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# Delhi Jal Board, INDIA

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

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# **Presentation Overview**



# **About Delhi Jal Board**

- DJB established on 6<sup>th</sup> 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)**











### **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** Portal – One Stop Place For Consumers



Download Centre

View/Print Bills/Receipts
Submit and Track Grievance
Receive Bills/Receipts on eMail
Alerts on Mobile
...more

Register Now



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# **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.



# **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



# Standardization of Address

SEQUENCE_NO	COLUMN_NAME	FIELD_TYPE
01	ADDRESS_ID	INT(10)
02	HOUSE_NO	CHAR(50)
03	FLAT_NO	CHAR(10)
04	FLOOR_NO	CHAR(3)
05	NUMBER_OF_FLOOR_OF_PROPERTY	CHAR(3)
06	PROPERTY_TYPE_CODE	CHAR(4)
07	STREET_THOROUGHFARE_GALI_NAME	CHAR(50)
08	SECTOR_AREA_LOCALITY_VILLAGE_MAHULLA_NAME	CHAR(50)
09	NEARBY_LANDMARK_NAME	CHAR(50)
10	BLOCK_POCKET_NAME	CHAR(50)
11	ADDRESS_LINE_1	CHAR(50)
12	ADDRESS_LINE_2	CHAR(50)
13	ADDRESS_LINE_3	CHAR(50)
14	WARD_NAME	CHAR(50)
15	ZONE_NAME	CHAR(50)
16	CITY_NAME	CHAR(50)
17	DISTRICT_NAME	CHAR(50)
18	STATE_NAME	CHAR(50)
19	POST_OFFICE_NAME	CHAR(50)
20	PIN_CODE	CHAR(6)
21	LOCATION_ID	CHAR(14)
22	COUNTRY_NAME	CHAR(50)
23	INTEGRATION_CODE	CHAR(255)

#### **Address Format**

#### **Address - Data Model**

#### In the automated enriching process, address data matched based on few fields like shown in below figure.

			SEQUENCE_NO	COLUMN_NAME	FIELD_TYPE	
			01	ADDRESS_ID	INT(10)	
	-		02	HOUSE_NO	CHAR(50)	
		03	FLAT_NO	CHAR(10)		
			04	FLOOR_NO	CHAR(3)	
		05	NUMBER_OF_FLOOR_OF_PR OPERTY	CHAR(3)		
			06	PROPERTY TYPE CODE	CHAR(4)	
E.				STREET_THOROUGHFARE_G		
$\leq$			07		CHAR(50)	
$\geq$			- 08	LLAGE MAHULLA NAME	CHAR(50)	Sporthunsing All Book
LE L		1	09	NEARBY_LANDMARK_NAME	CHAR(50)	
0			10	BLOCK_POCKET_NAME	CHAR(50)	I feel like tilles
			11	ADDRESS_LINE_1	CHAR(50)	SomvaPyrotek
S			12	ADDRESS_LINE_2	CHAR(50)	Services
S I			13	ADDRESS_LINE_3	CHAR(50)	
Ш			14	WARD_NAME	CHAR(50)	Primary School
ſ∠			15	ZONE_NAME	CHAR(50)	
0	-		16		CHAR(50)	
ā			1/	DISTRICT_NAME	CHAR(50)	
4	1 1		18	BOST OFFICE NAME	CHAR(SU)	
			19			
$\leq$			20			
Ш			21		CHAR(14)	
$\geq$			23	INTEGRATION CODE	CHAR(255)	
		ZONENO	PLOTAREA	OKREAD	AVGCOUNT	BILLNO
		MRNO		ADJSTBLWCH	MINCOUNT	BILLDT
		MRNO AREANO		ADJSTBLWCH ADJSTBLADP		BILLDT DUEDT
<		MRNO AREANO WCNO	NDSUBTYPE GWCSUBTYPE USAGE	ADJSTBLWCH ADJSTBLADP ADJSTBLACS	MINCOUNT OACOUNT RECIVEDAMT	BILLDT DUEDT ACSCHARG
TA		MRNO AREANO WCNO OLDCONSID	NDSUBTYPE GWCSUBTYPE USAGE SCHEDULE1	ADJSTBLWCH ADJSTBLADP ADJSTBLACS ADJSTBLCES	MINCOUNT OACOUNT RECIVEDAMT RECBEFODDT	BILLDT DUEDT ACSCHARG WTRCHARG
ATA		MRNO AREANO WCNO OLDCONSID CONSID	NDSUBTYPE GWCSUBTYPE USAGE SCHEDULE1 METERED	ADJSTBLWCH ADJSTBLADP ADJSTBLACS ADJSTBLCES ADJSTBLMR	MINCOUNT OACOUNT RECIVEDAMT RECEBFODDT NOOFRECIPT	BILLDT DUEDT ACSCHARG WTRCHARG ADDPERCENT
DATA		MRNO AREANO WCNO OLDCONSID CONSID CONSIAME	NDSUBTYPE GWCSUBTYPE USAGE SCHEDULE1 METERED MPLMETER	ADJSTBLWCH ADJSTBLADP ADJSTBLACS ADJSTBLCES ADJSTBLMR FAULTYFROM	MINCOUNT OACOUNT RECIVEDAMT RECEEFODDT NOOFRECIPT CUMSCH01K	BILLDT DUEDT ACSCHARG WTRCHARG ADDPERCENT CESS
R DATA		MRNO AREANO WCNO OLDCONSID CONSID CONSID CONSNAME WARDNO	NDSUBTYPE GWCSUBTYPE USAGE SCHEDULE1 METERED MPLMETER UMTYPE	ADJSTBLWCH ADJSTBLADP ADJSTBLACS ADJSTBLCES ADJSTBLMR FAULTYFROM LOCKGRFROM	MINCOUNT OACOUNT RECIVEDAMT RECBEFODDT NOOFRECIPT CUMSCH01K POSTEDUPTO	BILLDT DUEDT ACSCHARG WTRCHARG ADDPERCENT CESS MRENT
ER DATA		MRNO AREANO WCNO OLDCONSID CONSID CONSINAME WARDNO HOUSENO	NDSUBTYPE GWCSUBTYPE USAGE SCHEDULE1 METERED MPLMETER UMTYPE METERSIZE	ADJSTBLWCH ADJSTBLADP ADJSTBLACS ADJSTBLCES ADJSTBLCES ADJSTBLMR FAULTYFROM LOCKGRFROM DISCODT	MINCOUNT OACOUNT RECIVEDAMT RECBEFODDT NOOFRECIPT CUMSCH01K POSTEDUPTO ZERODUESDT	BILLDT DUEDT ACSCHARG WTRCHARG ADDPERCENT CESS MRENT FEESAMOUNT
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JSTOMER DATA	Ų	MRNO AREANO WCNO OLDCONSID CONSID CONSIA WARDNO HOUSENO BASTI ADD1 ADD2 CITY PIN	NDSUBTYPE GWCSUBTYPE USAGE SCHEDULE1 METERED MPLMETER UMTYPE BULKMSIZE BULKMSIZE METERNO UNIT METERMAKE LOCATION	ADJSTBLWCH ADJSTBLADP ADJSTBLACS ADJSTBLCES ADJSTBLMR FAULTYFROM LOCKORFROM DISCODT TOTCONSUM CONSREFDT BILDUPTODT PREVREADDT PREVREAD	MINCOUNT OACOUNT RECIVEDAMT RECBEFODDT NOOFRECIPT CUMSCH01K POSTEDUPTO ZERODUESDT MTRCHANGE CATCHANGE CMR CMRDT STATUS	BILLDT DUEDT ACSCHARG WTRCHARG ADDPERCENT CESS MRENT FEESAMOUNT DELETION FINEFECT TOBEPAID ROUNDOFF SURCHARG
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G CUSTOMER DATA	Ų	MRNO AREANO WCNO OLDCONSID CONSID CONSIAME WARDNO HOUSENO BASTI ADD1 ADD2 CITY PIN URBAN SRCITIZEN WC58_59	NDSUBTYPE GWCSUBTYPE USAGE SCHEDULE1 METERED MPLMETER UMTYPE METERSIZE BULKMSIZE BULKMSIZE METERNO UNIT METERMAKE LOCATION TAPSIZE TAPCOUNT SUBCONCTNO	ADJSTBLWCH ADJSTBLADP ADJSTBLACS ADJSTBLCES ADJSTBLCES ADJSTBLMR FAULTYFROM LOCKORFROM DISCODT TOTCONSUM CONSREFDT BILDUPTODT PREVREADDT PREVREAD PREVEADDT PREVREAD PREVSTAT PREVBASIS PREVUNPED	MINCOUNT OACOUNT RECIVEDAMT RECIVEDAMT RECBEFODDT NOOFRECIPT CUMSCH01K POSTEDUPTO ZERODUESDT MTRCHANGE CATCHANGE CMR CMRDT STATUS CMRAVG OLDCMRAVG CMRAVG CMRACRP	BILLDT DUEDT ACSCHARG WTRCHARG ADDPERCENT CESS MRENT FEESAMOUNT DELETION FINEFECT TOBEPAID ROUNDOFF SURCHARG CALCSCHARG BASIS SBASIS
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ING CUSTOMER DATA		MRNO AREANO WCNO OLDCONSID CONSID CONSID CONSNAME WARDNO HOUSENO BASTI ADD1 ADD2 CITY PIN URBAN SRCITIZEN WCS8_59 CONSTYPE SUBTYPE	NDSUBTYPE GWCSUBTYPE USAGE SCHEDULE1 METERED MPLMETER UMTYPE METERSIZE BULKMSIZE BULKMSIZE METERMAKE LOCATION TAPSIZE TAPCOUNT SUBCONCTNO AVGPER SEASONAL	ADJSTBLWCH ADJSTBLADP ADJSTBLACS ADJSTBLACS ADJSTBLCES ADJSTBLMR FAULTYFROM LOCKGRFROM DISCODT TOTCONSUM CONSREFDT BILDUPTODT BILDUPTODT PREVREADDT PREVREAD PREVREAD PREVSTAT PREVBASIS PREVUNPED DDA_ARR PREVALOTTE	MINCOUNT OACOUNT RECIVEDAMT RECIVEDAMT RECBEFODDT NOOFRECIPT CUMSCH01K POSTEDUPTO ZERODUESDT MTRCHANGE CATCHANGE CATCHANGE CARDT CMRDT STATUS CCMRDT CMRAVG OLDCMRAVG CMRAORP ADHOCAMT CONSUM	BILLDT         DUEDT         ACSCHARG         WTRCHARG         ADDPERCENT         CESS         MRENT         FEESAMOUNT         DELETION         FINEFECT         TOBEPAID         ROUNDOFF         SURCHARG         CALCSCHARG         BASIS         SBASIS         ACS1204         BILINDCATR
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XISTING CUSTOMER DATA	Ų	MRNO AREANO VVCNO OLDCONSID CONSID CONSID CONSIA WARDNO HOUSENO BASTI ADD1 ADD2 CITY PIN URBAN URBAN SRCITIZEN VVC58_59 CONSTYPE SUBTYPE OLDSUBTYPE DVELTYPE ENTEREDPA	NDSUBTYPE GWCSUBTYPE USAGE SCHEDULE1 METERED MPLMETER UMTYPE BULKMSIZE BULKMSIZE BULKMSIZE BULKMSIZE METERNA METERMAKE LOCATION TAPSIZE TAPCOUNT SUBCONCTNO AVGPER SEASONAL APPLYMNTN NOADDPRCNT APPLYREBET	ADJSTBLWCH ADJSTBLADP ADJSTBLACS ADJSTBLCES ADJSTBLMR FAULTYFROM LOCKORFROM DISCODT TOTCONSUM CONSREFDT BILDUPTODT PREVREADDT PREVREADDT PREVREADDT PREVSTAT PREVBASIS PREVUNPED DDA_ARR PREVALOTTE IFSURCHARG PREVSCHARG PREVBILLDT	MINCOUNT OACOUNT RECIVEDAMT RECIVEDAMT RECBEFODDT NOOFRECIPT CUMSCH01K POSTEDUPTO ZERODUESDT MTRCHANGE CATCHANGE CMR CMR CMRDT STATUS CMRAVG OLDCMRAVG OLDCMRAVG CMRAORP ADHOCAMT CONSUM FROMDT TODT BILLROUND	BILLDT DUEDT ACSCHARG WTRCHARG ADDPERCENT CESS MRENT FEESAMOUNT DELETION FINEFECT TOBEPAID ROUNDOFF SURCHARG CALCSCHARG BASIS SBASIS SBASIS ACS1204 BILINDCATR PMECODE BILLCOPIES NEVWVC
EXISTING CUSTOMER DATA		MRNO AREANO WCNO OLDCONSID CONSID CONSID CONSINAME WARDNO HOUSENO BASTI ADD1 ADD2 CITY PIN URBAN SRCITIZEN WC58_59 CONSTYPE OLDSUBTYPE OLDSUBTYPE DWELTYPE ENTEREDPA ENTEREDPA	NDSUBTYPE GWCSUBTYPE USAGE SCHEDULE1 METERED MPLMETER UMTYPE METERSIZE BULKMSIZE BULKMSIZE BULKMSIZE METERNAKE LOCATION TAPSIZE TAPCOUNT SUBCONCTNO AVGPER SEASONAL APPLYMNTN NOADDPRCNT APPLYREBET OKDT	ADJSTBLWCH ADJSTBLADP ADJSTBLACS ADJSTBLACS ADJSTBLCES ADJSTBLMR FAULTYFROM LOCKGRFROM DISCODT TOTCONSUM CONSREFDT BILDUPTODT PREVREADDT PREVREADDT PREVREADDT PREVREAD PREVSTAT PREVBASIS PREVUNPED DDA_ARR PREVALOTTE IFSURCHARG PREVSOLARG PREVSULDT PREVDUEDT	MINCOUNT OACOUNT RECIVEDAMT RECIVEDAMT RECBEFODDT NOOFRECIPT CUMSCH01K POSTEDUPTO ZERODUESDT MTRCHANGE CATCHANGE CATCHANGE CARDT STATUS CMRAT CMRAVG OLDCMRAVG OLDCMRAVG CMRAORP ADHOCAMT CONSUM FROMDT TODT BILLROUND BILLYEAR	BILLDT         DUEDT         ACSCHARG         WTRCHARG         ADDPERCENT         CESS         MRENT         FEESAMOUNT         DELETION         FINEFECT         TOBEPAID         ROUNDOFF         SURCHARG         CALCSCHARG         BASIS         SBASIS         ACS1204         BILLODES         NEVWVC         AV92809
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# **Consumer Mapping Process**



# **GIS** Application – System Architecture



# 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

# RMS GIS APPLICATION(Home Page)



### **Tool Bar & Navigation Bar**



# LEGEND FOR MAP



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**



#### Area Search(Continued...)



#### Area Search(Continued...)



## **Consumer Search: By K Number**



# Consumer Search: By K Number(Continued...)

						Welcome U	ser Lloqout
<u>ت</u>						welcome <b>u</b>	ser   <u>Logour</u>
REVENUE MANAGEME	NT SYSTEM -	GIS		FILE	SEARCH	REPORTS HELP	-
	<i>(</i> http://59.16	3.128.175:7777/ - Sear	ch Map - Win 🔳		Layers	5 Information	
	Area Search	Consumer Search				Consumer Cluster Consumer Density	
	Search consun	ner by:			□ <b>±</b> 0 p	Percentage Collection	
#	<b>⊙</b> KNO	Address	🔾 old ID			DIB Offices	
	K Number	0120010000			□ ± 0 ₪	Max Complaints(Areas)	
毛	K Number:	0139010000			□ <b>±</b> 0 ₪	Max Complaints(Houses)	
	A				□ <b>±</b> 0 ₪	lo Connection(Areas)	
	5					lo Connection(Houses)	
					🗆 🗰 🕕 s	Selection Results	
					🗌 🗇 🗊 s	Search Results	
march					🗌 🗇 🗊 🛛	lavigated Area	
	52						
O Contrada							
HEAR KIN XES	Sear	rch Reset	Cancel				
	J.		OKHLA	>			
5 mi							26
5 KM							

# Consumer Search: By K Number(Continued...)



#### Consumer Search:By Address(Continued...)



# Consumer Search: By Address(Continued...)



## Consumer Search:By Old ID(Continued...)

					We	elcome <b>User</b>   <u>Logout</u>
	SYSTEM - (	GIS	FII	LE SEARCH	REPORTS	HELP - Coo
	<i>C</i> http://59.163.	.128.175:7777/ - Search M	ap - Win 🔳 🗖	Lay	ers Inform	ation
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# Consumer Search: By Old ID(Continued...)







# **Consumer Cluster Report**

- 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

#### **Consumer Cluster Report**



## **Consumer Cluster Report**



### **Consumer Cluster Report**(Active)



# Consumer Cluster Report(Unbilled)



# Consumer Cluster Report(UnBilled)



## **Percentage Collection Report**

- 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...)



#### Percentage Collection Report(Continued...)



# **Consumer Density Report**

- 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)



### Consumer Density Report(Continued)



# **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**













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#### **Complaint Areas**(Continued...)



#### **Complaint Areas**(Block Level)



#### No Connection Houses(Continued...)



#### No Connection Houses(Continued...)



#### No Connection Houses(Continued...)



#### **No Connection Areas**(Continued...)



#### 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



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