Transforming Water Districts' Operations Using Cloud GIS & Hydraulic Modeling

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Abstract:

Transforming Water District's Operations using Cloud GIS and Hydraulic Modeling

Mabalacat City Water District (MCWD) operates and maintains a water distribution system comprising of over 310 kilometers of underground pipes and associated appurtenances, serving about 34,000 customers. To maximize benefits of GIS, MCWD decided to adopt Web-GIS and get away from the traditional desktop GIS, which was limited to one department. With its GIS on the Cloud now, all departments of MCWD has unlimited access to GIS, which has not only resulted in reducing time and effort needed to manage MCWD's operations, but also reduced operational costs considerably. Identifying problem locations and infrastructure is lot easier for engineering staff, while processing new service connection requests is quick and paperless for commercial department folks. Response time to manage leaks has become quicker, with Customer Service staff, liaising with the Operations folks electronically. What more, MCWD runs its hydraulic model on the cloud, to identify and fix supply related issues.

MCWD: Profile

ABOUT MCWD -

- MCWD is one of the pioneer Water Districts' in Philippines;
- Formed in 1978 (CCC No. 61);
- MCWD currently serves about 33,745 Active Concessionaires:
    - 32,427 Residential Connections;
    - 156 Connections in the Government Sector;
    - 1,159 Commercial Connections;
    - 2 Bulk Connections;
- MCWD serves 24 Barangays;
- Operates the system on a 24x7 basis;
- Source of Water is from 26 active deep well pump stations;

MCWD GIS Implementation - Road Map

- 2009: GIS Inception - Thru' a Grant received from USTDA

- Primary Objective: Work on a Pilot Area and do Feasibility Studies for NRW Reduction;
- Project used GIS, SCADA & Hydraulic Modeling; Results were quite significant;

- Full-On GIS

- MCWD decided GIS Implementation for remaining areas in Phases, due to budget limitations; Phase I - 2009; Phase II - 2010; Phase III - 2011;
- Digitalized Mainline, Valve, Hydrant, Pump Station, Reservoir, Service Meter Data, etc.;
- Developed Customer Service Connections Database

- Post GIS - Focus was on Mitigating Pressure & Flow Issues

- In 2012, MCWD called for Hydraulic Modeling Services;
- Developed a Hydraulic Model for the MCWD's Distribution Network;
- Identified 'Bottlenecks' in System; Currently working on Modeler's recommendation;

- Future Actions Plans for Better Monitoring

- Develop a Master Plan;
- SCADA Development & Integration with GIS, Fleet Vehicle Management System, etc.;

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Challenges & GIS Benefits at MCWD -

Challenges at MCWD (Prior to GIS Implementation) -

- As any Water District, MCWD many challenges to confront
  - Aging Infrastructure ; Regulatory Compliances; Desire to Maximize Staff Productivity
- Paper-based systems were not quite up to the task
  - Difficulty in getting aggregate Info.; Difficulty to Produce Reports; Limited Access to Information
- No Integration & Communication between Systems, Data and Departments
  - Systems and tools to meet the different business needs, need to be acquired and integrated
  - Anywhere and anytime access is crucial for operations

Benefits Derived by GIS Implementation -

- Centralized Data Sharing -
  Enabled data sharing across Depts., enabling Streamlined Work Management and Efficient Manpower Usage
- Enhanced Service Delivery-
  Response Time to attend to complaints was reduced, & Connection/Disconnection now managed well
- Efficient Use of Equipment -
  Fixing Issues and Maintenance has become easier, since asset locations are known/familiar
- Reporting & Analysis -
  Thru' Integration with Billing System & Hydraulic Modeling

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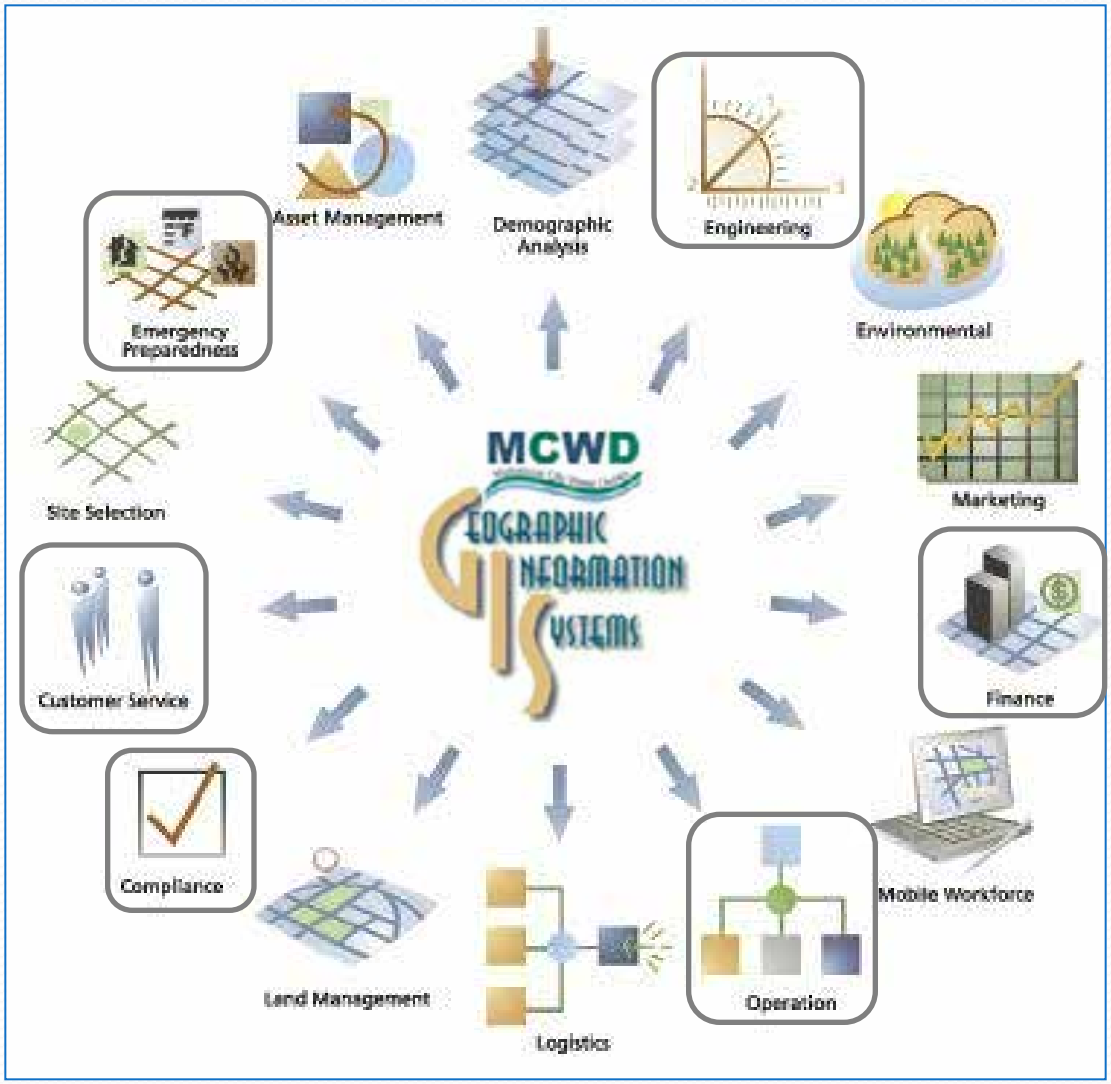
MCWD GIS: Pictorially -



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Why Web-GIS?

Post GIS Implementation Challenges -

- Dissemination of GIS across Departments
- Investments on Hardware & Software
- Setting up a Team to Manage GIS
- Budget Challenges

Nobel Systems' Solution -

- GeoViewer Online Solution

  Web-GIS Data Hosting Approach which was -
  - Cheaper then traditional GIS per seat
  - Works on any browser with/without plug-in (free-of-charge)
  - Access to GIS Data (Internet/Intranet)
  - No need for expensive and time-consuming training
  - Simple built-in tools, useful for multiple depts. to manage routine operations
- Catered to MCWD's GIS Data Demands -

  Had the ability quickly meet MCWD's demand for GIS data and capabilities without worrying about the infrastructure and staff to support it.
- Cost Efficiency -

  All this at a fraction of a cost, when compared to setting up a traditional in-house GIS data hosting setup

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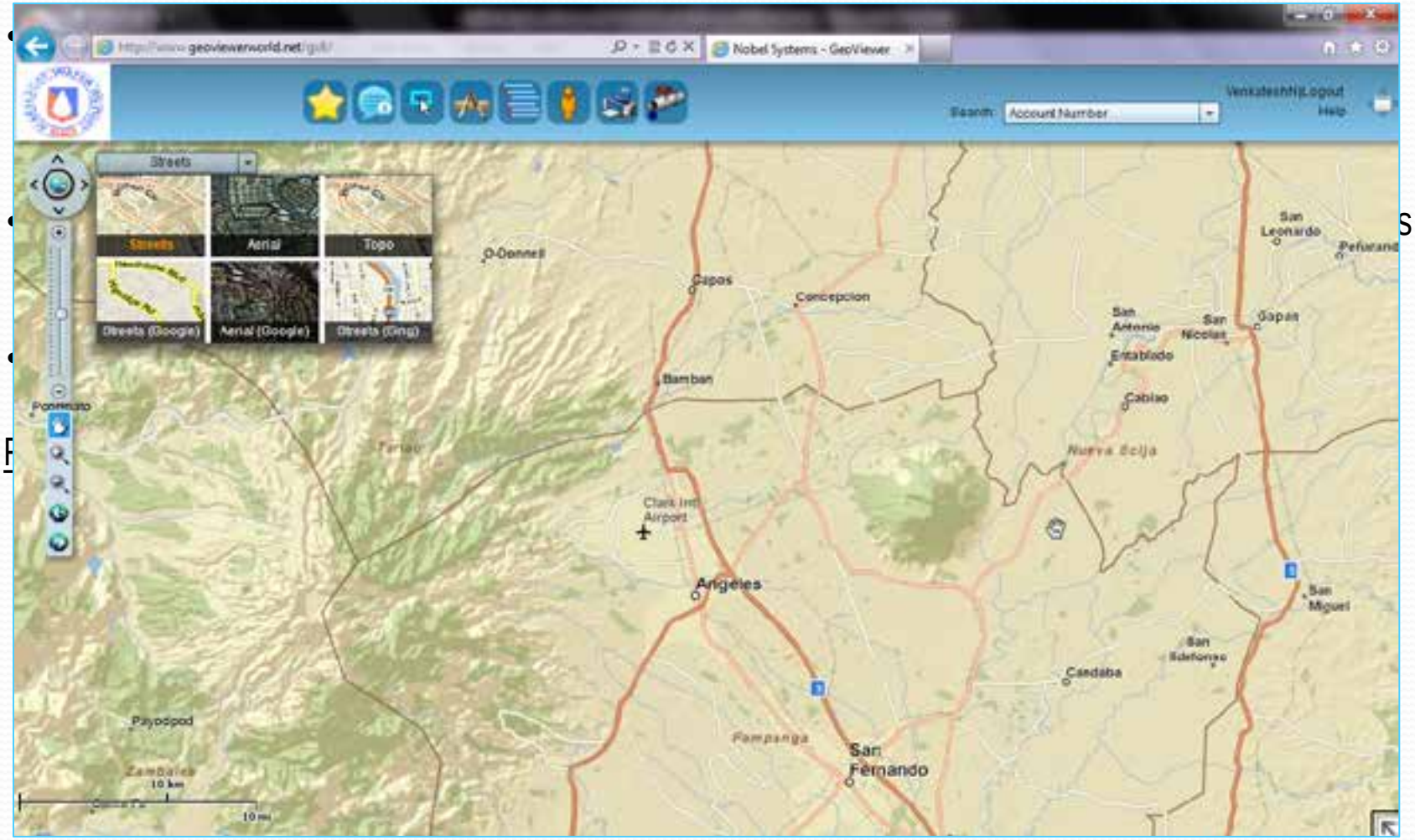
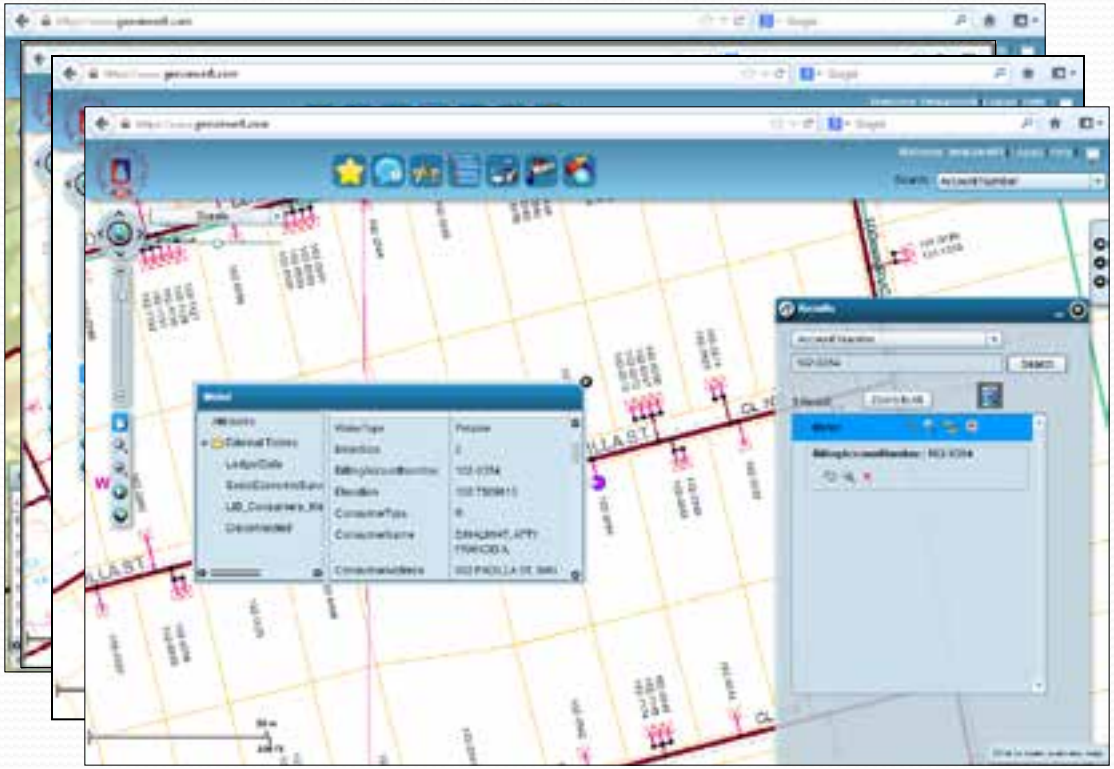
GeoViewer Online:



GeoViewer is a simple and easy to use interface, designed for Non-GIS Professionals, requiring minimum effort to learn!!

GeoViewer Online - Functions

Better Understanding of Asset Location



Search In the GIS - Information available at a Click of a button....

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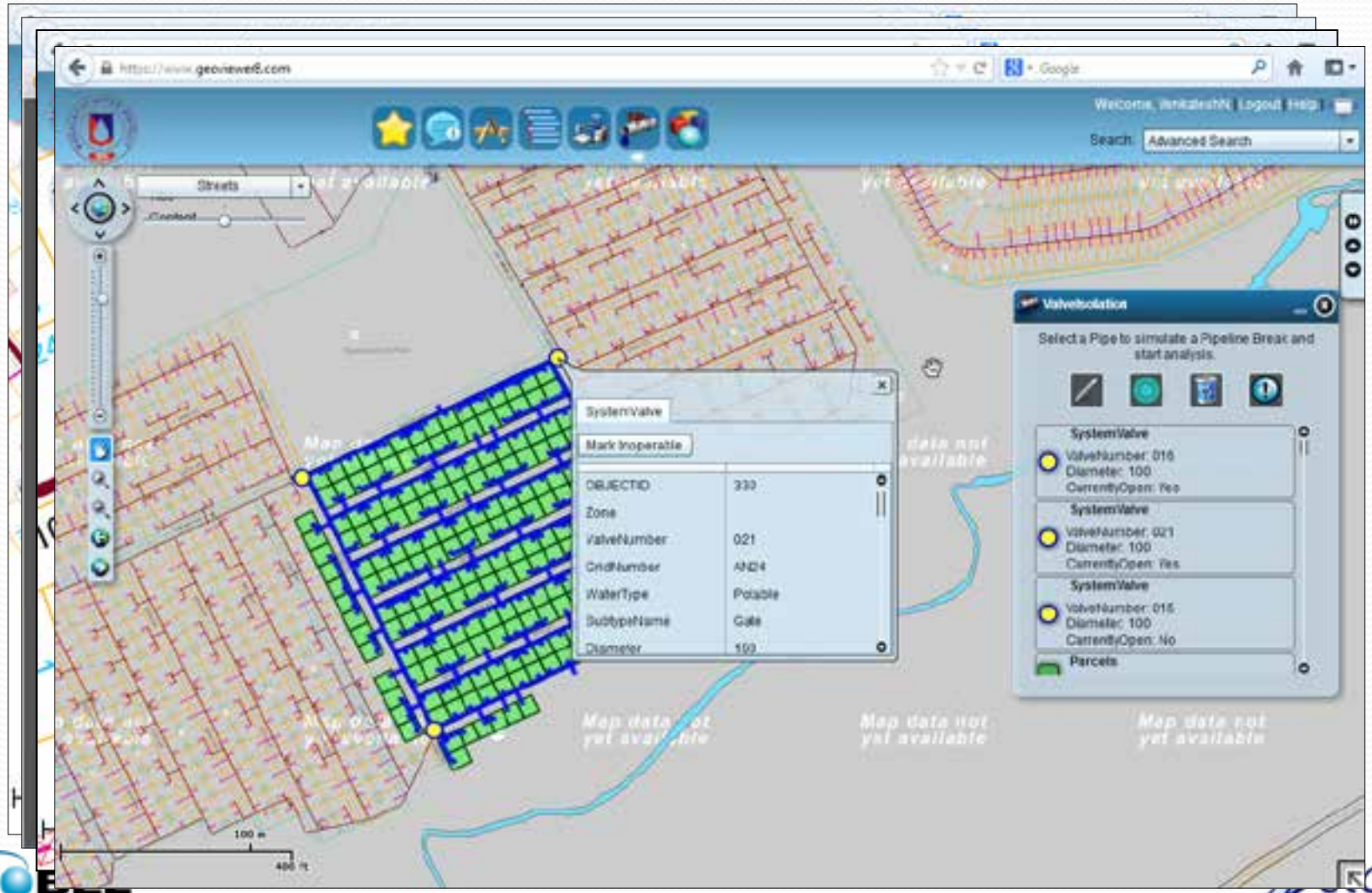
GeoViewer Online - Functions

Ability to View Detailed Information

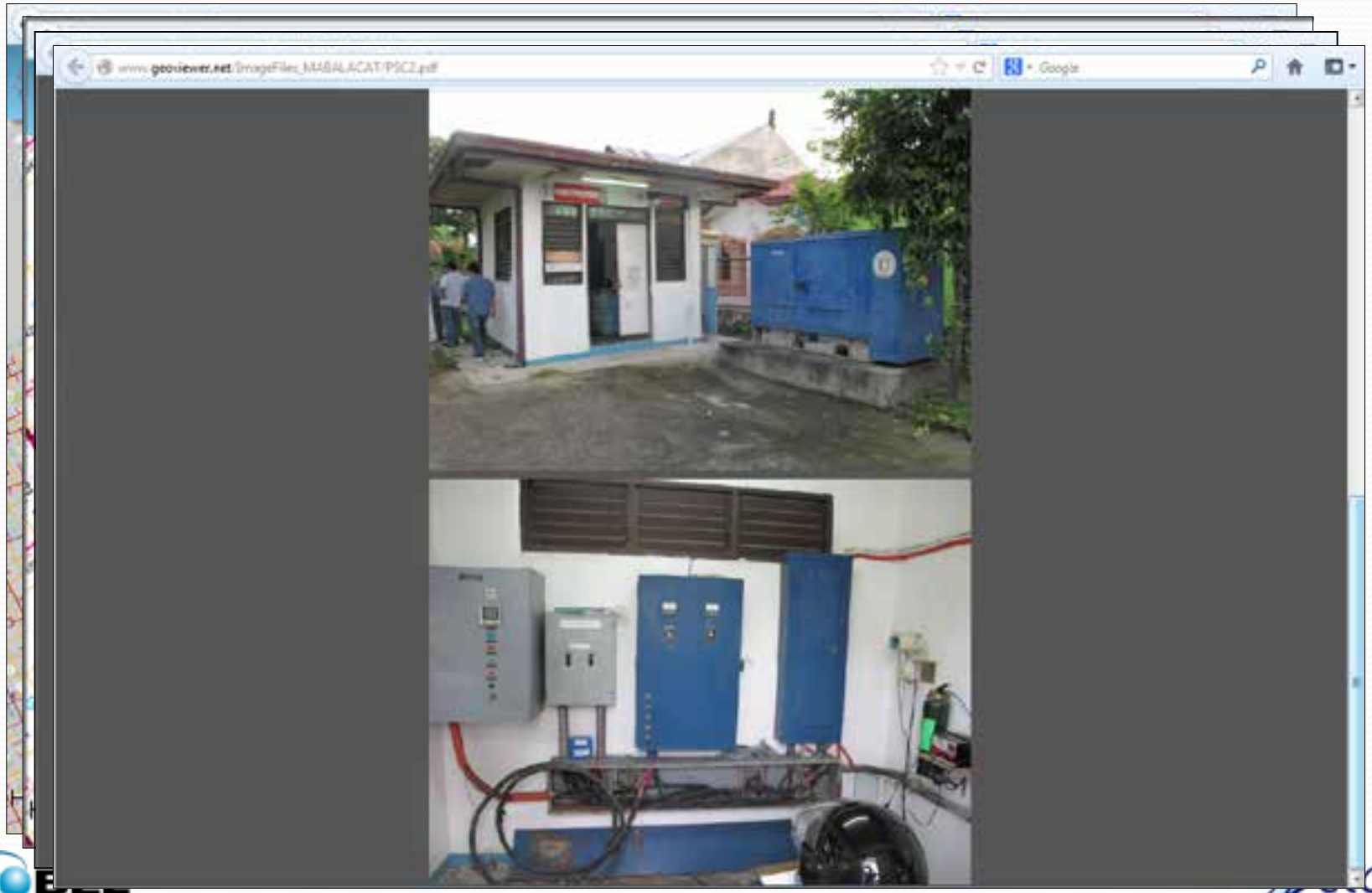
Identify In the GIS - Detailed Information can be seen just with a mouse click



GeoViewer Online - Functions

Print Maps & View Reports
in GIS

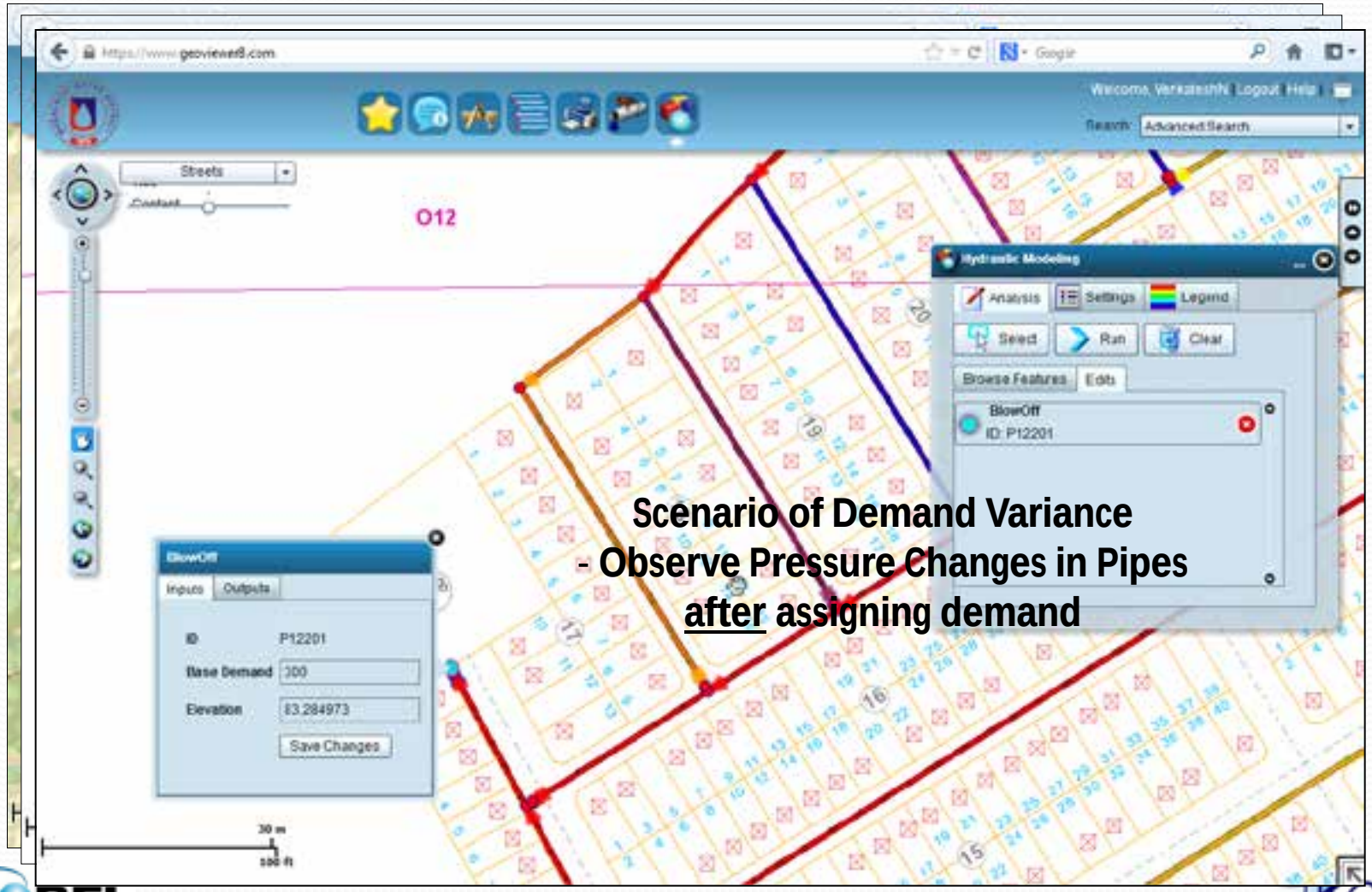
Ability to View Detailed Information



GeoViewer Online - Functions

GIS Integrated Hydraulic Modeling

Hydraulic Model is integrated with GIS System - Enables 'Analysis'



Scenario of Demand Variance
- Observe Pressure Changes in Pipes
<u>after</u> assigning demand

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GeoViewer Online - Applications

No Field Inspection for Processing New Connections

Before GIS Scenario -
New Customer
Application Processing

- Field Inspection
- Feasibility Checks
- Taking Measurements
- Time Consuming

... Laborious & Time Consuming Process!!

After GIS -

Customer Service Officer

- Access GIS Data
- Zoom to Location
- Does Feasibility Checks
- Measures Distance
- Faster Estimate Preparation

Satisfied Customer!!

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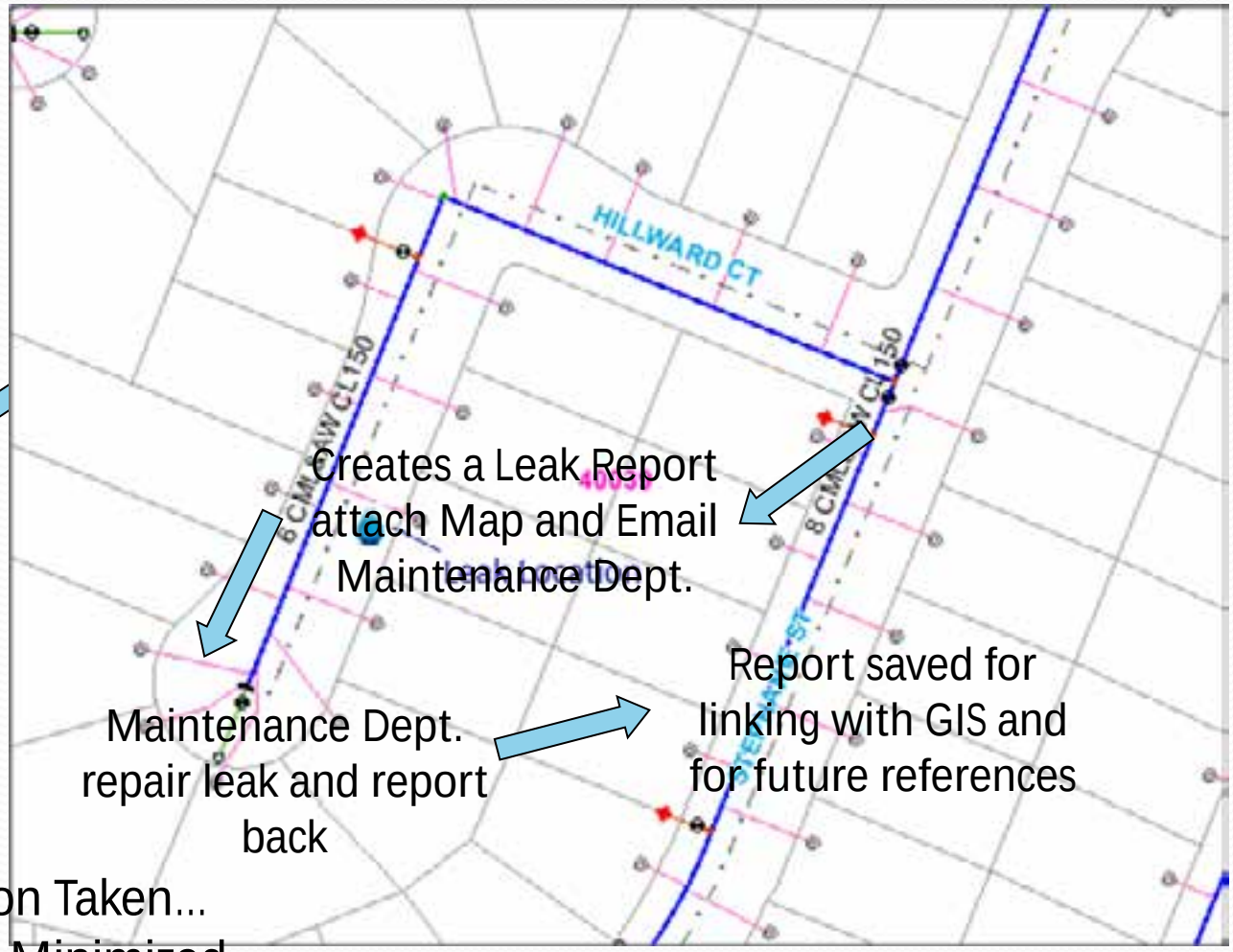
GeoViewer Online - Applications

Better Management of Leaks - Minimizing NRW

WD receives a call reporting 'Leak'

Customer Service Officer



Creates a Leak Report attach Map and Email Maintenance Dept.

Maintenance Dept. repair leak and report back

Report saved for linking with GIS and for future references

Quick Action Taken…
Water Losses Minimized…

Additional Savings for the WD!!

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Questions / Discussion:

Thank You!

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