

DIMs, MUMs, and More: Complying with CII Landscape Requirements



Speakers



Jazmine Molloy
Eagle Aerial Solutions



Justin Finch (*moderator*)
Melissa Salazar
John Lansden
Moulton Niguel Water District



Madeline Wood
City of Santa Barbara

PEER TO PEER

CONNECT. COLLABORATE. GROW.

June 1 - 2, 2022

Presented by



CALIFORNIA
WATER EFFICIENCY
PARTNERSHIP



DIMs, MUMs and More: Complying with CII Landscape Requirements



Jazmine Molloy

Eagle Aerial Solutions

Project Manager



WATERVIEW
Water Efficiency Software

QUICK SB 606 & AB 1668 Recap

INDOOR RESIDENTIAL
USE STANDARD



+

OUTDOOR RESIDENTIAL
USE STANDARD



+

COMMERCIAL, INDUSTRIAL,
AND INSTITUTIONAL
LANDSCAPE STANDARD



+

WATER LOSS
STANDARDS



+ (Variances) + (Recycled Water Bonus)

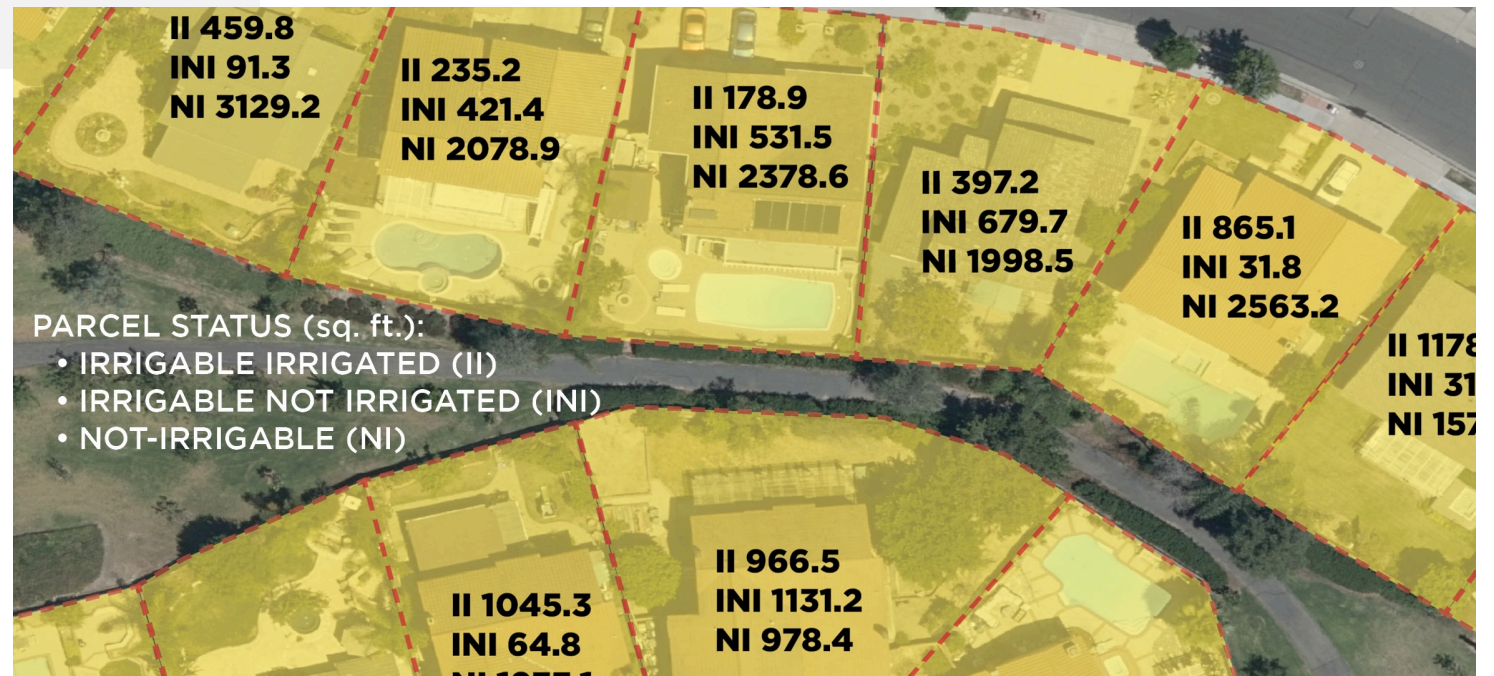
<https://calwep.org/wp-content/uploads/2021/08/WUE-Standards.png>



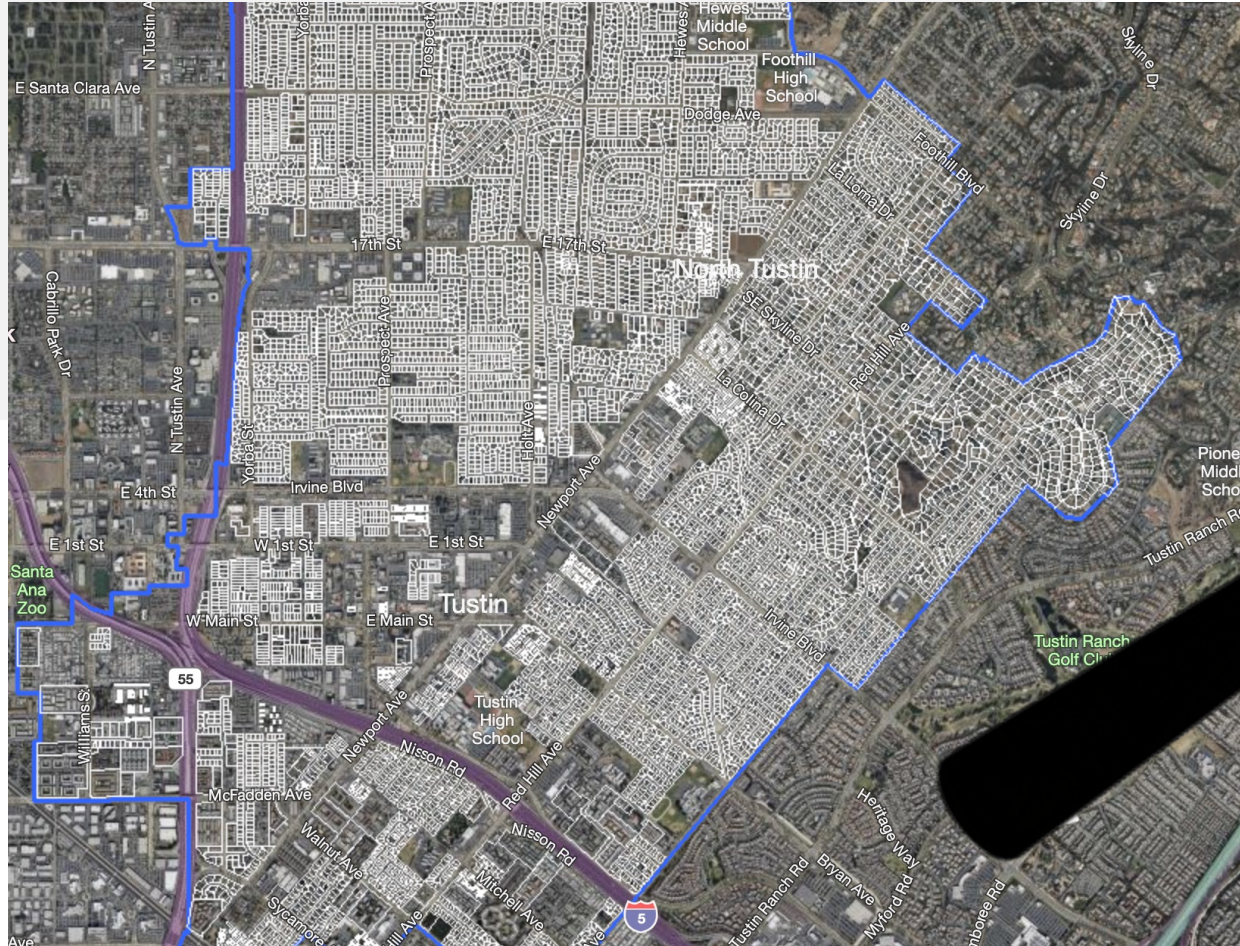
QUICK SB 606 & AB 1668 Recap



Residential Landscape Area Measurement



QUICK SB 606 & AB 1668 Recap



Water Supplier Service Area



WATERVIEW



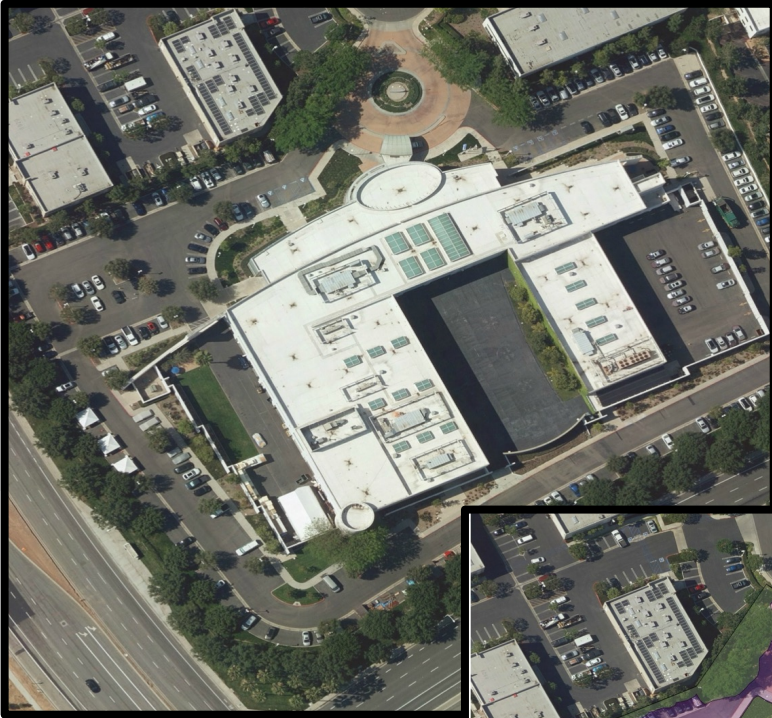
All
CII
parcels
to be
categorized





QUICK SB 606 & AB 1668 Recap

Classify - Identify - Map - Measure - Report



QUICK SB 606 & AB 1668 Recap

CII – DIM / Equivalent Tech. Conversion

- CII-DIM Water Budget Equation applies

Quantitative reporting: UWUO

In-Lieu Tech

- > 1 acre irrigated
- Demonstrate improved WUE
- Companion BMPs required

*Qualitative Reporting
+
Annual Water Use Report*

CII BMPs

**Process water excluded*

- 5 BMP categories
- Top 2.5% individual / Top 20% by sector
- Develop Implementation Plan

*Qualitative Reporting
+
Annual Water Use Report*



QUICK SB 606 & AB 1668 Recap

YEAR 1 <i>(Begins same year of adoption.)</i>	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	ANNUAL WATER USE REPORT
20% Identify above threshold for 20% conversion	40% Identify 40% Implement first 20%	60% Identify 60% Implement for the 40% group	80% Identify 80% Implement for the 60% group	100% Identify 100% Implement for the 80% group	NEW AND CHANGING METERS Implement 100%	Report on progress per year Report on progress of meter conversion towards achieving 20% per year

What



CII – DIM / Equivalent Tech. Conversion

- > 1 acre irrigated
- CII-DIM Water Budget Equation applies

Quantitative



- ✓ Classify
- ✓ Identify

YEAR 1 (Begins same year of adoption.)	YEAR 2
20% Identify above threshold for 20% conversion	40% Identify 40% Implement first 20%

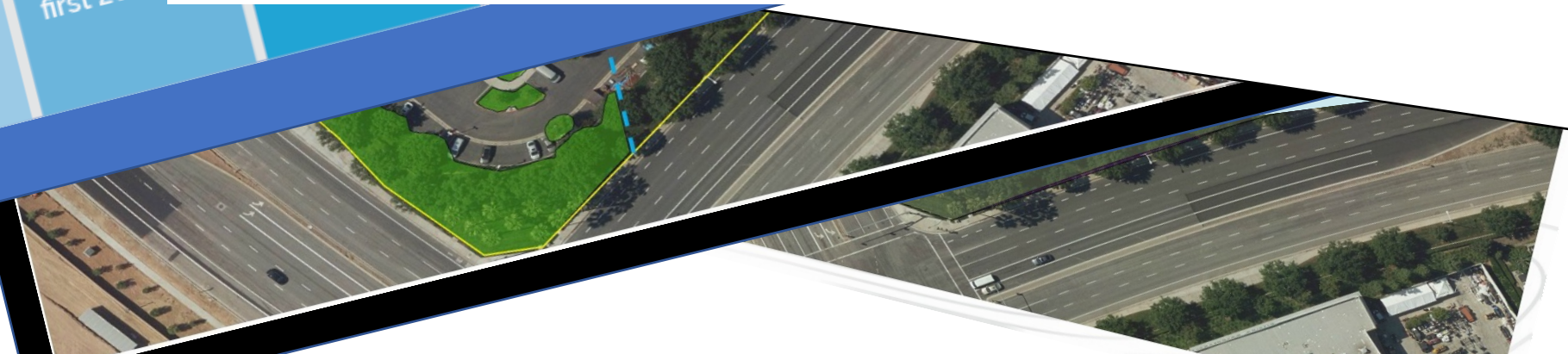
AR 6 ANNUAL WATER USE REPORT

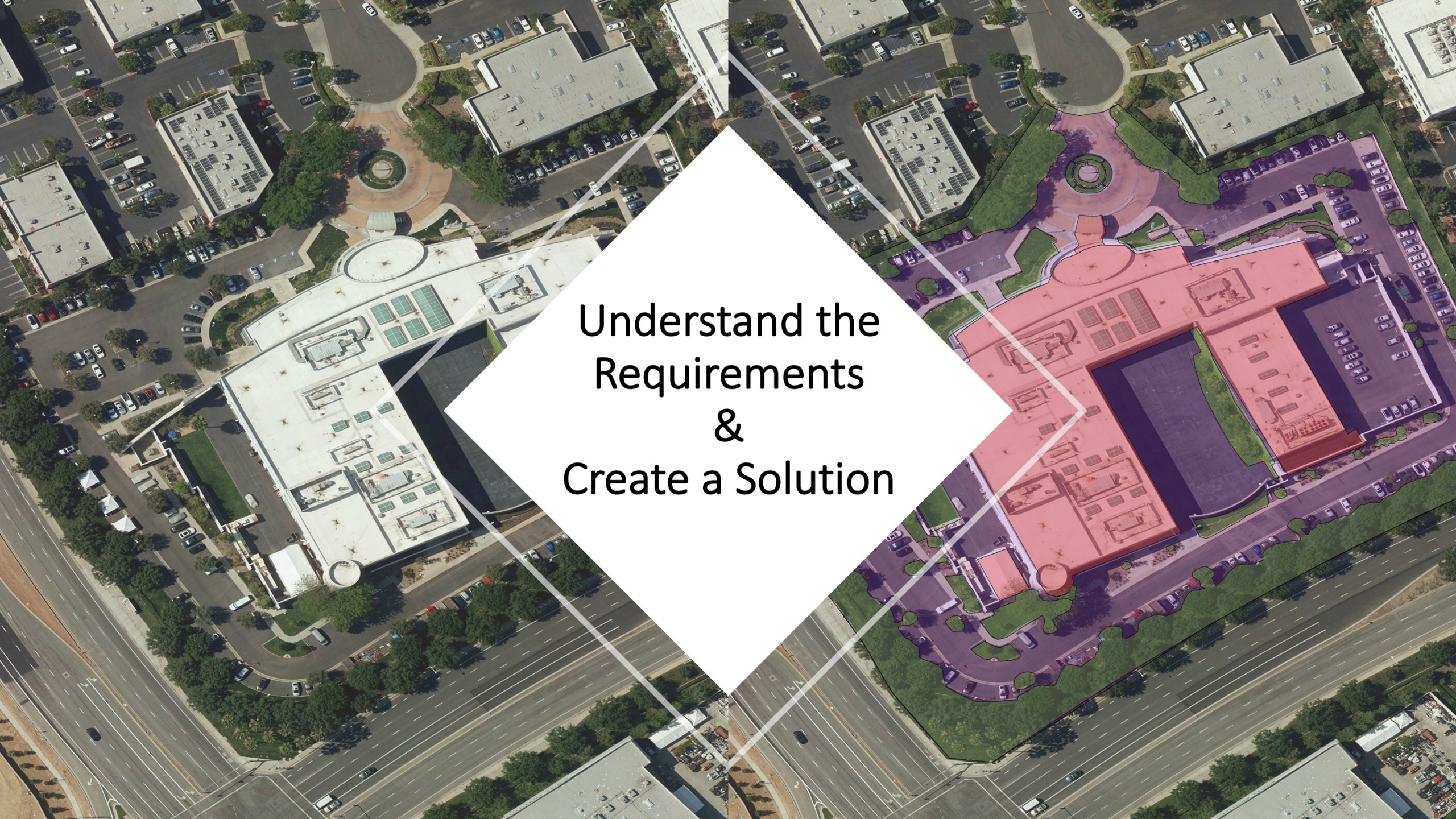
Report on progress per year

Report on progress of meter conversion towards achieving 20% per year

NEW AND CHANGING METERS

Implement 100%



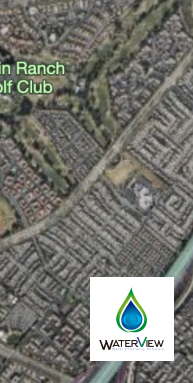
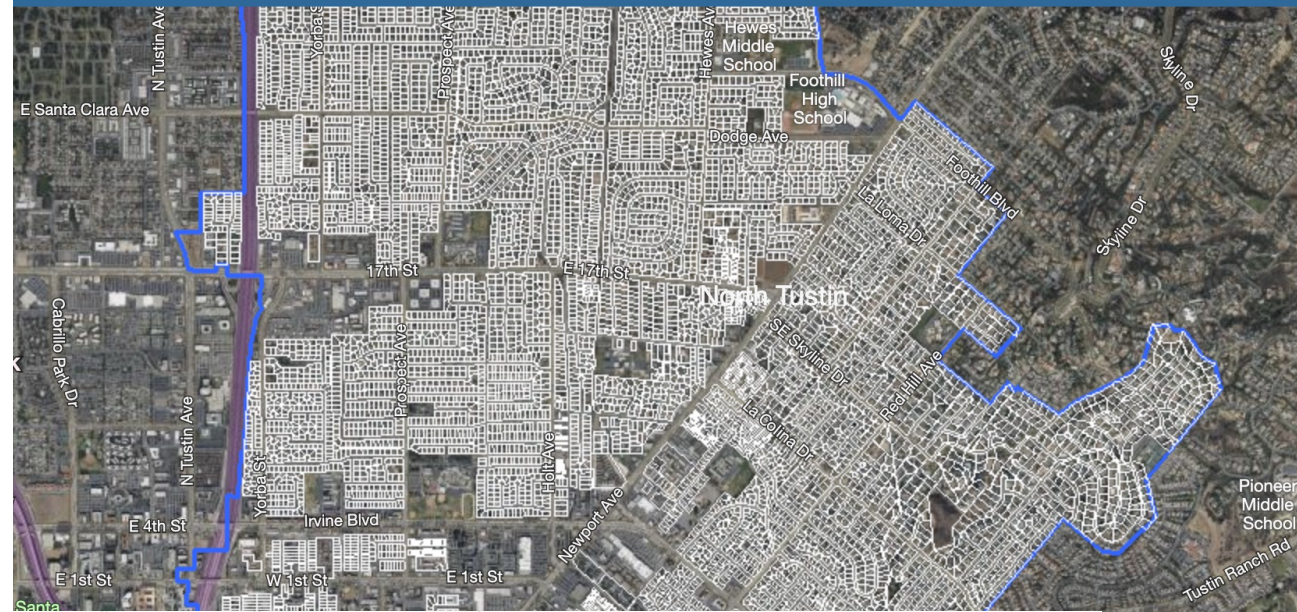
An aerial photograph of a city street corner. A large white diamond shape is superimposed over the center of the image. Inside the diamond, the text "Understand the Requirements & Create a Solution" is written in a black, sans-serif font. The background shows a multi-lane road, several buildings, parking lots with cars, and green trees. One building on the right side of the diamond is highlighted with a red and purple color overlay, suggesting a proposed design or renovation.

Understand the
Requirements
&
Create a Solution

Creating a holistic solution for all water suppliers

Getting Started:

- 4-band Aerial Imagery [RGB + NIR]
- Service Area Boundary
- Parcel Data
- Meter data:
 - Consumption
 - Location (if available)

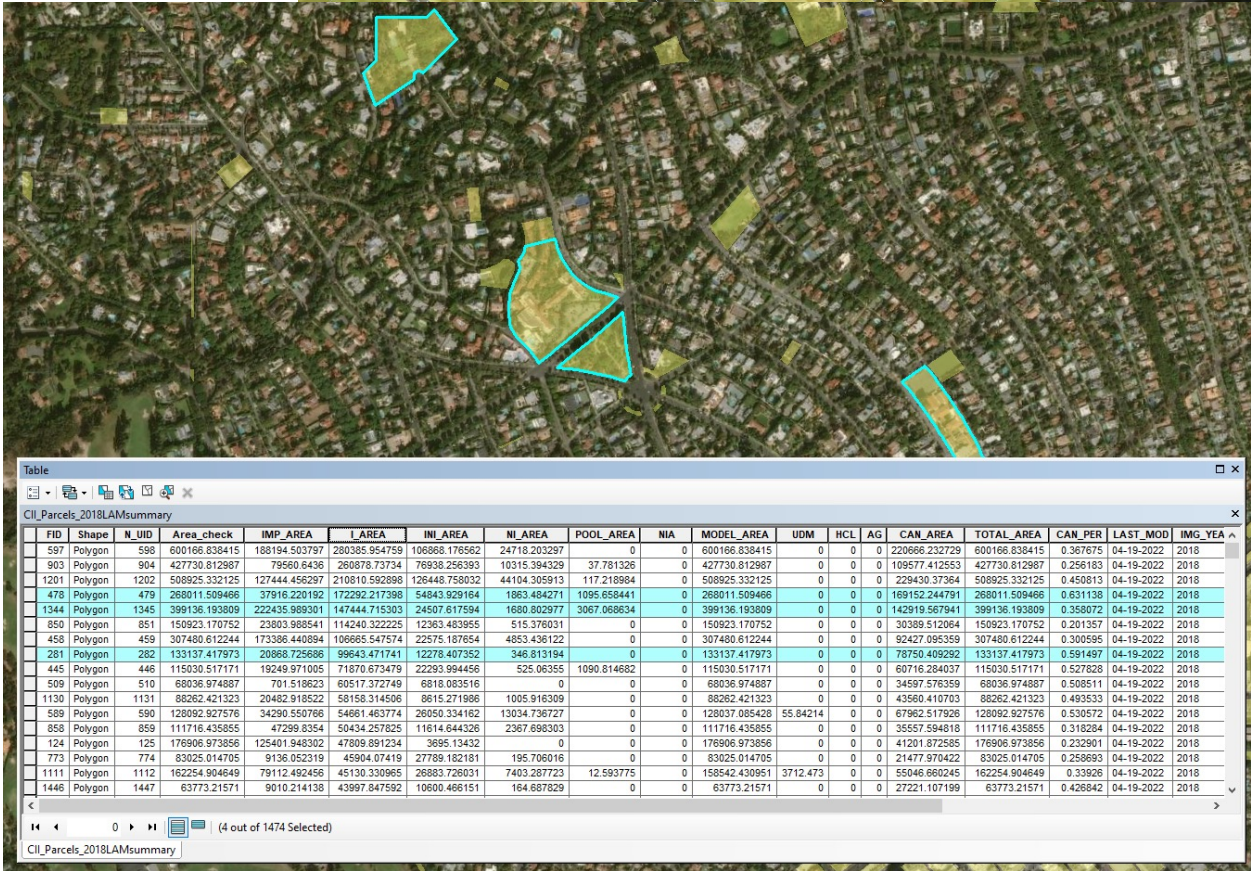
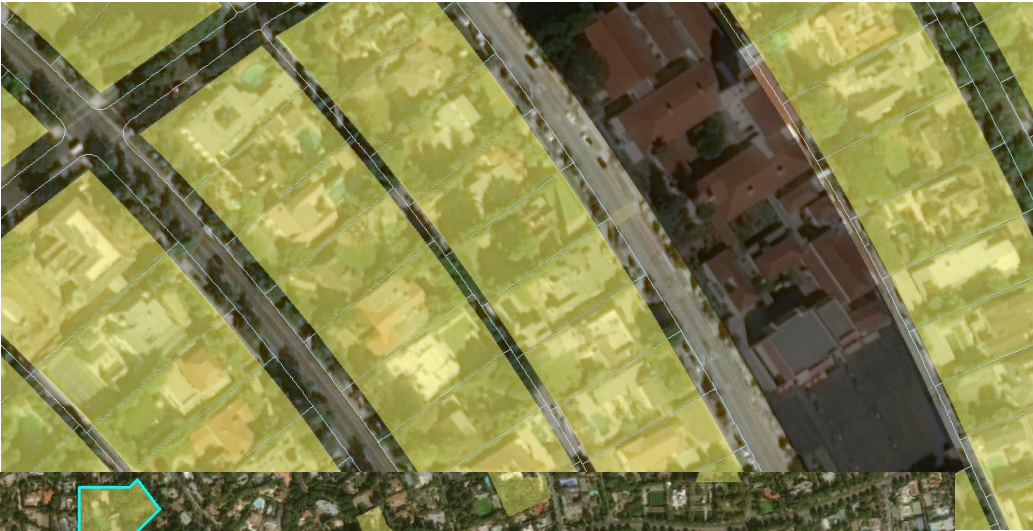




Initial In-Depth Analysis of the Service Area

Detailed Report

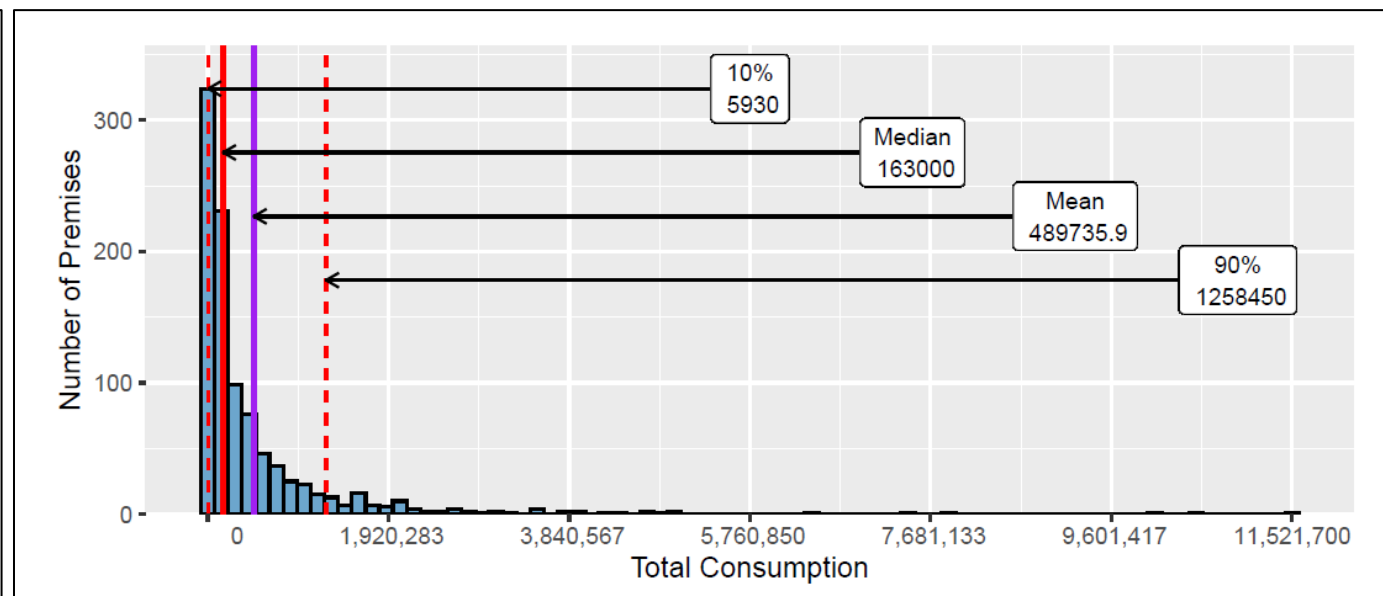
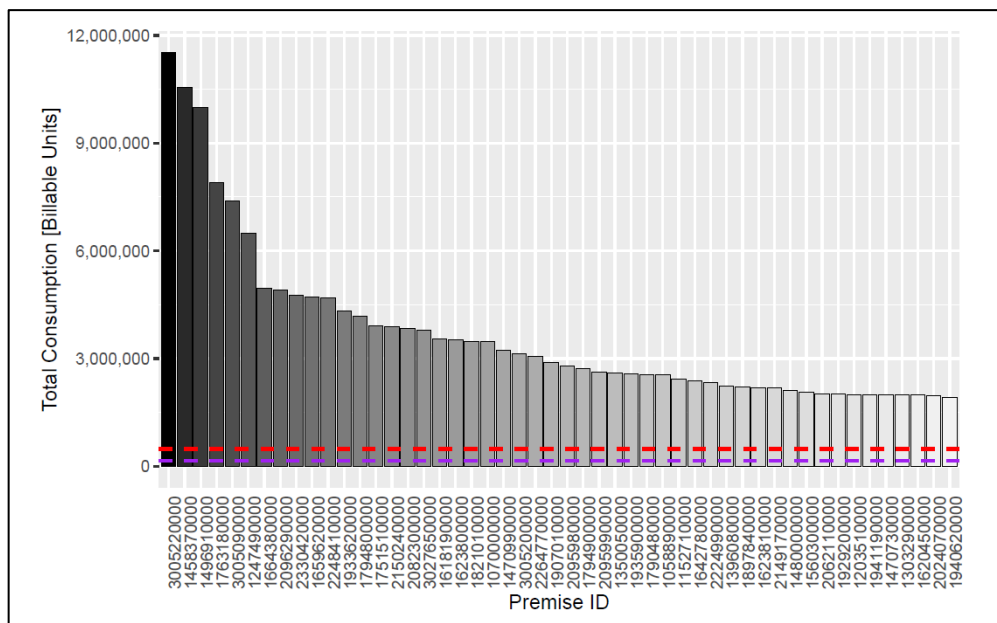
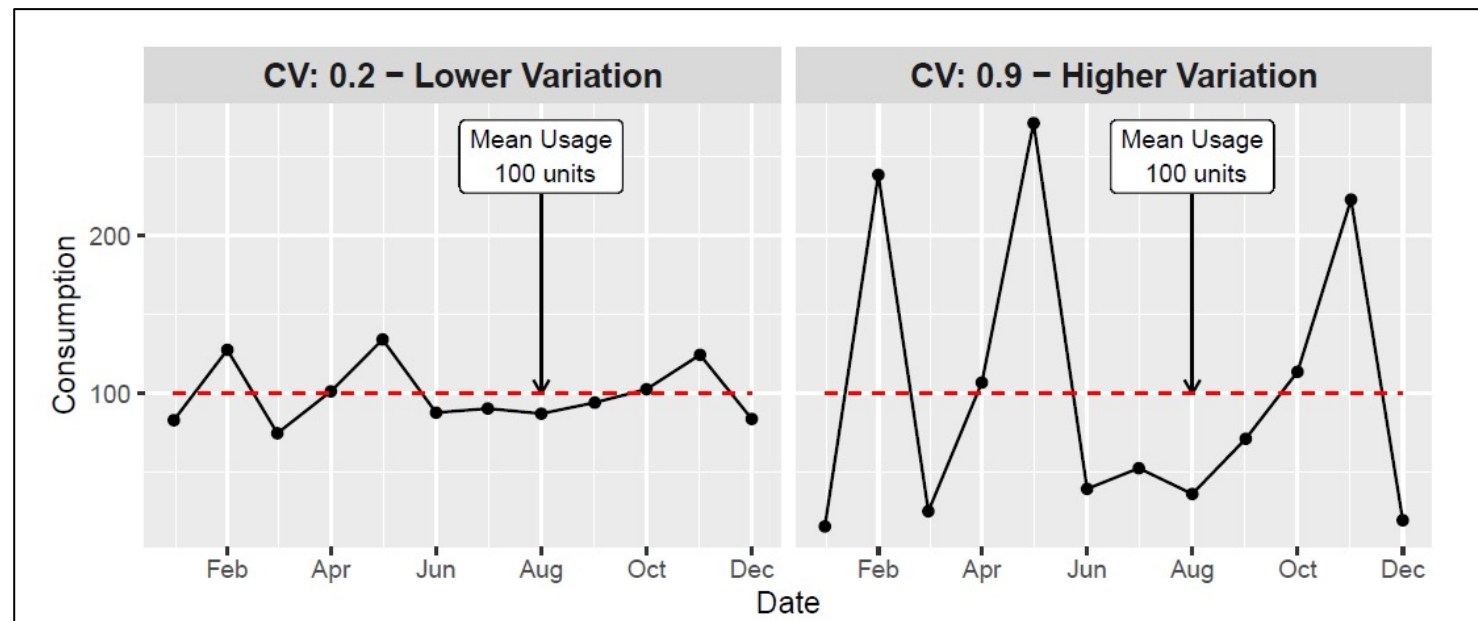
- Separates DIMs from MUMS
- Identify initial irrigation premises for DIMs
- Pinpoints MUMs that meet irrigation threshold
- Provides Consumption trends to help make informed decisions when choosing compliance pathways





Further analysis on Dedicated Irrigation Meters that provides:

- Estimated number of premises*
- Ranked consumption per premise
- Water use trends at the parcel and aggregate service area wide level



NEXT STEP: Refining Irrigated Premise Delineation & Mapping

Dedicated Irrigation Meters [*MUMs that meet irrigation threshold*]

Three ways to delineate:

- Interpretation
- Interview
- Field Visit

Kicks off the
mapping process





Land Use/Cover Classification Dataset (LUCD)

- ✓ Developed to cross-walk from the DWR landscape area classifications
- ✓ Added more granular remote sensing techniques to capture additional feature types (i.e. turf vs canopy)
- ✓ Developed using machine learning routines; manipulated through heads-up digitization to ensure accuracy





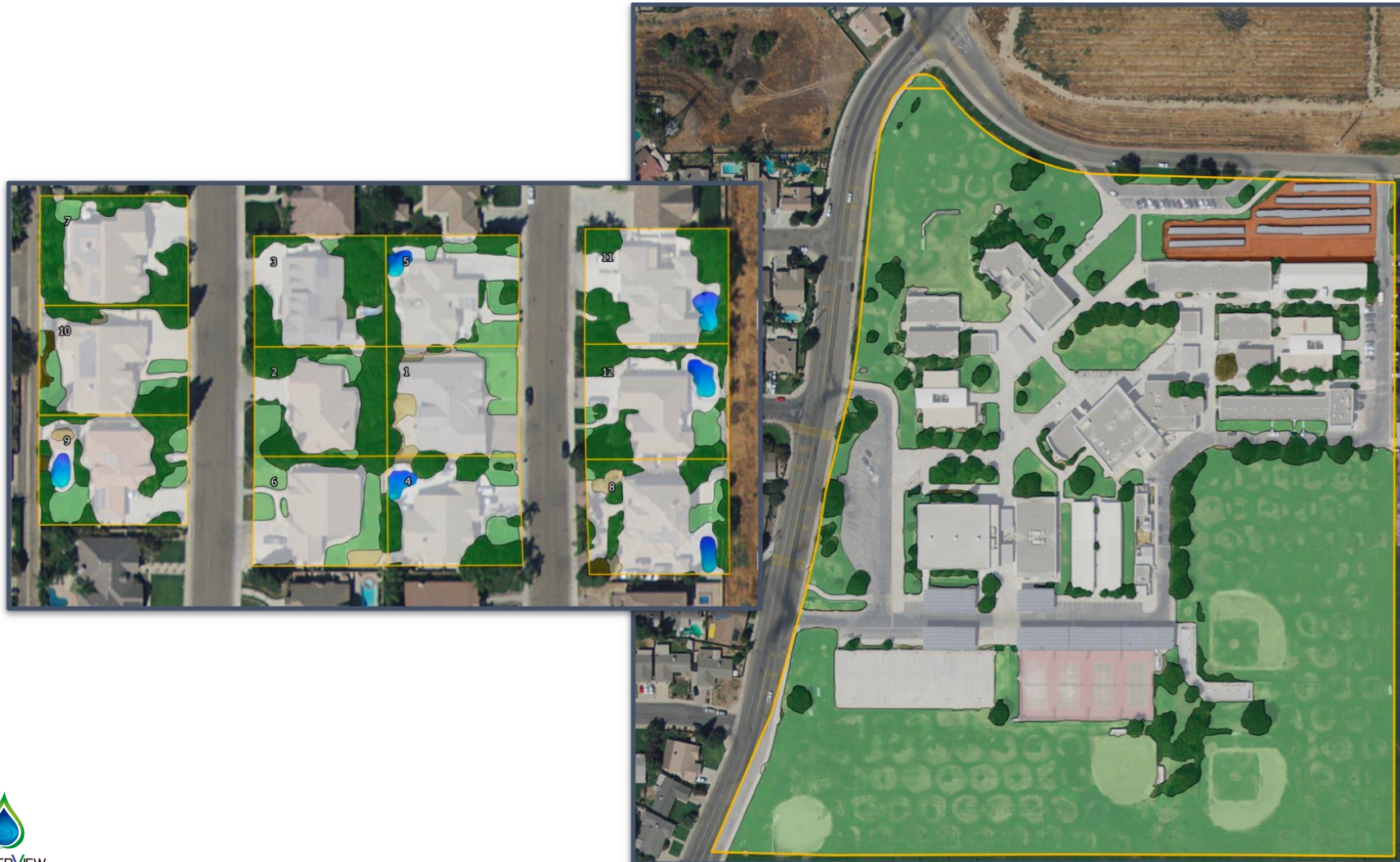
LUCD Classification Schema

Mirrors the state set landscape classification schema and allows for the quantification and summarization of irrigated areas.

Canopy Priority Classification System		
Level 1	Level 2	Irrigation Status
1. Impervious	Impervious	Not Irrigable
2. Pools	Swimming pools/man made water features	Irrigated
3. Irrigated	3.1 Turf grass/ground cover	Irrigated
	3.2 Canopy/planting beds	Irrigated
4. Irrigable not irrigated	4.1 Turf grass/ground cover	Irrigable not irrigated
	4.2 Canopy/other	Irrigable not irrigated
5. Non irrigated vegetation	Undeveloped for the purposes of irrigation	Not Irrigable
6. Undeveloped lands	Undeveloped Lands	Not Irrigable
7. Horse Corrals	Horse Corrals	Irrigated
8. Open Water	Other open natural water (rivers/ponds)	Not Irrigable
9. Artificial Turf	Artificial Turf	Not Irrigable
10. Agricultural Land	Agricultural Land (.25 acre mmu)	Irrigated

SPECIAL LANDSCAPE AREA'S (SLA's) ADDED TO THE CLASSIFICATION SCHEMA

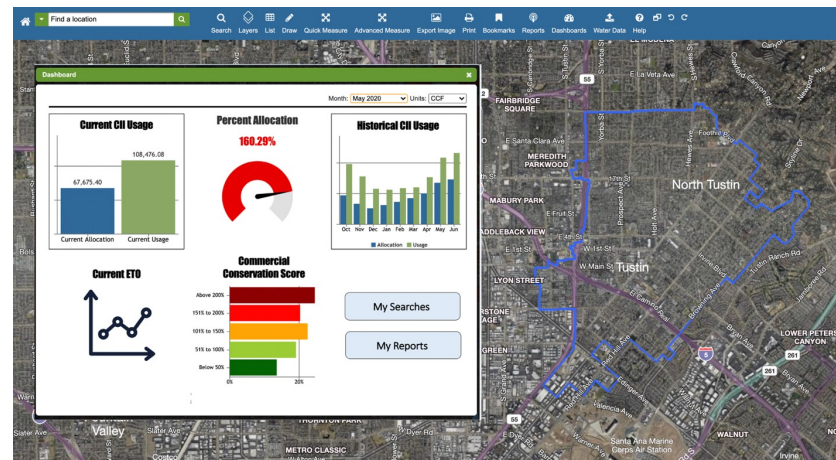
Landscape Classification - for CII Parcels



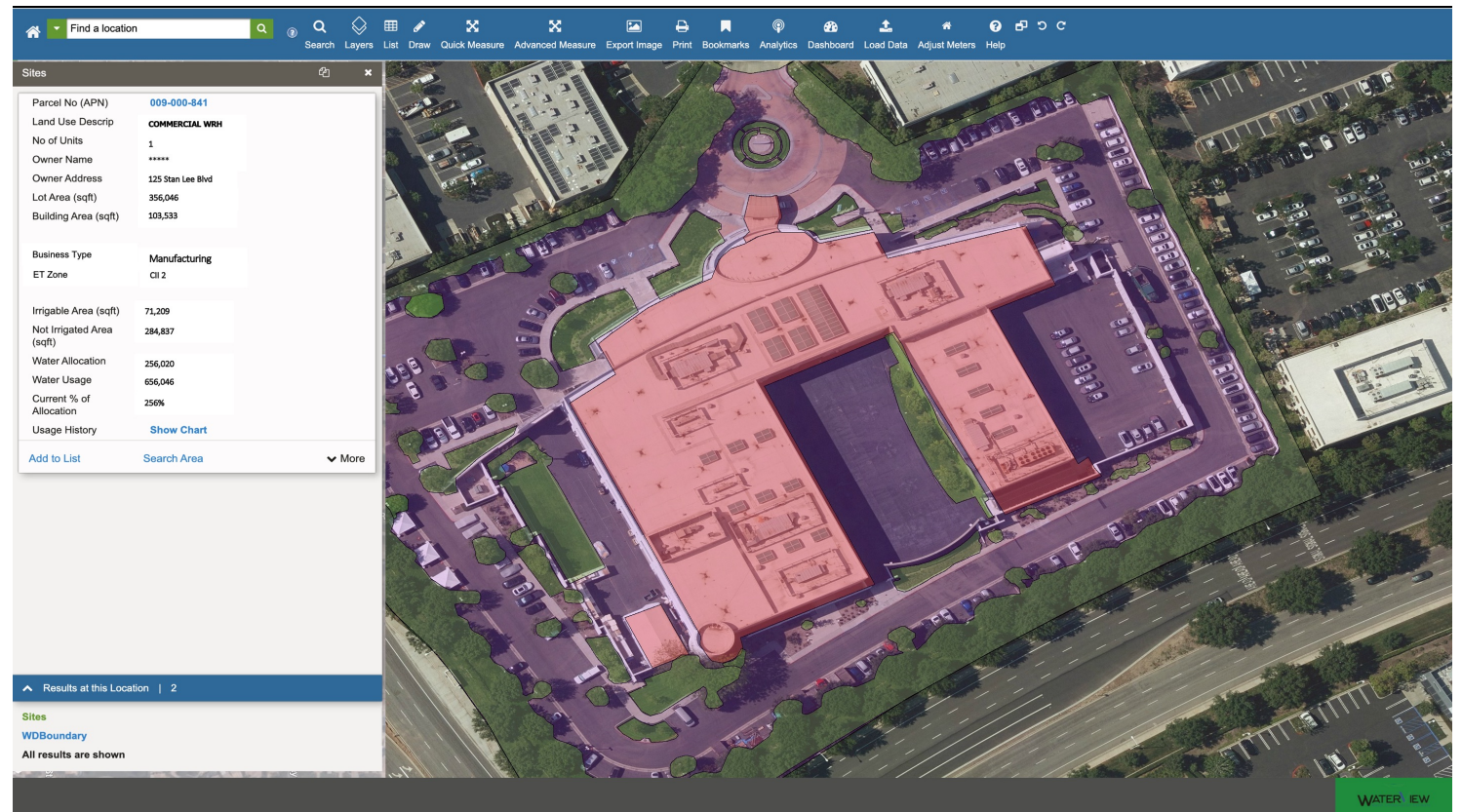
LUCD Classification

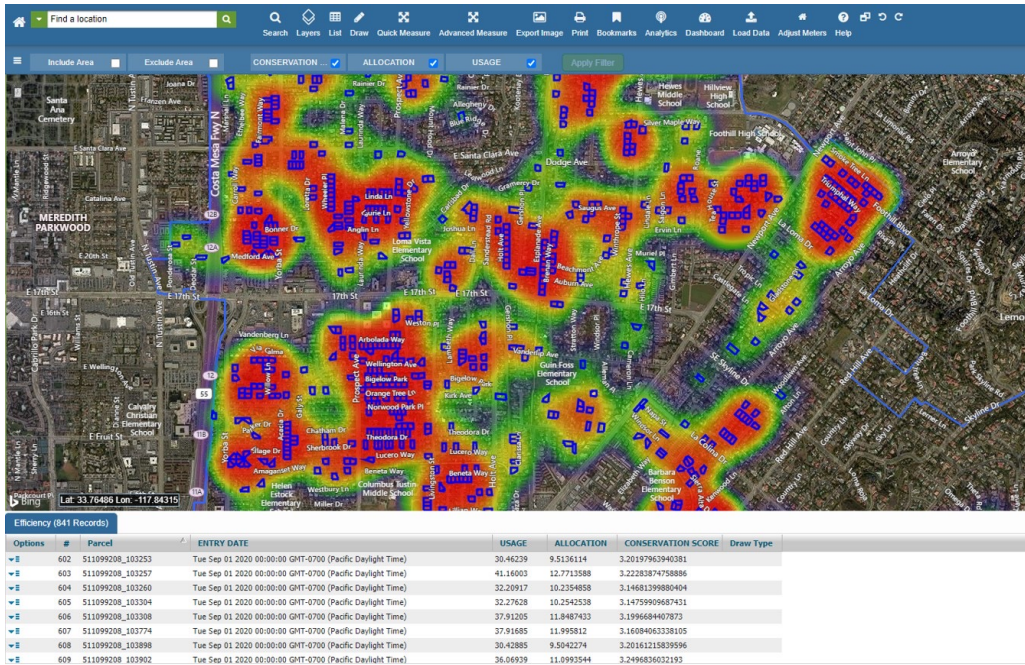
- Impervious
- Pools
- Irrigated Canopy
- Irrigated Turf/ Cover
- Irrigable Not Irrigated Canopy
- Irrigable Not Irrigated Turf/ Cover
- Not Irrigable Vegetation
- Undeveloped Lands
- Horse Corrals
- Open Water
- Artificial Turf
- Agricultural Lands
- Parcel Boundary

Making sense of the data



Using WaterView™





Search: Classified Polygons

▼ Descript

Descript

Select All Deselect All

- ☐ Agriculture
- ☐ Artificial Turf
- ☐ Horse Corrals
- ☐ Impervious
- ☐ Irrigable Not Irrigated Canopy
- ☐ Irrigable Not Irrigated Turf/Ground Cover
- ☐ Irrigated Canopy
- ☒ Irrigated Turf/Ground Cover
- ☐ Open Water
- ☐ Swimming Pool
- ☐ Undeveloped For Purposes of Irrigation
- ☐ Undeveloped Lands

▼ Shape Area

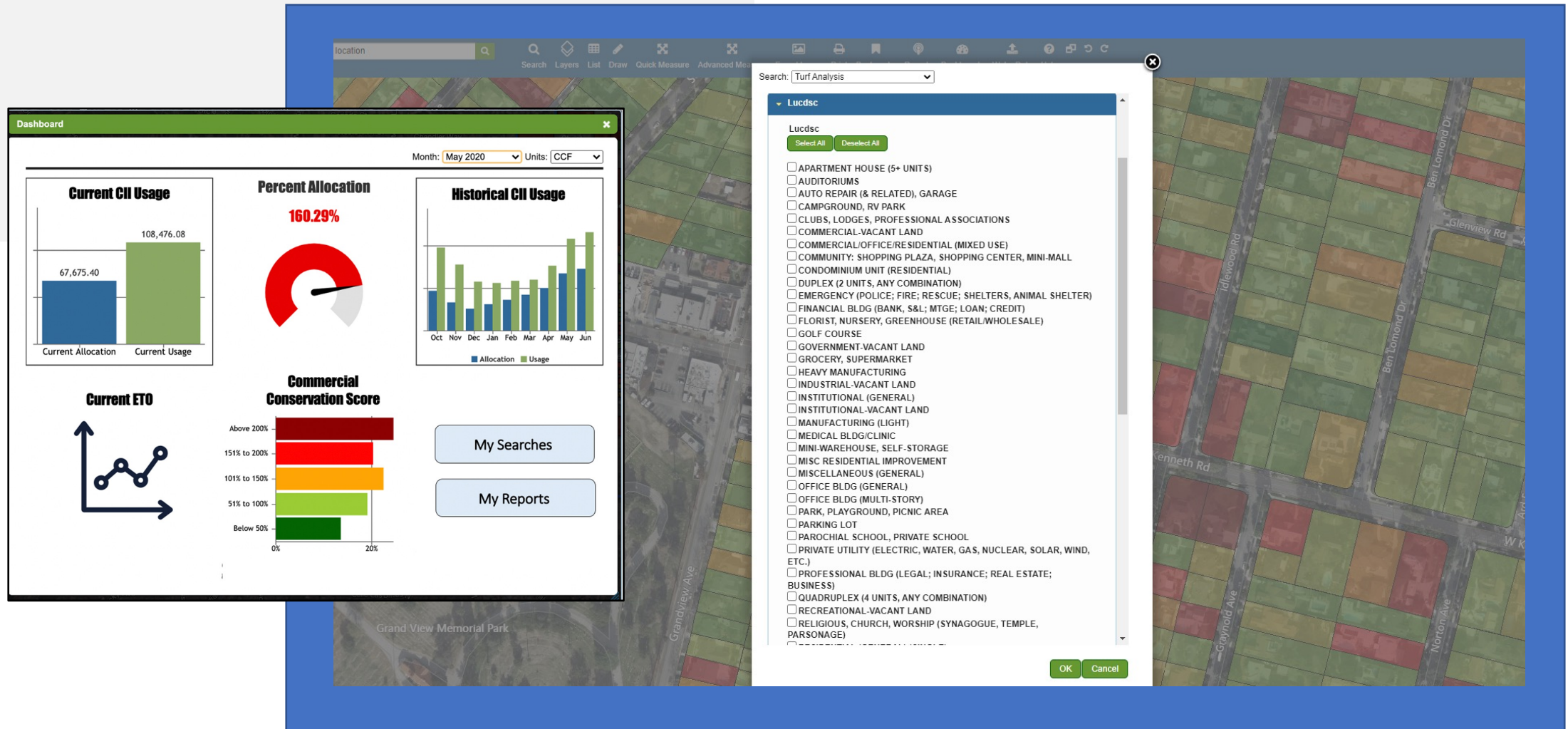
Shape Area > 1000

Percent Allocation

102.79%



Multi-part query functionality allows users to isolate or cross reference specific landscape data with land use classification consumption, custom turf analysis, etc.



UWUO CII DIM vs. CII Performance Measures

UWUO CII DIM

CII – DIM / Equivalent Tech. Conversion

- > 1 acre irrigated
- CII-DIM Water Budget Equation applies

Quantitative reporting: UWUO

Performance Measures

In-Lieu Tech

- > 1 acre irrigated
- Demonstrate improved WUE
- Companion BMPs required

Qualitative Reporting
+
Annual Water Use Report

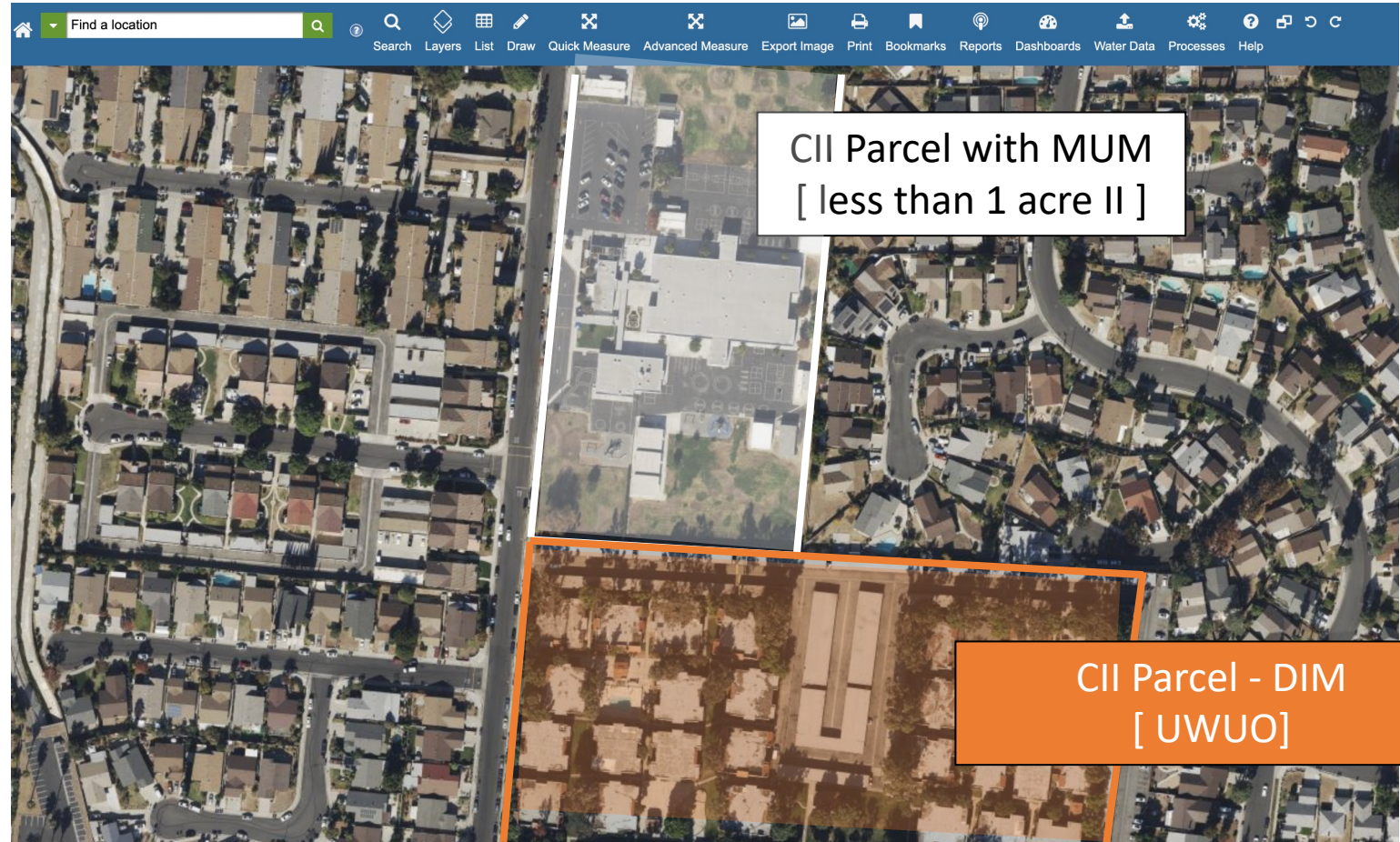
Performance Measures

CII BMPs

**Process water excluded*

- 5 BMP categories
- Top 2.5% individual / Top 20% by sector
- Develop Implementation Plan

Qualitative Reporting
+
Annual Water Use Report





CII Performance Measures

Performance measures are defined as:

“...actions to be taken by urban retail water suppliers that will result in increased water use efficiency by CII water users.”

CII – DIM / Equivalent Tech. Conversion

- > 1 acre irrigated
- CII-DIM Water Budget Equation applies

Quantitative reporting: UWUO

In-Lieu Tech

- > 1 acre irrigated
- Demonstrate improved WUE
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*Qualitative Reporting
+
Annual Water Use Report*

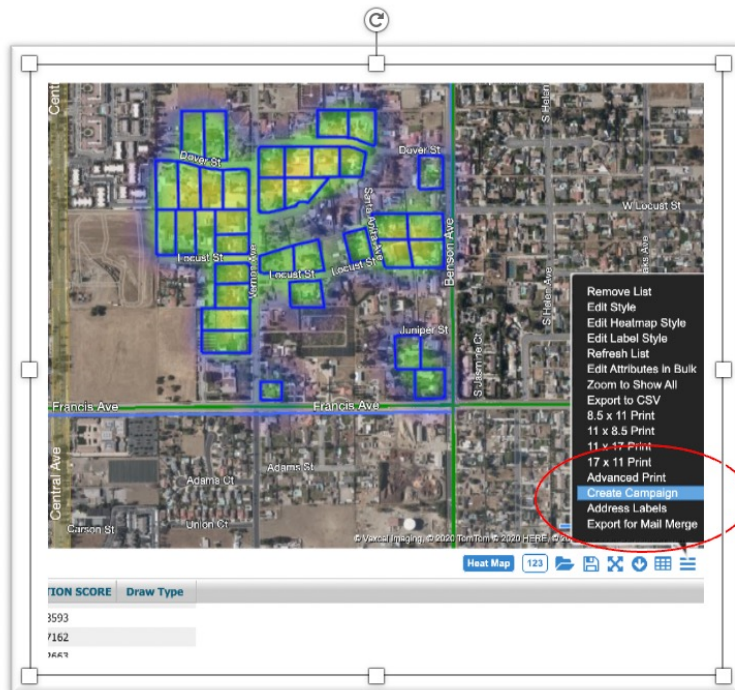
CII BMPs

**Process water excluded*

- 5 BMP categories
- Top 2.5% individual / Top 20% by sector
- Develop Implementation Plan

*Qualitative Reporting
+
Annual Water Use Report*

Tracking Progress



Create Campaign

Title

Category

Subcategory

Action Date

Notes

September 2020						
Su	Mo	Tu	We	Th	Fr	Sa
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			



WV - Outreach Module

Monitor the group included in the outreach effort

Filter Editor

Change over Time

CONSERVATION SCORE

Field CONSERVATION SCORE

Start of Range: 0

End of Range: 0

Remove

Criteria

Field ENTRY DATE

Starting Date: 08/01/2019

Ending Date: 10/31/2019

Remove

✉

Add Search Criteria

Add Group

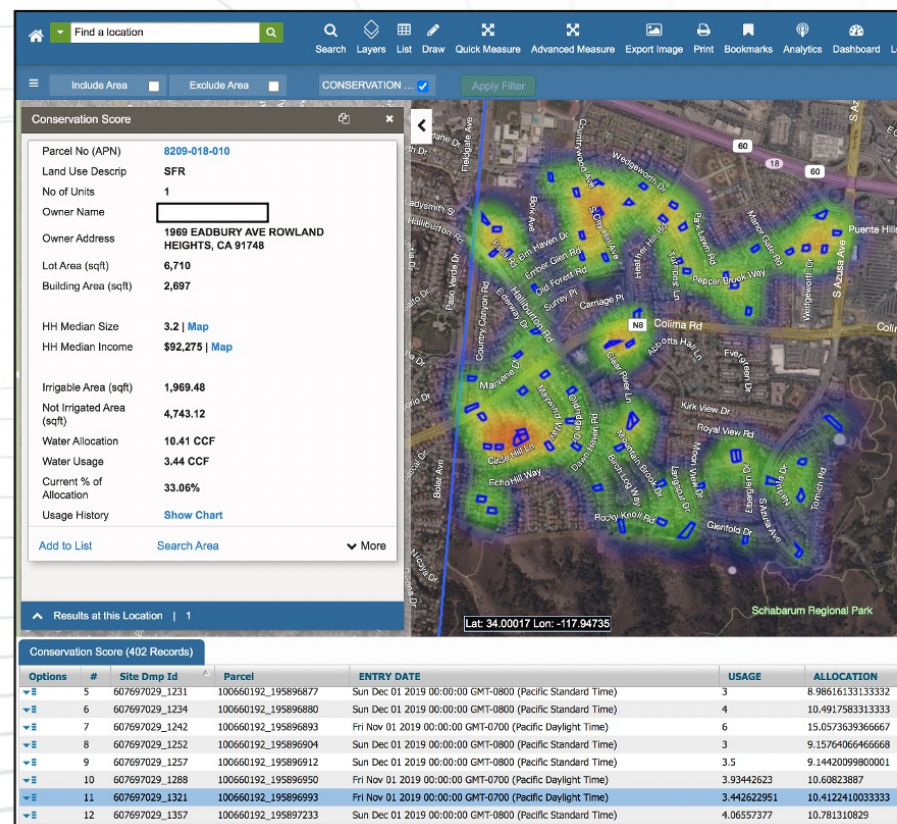
Folder: USER

Name: Change Over Time

OK

Cancel

Watch water use behavior changes over time



Reporting – Details still TBD

We will know more soon....



1st Report: January 1st, 2024



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DIMs, MUMs and More: Complying with CII Landscape Requirements



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WATERVIEW
Water Efficiency Software



moulton niguel water district

Efficiently Identifying CII Mixed Use Meters

Melissa Salazar & John Lansden

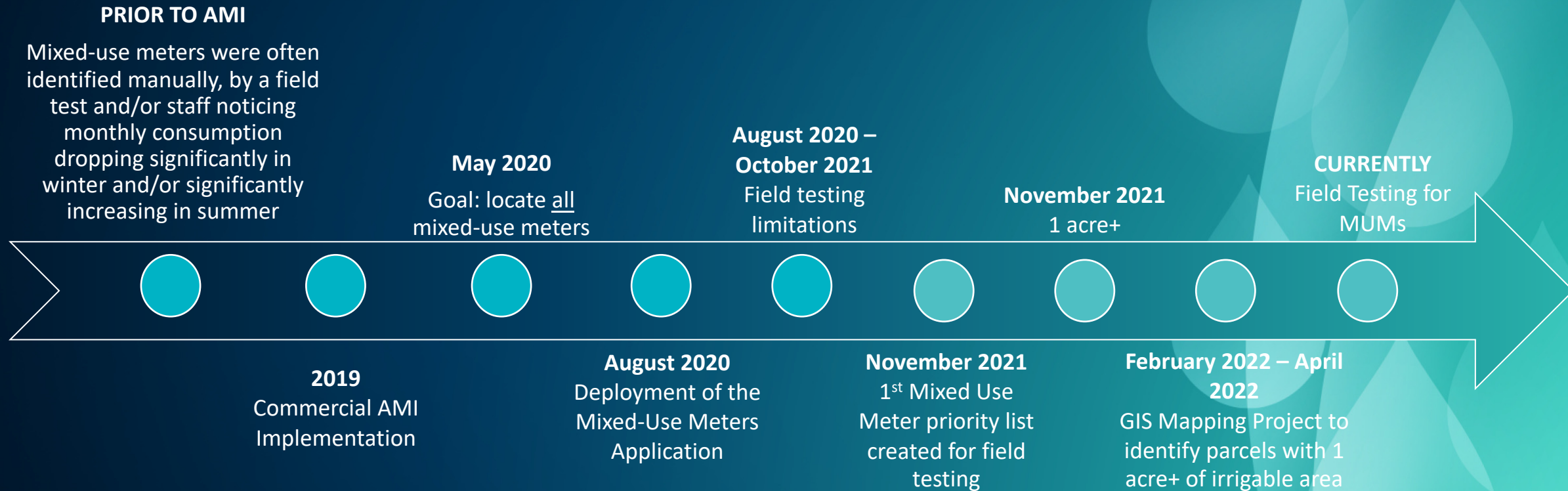
June 1, 2022

Moulton Niguel Water District

- Drinking water, wastewater treatment, recycled water
- 7-member Board of Directors
- ~55,000 connections
- 100% Imported Water
- More than 20% of demand met by recycled water
- Water Budget Based Rate Agency
- AMI deployment completed February 2022

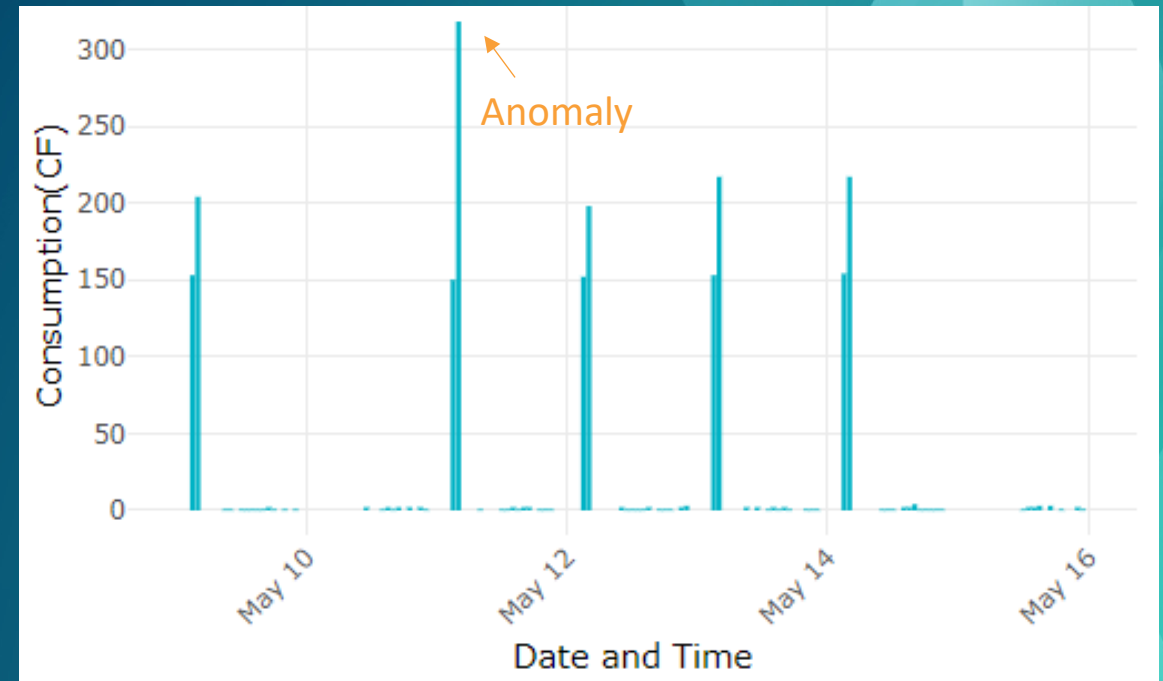


Identifying Mixed Use Meters Timeline



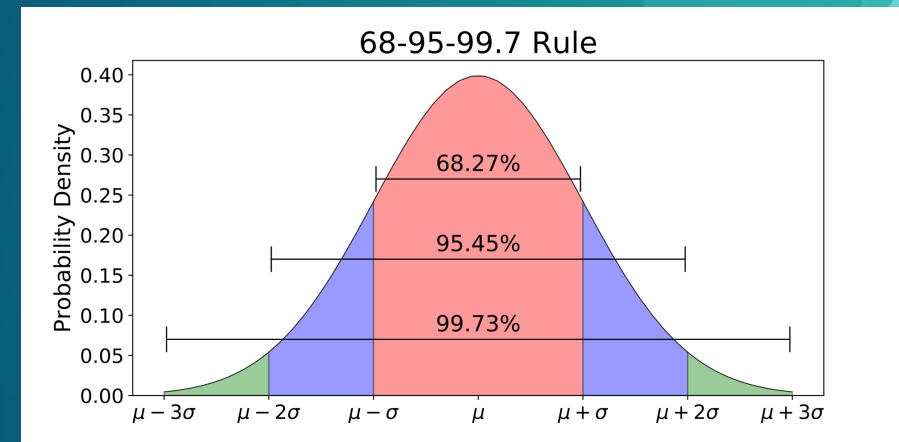
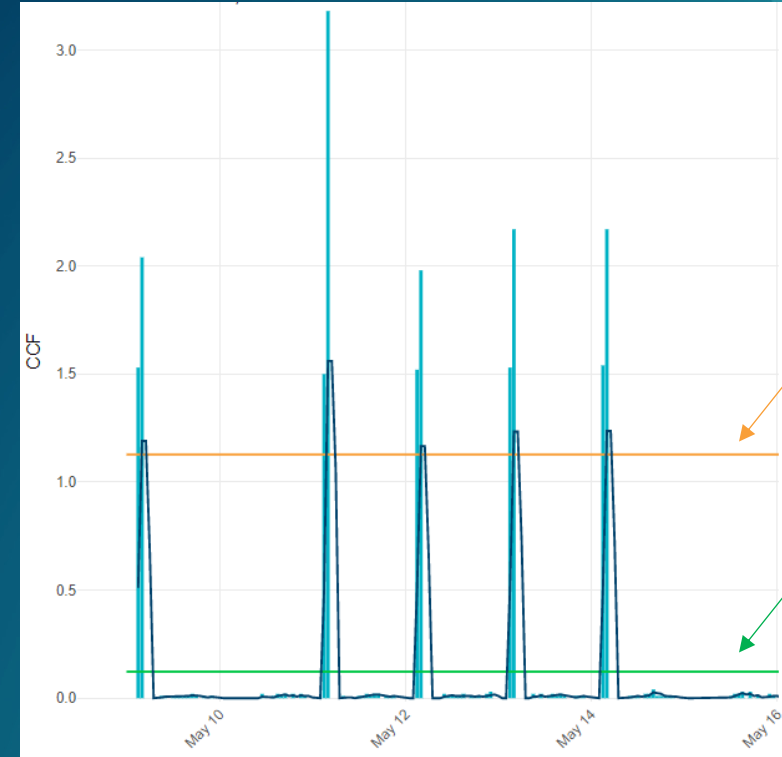
How Can We Use AMI Data & Analytics to Prioritize Which Meters to Test for Mixed-Use?

- Irrigation is often a spike in hourly consumption. With this in mind, the first step to identify mixed meters was to do an anomaly detection.
- In data analysis, anomaly detection (outlier detection) is the identification of rare events or observations which raise suspicions because it is significantly different than the rest of the data.
- By calculating the standard deviation for a set of data, we can determine anomalies.





Statistical References

- Mean (μ) (Average)
 - a calculated "central" value of a set of numbers
- Standard Deviation (σ)
 - A measure of how spread out a set of numbers are
- Normal Distribution
 - 68.3% is within 1 standard deviation
 - 95.5% is within 2 standard deviations
 - 99.7% is within 3 standard deviations



Methodology

- Anomaly detection limitations
 - Hourly water consumption is naturally anomalous
- To better identify irrigation, a few more criteria had to be added
- Assumption: commercial irrigation is scheduled using an irrigation timer on a weekly frequency

May						
S	M	T	W	T	F	S
1	2	3	4	5	6	7
						
8	9	10	11	12	13	14
						
15	16	17	18	19	20	21
						
22	23	24	25	26	27	28
						
29	30	31				
						



Criteria for Identifying Mixed Meters

- Standard deviation to detect an anomaly
 - 3
- Frequency of anomaly
 - 3 in 1 week
- Minimum consumption to be considered an anomaly
 - 0.1 CCF
- Hour of day (optional)

Date Range:

2022-05-07	to	2022-05-13
------------	----	------------

Date Range suggested max.: 1 week

Standard Deviation Cutoff:

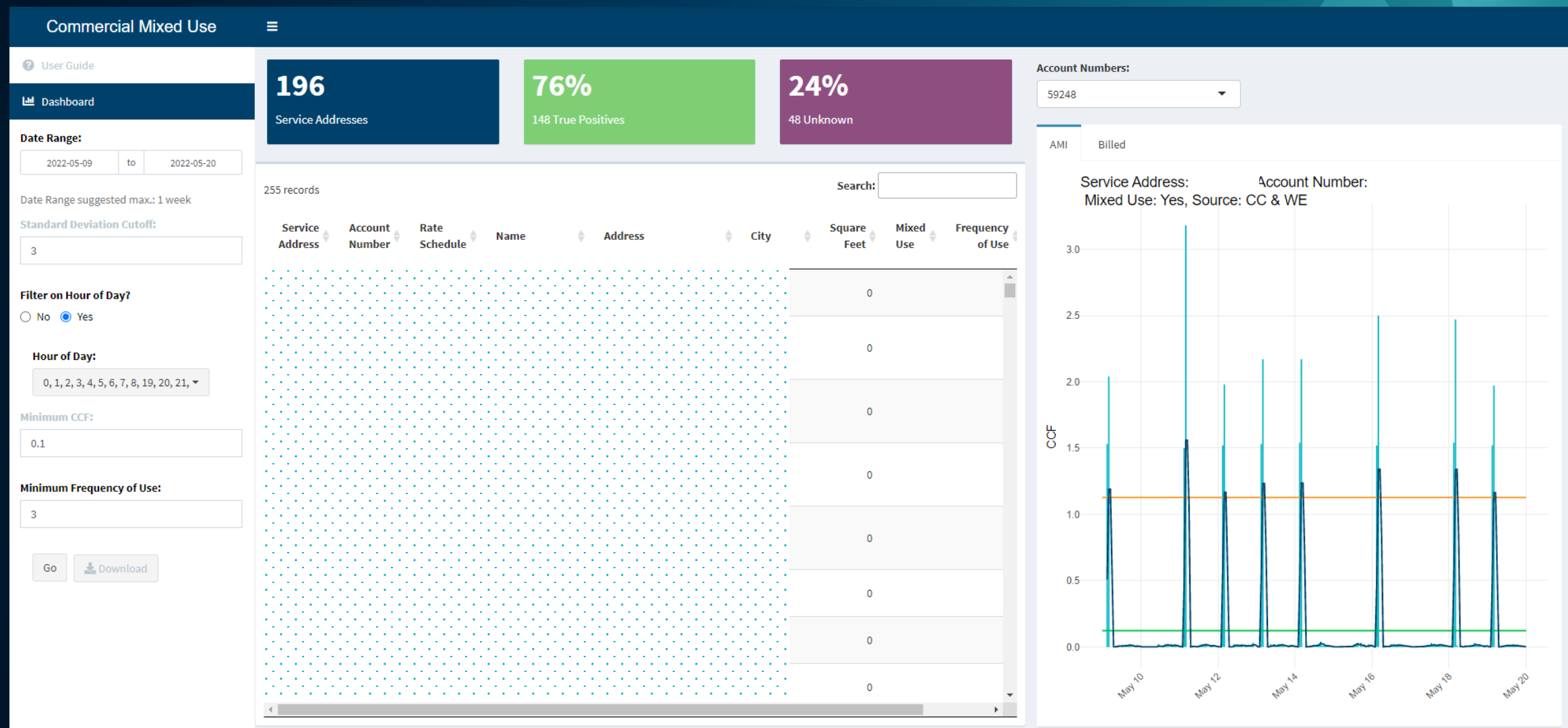
Filter on Hour of Day?

☒ No ☐ Yes

Minimum CCF:

Minimum Frequency of Use:

Commercial Mixed Use Meters Dashboard



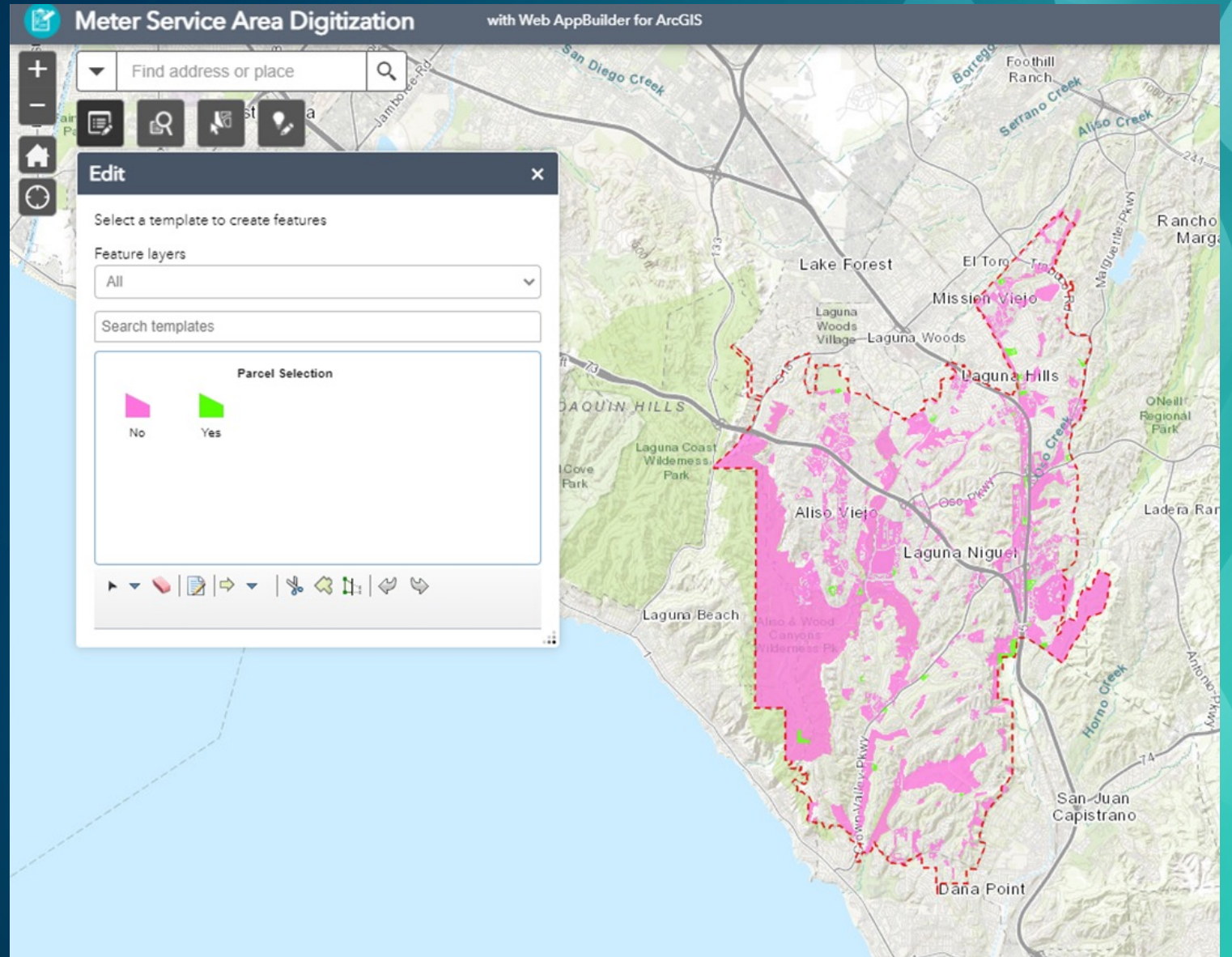
In the beginning....

- Mixed-Use Meter tool generates the initial priority list for field testing
 - ~400+
- Cross Connection (CC) provided a short list of confirmed mixed-use meters for a baseline

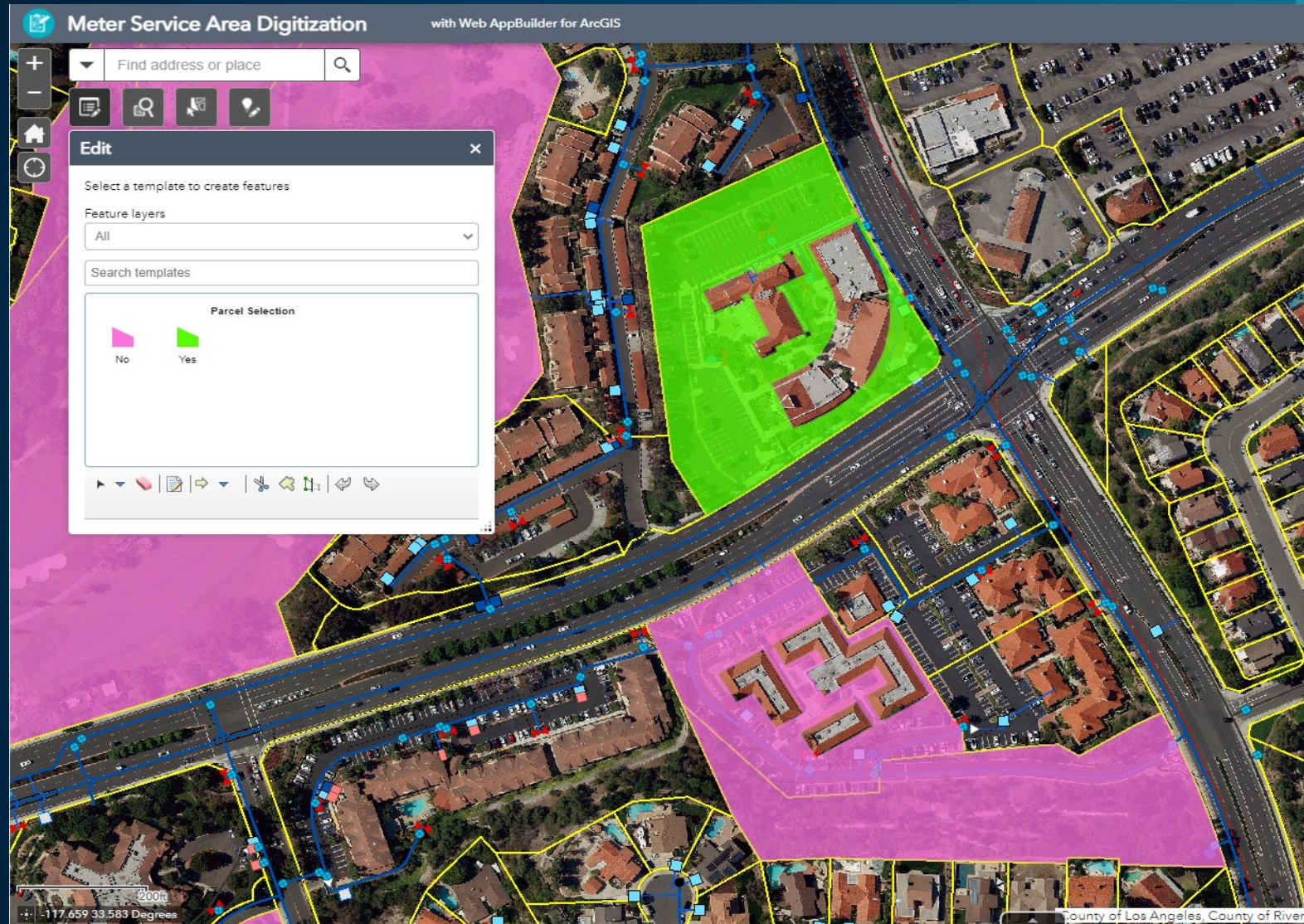
A	B	C	D	E	F
Account Number	Service Address	Rate Schedule	Mixed Use	Source	Check
		CM1			y
		CM1	No	CC	y
		CM5	No	CC	n
		CM5	No	CC	y
		CM1	No	CC	maybe
		CM5	No	CC	y
		CM5	No	CC	y
		CM4			y
		CM1	No	CC	y
		CM5	No	CC	y
		CM1	No	CC	maybe
		CM5			y
		CM5			y
		CM1			y
		CM5			y
		CM5			y
		CM5			y
		CM5			y
		CM1			y
		CM1			y
		CM1	No	CC	y
		CM1	No	CC	y
		CM1	No	CC	y
		CM4	No	CC	y
		CM1			y
		CM1	No	CC	y
		CM2	No	CC	y
		CM2	No	CC	y
		CM5			maybe
		CM5			y
		CM5			maybe
		CM1	No	CC	n
		CM1			y
		CM1			y
		CM1			y

CII Parcels with MUMs

- GIS identified all non-residential parcels over 1 acre (excluding building footprint)
- 900 CII parcels to potentially visually inspect
 - “No”
 - DIM present
 - Parking Lot
 - Natural areas
 - “Yes”
 - No DIM, or unclear
- Identified 37 CII parcels >1 acre that potentially have MUMs



CI Parcels & Meters, 1:1 & 1:Many & Many:1



Now the fun part starts...

Contact Customer for Inspection

Schedule with landscaper or property manager



Prepare for Inspection


Fill out top section(s) of inspection form at work



Meet at Site

Run Stations to Confirm
Irrigation is Used on Meter

Identify Areas that are
Irrigated

		CII Mixed Use Meters		Investigation Form
1. SITE INFORMATION				
Account Name		Address/Street		
City		Rate Schedule		
Site Address ID#		Business Type	(see list on back)	
Location Class	Comm / Industrial / Gov / Resi	AMI Encoder Number		
Meter Number		Meter Location		
Meter Size				
2. CUSTOMER INFORMATION				
First Name		Last Name		
Phone		E-Mail Address		
Contact person is:	<input type="checkbox"/> Owner	<input type="checkbox"/> Tenant	<input type="checkbox"/> Property Manager	<input type="checkbox"/> Landscaper
3. SURVEY INFORMATION				
Date of Survey		Surveyor Name(s)		
Survey Format	<input type="checkbox"/> In Person	<input type="checkbox"/> Virtual		
4. SYSTEM INFORMATION				
Looped System	Yes / No	Main / Bypass Meter?	ML / BP	
# of Backflow Prevention Assemblies		BPA Config Details	<input type="checkbox"/> Primary Only <input type="checkbox"/> Primary & Secondary <input type="checkbox"/> Multiple Primary <input type="checkbox"/> Other:	
5. WATER USE TYPES PRESENT				
<input type="checkbox"/> Domestic (Indoor) <input type="checkbox"/> Irrigation <input type="checkbox"/> Fire Protection <input type="checkbox"/> Other:				
6. DOMESTIC SYSTEM INFORMATION COLLECTED				
# of Resi Bldgs Served		# of CII Bldg Served		
# of Resi Dwellings Served		# of CII Suites Served		
# Residents		# Employees		
7. IRRIGATION SYSTEM INFORMATION COLLECTED				
Irrigable Area Measurement		Irrigated Area Measurement		
Irrigable Area Description		Irrigated Area Description		
Irrigation Mainline?	Yes / No	Irrigation Valves Manifolds	Yes / No	
# Irrigation Valves		# Irrigation Controllers		
8. FIRE PROTECTION SYSTEM INFORMATION COLLECTED				
Fire Protection Classes Present	<input type="checkbox"/> Class I (Sprinklers) <input type="checkbox"/> Class II (Private Hydrants) <input type="checkbox"/> Other:			
NOTES				

Back at the office...

- Enter all the information found at inspection into our online database via Microsoft Forms
- Update each account with a scanned copy of the Investigation Form, update the new measurements, and if it is a MUM or not
- Update our GIS maps to show the parcels that are MUMs



CII Mixed Use Meters Investigation Form

Hi, John. When you submit this form, the owner will see your name and email address.

* Required

SITE INFORMATION

1. Account Name *

2. Address/Street *

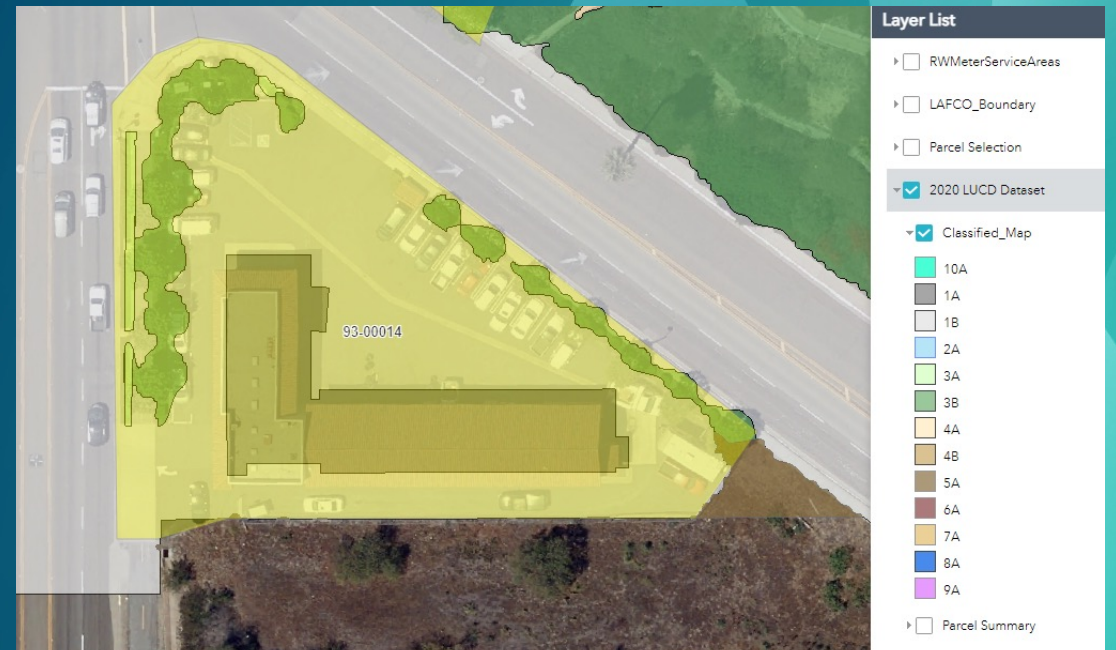
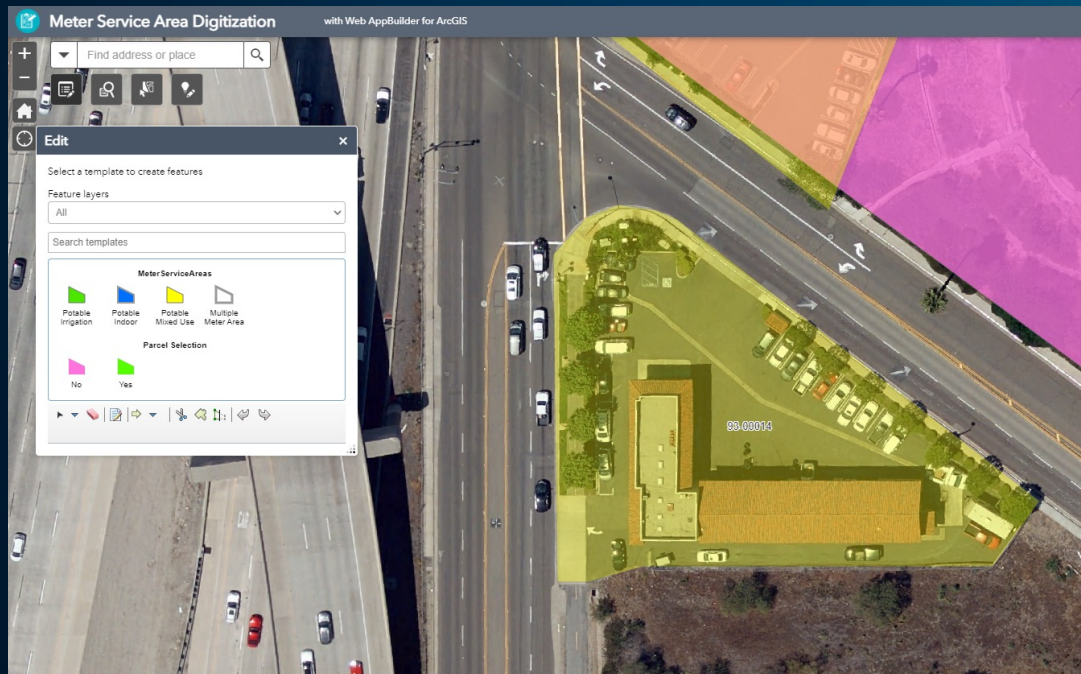
3. City *

- ☐ Aliso Viejo
- ☐ Dana Point
- ☐ Laguna Hills
- ☐ Laguna Niguel
- ☐ Mission Viejo
- ☐ San Juan Capistrano

Capturing in GIS

- Map the Meter Service Area
 - Include areas beyond parcel

- Overlay the Land Use Classification Dataset from NV5/Eagle Aerial
 - Determine irrigated/irrigable area



Contact Us

Melissa Salazar: MSalazar@mnwd.com

John Lansden: JLansden@mnwd.com

www.mnwd.com

26161 Gordon Rd, Laguna Hills, CA 92653

FOLLOW US ONLINE!





PUBLIC WORKS DEPARTMENT
WATER RESOURCES DIVISION - WATER CONSERVATION

BUDGET BASED RATES

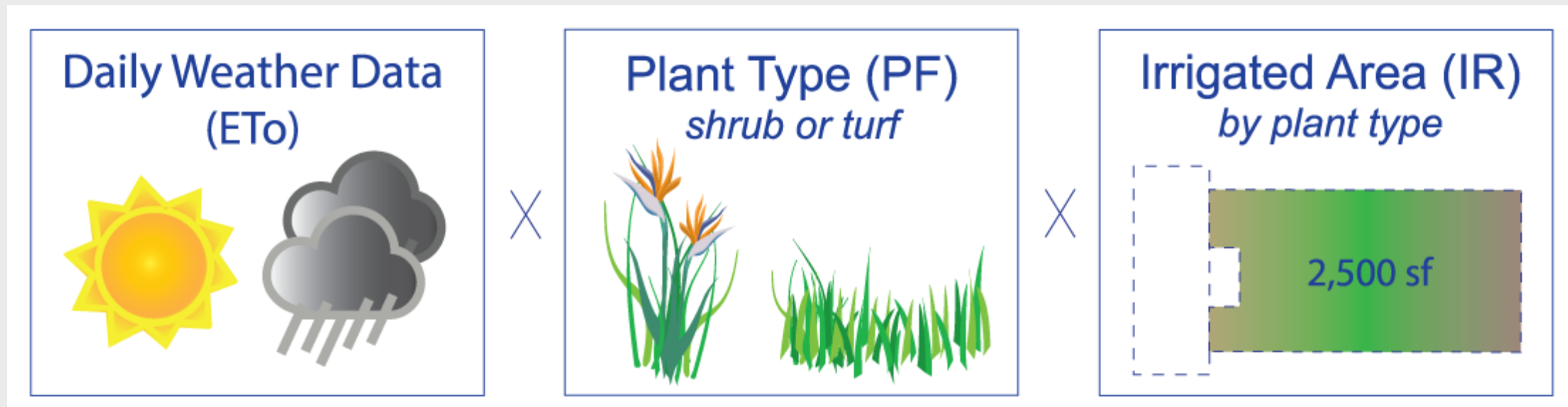
Santa Barbara's Landscape Budget Program

History

- DIMs were billed on a set usage/acre/year from 1989-2013
- Total service connections: 27,500
- DIMS: 780
- To prepare for budget-based billing, in 2006 the City started working to measure irrigation accounts
- Educational program for customers for first several years



Budget Based Rates



$$\text{Tier 1} = (\text{ETo})(.62/748)((\text{PF} \times \text{IR})/\text{IE})$$

Current Rates:

Tier 1: \$13.77/HCF Tier 2: \$25.89/HCF

Ground Truthing

- Budget creates a price signal to over-consumers
- Staff runs quarterly reports to check for users consistently going over/under budget by 20%+
- To date, 360 DIMs have received ground truthing



Area Changes Due to Ground Truthing

	Initial Estimate	After Ground Truthing	% Change
Total turfgrass	3.56 million sf	1.77 million sf	-50%
Total shrub	14.39 million sf	6.56 million sf	-54%

Ongoing Maintenance

- DIM City Code: required for projects > 1,000 SF
- Customers can use online Landscape Budgets Program in order to see their monthly usage and budgets.
- Upcoming AMI Landscape Budgets Module



Thank You

Madeline Wood

MWood@SantaBarbaraCA.gov

(805) 897-2672



Q&A



Thank you!

