



## **Maximizing Operations Utilizing Real Time Spatial Information**

Presented by Carl Alexander White House Utility District, TN









#OSIsoftUC

### Challenges: TECHNICAL









Challenges: NON TECHNICAL 2

### Non-Revenue Water Loss





#### Acoustic Ground Mic and Leak loggers for pinpointing individual leaks



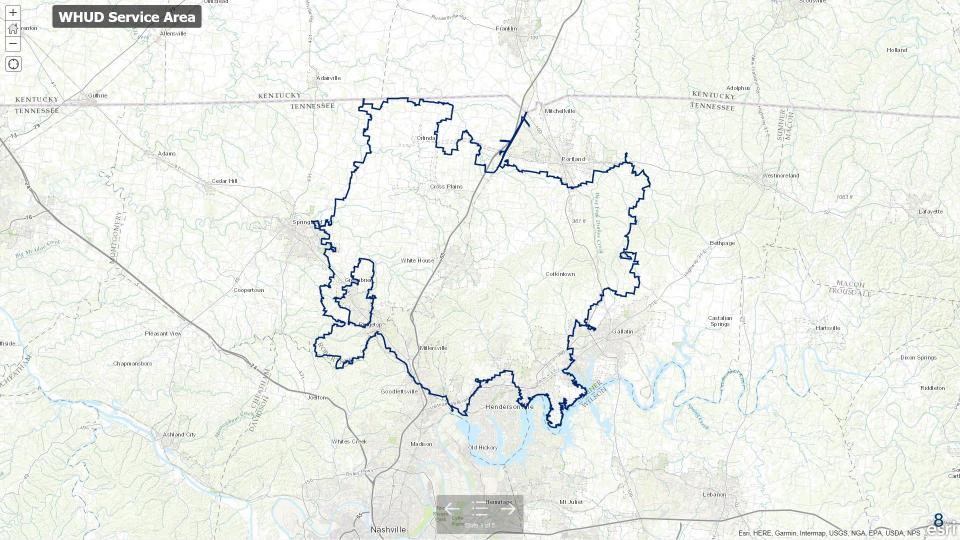
# Leaks are our problem. Now, what do I need to know?

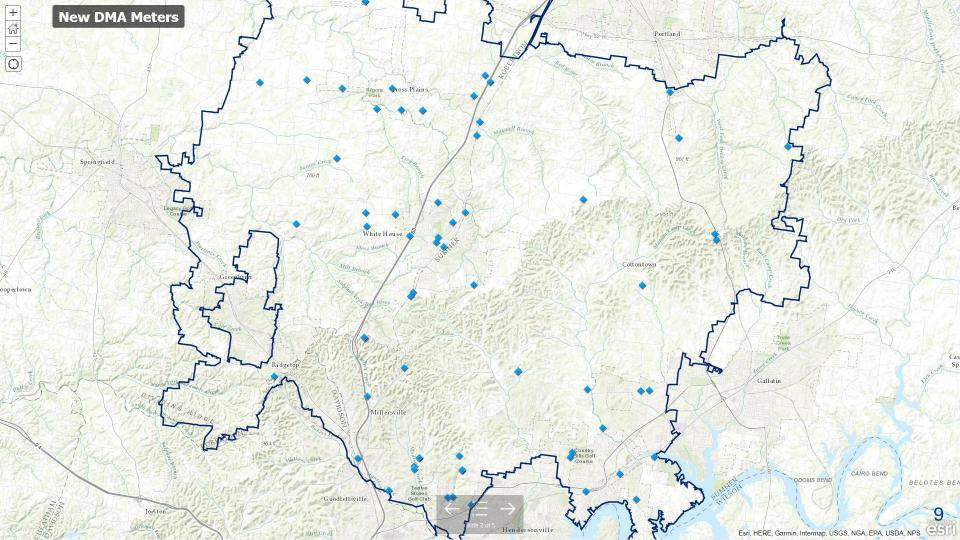
- Where is the water going?
- How much water should be going there?
- How do I reliably and accurately monitor flow in real-time

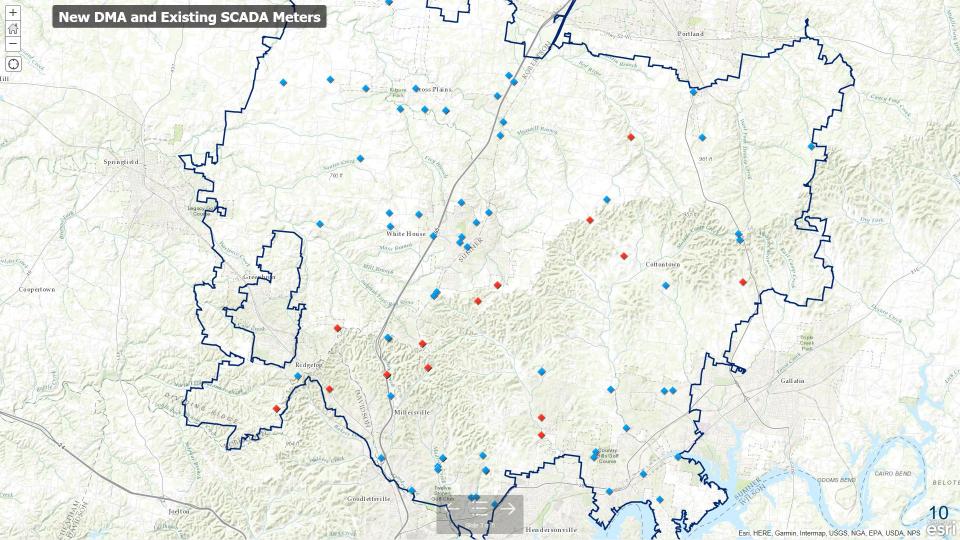


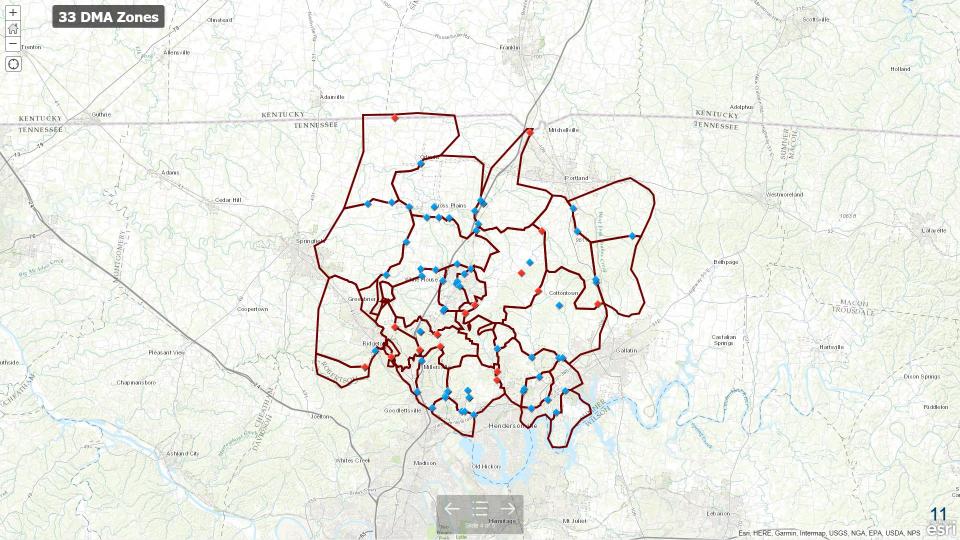
## District Metered Area (DMA)

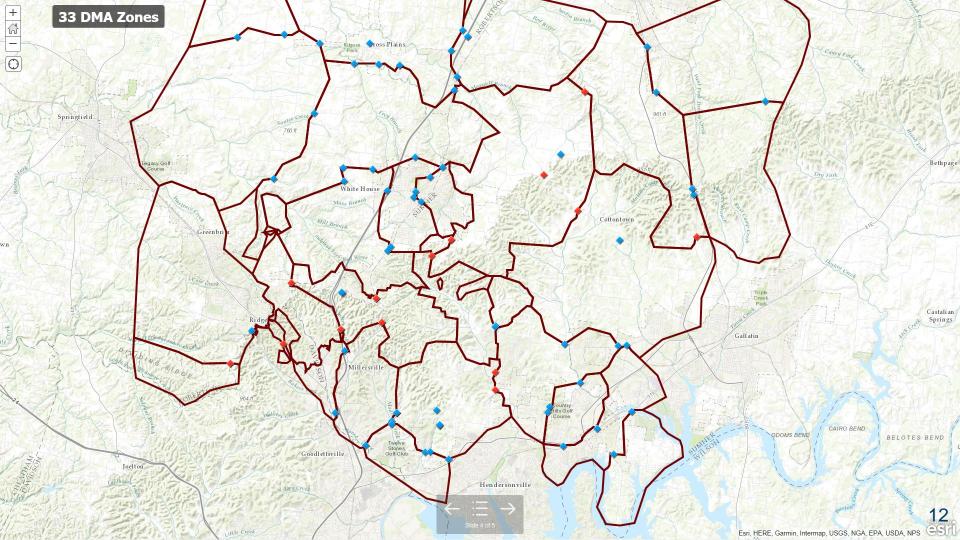
A portion of a water distribution system with metered boundaries that provide a means of determining instantaneous flow rates supplied to the area at specific points in time. Capabilities may also include monitoring of totalized flows over time

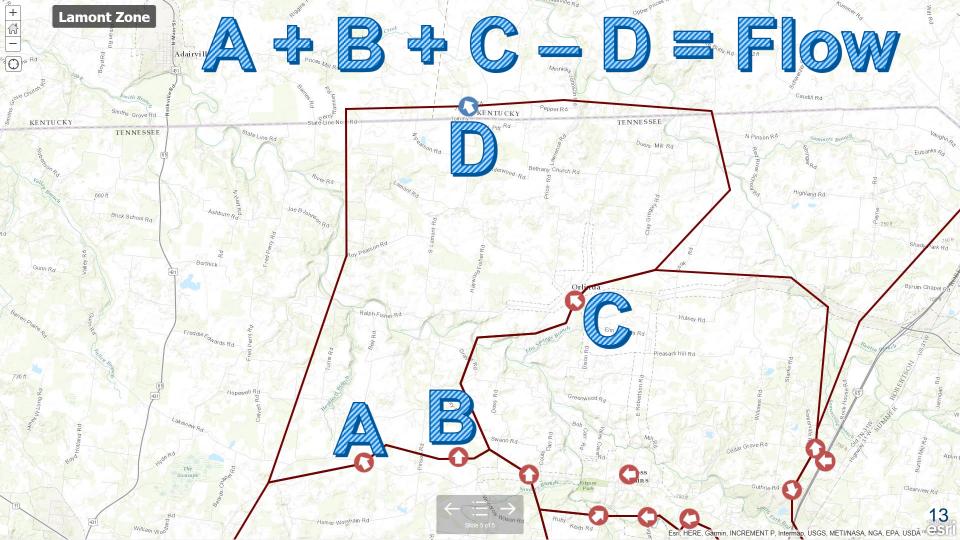








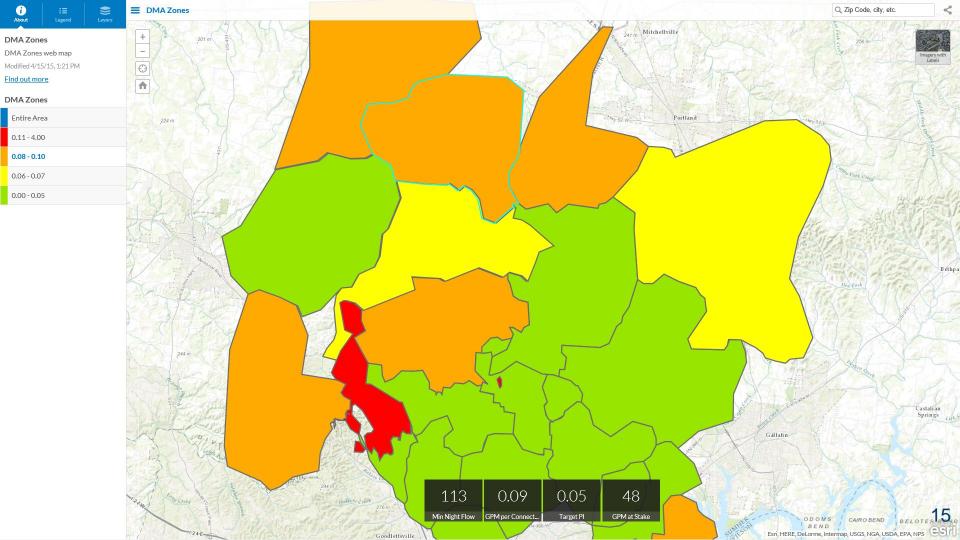




#### Use KPI's to Determine Whether Excess Leakage exists in DMA

**Example: Lamont DMA** - 571 Connections in rural area

- Min Night time Flow- lowest legitimate consumption (Usually 1 4 A.M.)
- Assume: Acceptable consumption/leak rate per connection of 0.05 gallons per minute per connection at time of Min Night Time flow
- 0.05 gpm/connection x 571 connections = 26 gpm
- Any Min Night time flow above this is considered a leak
- If Min time flow is 100 gpm then we expect to find a approx. 74 gpm leak
  - GPM at Stake (MNF (# of connections \* .05))
    Survey Date Date and time of Min Night time Flow



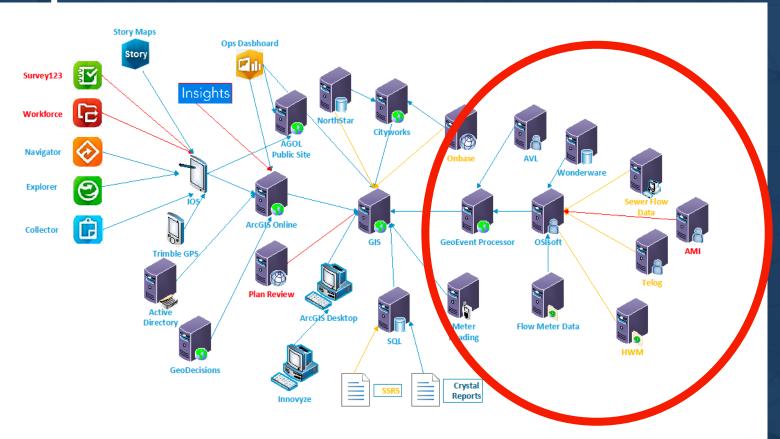
### We need to make this an Enterprise wide system

- Want to analyze and view data from several sources in GIS in real-time
- Need to automate our KPI and GIS
- Need to be able to see this data anywhere at an time
- What to be able to see easily view historical zone information





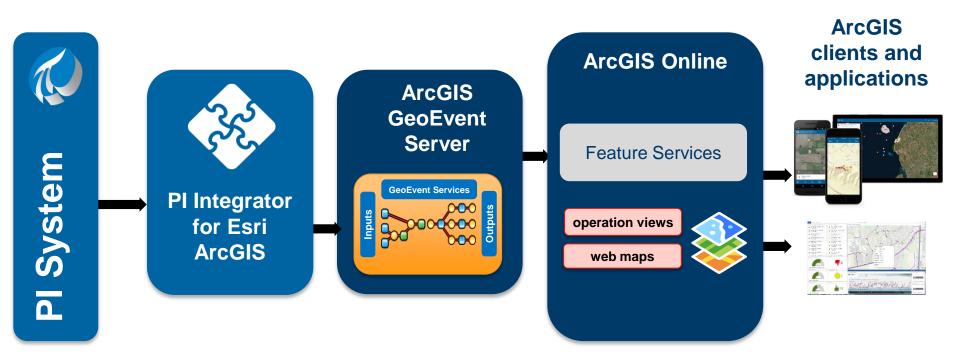
### **Enterprise Architecture**



### **GIS-Centric Water Loss Program**



### **SCADA and Meter Data Flow**









### 3.5 Days to Value Realization



# Example

4/20/2016 12:30 a.m. MNF = 400 gpm





## Repaired

4/26/2016 1:00 a.m. MNF = 120 gpm



# Repaired

280 gpm leak = 403,000 gallons per day

147,168,000 gallons per year

Water Treatment Plant Running 1 Hour Every Day just to feed this one leak

## Enough Water every day for 2,239

Repaired

## \$300,000 per year

What did it take?



### PI Interfaces and Connectors



#### **Interfaces and Connectors**

- SCADA connector
  - PI Interface for Relational Databases
  - Data updated 24/7
  - Water Flow Meters, Tanks, and Pump stations
- Flow meter
  - PI Connector for UFL
  - Text file source
  - Data updated once a day
  - Water Flow and Pressure Data

### **Asset Framework**



#### **AF Model**

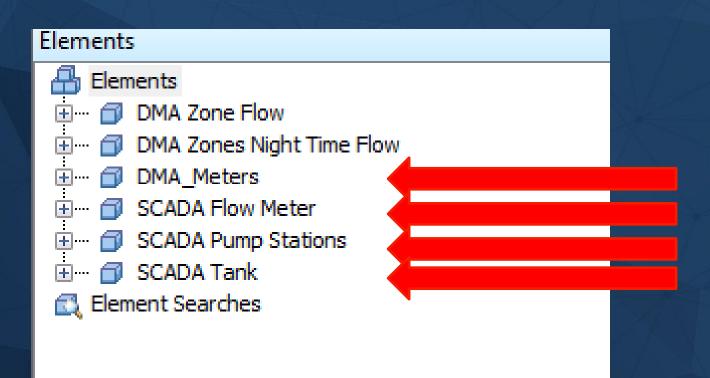
#### **Asset Analytics – Calculate KPIs**

- DMA Zone Flow
- Minimum Night Flow
- GPM at Stake
- Cost per Day



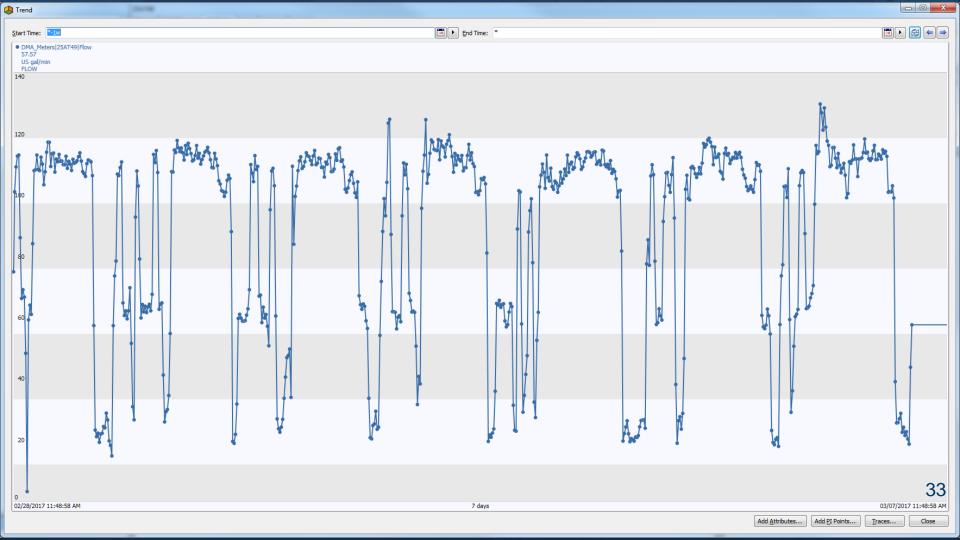


### Data

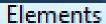


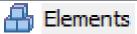
### Flow Meter Data

<b>/</b>   •   •   <del>Q</del>   Name △		Value	Time Stamp
₽	ArcGIS feature shape	{"x":1737455.7447908372,"y":809334.51131165	01/01/1970 12:00:00 AM
ū	ArcGIS feature shape type	Point	01/01/1970 12:00:00 AM
<b>□</b>	Coordinate projection ID	102736	01/01/1970 12:00:00 AM
Ī	Coordinate system ID	4269	01/01/1970 12:00:00 AM
	Coordinate system name	GCS_North_American_1983	01/01/1970 12:00:00 AM
	■ Elevation	742.5028	01/01/1970 12:00:00 AM
₽	■ Enabled	1	01/01/1970 12:00:00 AM
₽	■ Facility ID	w42	01/01/1970 12:00:00 AM
₽	■ Fitting Type	DMA	01/01/1970 12:00:00 AM
<b>∮</b> ■		57.5699996948242 US gal/min	03/07/2017 5:30:00 AM
	■ Latitude	36.5541277158219 °	01/01/1970 12:00:00 AM
	Location Description	6354 HWY 25 E	01/01/1970 12:00:00 AM
	■ Longitude	-86.7865775416069 °	01/01/1970 12:00:00 AM
₽	✓ NetFlowRangeOverPast25H	111.22999382019 US gal/min	03/07/2017 11:47:05.04 AM
₽	■ OBJECTID	12	01/01/1970 12:00:00 AM
<i>j</i> •		109.69000244140625	03/07/2017 5:30:00 AM
T	■ SCADA ID	25AT49	01/01/1970 12:00:00 AM
T	X-Coordinate	1737455.74479084	01/01/1970 12:00:00 AM
T	■ Y-Coordinate	809334.51131165	01/01/1970 12:00:00 AM



### **Data**

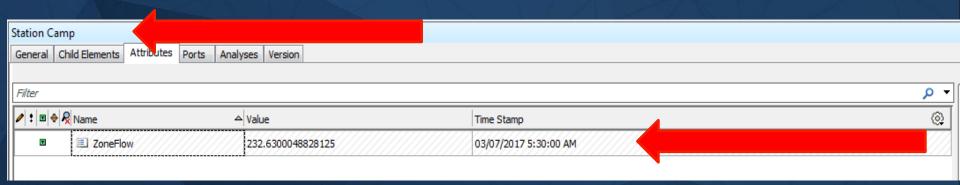




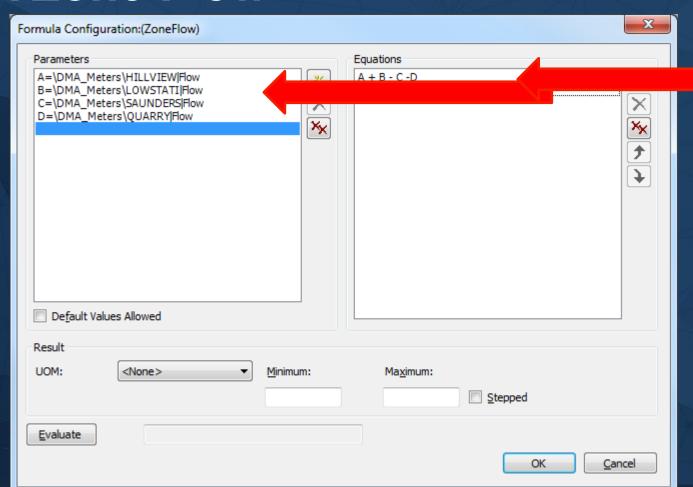
- 🗄 ... 🧻 DMA Zones Night Time Flow
- SCADA Flow Meter

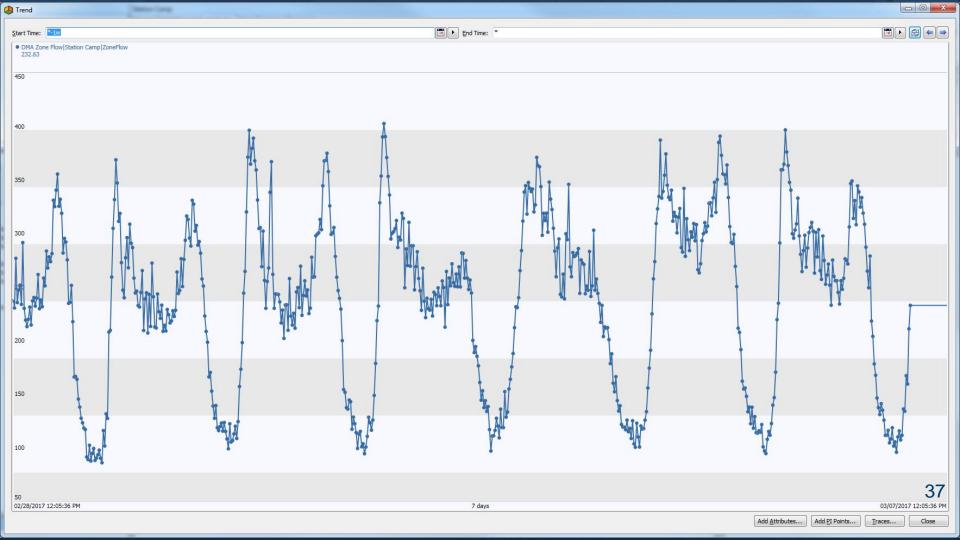
- Element Searches

### **DMA Zone Flow**

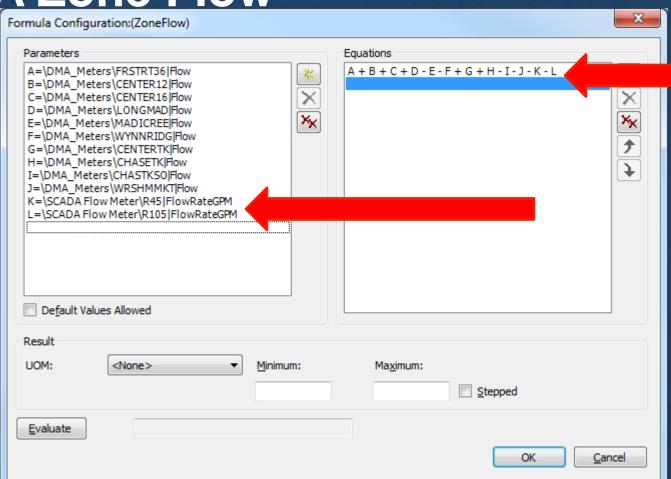


### **DMA Zone Flow**

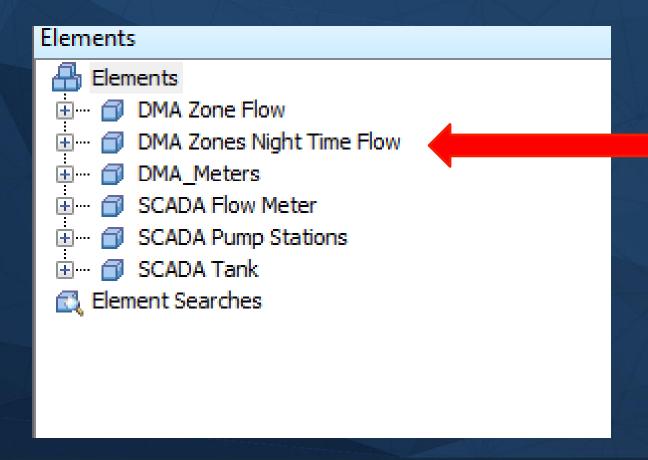




### **DMA Zone Flow**

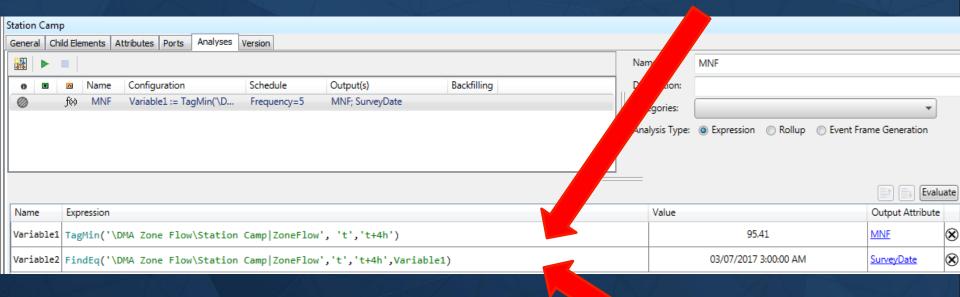


# **DMA Minimum Night Time Flow**

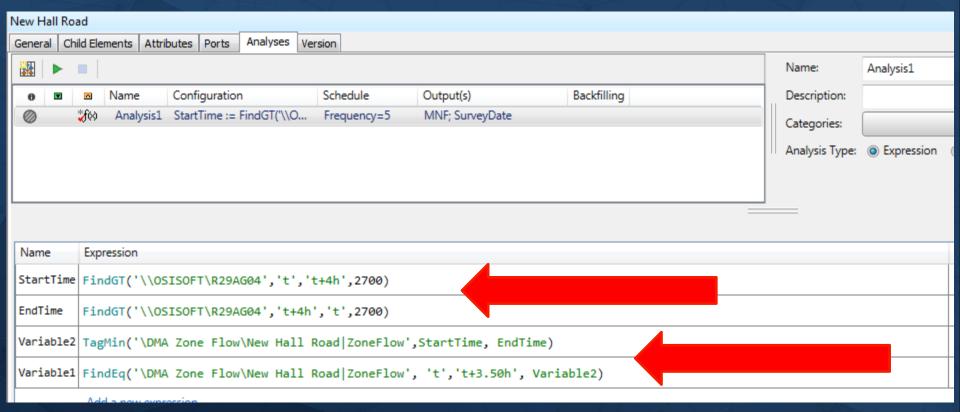


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/ :   <b>1</b>	O Nama	△ Value	Time Stamp	
	ArcGIS feature shape	{"rings":[[[1810440.4518393874,741333.985567	01/01/1970 12:00:00 AM	*
	ArcGIS feature shape type  ArcGIS feature shape type	Polygon	01/01/1970 12:00:00 AM	
■	Comments	<del>// </del>		
		target 76 mnf	01/01/1970 12:00:00 AM	
<u> </u>	Coordinate projection ID	102736	01/01/1970 12:00:00 AM	
□	■ CostPerDay	71,5967666015625 \$	03/07/2017 7:32:05 AM	
□	■ Feet_Pipe	123516 ft	01/01/1970 12:00:00 AM	
Ī	■ GPMatstake	24.8599884033203 US gal/min	03/07/2017 7:32:05 AM	
T	gpmperconn gpmperconn	0.0676187019158897 US gal/min	03/07/2017 7:32:05 AM	
T	gpmpermile	4.07909324040193 US gal/min	03/07/2017 7:32:05 AM	
	Last_Consu	5	01/01/1970 12:00:00 AM	
T	■ MilesPipe	23.39 mi	01/01/1970 12:00:00 AM	
₹ 💠		95.4099884033203 US gal/min	03/07/2017 7:32:05 AM	
T	■ Name	Station Camp	01/01/1970 12:00:00 AM	
T	■ Num_of_Met	1411	01/01/1970 12:00:00 AM	
□	■ NumDMAMtrs	4	01/01/1970 12:00:00 AM	
T	■ OBJECTID	11	01/01/1970 12:00:00 AM	
T	■ Phase	2	01/01/1970 12:00:00 AM	
■ 💠	SurveyDate	03/07/2017 3:00:00 AM	03/07/2017 7:32:05 AM	
¥	■ TargetPI	0.05	01/01/1970 12:00:00 AM	
T	Zone_calc	HILLVIEW+LOWSTATI-SAUNDERS-QUARRY	01/01/1970 12:00:00 AM	4

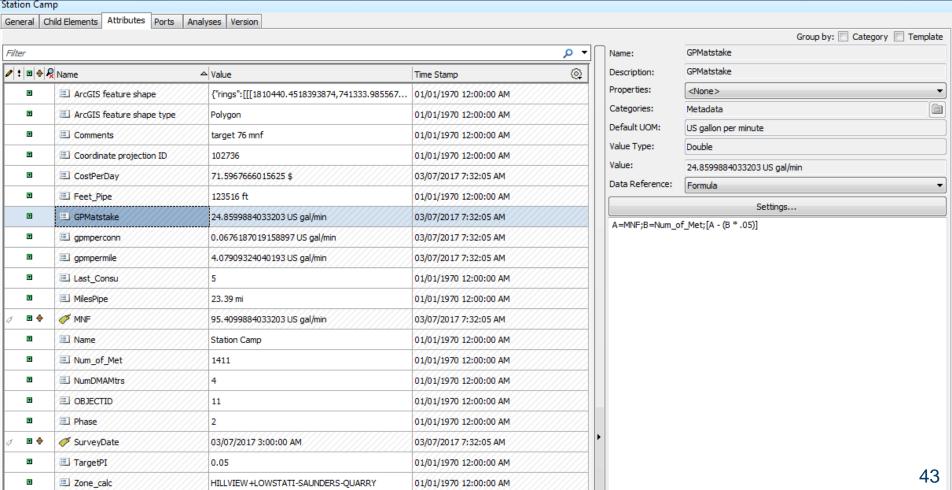
# **DMA Minimum Night Time Flow**



# **DMA Minimum Night Time Flow**



### **GPM at Stake KPI**



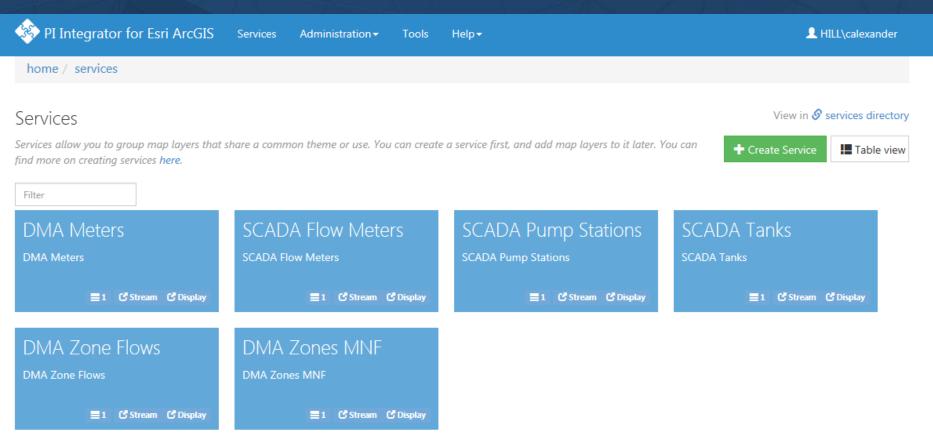
Cost per Day KPI

Station Can	mp						
General C	Child Elements Attributes Ports Ar	Analyses Version					
					Group by: Category Template		
Filter			ρ	<del>_</del>	CostPerDay		
<b>⊘</b>   :   ⊞  ♦	Name	△ Value	Time Stamp	Description:	CostPerDay		
	ArcGIS feature shape	{"rings":[[[1810440.4518393874,741333.985567	01/01/1970 12:00:00 AM	Properties:	<none> •</none>		
•	ArcGIS feature shape type	Polygon	01/01/1970 12:00:00 AM	Categories:	Metadata		
•	■ Comments	target 76 mnf	01/01/1970 12:00:00 AM	Default UOM:	Dollars		
₽	Coordinate projection ID	102736	01/01/1970 12:00:00 AM	Value Type:	Double		
T	■ CostPerDay	71.5967666015625 \$	03/07/2017 7:32:05 AM	Value:	71.5967666015625 \$		
	■ Feet_Pipe	123516 ft	01/01/1970 12:00:00 AM	Data Reference:	, ormana		
	■ GPMatstake	24.8599884033203 US gal/min	03/07/2017 7:32:05 AM		Settings  A=GPMatstake; [A * 2.88]		
•	gpmperconn	0.0676187019158897 US gal/min	03/07/2017 7:32:05 AM	A=GPMatstake;[/			
•	gpmpermile	4.07909324040193 US gal/min	03/07/2017 7:32:05 AM	áll			
•	■ Last_Consu	5	01/01/1970 12:00:00 AM	áll			
•	■ MilesPipe	23.39 mi	01/01/1970 12:00:00 AM	all —			
Ø ■ ♦	Ø MNF	95.4099884033203 US gal/min	03/07/2017 7:32:05 AM	ál I			
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	Num_of_Met	1411	01/01/1970 12:00:00 AM	ál I			
	NumDMAMtrs	4	01/01/1970 12:00:00 AM	áll –			
	■ OBJECTID	11	01/01/1970 12:00:00 AM	all —			
•	Phase	2	01/01/1970 12:00:00 AM	ál l			
<i>3</i> ■ ♦		03/07/2017 3:00:00 AM	03/07/2017 7:32:05 AM	<b>4 6</b>	44		
·	■ TargetPI	0.05	01/01/1970 12:00:00 AM	<b>41</b>			
	Zone calc	HILLVIEW +LOWSTATI-SAUNDERS-OUARRY	01/01/1970 12:00:00 AM	<b>#</b>			

## PI Integrator for Esri ArcGIS



### WHUD PI Integrator for Esri ArcGIS



### WHUD PI Integrator for Esri ArcGIS



PI Integrator for Esri ArcGIS

Services

Administration -

Tools

Help▼

♣ HILL\calexander

View in services directory: StreamServer DisplayServer

home / services / DMA Zones MNF / DMA MNF



DMA MNF

Created on 03/21/2016 03:59:48 (12 months ago)

All Features

Fields

StreamServer

DisplayServer

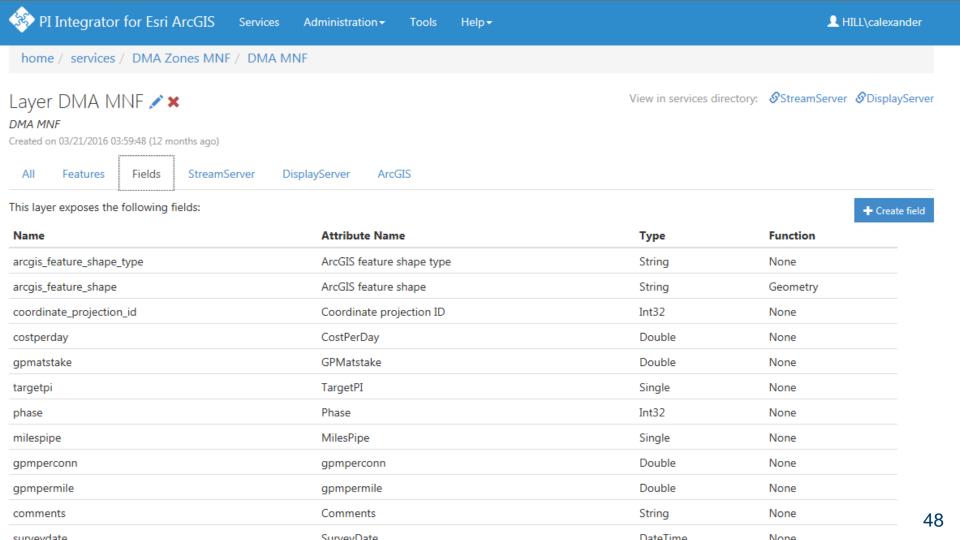
ArcGIS

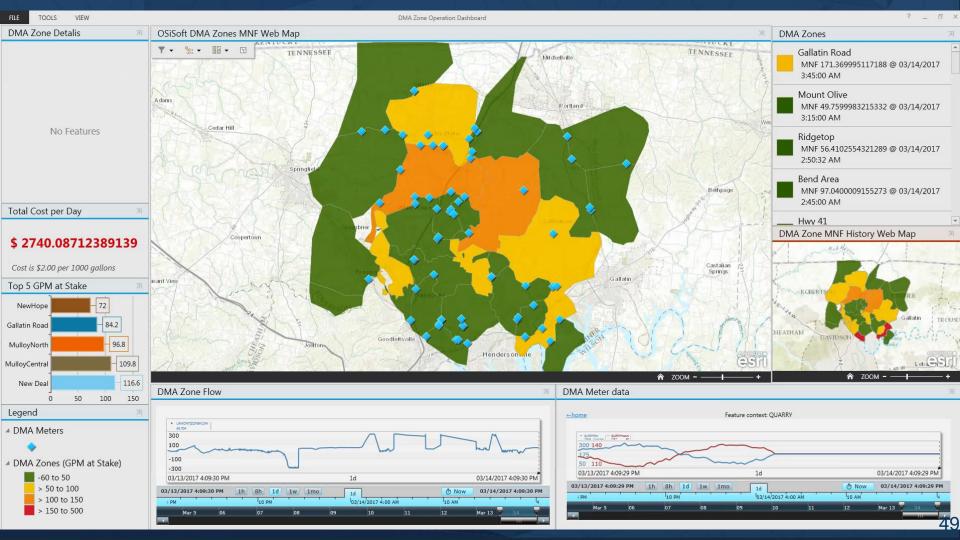
This layer exposes PI AF Elements using the following search parameters

AF Server	OSISOFT	Categories	
AF Database	SCADA	Search root	DMA Zones Night Time Flow
Template	DMA Zones	Max count	1000000

Geometry settings

Geometry Type	Polygon
Spatial Reference	NAD 1983 StatePlane Tennessee FIPS 4100 Feet





Integrating
Existing
SCADA Sites
Savings
\$ 200,000

Workflow optimisation Yearly Savings \$30,000+



2016 & 2015 Water loss Savings \$900,000

Delivering Real Value

# **Future**

- AMI Advanced Metering Infrastructure
  - Daily Customer Consumption
- Water Pressure Sensors
- Weather Data
  - Real Time & Historical Trending
- Sewer Flow Monitoring

#### **Contact Information**

#### Carl Alexander

calexander@whud.org

**GIS** Director

White House Utility District, TN







#### Questions

Please wait for the microphone before asking your questions

State your name & company

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감사합니다

Danke

谢谢

**Gracias** 

Merci

Thank You

ありがとう

Спасибо

Obrigado



