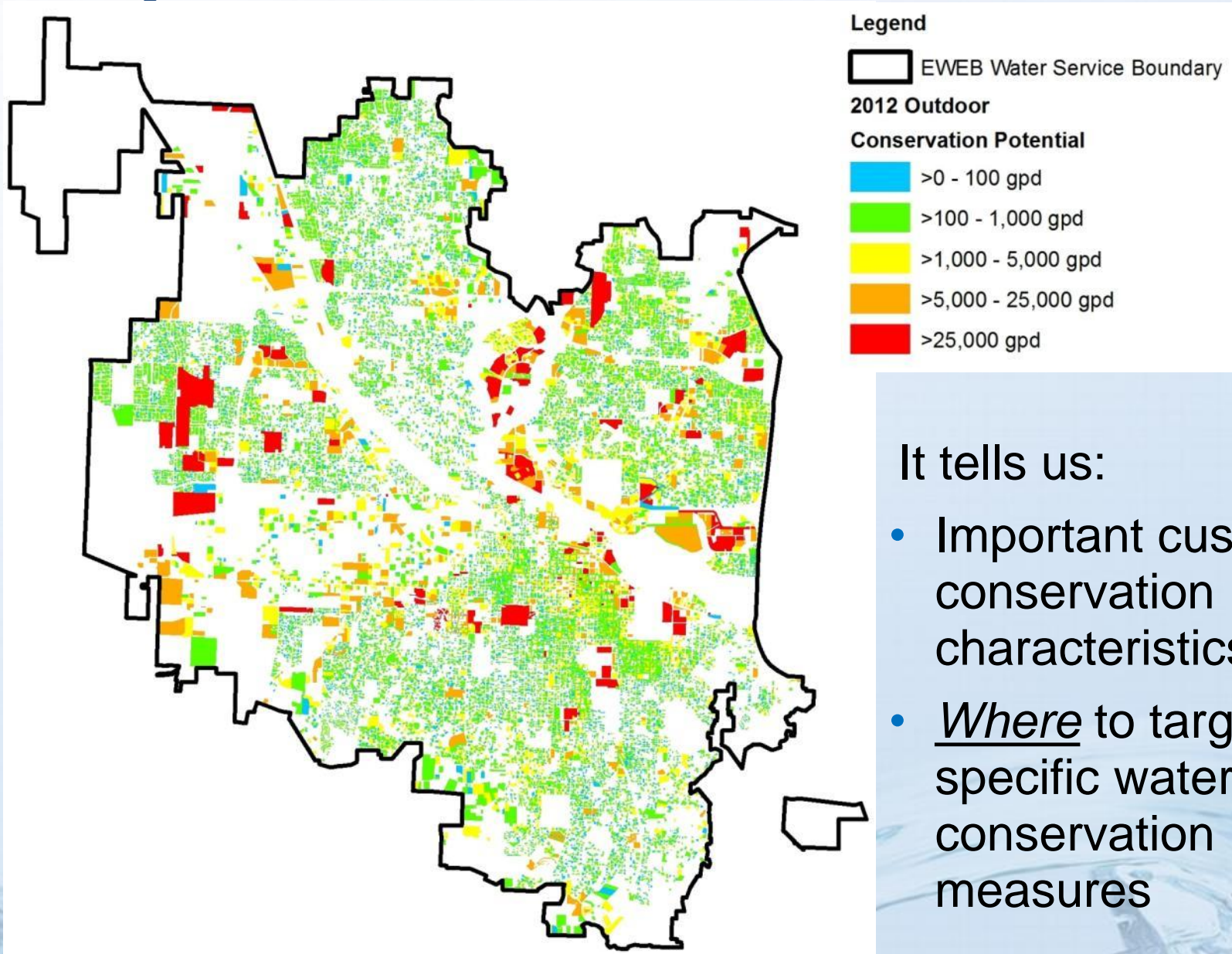


GIS: A Tool For Water Conservation Planning & Tracking

Rachel Lanigan, PE
Jill Hoyenga (EWEB)



Why use GIS for Water Conservation?



It tells us:

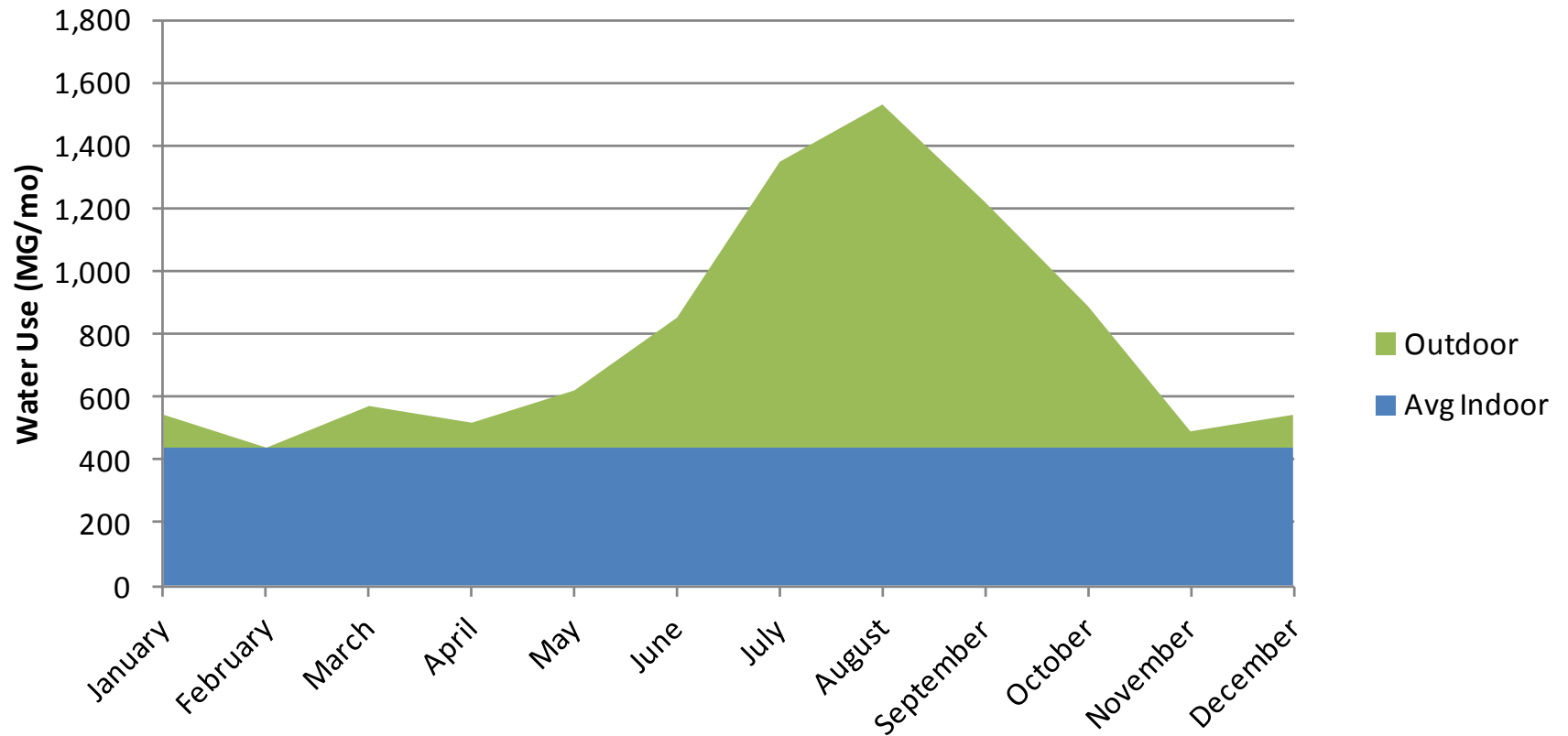
- Important customer conservation characteristics
- Where to target specific water conservation measures

Eugene Water and Electric Board (EWEB)



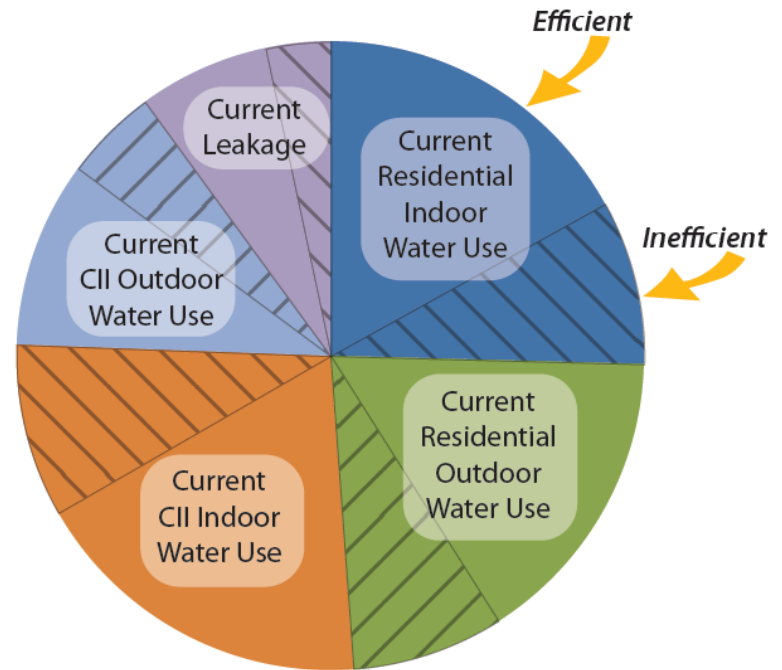
Seasonal Water Use

Monthly Indoor vs. Outdoor Water Use



Project Goals

Tailor EWEB's Water Conservation Program to prioritize conservation measures according to areas of greatest potential

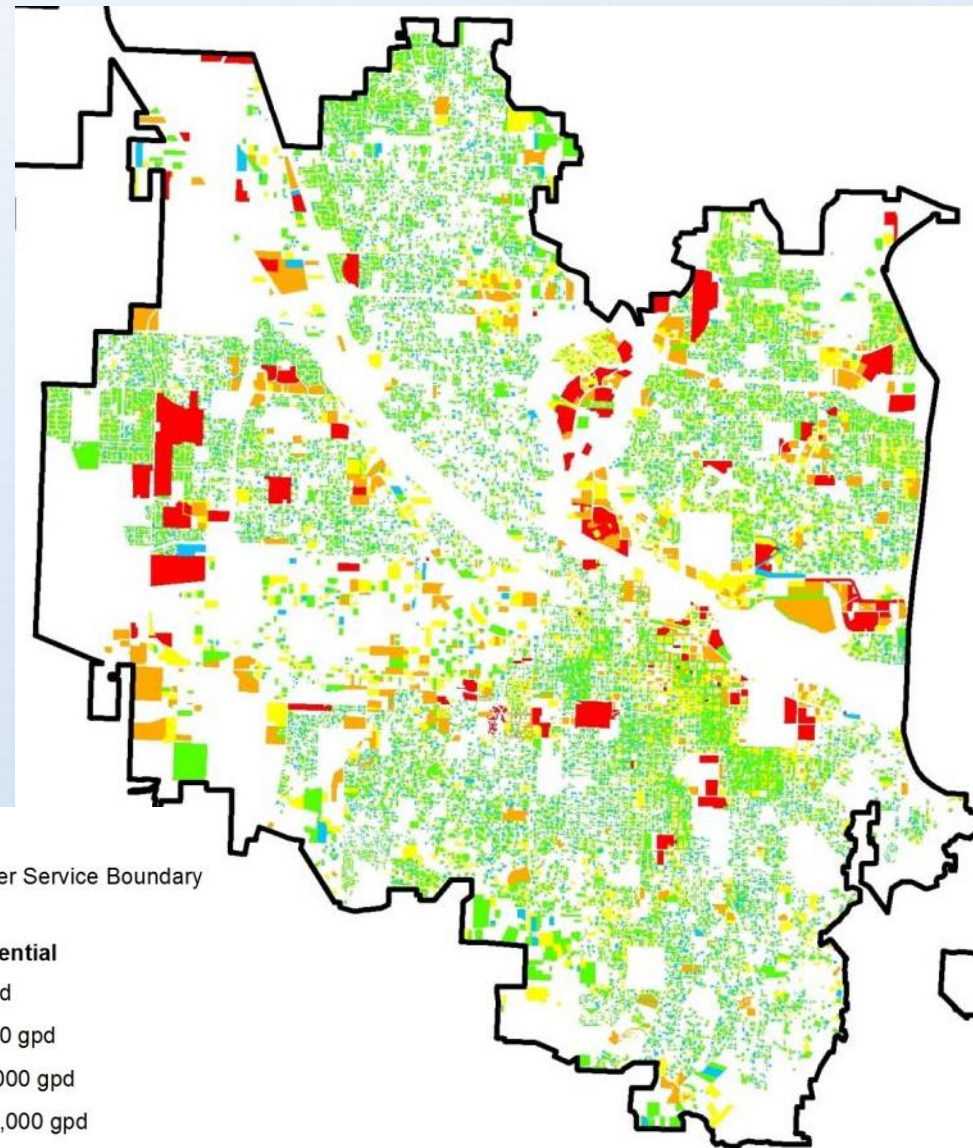


Project Objectives:

1. Identify potential water conservation still remaining;
2. Evaluate water conservation measures appropriate to EWEB;
3. Provide GIS tool for evaluating conservation and future planning.

EWEB GIS Tool Goals

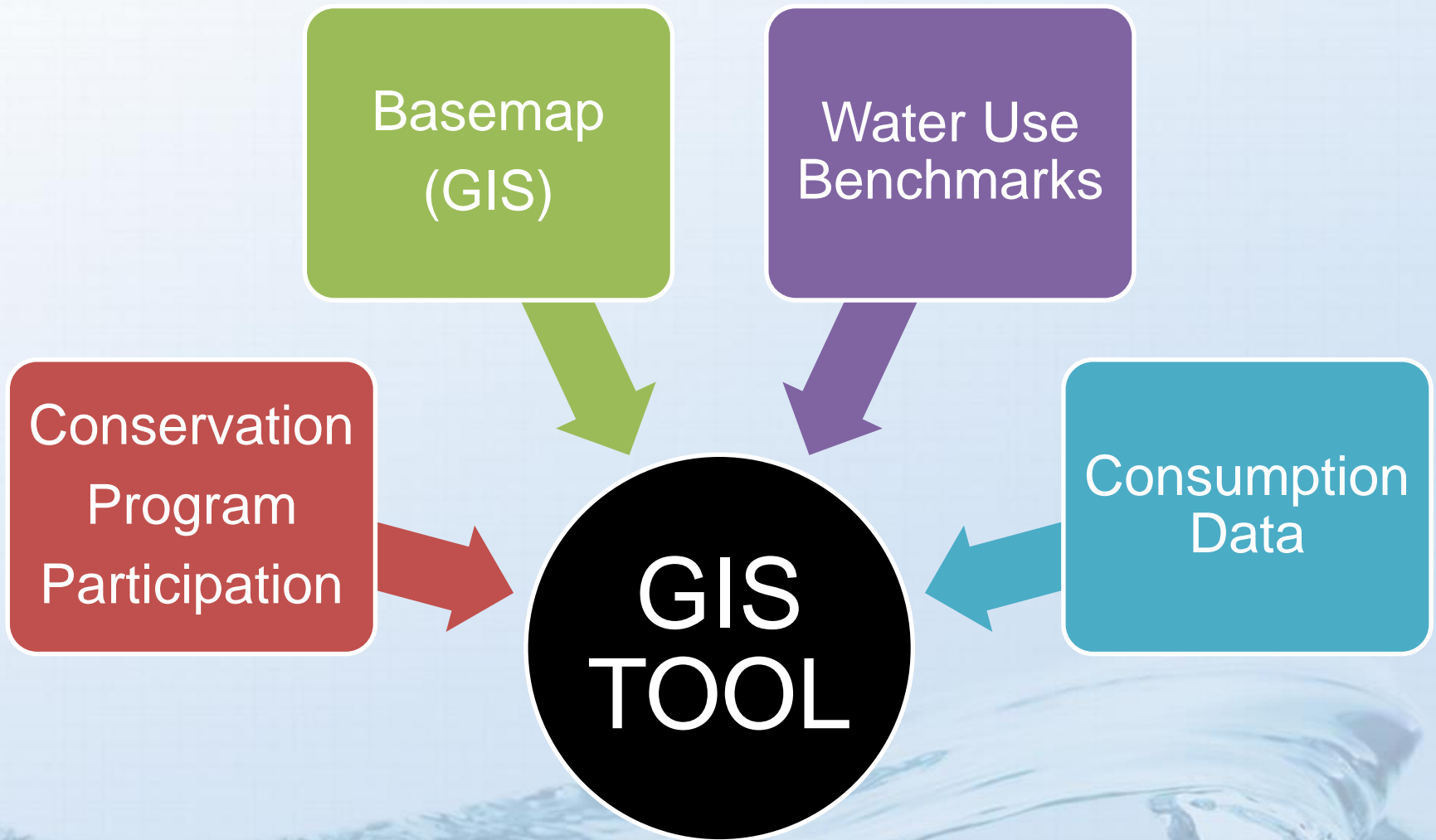
- Spatially identify conservation potential
- Estimate water use budgets
- Integrate demands with master planning
- Water use tracking
- Conservation program tracking



GIS Tool Methodology & Analysis



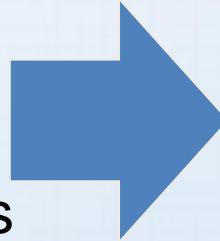
Inputs (aka “the Wish List”)



What data sources did we have to start with?

Available data sources

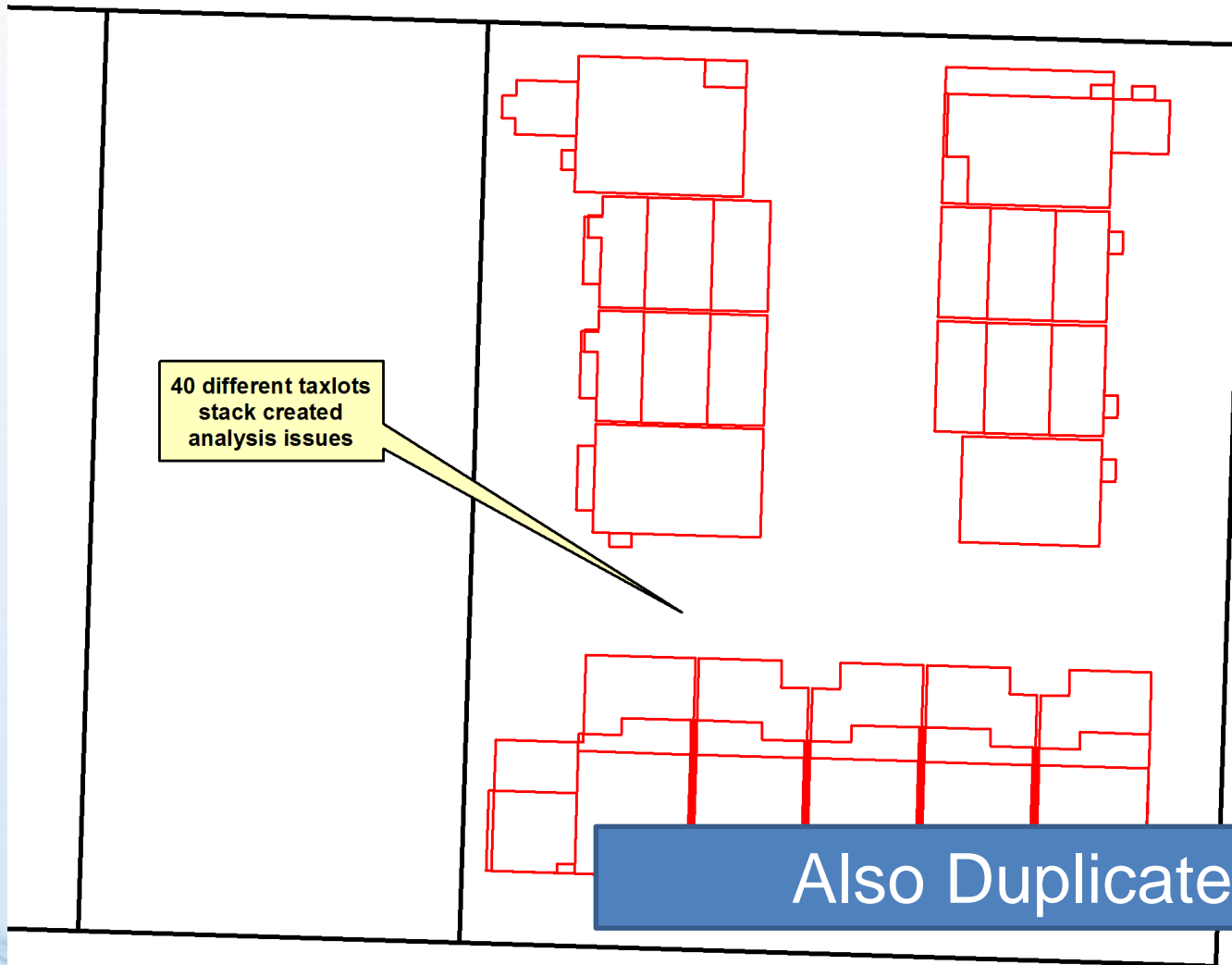
- GIS
- Water Billing Data
- Conservation Studies



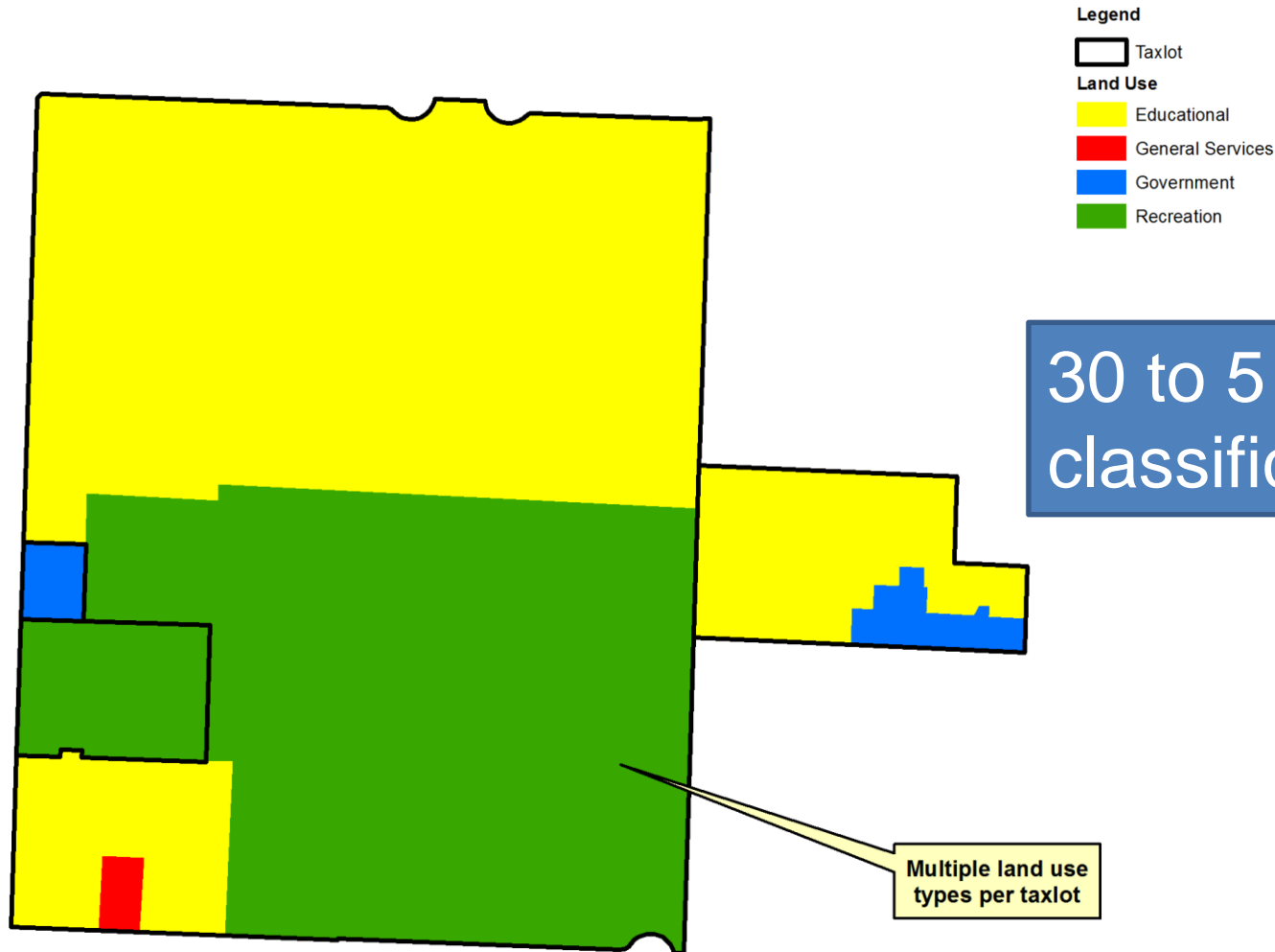
GIS Inputs

- Taxlots (Base)
- Land Use
- Pervious Surface (Residential Only)
- Building Footprints
- Pressure Zones
- Water Accounts
- Benchmarks

Data Challenges: duplicate parcels with different taxlot IDs



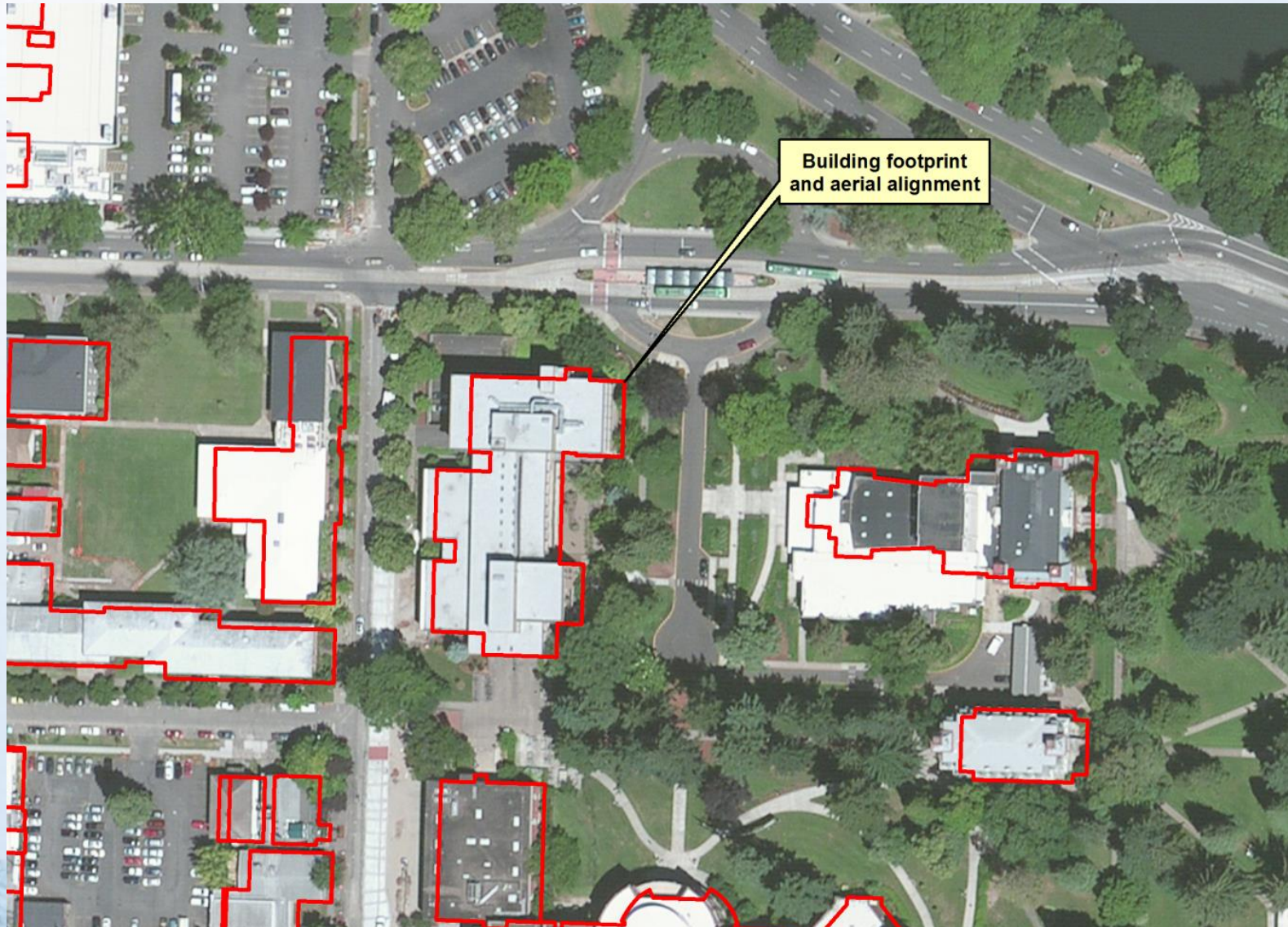
Data Challenges: Multiple Land Use types per Taxlot ID



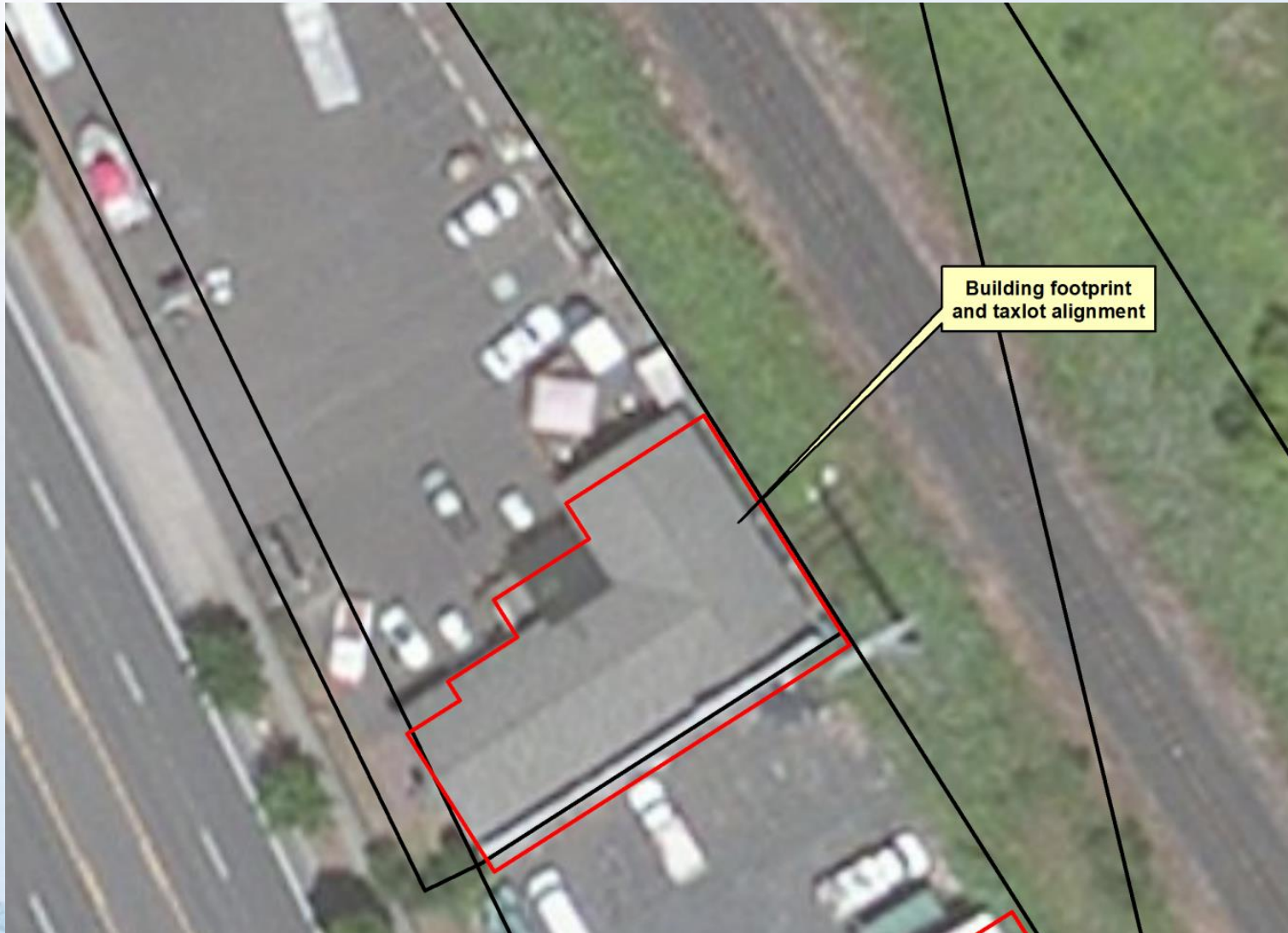
Data Challenge: Pervious Area Calculated for Some Properties



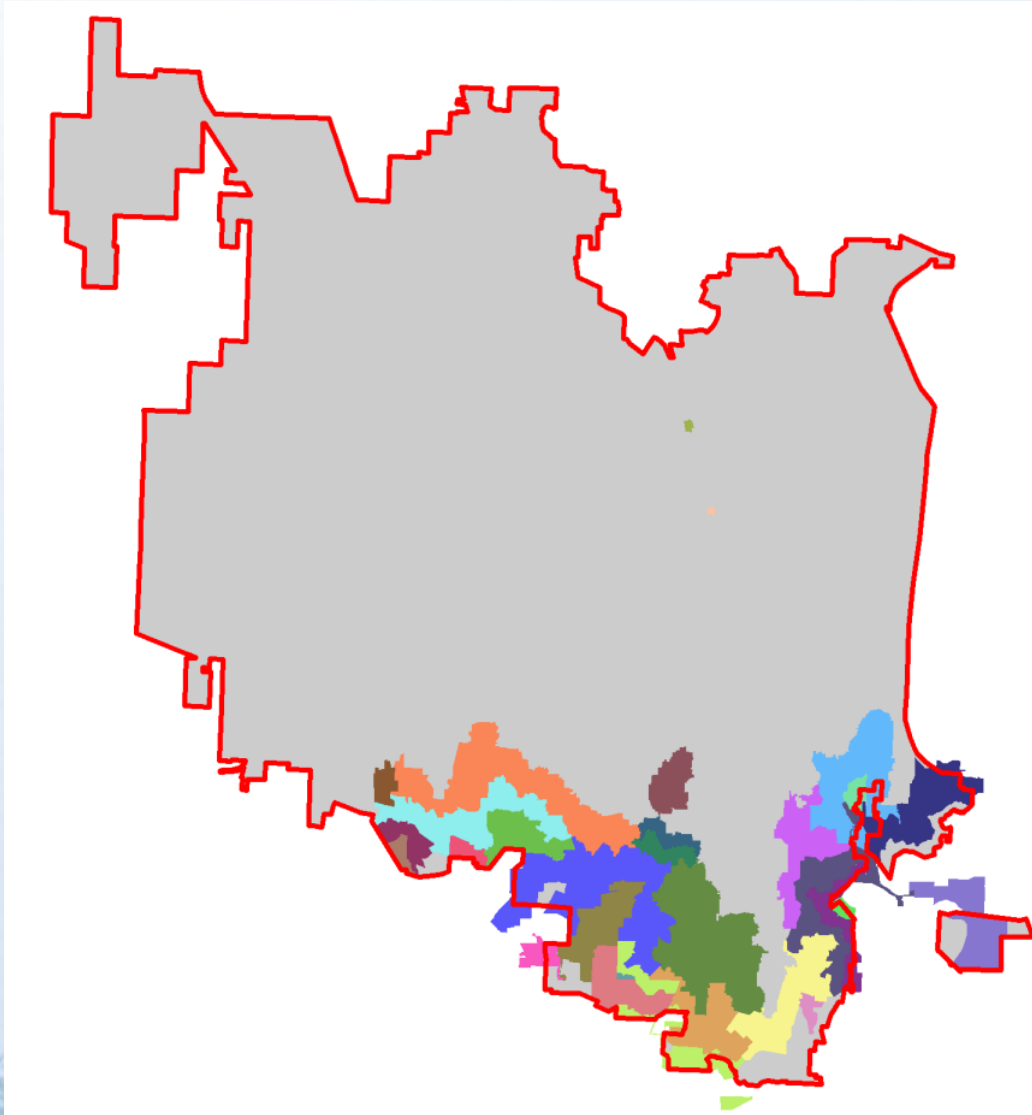
Data Challenge: Building footprints were digitized from older aerial photos



Data Challenge: Building footprints overlapped taxlot boundaries

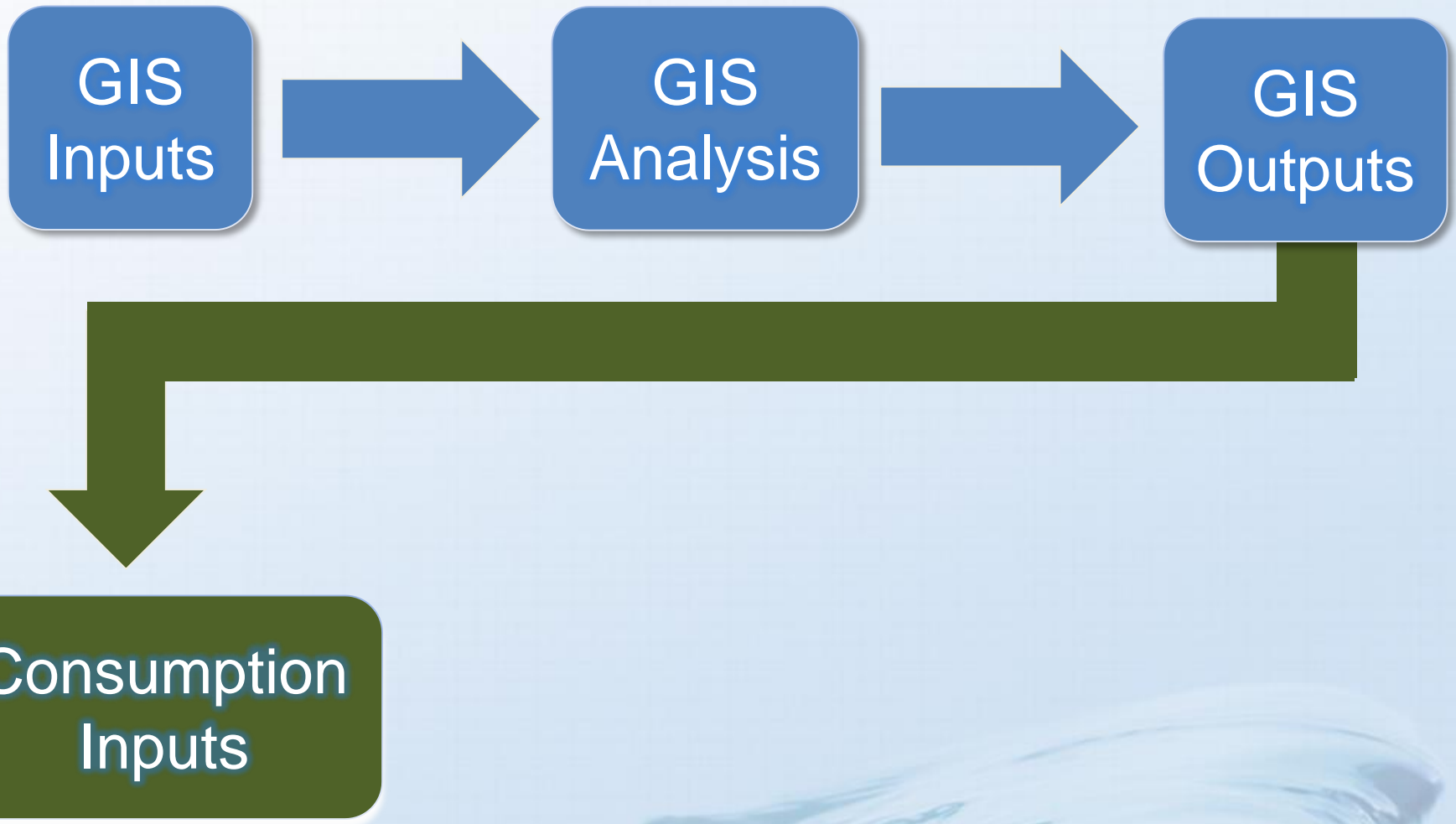


Lastly, we connected water accounts and assigned the pressure zone

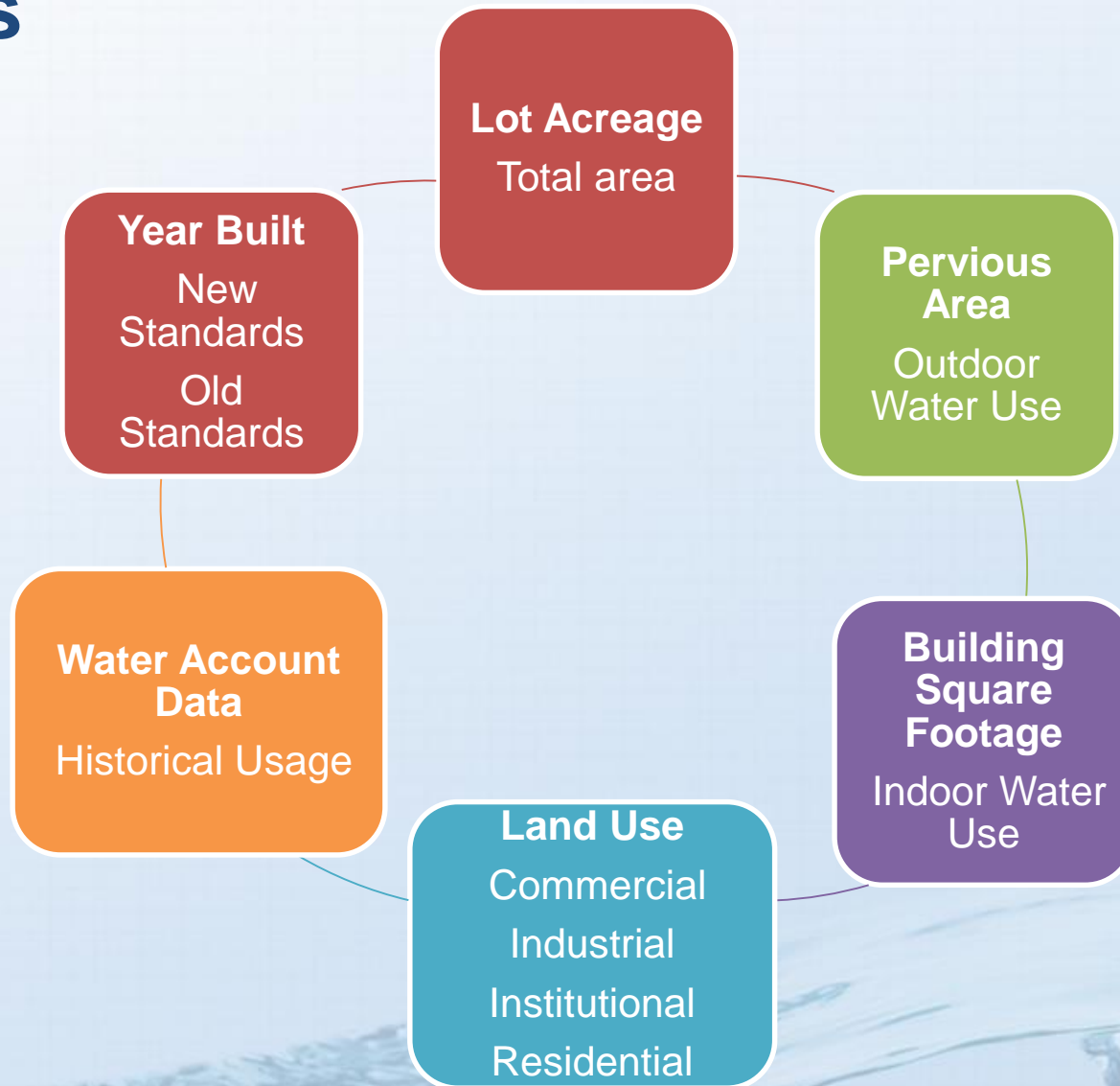


31 Pressure
Zones

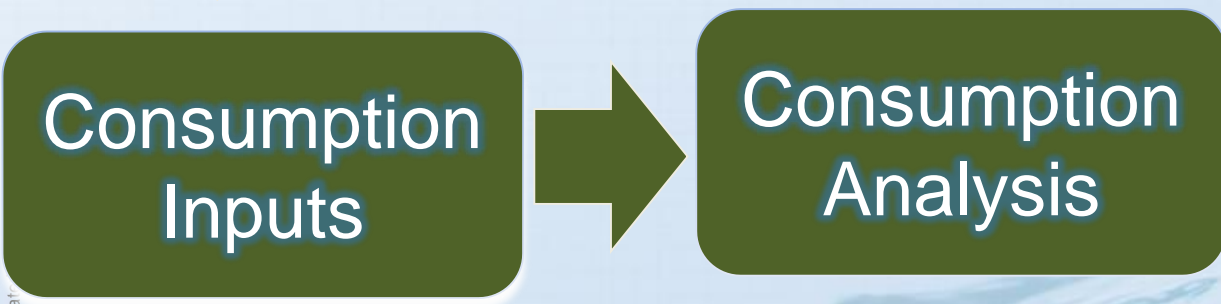
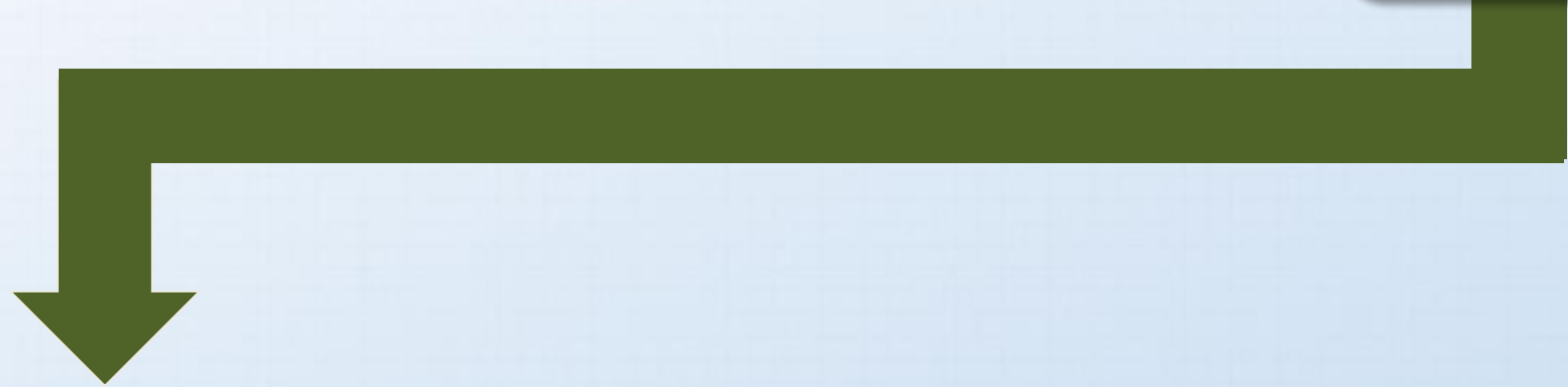
GIS Tool Methodology & Analysis



GIS Outputs Become Conservation Inputs



GIS Tool Methodology & Analysis



Conservation Potential – Indoor

Indoor Water Use

Current Water
Use (gpd)

-
Benchmark
Water Use
(gpd)

Indoor
Conservation
Potential

Outdoor Water Use

Current Water
Use (gpd)

-
Irrigation
Water Budget
(gpd)

Outdoor
Conservation
Potential

Indoor Water Use Conservation Potential was estimated by Benchmarks



- Residential
 - **Benchmark** - gallons per day per account
- Hotels, Restaurants, Offices, Grocery Stores, Offices, and Schools
 - **Benchmark** – gallons per day per square foot
- All Other Customer Types
 - **Benchmark - based on percentage**
 - Ranges from 13-49%
 - Based on literature

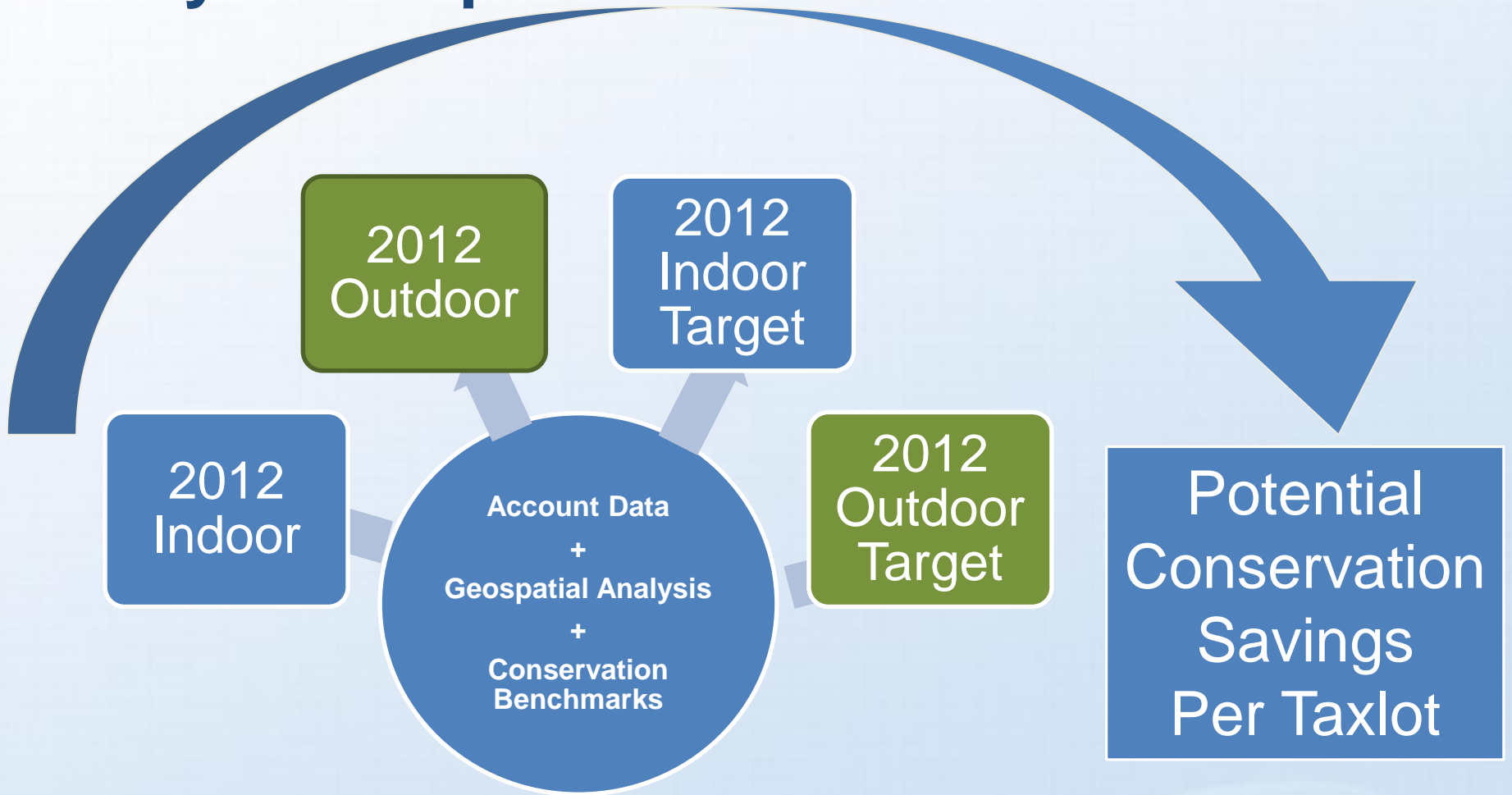
Outdoor Water Use Conservation Potential was estimated by Water Use Budget



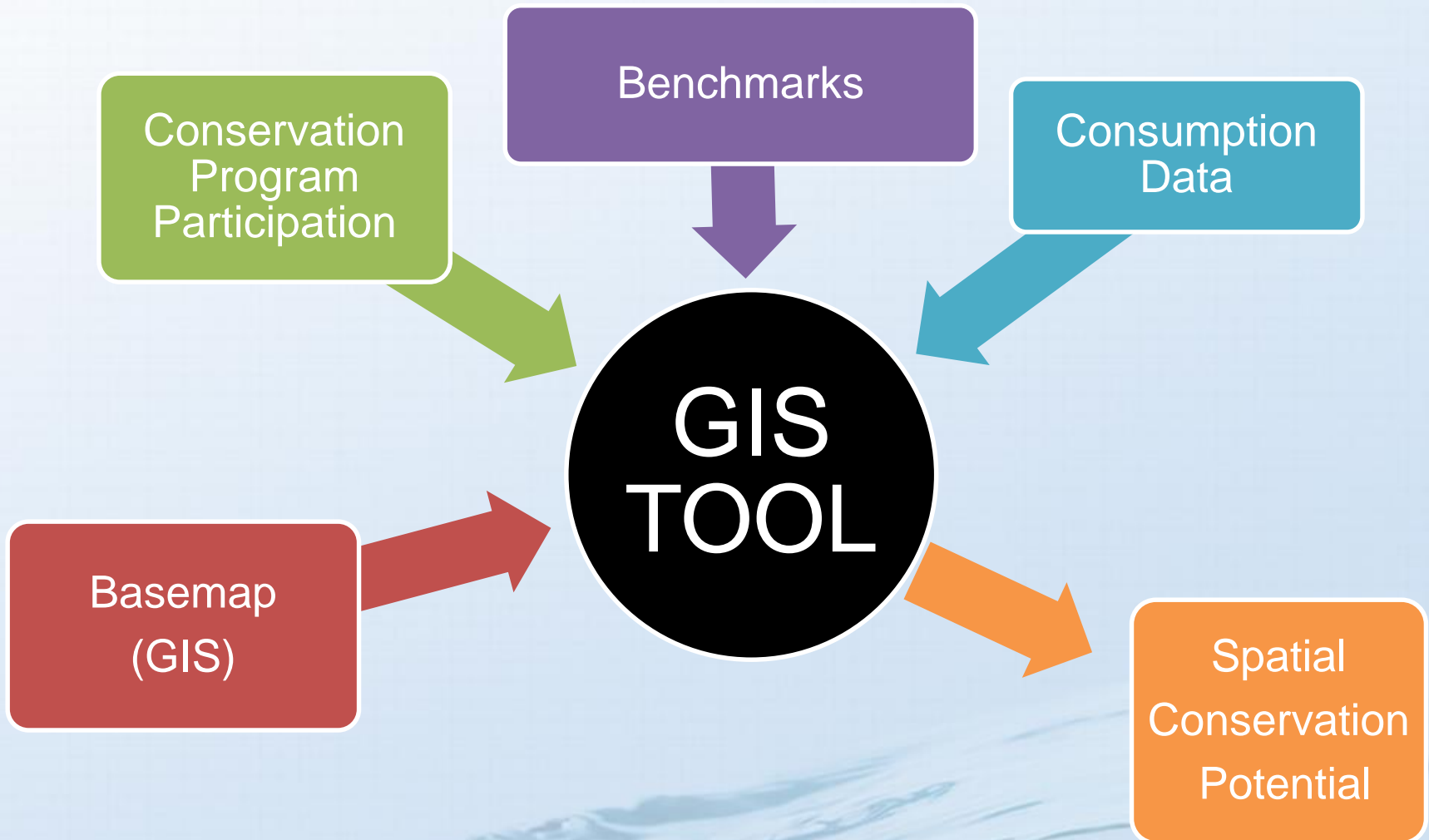
- Pervious Acreage
 - Developed in geospatial analysis
- Crop Coefficient
 - % area covered in crops
 - Agreed on by client
 - Generally 60%, parks and golf courses 100%
- Evapotranspiration Value
 - 4.94 inches in August in Eugene, Oregon

Water Use Budget = (Acreage) x (Crop Coefficient) x (ET Value)

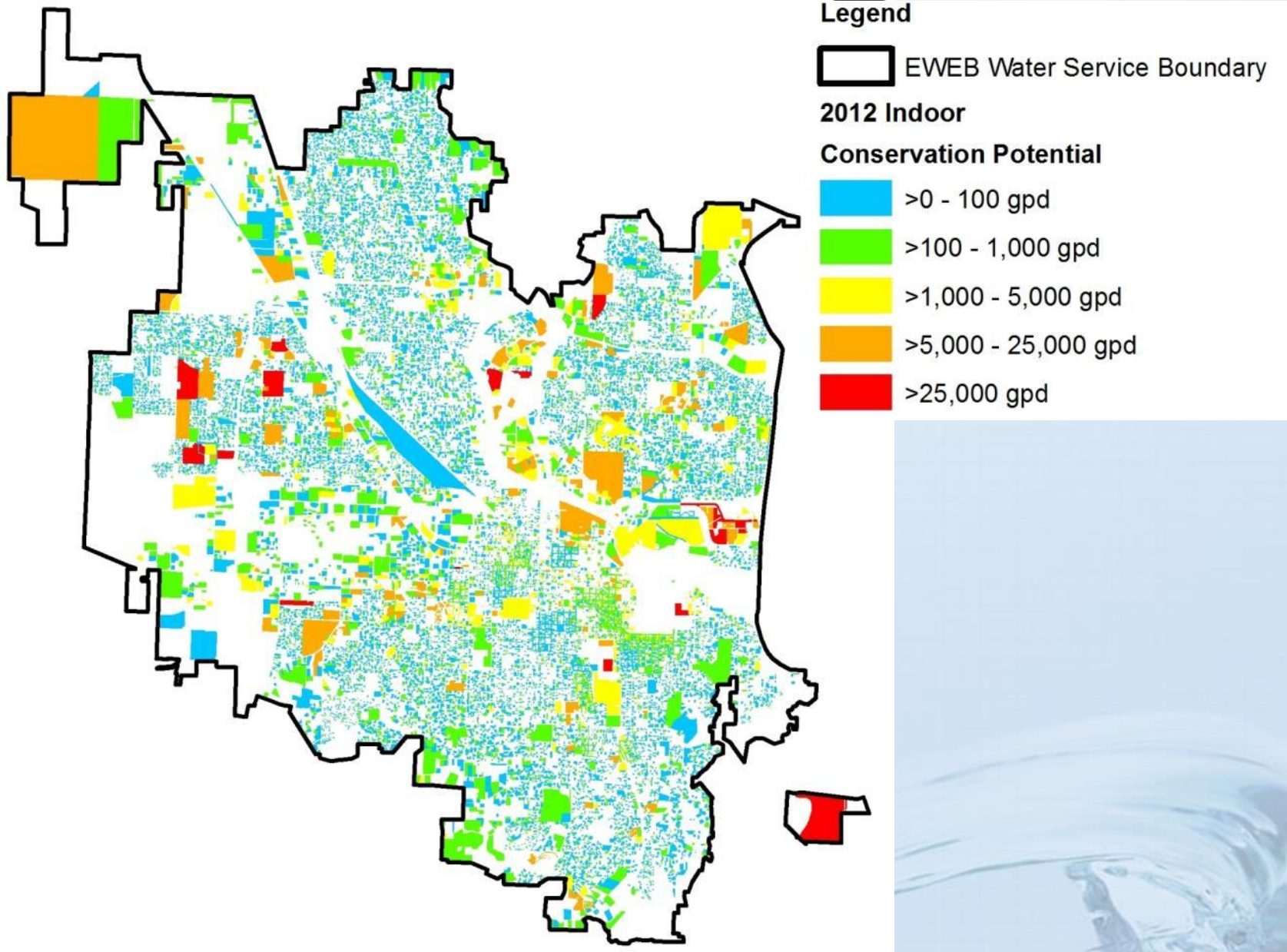
Analysis Outputs



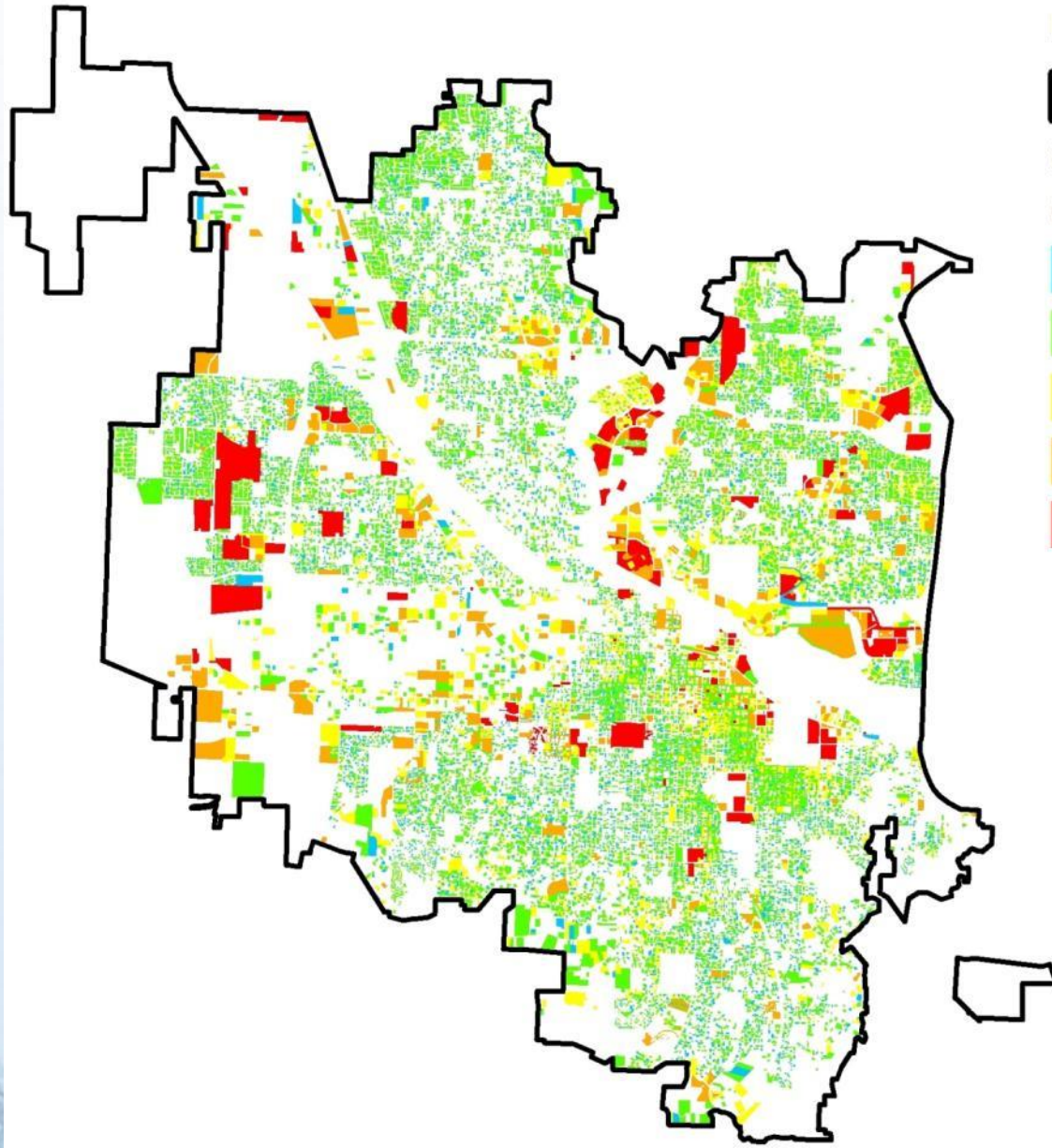
GIS Tool Output




Tool Results – Indoor Cons Potential



Tool Results – Outdoor Cons Potential

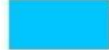



Legend


 EWEB Water Service Boundary

2012 Outdoor


Conservation Potential

 >0 - 100 gpd

 >100 - 1,000 gpd

 >1,000 - 5,000 gpd

 >5,000 - 25,000 gpd

 >25,000 gpd

Resulting Total Potential

Customer Type	Indoor Conservation Potential (MGY)	Outdoor Conservation Potential (MGD)
SFR	217	0
MFR	79	1.66
Commercial	120	2.08
Institutional	51	0.71
Industrial	108	0
Irrigation	N/A	0
Other	33	1.05
Total	608	5.49
Percent of Current Water Use	13%	15%

Lessons Learned

- Start with your “Wish List”
 - Identify your data gaps
 - What other agency has the data you need?
- Results are only as good as your input data
 - GIS base & water billing data linkage needs to be maintained & updated
- Roll with the punches
 - Don’t let the data issues get in the way of completing a high quality project
- Document your data assumptions & methodology

GIS Tool Growth and Expansion Potential

- Data and sources to improve GIS Tool
 - Imagery analysis to improve impervious/pervious surface and building footprint analysis
 - Add additional features from the Inputs “Wish List”
 - Single-Family Residential number of bathrooms & bedrooms
 - Retrofit of low-flow fixtures and appliances
 - CII Building Area (sf)
- GIS Tool Future Updates
 - Track conservation efforts
 - Recalculate conservation potential
- Tie into demand planning

Questions

Water Conservation Recommendations

Measure	Lifespan (years)	Volume Savings	Amortized Cost per 1,000 Gallons
Irrigation Controller Rebate	10	37 gpd	\$1.59
Soil Moisture Sensor Rebate	20	10 gpd	\$0.16
Efficient Sprinkler Rebate	5	3.5 gpd	\$1.09
Pressure Regulating Spray Head Rebate	Ukn	3.5 gpd	\$1.09
Sprinkler Check Valve Rebate	Ukn	Variable	Variable
Drip Irrigation Retrofit Rebate	10 to 30	48 gpd	\$0.96
WaterSense High Efficiency Toilet	20	11 gpd	\$0.63
Single Pass Cooling Retrofit	Variable	80-95%+	Variable
ENERGY STAR Clothes Washer	12 to 14	19 gpd	4.81
Water Smart Readers	10	17 gpd	0.89
Leak Detection and Repair	n/a	4.2 gpd	5.08
Pressure Reducing Valves	35	Variable	Variable

Estimated Conservation Potential – Indoor Water Use

Customer Type	2011 Number of Customers	Historic Indoor Water Use (gpd/account)	Indoor Water Use Benchmark (gpd/account)	Conservation Potential (MGY)
SFR	51,315	132	120	217
MFR	3,899	559	504	79

Customer Type	Historic Indoor Water Use (MGY)	Conservation Weighted Reduction (%)	Estimated Efficient Water Use (MGY)	Conservation Potential (MGY)
Commercial	516	23	396	120
Institutional	306	17	254	51
Industrial	275	39	167	108
Other	265	13	232	33


Resulting Conservation Potential – Outdoor Water Use

Customer Type	2011 Number of Customers	Historic Peak Outdoor Water Use (gpd/account)	Benchmark Peak Outdoor Water Use (gpd/account)	Conservation Potential (mgd)
SFR	51,315	368	383	0
MFR	3,899	1,048	623	1.66
Commercial	2,751	1,571	814	2.08
Institutional	1,159	3,899	3,290	0.71
Industrial	565	1,394	2,252	0
Irrigation	249	5,122	35,710	0
Other	826	1,925	658	1.05
Total				5.49

GIS Tool Outputs

Every property has:

- Taxlot ID
- Spatial Location
- Land Use Type
- Building Age
- Pressure Zone
- Water Account #
 - Link to historic water use
- Building Footprint
- Pervious Area



Water
Consumption
Analysis
Inputs