Improving Revenue Management for Urban Water Supply through Spatially Enabled Systems: Applied experience in Delhi City

B.S. Jaglan, Director(Revenue)
Vikram Singh, Superintending Engineer
Presentation Overview

- Revenue Management System (RMS) Overview
- RMS – Salient Features
- RMS Portal – One Stop Place For Consumer
- RMS-GIS Architecture
- Consumer Mapping Process
- GIS Application
- RMS - Benefits
About Delhi Jal Board

- DJB established on 6th April, 1998 by an Act of Delhi Assembly
- Supplies potable water to 17.0 million population - 845 MGD
- Water sources- Yamuna River, Bhakhra storage, upper Ganga and Sub-surface
- Treatment and disposal of waste water
- Introduction of New Revenue Management System
RMS Overview

- Automation of Metering, Billing, Collection and Customer Care functions for DJB
- Document Management System for digitization and storage of old water connection files (20 million pages)
- Infrastructure setup and Networking across 32 Zonal offices
- GIS Interface – Address Standardization, Customer Mapping & GIS Application

RMS launched in July 2012
RMS Overview (Continued…)

REVENUE MANAGEMENT SYSTEM (RMS)

Metering
Billing
Collections
Customer Care

MIS
RMS Portal
HHD
GIS
RMS - Salient Features

- **RMS Portal – One Stop Place** for Delhi Jal Board Consumers for all their needs
  - Apply online for New Water or Sewerage connection
  - Request for Disconnection or Reopening online
  - Raise Mutation request online
  - View Bill details and make Payment
  - Raise Grievance and Track Status

- **New touch points** introduced for consumer interaction
  - Web/Portal,
  - Bills on Emails,
  - SMS Alerts,
  - Helpdesk

- **Handheld devices** introduced to facilitate Meter Reading, Spot Billing and Collection at the consumer premise

- **New modes of collection** introduced - Net Banking, Credit and Debit cards
RMS – GIS INTERFACE
RMS – GIS OVERVIEW

- **Delhi City GIS Base Map**
  
  Delhi State Spatial Data Infrastructure (DSSDI) Project created a GIS Base Map of Delhi at the scale of 1:2000 with all building parcels and household units mapped.

- **DJB Consumer Address Standardization and Enrichment**
  
  DSSDI Base map was used as base for address standardization and enrichment (1.9 million consumers)

- **DJB Consumer Mapping**
  
  An interface developed to map DJB consumers on the GIS Map of Delhi.

- **GIS Application**
  
  Besides, other GIS layers developed to show percentage collection, areas/houses without water connections, areas/houses with larger set of complaints etc.
Creation of DSSDI Database

- Establishment of Control Network
- Aerial Triangulation & Block Adjustment
- Digital Elevation Model
- Ortho Photo
- Vectorisation
- Utility Mapping
- Ground Validation
- Integration of Departmental Data
- Property Survey
- Cadastral Mapping
- Development of Delhi GeoPortal
- Digital Database

Flowchart diagram showing the process of creating a DSSDI Database.
Consumer Mapping Process

- Map the building units with the address of DJB Customers in its database
- Enrich DJB’s address data based on GIS Base Map data
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<th>COLUMN_NAME</th>
<th>FIELD_TYPE</th>
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Address Format
In the automated enriching process, address data matched based on few fields like shown in below figure.

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Consumer Mapping Process

DJB Customer Data

Old DJB billing data contains text/csv files with house no, street name, customer name, etc.

DSSDI BASE MAP

Buildings (Polygon feature class) and Building Units (Point feature class) Attributes

Spatial Analysis & Geo coding

DJB Consumers mapped on GIS Map (In geospatial formats – Shape files)
GIS Application – System Architecture

- Web Browser/Application
- HTTP
- DJB Environment
- MapViewer
  - Rendering Engine
  - JDBC
- Oracle 11g-SPATIAL (Customer Data & Billing Data)
- DSSDI Base Map
- Oracle 11g
Map Builder with Map Viewer
RMS-GIS Application Functionalities

- Area Search
- Consumer Search
  - By using Consumer Number
  - By using Address
  - By using Old ID’s
- Consumer Cluster Report
- Percentage Collection Report
- Consumer Density
- Complaint Houses
- Complaint Areas
- No-Connection Houses
- No-Connection Areas
Tool Bar & Navigation Bar

Navigation Bar

Tool Bar

- Zoom Out
- Pan
- Set full Extent
- Distance Calculator
- Map Printing
- Marquee Zoom
- Clear Selection
LEGEND FOR MAP

- Locality
- Sublocality
- Sublocality1
- Sublocality2
- Buildings
- No Connection Area
- Consumer Search
- Consumer Cluster
- Max Complaints(Areas)
- Max Complaints(Houses)
- No Connection(Areas)
- No Connection(Houses)
- Selection Results
- Search Results
- Navigated Area

Consumer Cluster
Consumer Density
Percentage Collection
DJB Offices
Consumer Density Low
Consumer Density Medium
Consumer Density High
This search will allow the user to:

• Navigate to a particular Locality/SubLocality/Block/Building which will be selected by the user from a provided list populated dynamically from the database.

• The map will be zoomed on to the selected Locality/Building which will provide information about the selected area.
AREA SEARCH

REVENUE MANAGEMENT SYSTEM - GIS

Area Search

Select the values to search:

- Pin Code: SelectPinCode
- Locality: SelectLocality
- SubLocality: SelectSubLocality
- SubLocality One: SelectSubLocality One
- SubLocality Two: SelectSubLocality Two
- Building: SelectBuilding

Search | Reset | Cancel

Layers

- Consumer Cluster
- Consumer Density
- Percentage Collection
- DJS Offices
- Max Complaints(Areas)
- Max Complaints(Houses)
- No Connection(Areas)
- No Connection(Houses)
- Selection Results
- Search Results
- Navigated Area
Area Search (Continued…)

REVENUE MANAGEMENT SYSTEM - GIS

Area Search

Select the values to search:

- Pin Code: 110092
- Locality: SHAKARPUR
- SubLocality: PREET VIHAR
- SubLocality One: BLOCK C
- SubLocality Two: CENTRAL BOARD O

Search
Reset
Cancel

Layers
Information

- Consumer Cluster
- Consumer Density
- Percentage Collection
- DJB Offices
- Max Complaints(Areas)
- Max Complaints(Houses)
- No Connection(Areas)
- No Connection(Houses)
- Selection Results
- Search Results
- Navigated Area
Area Search (Continued...)
Consumer Search: By K Number
Consumer Search: By K Number (Continued...)
Consumer Search: By K Number (Continued...)

- **Customer Info**
  - **Consumer Name:** PRAKASH KANAWAL, O&M
  - **K Number:** 0139810099
  - **BUSH:** 36940001003001
  - **Locality:** SHAKARPUR
  - **SubLocality:** PREET VIHAR

- **Customer Info**
  - **Attribute**
    - **Value**
    - **CONS_NAME:** PRAKASH KANAWAL, O&M
    - **ZONENO:** 823
    - **MRWD:** 247
    - **AREMNO:** 13
    - **WONO:** 10887
    - **ACCT_ID:** 0139810000
    - **BUSH:** 36940001003001
    - **DDESL_ID:** 36940001003001
    - **HAPNID:** 369400
    - **BULD_ID:** 00103
    - **BULD_USLNO:** 001
    - **BULD_UNAME:** NA
    - **ILSN:** E-40
    - **FRN:** 0.1
    - **WTN:** 0
    - **BUILD_NM:** NA
    - **GIS_LOCALITY:** SHAKARPUR
    - **SUB_LOC:** PREET VIHAR
    - **SUB_LOC1:** BLOCK E
    - **RD_NM_NO:** NA
    - **PML_CODE:** 110092
    - **REV_VIL_NM:** MANIWALI FAZAL PUS
    - **DIST_NM:** EAST
    - **ELLED_AMT:** 0
    - **PAID_AMT:** 0
    - **START_DATE:** 2012-04-16 00
    - **END_DATE:** 2012-04-16 00
Consumer Search: By Address (Continued...)
Consumer Search: By Address (Continued...)
Consumer Search: By Old ID (Continued…)

**SEARCH**

**Area Search**

**Consumer Search**

**Search consumer by:**

- **KNO**
- **Address**
- **Old ID**

**Zone Name:** EZ2
**MR Area:** 247
**Area Number:** 13
**WC Number:** 10587

**Layers**

- Consumer Cluster
- Consumer Density
- Percentage Collection
- DJB Offices
- Max Complaints (Areas)
- Max Complaints (Houses)
- No Connection (Areas)
- No Connection (Houses)
- Selection Results
- Search Results
- Navigated Area
This report will display a dot-map of DJB customers.

It will help in identifying the exact location of the customer on the GIS map.

On one clicking on an address dot, the complete address of that customer will be displayed in an information window.

Consumer Categories

- Active
- Unbilled
- Billed but un paid
- Paid
- Disconnected
• This reports will provide bar-charts for various attributes at Locality / SubLocality / Block level based on the amount of revenue collected from the customers in a particular area.

• These charts will be clickable and will provide relevant information (Including Billing details) on clicking.
Percentage Collection Report (Continued…)

REVENUE MANAGEMENT SYSTEM - GIS

Area Name | Percentage Collection
----------|------------------------
MADURUR ENCLAVE | 79.5
BLOCK A | 99.4
BLOCK B | 89.4
BLOCK C | 41.9
BLOCK D | 36.2
BLOCK E | 55.6
BLOCK F | 91.0
BLOCK G | 25.4

PREET VIHAR
• This report will display a color-coded range-map based on the density of DJB customers.

• The High and Low density areas will be colored with dark and light colors respectively.

• It will help to identifying the areas having high/low density of customers in a selected area.
Consumer Density Report (Continued)

SubLocality One: BLOCK A
Population: 559
Consumers: 318
Types of Complains

- The following type of consumers complaints are mapped in the GIS Application
  - Change of Address
  - Issue of Duplicate Bills
  - Arrears Disputes
  - Non Receipt of Bill
  - Meter Reading issues

- Complaints Status
  - Complaint Lodged
  - Investigation Started
  - Meter Testing
Complaint Houses Report (Continued...)
Complaint Houses Report (Continued...)

Select parameters for the report

Select Level: Locality
Select Locality: VIVEK VIHAR
Select Sublocality: Select Sublocality
Select Sublocality One: Select SublocOne
Select Sublocality Two: Select SublocTwo

Type: Arrears display
Status: Investigation

From: 1-May-2011  To: 6-May-2013

Search  Reset  Cancel
Complaint Houses Report (Continued…)

Customer Info:
- Consumer Name: RAU, T. BHUPTET
- KNO: 01404100000
- Name: VIVEK Vihar
- Complain ID: 4306870001
- Date of Complaint: 2012-09-19 02:00:00
- Status: Investigation Started
- Type: Animal Dispute
- Address: 466
Complaint Areas (Continued...)
Complaint Areas (Block Level)
No Connection Houses (Continued…)

[Map and data interface for revenue management system]
No Connection Houses (Continued...)
No Connection Houses (Continued...)
No Connection Areas (Continued…)

[Map showing areas with no connection with labels such as 'NAME: SAGARPUR' and 'CONNECTIONS: 0'].

[Layer options for different types of data such as Consumer Cluster, Consumer Density, Percentage Collection, DBJ Offices, Max Complaints(Areas), Max Complaints(Houses), No Connection(Areas), No Connection(Houses), Selection Results, Search Results, Navigated Area].
No Connection Areas (Block Level)
**RMS Benefits**

**Benefits to Citizens**
- Shorter turnaround time in issuing New Water or Sewerage connection
- Spot Billing and Collection
- New payment modes for Collection introduced – Credit, Debit Cards, Net Banking
- Quick grievance redressal through Portal, Customer Care

**Effective, Efficient and Prompt Services**

**GIS Application benefits**
- This Application provide the user with a bird’s eye view of the complete Billing scenario.
- Help to identifying the areas having high/low density of customers which will help to increase consumer base.
- Help in identifying areas where revenue generation is low due to Un paid bills/Unbilled customers etc.

**Benefits to DJB**
- Widen the coverage of Billing and Collection
- Real time update of Meter Reading from the field or consumer premise through Handheld device
- Generation of Bills on a click of a mouse;
  Configurable Tariff Structure; Easy to change
Contact details: jaglanbs@gmail.com, vs_djb@yahoo.com