RESEARCH ARTICLE OPEN ACCESS

Transforming Intermittant water supply to 24*7 case study Baddenagar DMA Nashik.

Mr.Sunil Sawardekar, Dr Arunkumar Dwivedi , Ms. Swati Patil
PG Student,School of Engineering & TechnologyDepartment of Civil Sandip University Nashik
Dean (Acadmics & Engineering), Sandip university Nashik
Assistant professorDepartment of civil Sandip University Nashik
Corresponding Author: Mr.Sunil Sawardekar

ABSTRACT: This paper inform us development of Intermittent to 24*7 water supply by smart DMA formation in the urban water management of Baddenagr DMA of Nashik city Maharashtra. In this case Recognizing the potential to revolutionize customer engagement and water management of urban water infrastructure development.The present water supply situation in the city is very challenging. Non-Revenue Water (NRW) is very high:42% and therefore there is huge water loss and as a result, residents of the city get water once in day and that too for a duration of just 90 minutes. Cost recovery in water supply services is poor, resulting into unsustainable operation of water supply. To resolve all these matter it is necessary to convert water supply Intermittent to 24*7. Water is the origin of life on earth. Every living organism is somehow dependent on water to sustain their life. There is no Life without Water. Thus, Water is Life! And now, thousands of years after that first living cell was originated, we have evolved, we have developed and we have created such a scenario that this Life is in danger now as we have been ignorant towards this inexpensive and plentiful utility. Water is a basic necessity but the ability to pay for it in India is very limited. If the water losses in distribution . Transmission, Supply systems is reduced then only it is possible the areas which not receiving the water supply properly are getting the water and it results improve the revenue of the organization with competitive lesser investment.A portion of the total water use is leakage, some of it is due to inaccurate metering, some of it may be unauthorized use, and some of it is water delivered to customers. A water audit determines where the water ends up and how much of it got there. The level of detail in the water audit will vary based on the information on system has available

---

Date Of Submission: 04-04-2019 Date Of Acceptance: 23-04-2019

I. INTRODUCTION

Water is an essential resource for all life on the planet. Of the water resources on Earth only three percent of it is fresh and two-thirds of the freshwater is locked up in ice caps and glaciers. Of the remaining one percent, a fifth is in remote, inaccessible areas and much seasonal rainfall in monsoonal deluges and floods cannot easily be used. As time advances, water is becoming scarcer and having access to clean, safe, drinking water is limited among countries. At present only about 0.08 percent of all world's freshwater is exploited by making in ever increasing demand for for sanitation, drinking, manufacturing, leisure and agriculture. Due to the small percentage of water remaining, optimizing the fresh water we have left from natural resources has been a continuous difficulty in several locations worldwide.

Demand management is the first and easiest step for councils to take towards 24*7 urban water management and can have a significant impact on the bottom line

In this paper we discusses for the preparation of smart DMA it is necessary to use of GIS and Water GEMS software for simulation of pipe network and suggests modifications required to rebuild the system. It includes Scenario Management for determining the extent of operational zones of distribution system so that the serving tanks do not remain empty or overflow; Active Topology tool used to create boundary of District Metering Area (DMA); Darwin Designer for optimization of pipe network; Darwin Calibrator for calibration of the pipe network and identify the probable leaking pipes; Criticality tool to increase reliability of the network and determining locations of isolating valves and setting the procedure for carrying out Step Tests required for determining NRW in DMAs. Which is very useful for making smart DMA.

Water is the origin of life on earth. Every living organism is somehow dependent on water to sustain their life. There is no Life without Water. Thus, Water is Life! And now, thousands of years after that first living cell was originated, we have evolved, we have developed and we have created such a scenario that this Life is in danger now as

we have been ignorant towards this inexpensive and plentiful utility.

SMART DMA Badade nagar Elevated service reservoir (ESR) zone (Working area)

The area covered under this ESR Zone is 215.73Ha. This ESR Zone is located in Sector III, and surrounded by Mahakali ESR Zone, Lekha Nagar ESR Zone, Kalika ESR Zone and Chaddha Park, Pawan Nagar, 5 + 3 Lakh Gallon ESR Zone. The wards covered under this ESR Zone are 58, 89, 88, 90 and 78. The present population is counted by field survey is 25,567.

This ESR Zone is served by the two Elevated Service Reservoirs of 2ML capacity each and staging height of 20m each near Bhujbal Farms. These ESRs are constructed in year 2009 and 2014. The ESRs are filled one time in a day from feeder mains from Shivaji Nagar WTP to Pathardi GSR. This ESR is provided by the by-pass connection directly to the distribution system, only for emergency purpose. However, the bypass arrangement seems to be used frequently during operations. The feeder main provides adequate water supply to the reservoir. The inlet and outlet of the reservoir are without flow meters.

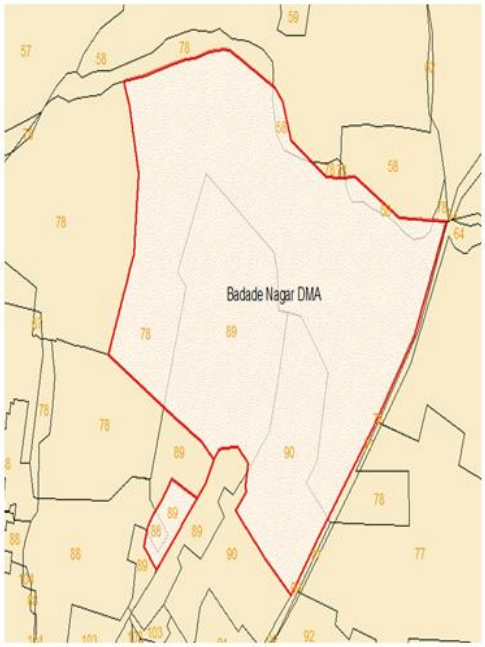
Structural stability of ESR is found satisfactory and no major leakages are observed in ESR tank. The drop test is carried out for these ESRs and no visible leaks are observed in the container of the reservoir. Level indicators of these ESRs are functioning properly.

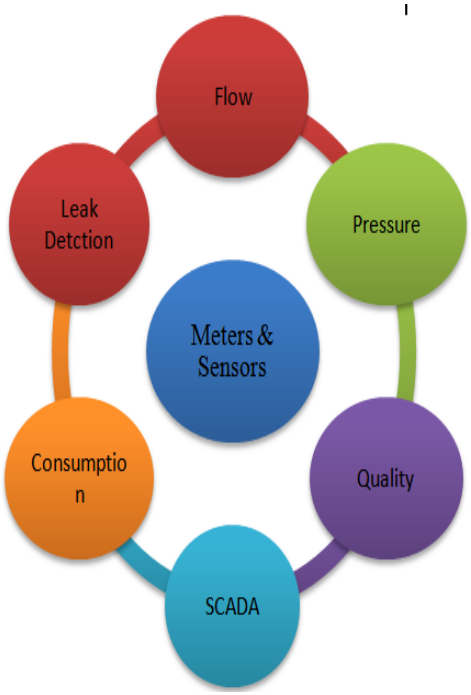
The ESR premise is having two watchmen quarters and free water supply is provided to these quarters. All the valves in ESR premises are operated manually without automation. Minor leakages are observed in body of the valve. However, current condition of valve is generally satisfactory.

The installation of District Metered Areas (DMA) is one of the most successful methods that water companies use for identifying and reducing leakage and implementing simplistic pressure management. This involves the segregation of the water distribution network (WDN) into small zones, known as DMAs by permanently closing isolation valves. Their permanent closure stops own from breaching the boundary of the DMA and they are therefore commonly referred to as boundary valves (BV). Each DMA typically has a single inlet (feed).

The benefits of this approach are as follows: During times of low demand (i.e. at night), the flow at the DMA inlet is monitored and leakage estimates are made. This aids in the identification of new bursts as well as prioritization within rehabilitation schemes for DMAs that possess high background leakage. Simplistic pressure management can be implemented by installing a pressure reducing valve (PRV) at the DMA inlet. Reducing the average zone pressure (AZP) reduces leakage within the DMA. The pressure reduction must be carried out with a high degree of certainty to ensure customers still receive an adequate level of service i.e. a minimum allowable pressure must be maintained. In order to aid with this, a water company can monitor pressure at the critical point (CP) of the DMA, which is denned as the point of the DMA where pressure is closest to the minimum allowable pressure. Provided that the CP of the DMA does not move, maintaining a minimum allowable pressure at the CP

Location of working area





Water Audit

As a human being, our needs never end, thus, the usage of water everywhere is way greater than the resources that we have. Now, with increase in population, the demand for water consumption has hiked up exponentially. To streamline this problem, Measurement of Water or Audit of Water is must. Water Audit gives you the scientific, rational information of your system, its purpose is to do actual calculation of the water use by the concerned body.

Water Audit determines the shortage, leakages, losses of Water and it helps to maintain the water balance of the city/ organization/ system etc. Through water audit we can calculate the non revenue water, it is a fantastic tool to regenerate the system and for water management.

Effective management of non-revenue water (NRW) could be one of the possible solutions for improving the finances of ULBs. NRW management is very beneficial for concerned organization, city, system etc, due to its effective resource utilization, effective utility management, consumer satisfaction and postponement of capital, intensive addition to capacity.

As per the current scenario in developing countries, the water losses in systems are 40 to

60%	due to the leakage and NRW issues. But

as prescribed by MOUD/CPHEEO it should be below 15%. inaction with competitive lesser investment.Water is a basic necessity but the ability to pay for it in India is very limited. If the water losses in distribution . Transmission, Supply systems is reduced then only it is possible the areas which not receiving the water supply properly are getting the water and it results improve the revenue of the organ

Details of Distribution Network for Badade Nagar ESR Zone

Sr. No.	Dia., in mm	Material of pipe	Length of pipe (m)
1	150	DI	4792.17
2	600	CI	25.16
34	600	DI	27.77
5	450	DI	16.37
6	400	DI	5907.4
7	400	CI	707.6
8	350	CI	121.44
9	300	CI	86.65
10	250	CI	36.72
11	200	CI	3309.74
12	200	DI	4970.12
13	160	MDPE	1290.42
14	150	CI	6901.02
15	110	MDPE	156.2
16	100	CI	7297.96
17	80	CI	1799.33
18	50	GI	334.35
			37780.41

Source: NMC GIS data updated by NJSEI Project Team, 2017

Details of Distribution Network Valve for Badade Nagar ESR Zone

Source: NMC GIS data updated by NJSEI Project Team, 2017

Details of Distribution Network Service Connections for Badade Nagar ESR Zone:

Diameter of the valves in mm	Type of the valve	Grand Total
80	Sluice Valve	4
100	Sluice Valve	16
150	Sluice Valve	14
200	Sluice Valve	8
400	Sluice Valve	9
500	Sluice Valve	2
600	Sluice Valve	2
Grand Total		**55**

[Source: NMC GIS data updated by NJSEI Project Team, 2017]

AMR - Automated Meter Reading

Technology which automatically collects metering data and transfers that data to a central database for analysis and billing purposes, generally called "smart meters". Detailed water usage data can be collected continuously at regular intervals (forexample, every 30 minutes) and can be read remotely via an automated process, with the usage data sent to the utility's management and billing system. AMR can consist of a number of various methods, ranging from a simple drive-by meter (where themeter reader cruises down the street automatically downloading the meter data) to one way communications with the utility.

Google Image of working area

AMI - Advanced Metering Infrastructure

Starts with smart meters and adds two-way communication between the meter and utility, and between the meter and consumer. This means that in addition to providing readings, the meter can also receive (and often act on) instructions sent from the utility or consumer.

Stepwise Approach to 24*7

24 X 7 water supply projects in Baddenagar area and improved water supply services
Sustainable water source development
Metering of 100% household connections
At least 80% recovery of O&M cost of water supply and sanitation
Achieve at least 80% collection efficiency
Providing safe collection and disposal of drainage and sewerage system
Creating MIS at various levels
Establish system of water tariff framing
City wide 24 X 7 water supply system
100% consumer metering

Evaluation of Intermittent Water Supply System and Design of 24x7 for a Baddenagar area –

24x7 which helps to prevent deliberate wasting of water in comparison to intermittent water supply system. In this paper along with the design of the 24x7water supply system for existing intermittent water supply system water quality analysis is being done. Designing of Water supply system is made using LOOP and EPANET and compared for their efficiency.

II. METHODOLOGY

A. System Layout

By using GIS and surveying the field with the help of Council Engineers and water supply staff, we track the entire water network starting from source to line before consumer end with
the help of total station and also collects relevant data.

B. Data Entry

Once collected all the data from the field, transfer the tracked network into the ArcGIS software, where we create shape files for various elements of water supply system. Then we add all the relevant information to the respective element layer.
For example: i) In pipe attribute table, we input diameter, material, length, etc.
ii) In pump attribute table, we input head, flow, power, etc.
iii) In ESR attribute table, we input GL, LSL, FSL, etc.
After creating the shape files, authenticates the network with the Municipal Council and then hydraulic modeling is done.

C. Data checking

After receiving the authenticated shape files from hydraulic modeling, checking all the data with relevant information is done like For example:

i) From Energy Audit report we check all the pumping details.

ii) From scheme file, we check the transmission line and ESR details, etc.

iii) From census population, we check the consumer survey data.

iv) From contour plan, we check elevations.

Now, with the help of Model Builder, we add all the shape files into the Bentley Water GEMS v8i software.

D. Population forecasting and Demand calculation

We collect the census population from 1961 to 2011 and based on that with the help of "CPHEEO Manual on Water Supply and Treatment" guidelines and as per service level benchmark, we forecast the population for the next 30 years from the base design period.

Now, with the help of consumer survey data, we segregate the Baddenagar area population for respective council and based on council's development plan, we forecast the ward wise population for next 30 years.

III. CONCLUSION

The current system is on intermittent mode. By controlling the valve operations of the existing water supply system, it is possible to convert the existing system into 24x7, which is the ultimate aim of the project.

REFRENCES

[1]. Water Audit Report prepared by NJSEI for Nashik Municipal corporation Nashik.

[2]. A model for transforming an intermittent into a 24x7 water supply system-Dr. Sanjay and V. Dahasahasra Member Secretary Maharashtra Jeevan Pradhikaran Mumbai, India -Case-Study

[3]. IJSRD - International Journal for Scientific Research & Development| Vol. 1, Issue 2, 2013 | ISSN (online): 2321-0613

[4]. Continuous water supply system against existing Intermittent Supply system
Rutva N. Gohil1 1 PG Student ME-IV, Department of Civil Engineering 1S.S.E.C, Bhavnagar, Gujarat, India
Research Volume -1 Issue -11, July 2014

[5]. Helping India Achieve 24x7 Water Supply Service by 2010- A summary of observations and outputs from the Roundtable Discussion on Private Sector Participation in Water Supply in India (Bangalore, 15–16 June 2005) and Follow-up Conference (Delhi, 25 August 2005

[6]. By K. E. Seetharam and Geoffrey Bridges Water and Sanitation Program.,(2010) "The Karnataka Urban Wa

[7]. Mona N shah Thilak Babu Gottipati, Non – Revenue water imperatives to improvement water management of ULBs/WBs in Indian cities Art. Sept.12IWA manualLon W House Phd , AMR/AMI for water utilities.

[8]. Holmes Matthew (2007), "Water Use Auditing" ,N ew Mexico Rural Water association pp 1-20

[9]. Fanner V.P, Sturn R., J.Thornton (2007), "Evaluating Water Loss and Planning" manual, chapter 7 pp 7

[10]. Rathi Dinesh (2005), "Water audit in National scenario" National conference on water management .

[11]. CPHEEO (1999) Manual on Water Supplyand Treatment, Central Public Health and Environmental Engineering Organization(CPHEEO), 1999.

[12]. HPEC (2011) High Powered Expert Committee(HPEC) Report, 2011 for Estimating the Investment Requirements for Urban Infrastructure Services (www.niua.org/projects/hpec/finalreport-hpec.pdf).

[13]. Mays, L. (1999) Water Distribution SystemsHandbook McGraw-Hill, USA

[14]. Sashikumar, N., Mohankumar, M.S. and Sridharan, K. (2003) Modeling an IntermittentWater Supply. World Water & Environmental Resources Congress 2003, pp. 1-11, doi:10.1061/40685(2003)261

[15]. Nagari, A Publication of ASCI, Hyderabad. Goldman Sachs, (2007), "India's Urbanization-Areprt", Asia Economics Analyst, 07(13)

[16]. Haested, Walski and et al, "Advanced Water Distribution Modeling and Management," Haested Methods, First Edition,2003..http://moud.gov.in/sites/upload_files/moud/files/pdf/Indicators_ColourCoding.pdf.indiawaterportal.org

[17]. Ministry of Urban Development web site World Population Prospects, the 2010 Revision - theUnited 8esa.un.org/wpp/ documentation.

[18]. Veolia Report, 24x7 water supply attempt in Hubli-Dharwad (Karnataka) by Karnataka Urban Infrastructure Development and Finance Corporation, India.

[19]. Detailed Project Report for Puri City, Municiple Corporation, India 2009.

[20]. Feedback Ventures, Technical Report for Morbi Town Gujarat, India 2008.

[21]. Dr Sanjay Dahasasra, "Design of Operational Zones of Distribution System for Continuous water supply system The Government Of India-Central Public Health & Environmental Engineering Organization, Manual On Water Supply And Treatment.

[22]. Department of Civil Engineering, STJIT Engg. Colleg, Renebennur, Karnataka, India, Design of 24x7 Water Supply System for Renebennur Town.

[23]. Abhay Tawalare & Yazhini Balu, Performance Evaluation Of Implementation Of Continuous Water Supply Projects: Two Case Studies From India.
[24]. Malkapur Nagarpanchayat and Maharastra Jeevan Pradhikaran, Malkapur 24x7 Water Supply Scheme.
[25]. Darpan Jain and Raghava Neti, Karnataka Three Towns Pilot 24x7 Water Supply.
[26]. Ministry of Urban Development, Government of India. Guidance notes for continuous water supply (24-7 supply).
[27]. CEPT University, Road map towards 24x7 water supply in class 'A' municipal councils in Maharastra (April 2013).

Mr.Sunil Sawardekar" Transforming Intermittant water supply to 24*7 case study Baddenagar DMA Nashik. " International Journal of Engineering Research and Applications (IJERA), Vol. 09, No.04, 2019, pp. 67-72