodes, height of water in storage tanks and concentration of chemical species throughout the pipe network.



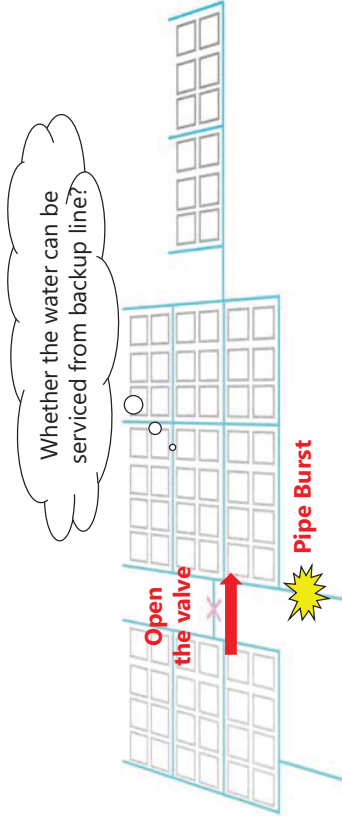
(3) Consideration of the changing of pipe size

If the size of the pipe is changed, we can simulate whether or not the needed water volume can be distributed by carrying out the hydraulic analysis.



(4) Consideration of water operation of emergency

In the event of an emergency, such as a pipe burst, we can simulate whether or not water is distributed from the backup line by carrying out the hydraulic analysis.



Thank you for your attention

Diagnosis of Distribution Network

- By calculating the hydraulic analysis, facilities (water distribution system) can be diagnosed.
- It is also possible to simulate the countermeasures to improve the facilities.
- Based on the results of simulation, facility improvement may be achieved.



The Federal Capital Territory Reduction of NRW Project

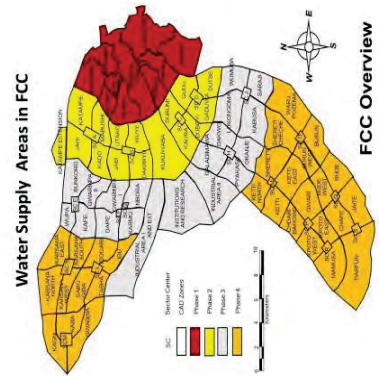
Findings and Lessons Learnt

October, 2018

Engr. Moh. Kabir Rabiul
HoU NRW, Distribution, FCTWB

Findings

- **As-Built Drawings:** most of the existing drawings are not soft copies but hard copies of limited numbers
- Phase-1 - FCTWB has converted manually as-built drawings into digital form in map book by GIS, and accomplished 95%.
- Phase-2&3 -construction of water supply facilities are still ongoing by FCDA, Operation by FCT WB without as-built drawings.



Findings

- **GIS Database:** No easy access to information on the Board's AGIS Computer for use of GIS team due to administrative password on the system.
- **Inefficient Management of Customer Data:** customer data including meter-reading data and payment records has not been unified timely among HQs and Area Offices, causes data handling errors, then may lead to wrong billing.
- **Complexity in Customer Category:** domestic, commercial , major consumer, mini-hotel, petrol station / plaza, private school / clinic), institution (embassy / high commission, ministry / parastatals, liaison office, religion), public tap / convenience & kiosk, and lifting point etc. This mixture caused difficulty in data assembling in the pilot project.
- **Several Types of Customer Meter:** Conventional including flat-rate, AMR and prepaid meters. This mixture makes O&M and financial analysis difficult, Communication failure occur in AMR due to trees or other obstruction, Malfunctioning in pre-paid meter due to battery life time and easily bypass.
- **Estimate Billing System:** caused by no meter reading, absence of customer, inaccessibility to customer meter, infrequent meter reading due to non-provision logistics

CONTENT

- A. Findings:
 - i. As-Built Drawings
 - ii. GIS Database
 - iii. Inefficient Management of Customer Data
 - iv. Complexity in Customer Category
 - v. Several Types of Customer Meter
 - vi. Estimate Billing System
 - vii. Duplicated / Return Bills
 - viii. Complexity in Water Tariff
 - ix. Customer Meter Inaccuracy
 - x. Unauthorized Consumption
 - xi. Leakage
- B. Lessons Learnt
 - i. Delayed in Release of Budget
 - ii. Logistics and Staff Skills
 - iii. Difficulties in Isolating PMAs and SMAs
 - iv. Meter Reading Divisions and Flat-Rate
 - v. Billed Unmetered Consumption (Nominal Excess Use)
 - vi. Unbilled Unmetered Consumption
- C. Recommendations

Findings

- **Duplicated / Return Bills:** returned or undelivered bills cause unreliable financial analysis statement, NRW and collection ratio.
- **Complexity in Water Tariff:** N80/m³ or N5,500/month for domestic, N150/m³ or N45,000/month for commercial, and N150/m³ or various prices per month for major consumers. This mixture makes financial analysis complicated.
- **Customer Meter Inaccuracy:** Inaccuracy of conventional meters is higher than that of AMR and prepaid meters, there should be meter replacement after period of operation.
- **Unauthorized Consumption:** Illegal bypassing/connections were found mostly where AMR and pre-paid meters are installed due to non regular monitoring in the field
- **Leakage:** In estates where distribution network was installed by private developers, the leakages observed was due to low quality material and workmanship
- **Delayed or No Release of the Nigerian Budget to implement NRW Reduction Operations**

Recommendations

- Frequent update of As-built drawings
- Streamlining Customer Category
- Training and efficient supervision of meter readers
- streamlining of customer meter types
- Metering of all customers
- Deactivation of duplicated/return bills.
- Frequent monitoring of customers
- Replacement of faulty meters
- Frequent leakage survey , repair, ensure use of quality workmanship and connection materials
- Early release and availability of operational funds

Lessons Learnt

- **Logistics and Staff Skills:** Area Offices are not well equipped with personal computer, material stocks, tools , logistics including operational vehicles for O&M and meter reading are not adequate. Field staff acquire skills through on-the-job training.
- **Difficulties in isolating PMAs and SMAs:** due to discrepancy between designed drawings and what is actually on ground. The existing GIS pipeline network data has not been updated and there are areas where GIS data have not been developed.
- **Meter Reading Divisions :** Area Offices, AMR Unit, Prepaid Unit and nine Units for major consumers in HQs are responsible for meter reading, this kind of segmentation causes inefficiency in billing
- **Billed Unmetered Consumption (Nominal Excess Use):**Flat-rate customers tend to consume water more than the expected as excess use, a part of NRW
- **Unbilled Unmetered Consumption:** some major consumers, public institutions, FCTWB offices and its staff quarters, these should be billed or unbilled metered consumers at least by installing meters to measure water consumption.

THANK YOU FOR YOUR ATTENTION



The Federal Capital Territory Reduction of NRW Project

CASE SAMPLE OF VOLUNTARY-INITIATED NRW REDUCTION

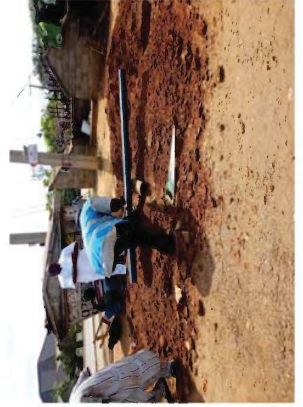
OCTOBER, 2018

ENGR. ABDULLAHI MAS'UD
AREA MANAGER (GWARINPA)

REPAIRS/MAINTENANCE OF LEAKAGES



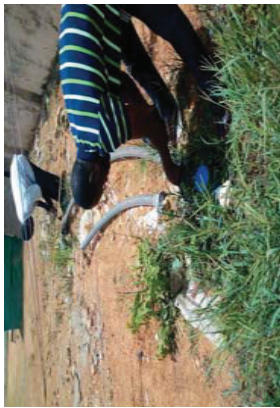
REPLACEMENT OF DAMAGE UPVC PIPES



MAINTENANCE OF PIPE BURSTS



**LEAKAGE REPAIRS/DISCONNECTION OF
DEFFAULTERS**



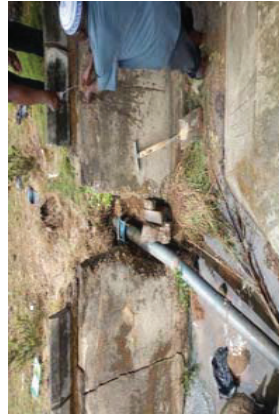
**MAINTENANCE OF LEAKAGES ON 300MM DIA UPVC
PIPE**



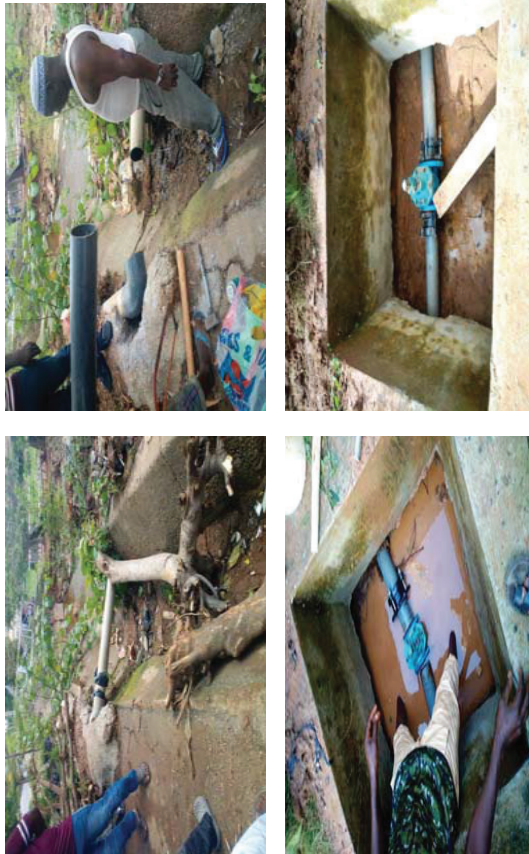
DISCONNECTION OF ILLEGAL WATER USERS



**MAINTENANCE OF LEAKAGES ON 300MM DIA UPVC
PIPE**



REPAIRS OF PIPE BURST COUSE BY NATURAL PHENOMENOM



CONSTRUCTION OF CHAMBER AND ANCHORAGE THRUST BLOCK



EXCAVATION TO LOCATE BURIED SLUICE VALVES AND CONSTRUCTION OF CHAMBER



MAINTENANCE OF PIPELINE APPURTUNANCES



**MAINTENANCE OF 150MM UPVC PIPE BY TRANSFORMER AND
EXCAVATION OF BURIED SLUICE VALVE**



**MAINTENANCE OF PIPE BURST AND INSTALLATION OF
AIR RELIEF VALVES**



**MAINTENANCE OF PIPE BURST AND REPLACEMENT OF
DAMAGE UPVC PIPES**



MAINTENANCE OF PIPE BURST



REPAIRS OF LEAKAGES BY SCENARIOR



REPAIRS OF PIPE BURST BY SCENARIOR



LIST OF THE REPAIRS/LEAKAGES CARRIED OUT

S/ N	LOCATION OF THE LEAKAGE AREA	MATERIALS USE	DURATION OF THE REPAIRS	DATE REPAIRS CARRIED OUT	EXISTANCE OF THE LEAKAGE	REMARKS
1	201 Road, 2 nd Avenue	100mm dia Verkin Joint, Free Socket/Tangit Gum	5 Hours	27 th April, 2018	2 Months	Completed
2	35 Road 3 rd Avenue	1 Length of 63mm dia UPVC Pipe, Free sockets and Tangit Gum	1 Hour	28 th April, 2018	1 day	Completed
3	Citec estate Junction	150mm dia Sluice Valve, 150mm dia UPVC Free Sockets	4 Hours	29 th April, 2018	5 years	Completed
4	Next Junction	100mm dia UPVC Free Sockets	4 Hours	29 th April, 2018	3 Months	Completed
5	Citec Estate	150mm dia Verkin Joint	3 Hours	1 st May, 2018	1 year	Completed

LIST OF THE REPAIRS/LEAKAGES CARRIED OUT

S/ N	LOCATION OF THE LEAKAGE AREA	MATERIALS USE	DURATION OF THE REPAIRS	DATE REPAIRS CARRIED OUT	EXISTANCE OF THE LEAKAGE	REMARKS
6	CITEC Estate	100mm dia Verkin Joint, Free Socket/Tangit Gum	3 Hours	1 st May, 2018	1 year	Completed
7	CITEC Estate	100mm dia Verkin Joint, Free Socket/Tangit Gum	2 Hours	3 rd May, 2018	2 Years	Completed
8	CITEC Estate	100mm dia Verkin Joint, Free Socket/Tangit Gum	4 Hours	3 rd May, 2018	2 years	Completed
9	CITEC Estate	150mm dia UPVC Free Sockets	4 Hours	5 th May, 2018	2 Years	Completed
10	Citec Estate	100mm dia Verkin Joint	3 Hours	5 st May, 2018	2 year	Completed

LIST OF THE REPAIRS/LEAKAGES CARRIED OUT

S/N	LOCATION OF THE LEAKAGE AREA	MATERIALS USE	DURATION OF THE REPAIRS	DATE REPAIRS CARRIED OUT	EXISTANCE OF THE LEAKAGE	REMARKS
11	CITEC Estate	100mm dia Verkin Joint, Free Socket/Tangit Gum	2 Hours	6 th May, 2018	2 years	Completed
12	CITEC Estate	100mm dia Verkin Joint, Free Socket/Tangit Gum	2 Hours	6 th May, 2018	2 Years	Completed
13	Along Setraco Road	300mm dia UPVC Free Socket	1 day	7 th May, 2018	10 Hours	Completed
14	CITEC Estate	150mm dia UPVC Free Sockets	4 Hours	8 th May, 2018	2 Years	Completed
15	Citec Estate	100mm dia Verkin Joint	3 Hours	8 th May, 2018	2 year	Completed

LIST OF THE REPAIRS/LEAKAGES CARRIED OUT

S/N	LOCATION OF THE LEAKAGE AREA	MATERIALS USE	DURATION OF THE REPAIRS	DATE REPAIRS CARRIED OUT	TIME OF THE LEAKAGE/PROBLEMS	REMARKS
21	By Foreign Affairs Quarters	Construction of 1.5M2 Chamber 9" Blocks, Cement, Gravel and Sand	4 Hours	20 th May, 2018	4 years	Completed
22	CITEC Estate	100mm dia Verkin Joint	1 Hour	22 nd May, 2018	3 Years	Completed
23	CITEC Estate Junction	Construction of 1.5M2 Chamber 9" Blocks, Cement, Gravel and Sand	4 Hours	25 th May, 2018	6 years	Completed
24	Along Setraco Road	Casting of 1.2M2 in size. Cement, Gravel and Sand	4 Hours	26 th May, 2018	1 day	Completed
25	24 Crescent Junction, behind former COREN office	100mm dia Sluice Valve/Gl Adaptor	2 Hours	19 th May, 2018	2 year	Completed

LIST OF THE REPAIRS/LEAKAGES CARRIED OUT

S/N	LOCATION OF THE LEAKAGE AREA	MATERIALS USE	DURATION OF THE REPAIRS	DATE REPAIRS CARRIED OUT	DURATION OF THE LEAKAGE	REMARKS
16	CITEC Estate	150mm dia UPVC Free Sockets	4 Hours	11 th May, 2018	2 years	Completed
17	CITEC Estate	63mm dia UPVC Pipe, Free Socket/Tangit Gum	1 Hour	11 th May, 2018	2 Years	Completed
18	24 Crescent, Behind Jumua't Mosque	100mm dia Verkin Joint	1 day	14 th May, 2018	3 Months	Completed
19	Along 24 Crescent before PHCN Office	150mm dia UPVC Free Sockets	4 Hours	19 th May, 2018	1 day	Completed
20	24 Crescent Junction, behind former COREN office	100mm dia Sluice Valve/Gl Adaptor	2 Hours	19 th May, 2018	2 year	Completed

LIST OF THE REPAIRS/LEAKAGES CARRIED OUT

S/N	LOCATION OF THE LEAKAGE AREA	MATERIALS USE	DURATION OF THE REPAIRS	DATE REPAIRS CARRIED OUT	TIME OF THE LEAKAGE/PROBLEMS	REMARKS
26	By Glass House Setraco Road	200mm dia short piece, 200mm dia Verkin joint	13 Hours	7 th June, 2018	42 Hours	Completed
27	Opposite Glass House Setraco Road	150mm dia Free Socket	1 day	10 th June, 2018	3 Hours	Completed
28	Aliyu Mustapha Road	150mm dia Verkin Joint and 150mm dia free socket (Tangit)	10 days	14 th June, 2018	6 years	Completed
29	Along Setraco Road	Construction of 1.5M2 Chamber 9" Blocks, Cement, Gravel and Sand	4 Hours	18 th June, 2018	11 Years	Completed
30	Along Setraco Road	Construction of 1.5M2 Chamber 9" Blocks, Cement, Gravel and Sand	2 Hours	19 th June, 2018	2 year	Completed

PROPOSE ACTIVITIES ON STAFF CAPACITY BUILDING ON NON-REVENUE WATER REDUCTION

- Application of Meter Tester Device for checking the calibration of customers water meters
- Assessment of pressure in the distribution network
- Application of Ultrasonic Flow meter for the calculation of system input volume and system output volume
- Determination of Leakage Volumes

PROPOSE ACTIVITIES OF STAFF CAPACITY BUILDING ON NON-REVENUE WATER

- Use of underground Microphone for leakage detection.
- Use of metal and Pipe detector.
- Analysis for computation of minimum night flow using Ultrasonic flow meter, including graphical demonstration.
- Monthly training on meter reading to both commercial and distribution staff of the Area Office.

PROPOSE ACTIVITIES FOR THE IMPROVEMENT OF REVENUE GENERATION

To further improve on revenue generation the Area office have formulated some measures to enhance revenue generation and also update customers records. The measures are as follows:

- Introduction of central disconnection team.
- Introduction of Central Monitoring team.
- Conversion of customers on teller payments to bill payment system.
- Conversion of Flat rate customers to metered rate Customers.

CONSTRAINTS/CHALLENGES

The Area Office constraints are as follows:

- Non-Reflection of payments
- Lack of office accommodation
- Lack of awareness on meter reading.
- Pipeline appurtenances such as Air Relief Valves, sluice valves and Fire hydrants.
- Lack of Isolation valves and chambers

OBSERVATION AND WAY FORWARD

In furtherance to reducing cost of maintenance and reduction of Non-Revenue Water, the following observations were identified:

- There should be quality assurance of design and construction by supervising authority.
- There should also be preventive maintenance by FCT Water Board.

APPRECIATIONS

My appreciation goes to all staff of Gwarinpa Area Office, specifically to mention but few whose contribution towards achieving these exercise are immeasurable.

I say thank you once more

THANK YOU FOR YOUR TIME



THE FEDERAL CAPITAL TERRITOR WATER BOARD

ACTION PLAN

ON

NON REVENUE WATER REDUCTION IN NATIONAL ASSEMBLY QUARTERS ZONE A & B GUDU

PROPOSED BY

ENGR. MOHAMMED ABDUL OZUMI
OCTOBER, 2018

Background

- Total commerce and distribution staffs 27 in number
- In Gudu area office we have five units (Apo/Gudu, Adisa, Prince & Princess, Durumi and Gaduwa)
- The total number of properties within this area is about 250 properties on prepaid meter
- About 60% of the prepaid within the estate (the national assembly) are malfunctioning, bypassed or are on direct connection due to lack of parts for the maintenance of the meters
- 200mm diameter UPVC pipe
- Length of the network is about 1,800 meters
- Pipe depth 1 meter to 1.5 meters

CONTENT

- Background
- Challenges
- Objective
- Output
- Activities
- Input
- Schedule
- Evaluation

PHOTO OF PREPAID METER AND CONVENTIONAL



The objective of this Action Plan

To reduce the non revenue water in national assembly quarter in Gudu.

Outputs

1. Replacement of malfunction prepaid
2. Illegal connection by passing prepaid meter will be checkmate
3. Leakage repair

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Input

S/NO	Descriptions	NO	Days	Rate	Cost(USD)
1	Engineer	1	-	-	staff
2	Technologist	1	-	-	Staff
3	Plumbers	6	-	-	Staff
4	Prepaid staffs	2	-	-	staff

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- Drawing of the national assembly quarters water supply system (1,2&3)
- Installation of ultrasonic flow meter to determine the average daily supply and also minimum night flow (1,2&3)
- Installation of control valves (1,2&3)
- House to house check of the malfunction prepaid meter by removing the smart card and see if water still runs (1&2)
- Using acoustic rod to determine illegal connection to each properties
- Replacement of malfunction meters (2)
- Disconnection of illegally connected properties with sub-charge (2)
- Comparing the minimum night flow and average daily supply of water after replacement of malfunction meter and illegal connection is the non revenue water of the national assembly quarters
- Evaluation exercise, after the replacement of malfunction meters. If the minimum night flow and average daily supply is still high then we go for leakage detection and leak repair(3)
- Using error meter test machine to determine selected properties meter for accuracy (1)

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Logistic and Labor for the exercise

S/NO	Description	NO	Days	Rate	Cost (N)
1	Security for the ultra sonic flow meter	-	4	LS	40,000
2	Transportation for midnight test	-	12	LS	30,000
3	Manual excavation and backfilling	-	-	LS	120,000
TOTAL					190,000

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Equipment and materials

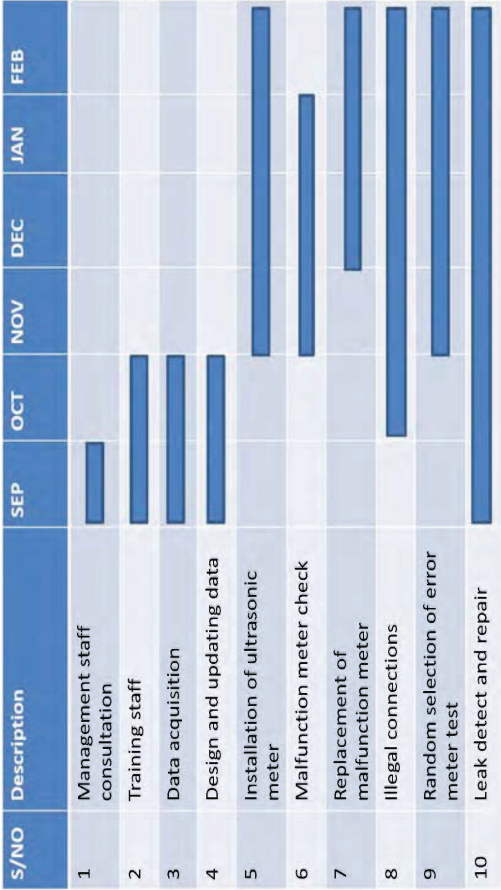
No	Description	NO	Days	Rate	Cost (N)
1	Computer	1	-	-	Office
2	Printer	1	-	-	Office
3	Ultra sonic flow meter	2	-	-	Office
4	Leakage detector machine	2	-	-	Office
5	Acoustic rod	2	-	-	Office
6	Error meter test machine	2	-	-	Office
7	Stationeries	-	-	LS	3,000
8	Printer Toner	2	-	18,000	36,000
TOTAL					39,000

Evaluation

After the leak repairs, disconnection of illegally connected properties and replacement of malfunctioning prepaid meters. I will repeat the minimum night flow again.

The difference water volume in current minimum night flow and previous minimum night flow is the non revenue water.

IMPLEMENTATION SCHEDULE



THANK YOU