

Guess??

178,000,000

(178 Million)

15,000

2,000,000

(2 Million)

383

**178,000,000 (178 Million)
MGD (Million Gallons/Day)**



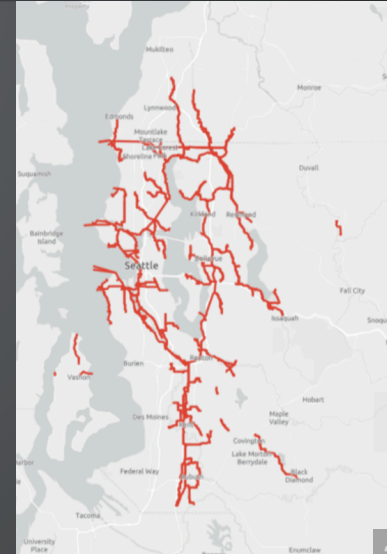
15,000 Trucks



**2,000,000 (2 Million)
People**



**383 Miles
of Pipe**



Drone to map, Now What?

KC Wastewater Drone Program to support sustainable infrastructure with GIS



Jason Celeste
Joe Géigel
Peter Keum

WAGISA, Bellevue

May 20, 2026

OR

WTD Drone Program

We Came, We Flew Up, Up and, We Mapped..

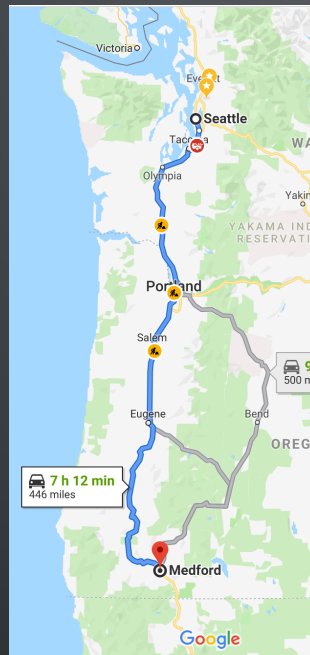




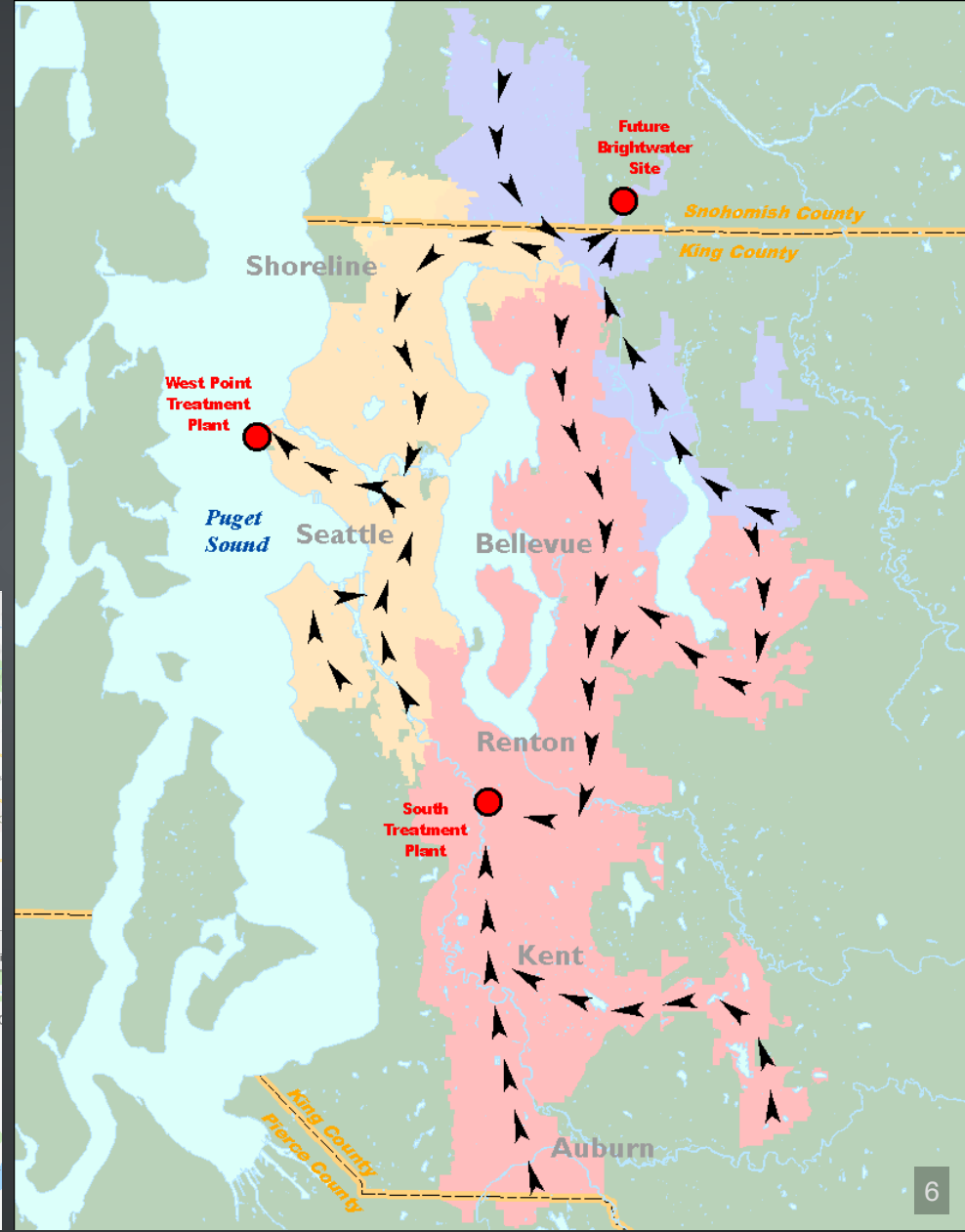
- WTD Drone Program
- GIS Data
- Integration Product

King County Wastewater Treatment by Numbers

- **2** million residents
- **34** Agencies
- **424** square miles
- **383** miles sewer pipeline (2.5 inch to 14 ft)
- **74** facilities (PS & RS)
- **3** Treatment Plants: 180 MGD ~ Max. 460 MGD



Seattle, WA --> Medford, OR



WTD GIS Team



Jason Celeste
GIS Specialist - Journey

Email

Teams



Shari Cross
Spatial Information Lead

Email

Teams



Donald Ellis
GIS Specialist - Senior

Email

Teams



Xavier Franczyk
GIS Specialist - Journey

Email

Teams



Joe Géigel
GIS Specialist - Journey

Email

Teams



Peter Keum
Drone Program Lead

Email

Teams



James MacLachlan
GIS Specialist - Journey

Email

Teams



Taylor Rulien
GIS Specialist - Journey

Email

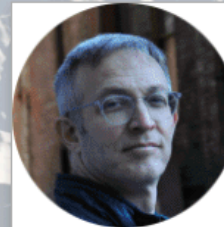
Teams



Patrick Sowers
GIS Specialist - Senior

Email

Teams



Shaun O'Neil
WTD GIS Supervisor

Teams

Supervisor

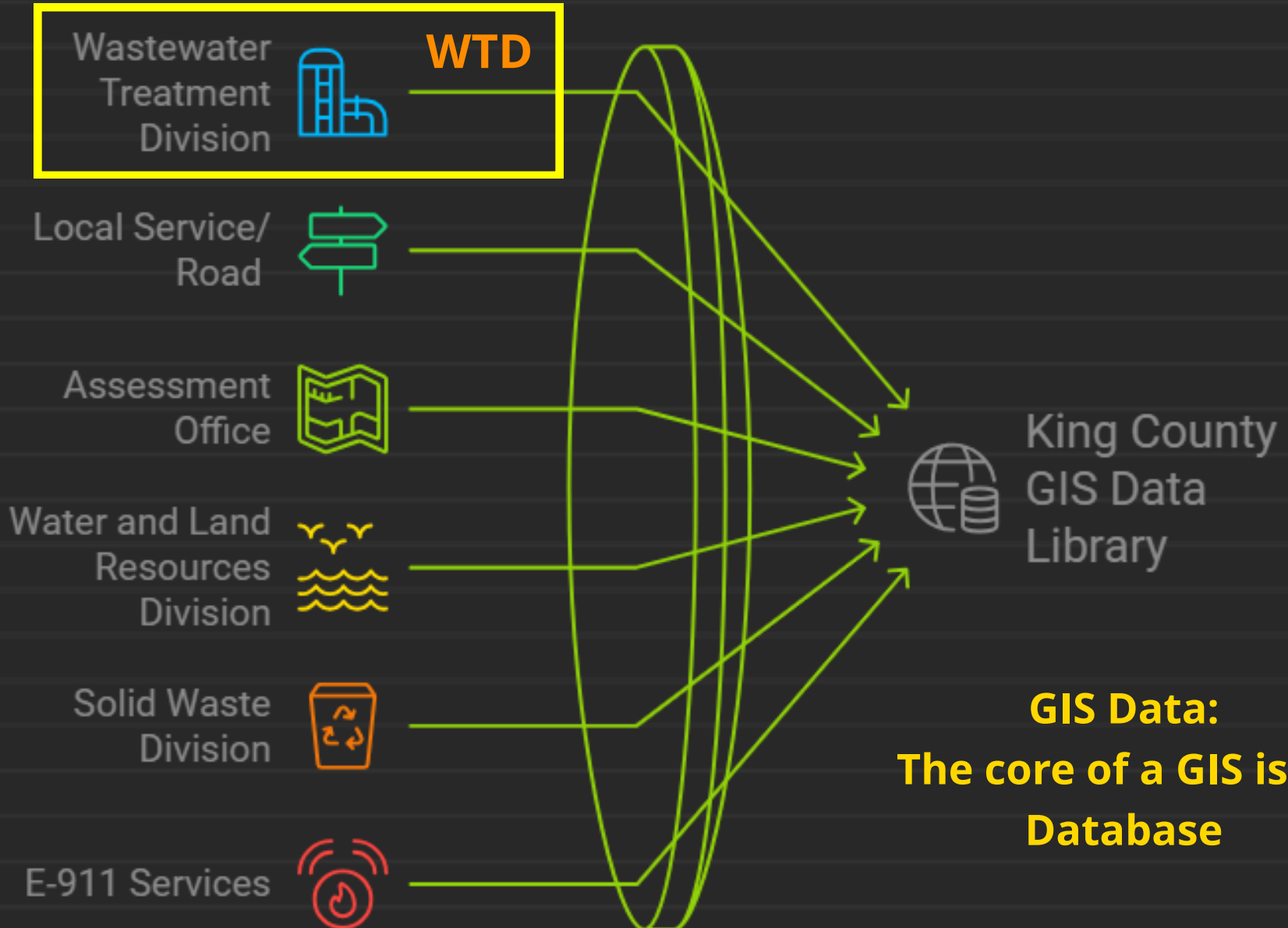
- 10 GIS Specialists
- 4 FAA Certified Pilots
- 3 Studying to be Certified
- Two Interns
 - Olivia
 - Max



WTD Summary Organizational Structure



BUT....There are 17 county agencies support King County GIS Data Library System



WTD GIS Drone Program

Not So Brief History of King County Wastewater Treatment Drone Program



May 2026

- Four FAA Part 107 Drone Certified Pilots - WTD GIS Specialists
 - 3 More Training
- Assisting other departments to stand up their own drone programs (WLRD/ SWD/ Local Service/ KCIA/ FMD)



Matrice 4 Ent. (1)
2025

dji MATRICE 4 SERIES
The Age of Intelligent Flight



Mavic 3 Ent (2x)
2023



Mavic 2 Ent. Adv. (1)
2022



DJI Mavic 2 Pro (1)
2021

Total: ~ \$27,000

Latest Hardware

dji ENTERPRISE

DJI MATRICE 400

Engineered for Excellence, Designed for Versatility



Extended Flight Time, High Speed Performance



6kg Payload Capacity With Versatile Compatibility



Safe and Reliable Flight



Enhanced Intelligence and Efficiency



Easier Automated Operations



Comprehensive Accessory Upgrades



\$11,000

All WEather

**H30T -
Thermal
~ \$ 12,000**



**L3 - lidar
~ \$ 18,000**



Sensors Payload



Thermal Infrared



Multi-spectral



Methane Gas Detector



Lidar Camera



High resolution digital camera (100 MP)

1. Aircraft + Sensor (Data Collection)

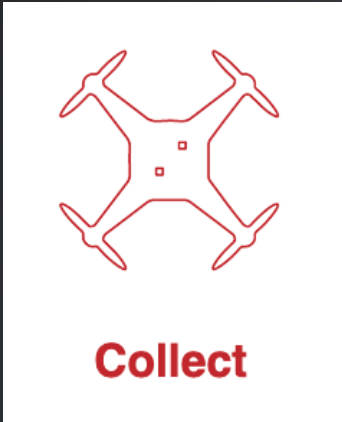
+

2. Data Processing & Analyzing (GIS)

=

3. Information Products

1. Platform + Sensor (Data Collection)



2. Data Processing & Analyzing (GIS)



3. Information Products



Orthomosaics



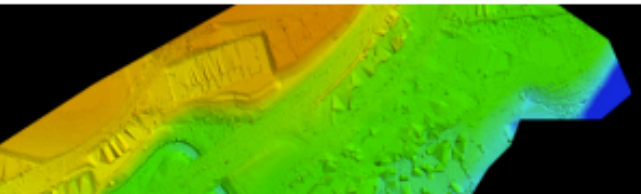
Asset photo collections



Thermal Imagery



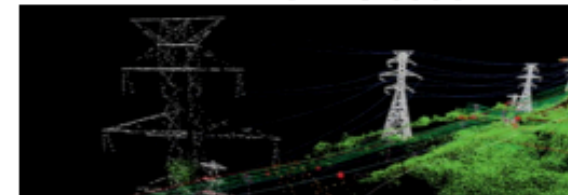
DSMs, DTMs



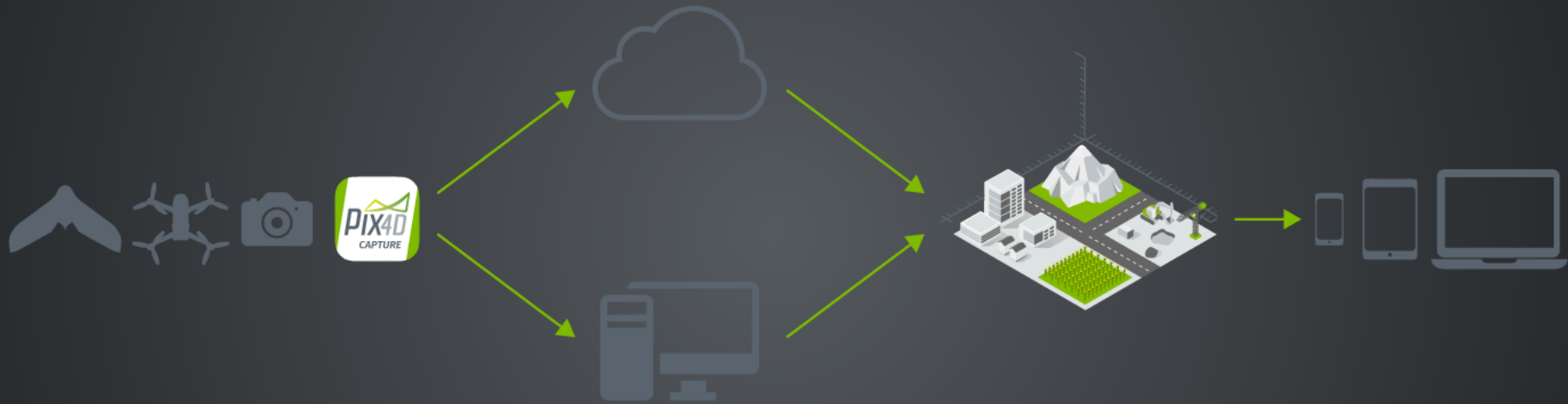
Volumetrics



Point Clouds



Standard Drone Workflow



 **CAPTURE**


 **PROCESS**

 **ANALYZE**

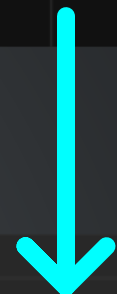
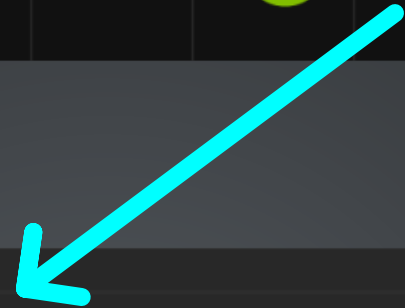
 **SHARE**

 **CAPTURE**

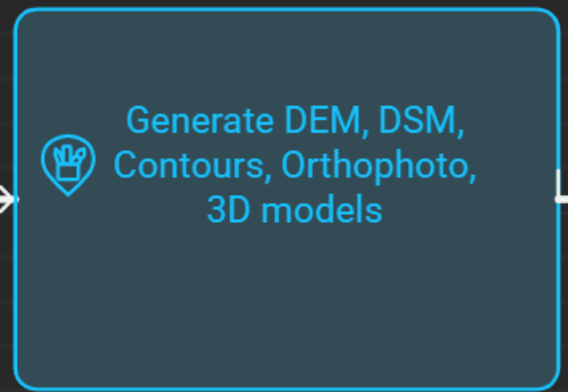
 **PROCESS**

 **ANALYZE**

 **SHARE**



Use SiteScan and Drone2Map



Drone

&

GIS



Great Combo?

Great combo !

GIS & DRONE



Great combo !



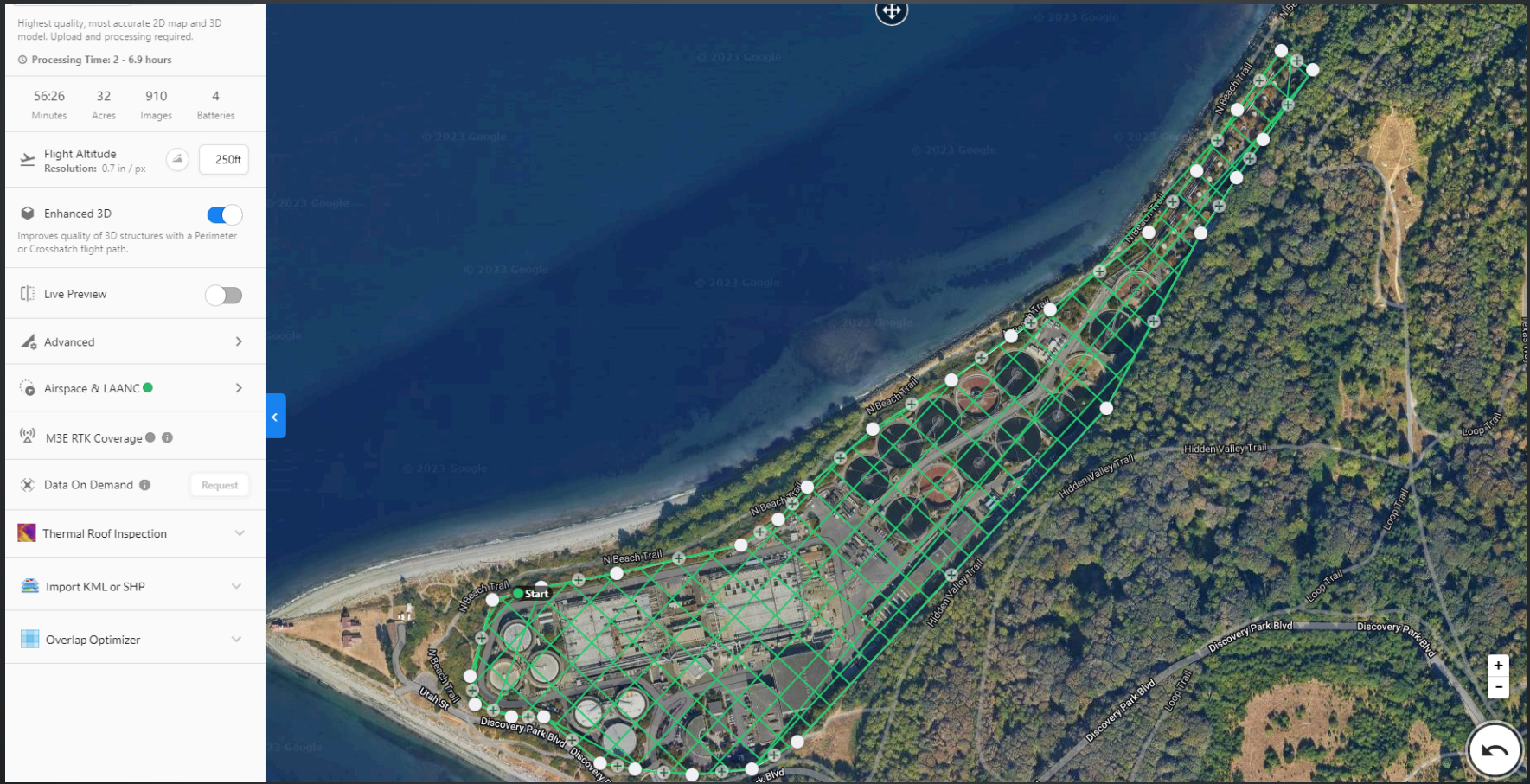
GIS & DRONE



Why Use Drones?

1. Easy - Simple with little effort

Automatic
Repeatable



Why Use Drones?

2. Efficient - Results without waste

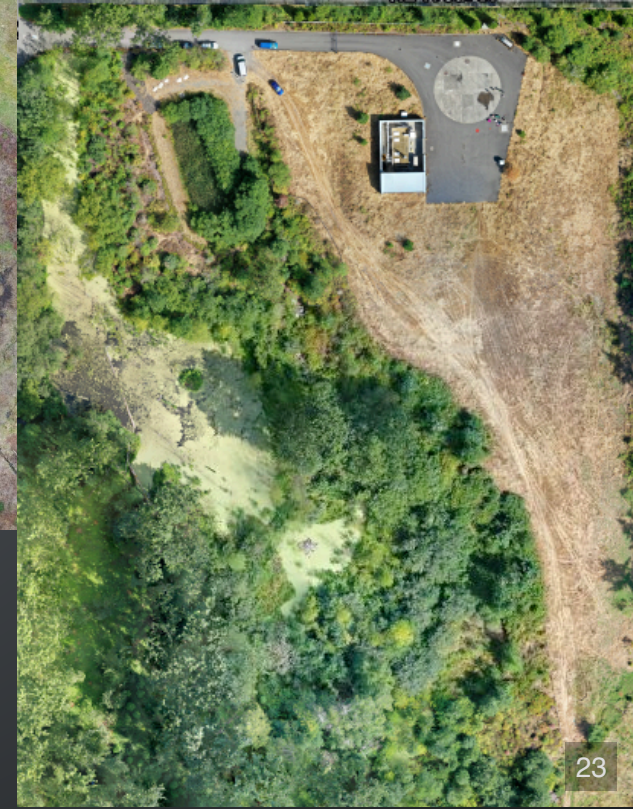
Safety of staffs & Save Time & \$\$

South Treatment Plant



Why Use Drones?

3. Effective - Producing Results



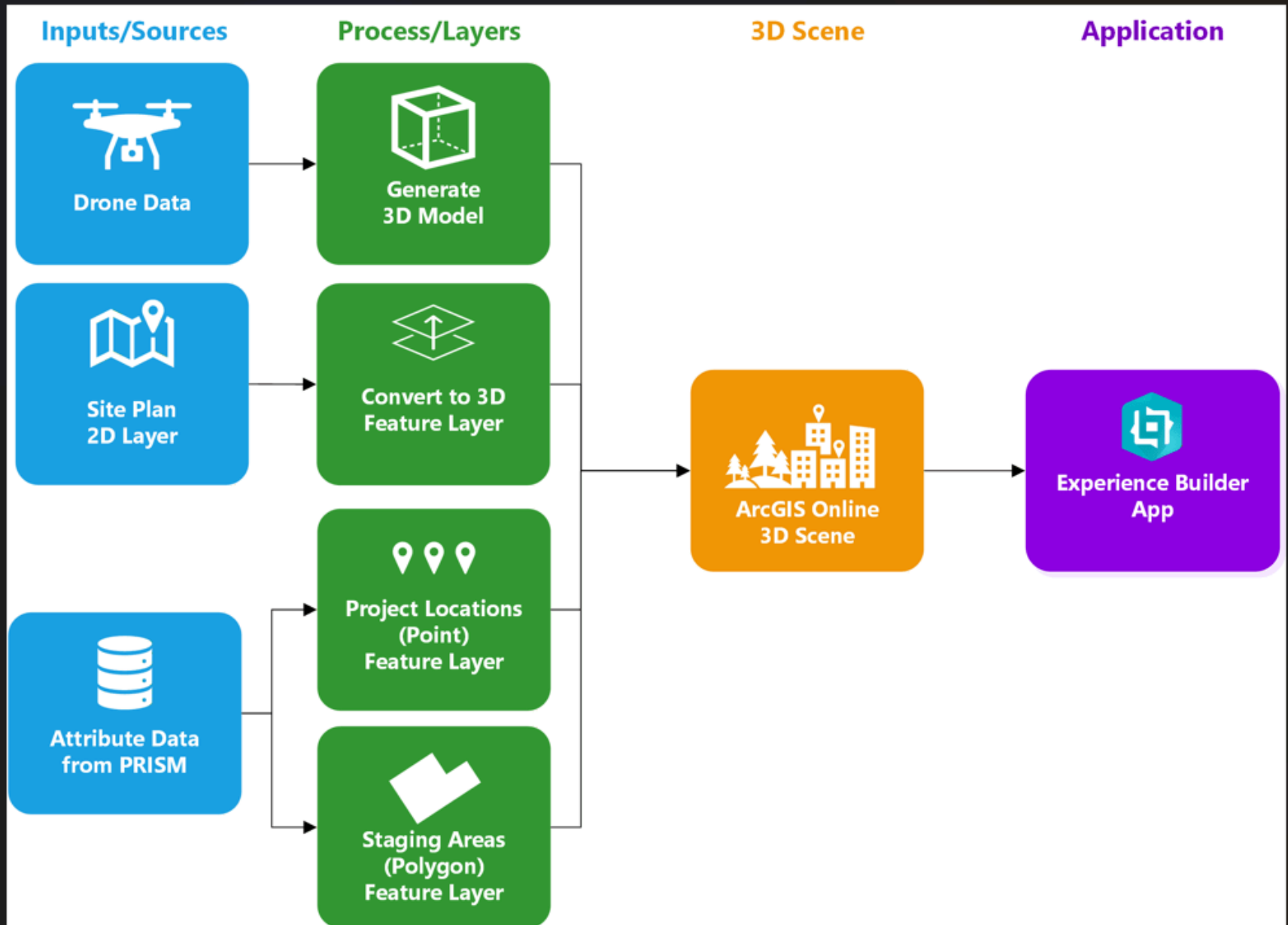
6x time the resolution

(from KC Aerial
Imagery - June 2025)



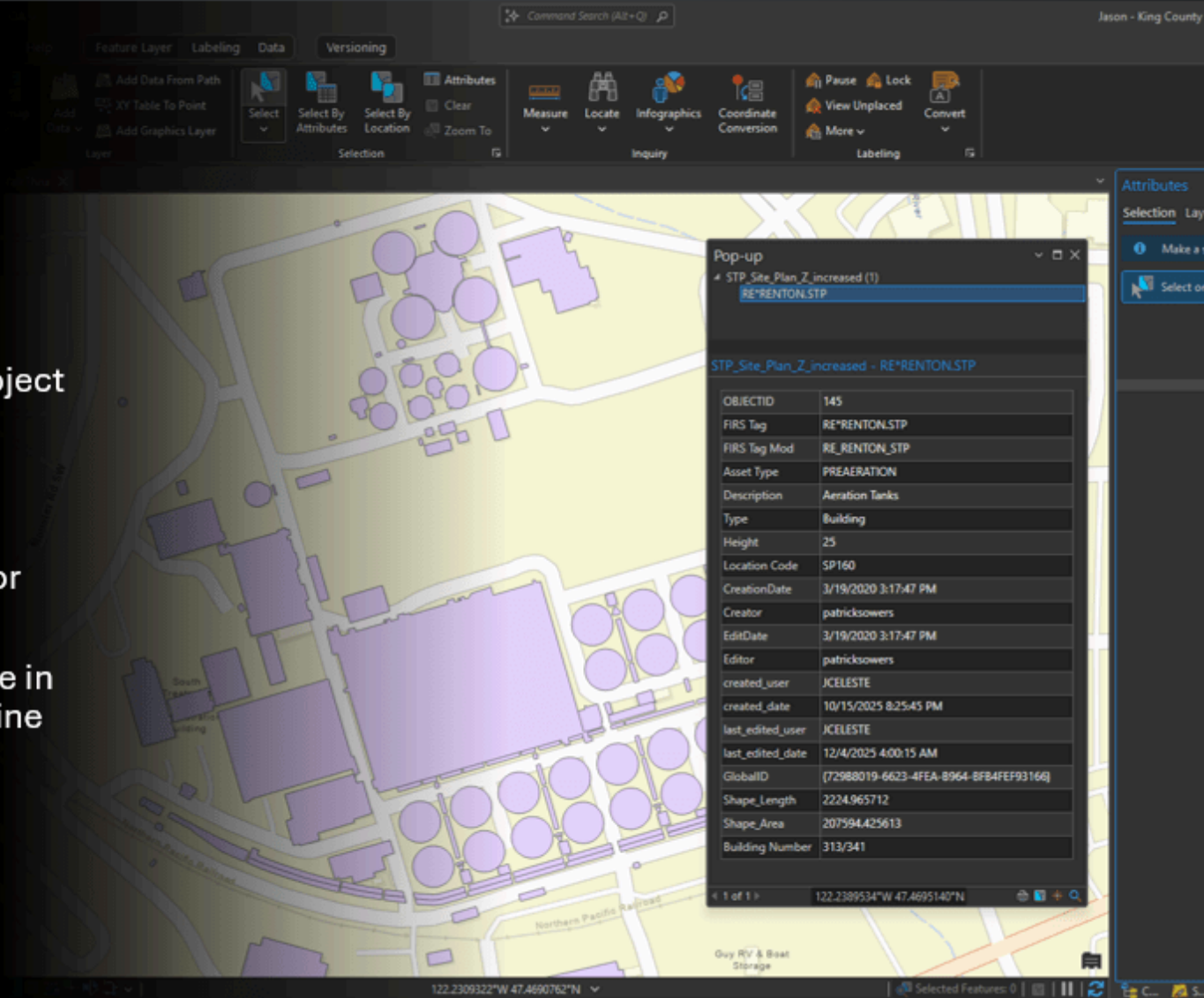
0.50 in/px
June 2025

Drone to Map to App



2D → 3D Data: Why?

- Better visualization of project and facility data
- Integration with drone-captured mesh imagery
- Can use existing 2D vector data
- Minimal processing to use in ArcGIS Pro or ArcGIS Online
- Why not?



The screenshot displays the ArcGIS Pro interface. The top ribbon includes tabs for Feature Layer, Labeling, Data, and Versioning. The main map area shows a 3D perspective view of a facility with various structures and circular tanks. A pop-up window is open over a selected feature, displaying the following attribute data:

STP_Site_Plan_Z_increased - RE*RENTON_STP	
OBJECTID	145
FIRS Tag	RE*RENTON_STP
FIRS Tag Mod	RE_RENTON_STP
Asset Type	PREAERATION
Description	Aeration Tanks
Type	Building
Height	25
Location Code	SP160
CreationDate	3/19/2020 3:17:47 PM
Creator	patrickowers
EditDate	3/19/2020 3:17:47 PM
Editor	patrickowers
created_user	JCELESTE
created_date	10/15/2025 8:25:45 PM
last_edited_user	JCELESTE
last_edited_date	12/4/2025 4:00:15 AM
GlobalID	(72988019-6623-4FEA-8964-8FB4FEF93169)
Shape_Length	2224.965712
Shape_Area	207594.425613
Building Number	313/341

The interface also shows a Command Search bar at the top right, a Layer panel on the left, and an Attributes panel on the right. The status bar at the bottom indicates the current location as 122.2309322°W 47.4690762°N.

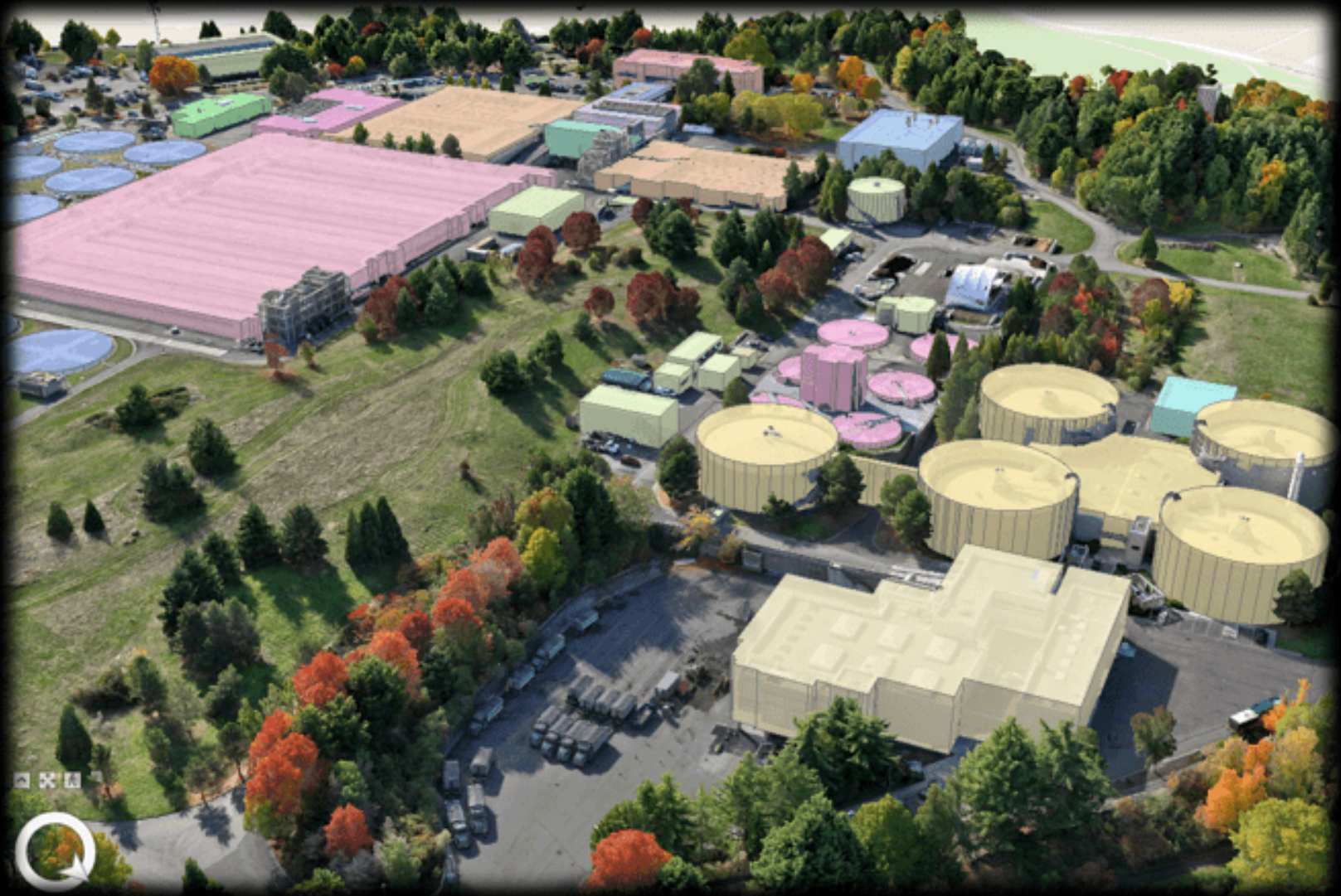
2D → 3D Data: How?

How do you go from this:



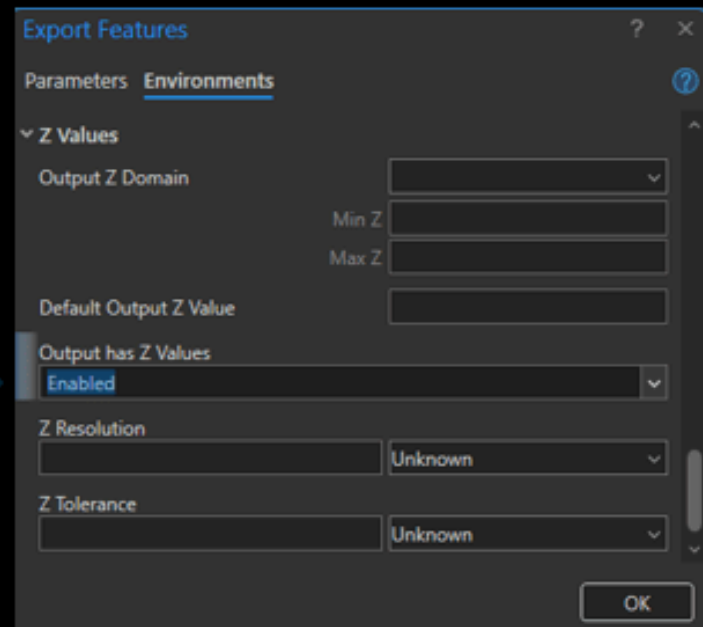
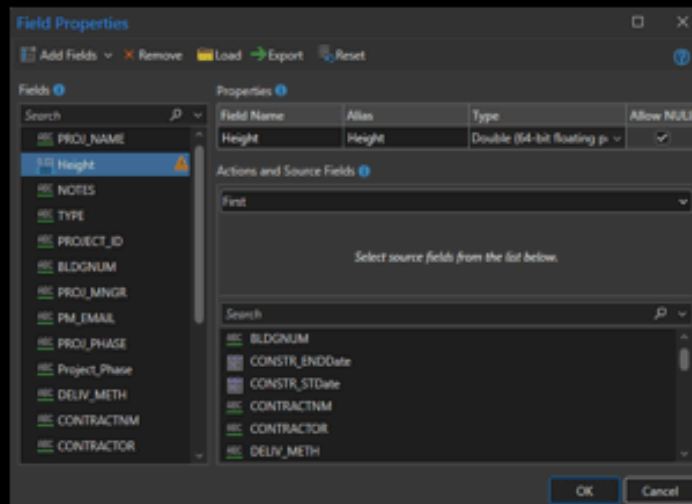
2D → 3D Data: How?

To this:



Considerations

- Does your 2D feature class have Z values enabled?
 - Yes – proceed to establishing height data
 - Add Height field (use Double precision)
 - No – Export feature class to new feature class
 - Enable Z Values (Environments)
 - Add Height field



Populate Height Field

- Methodology:

- Approach 1 – Eyeball Estimate

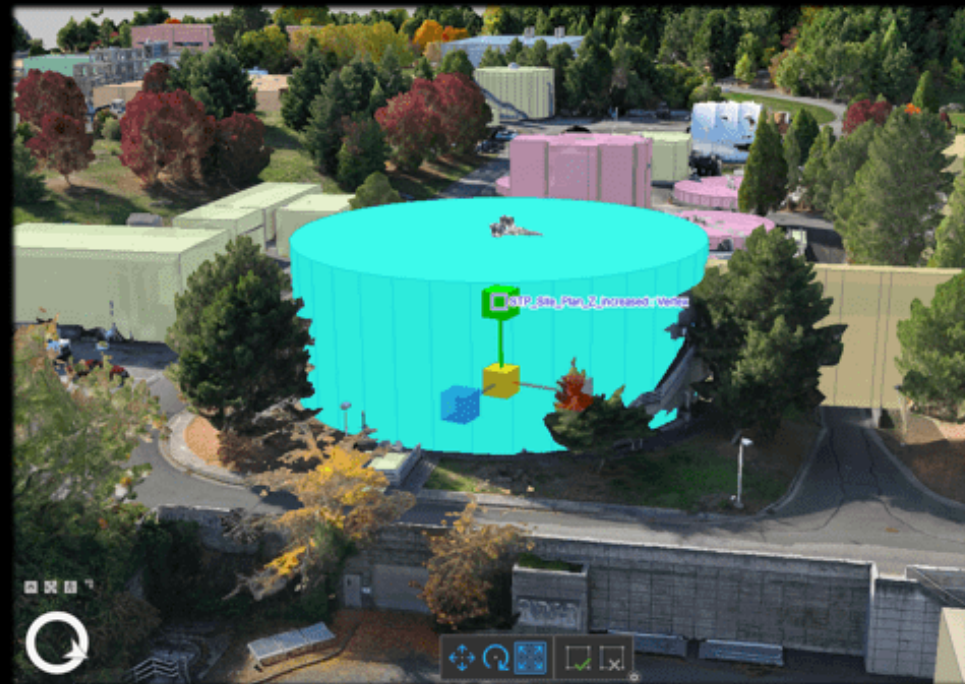
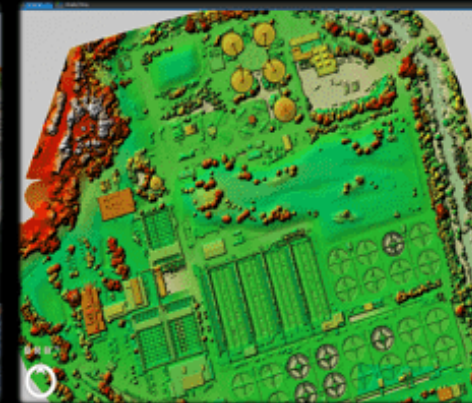
- If precise height measurements are not required
 - For visualization only

- Approach 2 – Using DSM & DTM

- Extensions required
 - Spatial Analyst, Image Analyst or 3D Analyst
 - Minus tool, Raster Calculator, Zonal Statistics

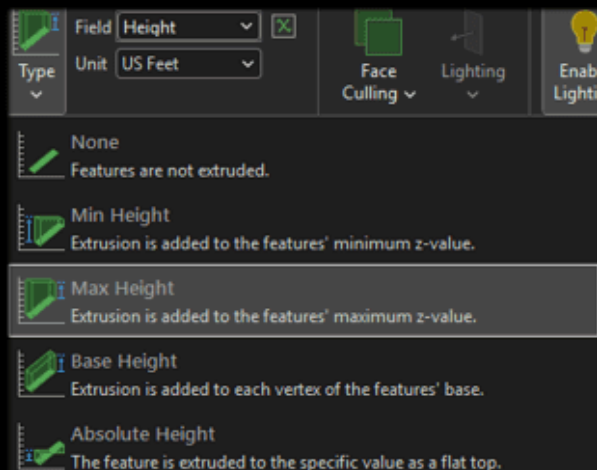
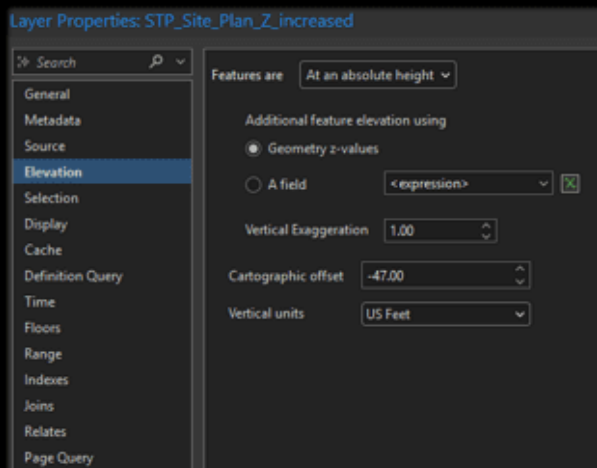
- Approach 3 – Interactive Editing

- Raise polygon using Scale tool – populates height field automatically



Extrusion in ArcGIS Pro or AGOL WebMap

- Once Height values have been established
 - Set extrusion settings for feature layer and layer properties (ArcGIS Pro)



Examples - Integrating with GIS

Brightwater Treatment Plant

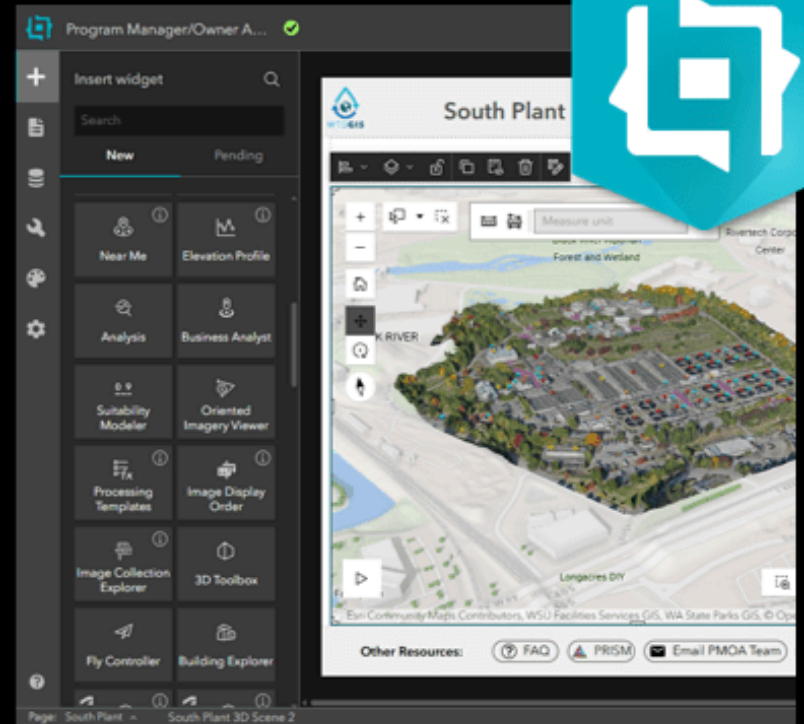
<https://gisenterprise.kingcounty.gov/portal/apps/instant/3dviewer/index.html?appid=f018d72c14de4c388939736fa6dd68b0>

Why Experience Builder?

- Highly configurable, low-code
- Integrates directly with our ArcGIS Online environment
- Easy to update and maintain

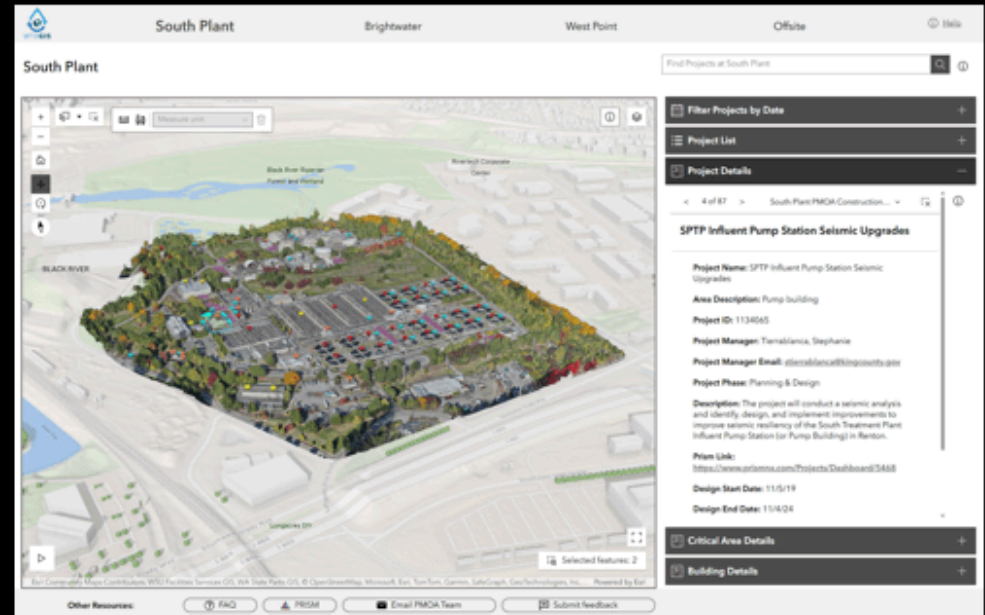
- **Goal of our app**

To provide an interactive, map-based way to explore capital projects and support informed program delivery.



Key Details

- One page per facility
- Simple layout for each page:
 - Header (page menu)
 - 3D scene
 - Right panel for feature details
 - Footer (other resources)
- Tooltips to assist navigation



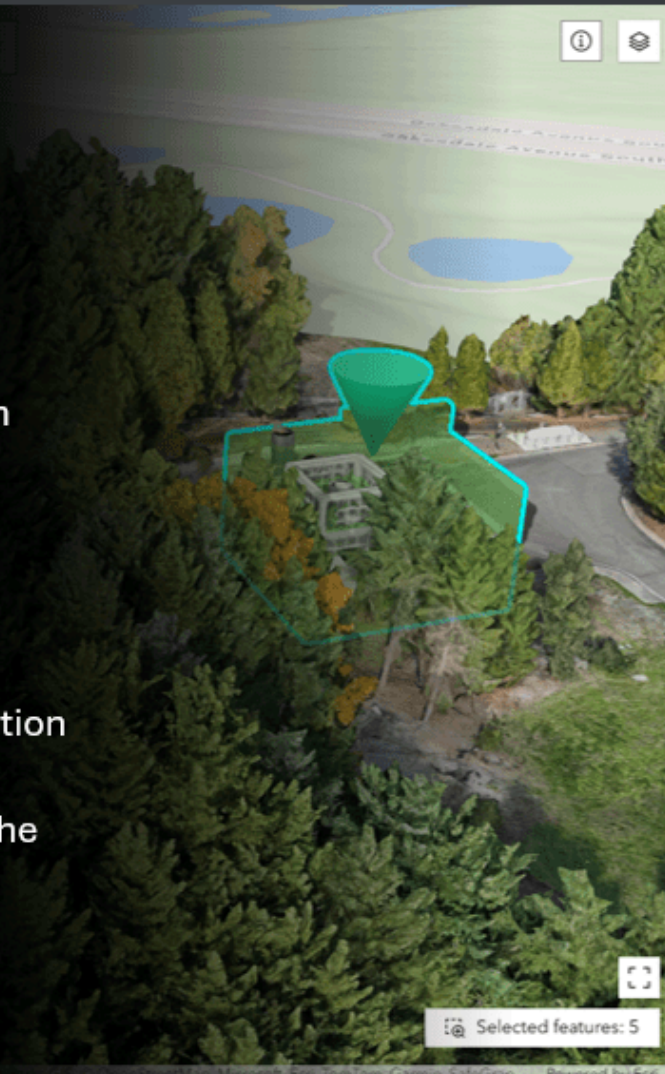
Map Widget

- Drone mesh as centerpiece
- Capital project and building locations
- A variety of navigation tools:
 - Zoom in/out
 - Rotate
 - Selection toolbar
 - Measure



Right Panel Widgets

- Find projects using a search bar
- Accordion widget hosting multiple tools to:
 - Filter projects by date
 - See a list of projects
 - Access feature information widgets
- Seamless integration with the 3D scene



Filter Projects by Date

Project List

Sort by project I...

1114383 - Reclaimed Water Planning & Infrastructure
STP Reuse Sand Filter Refurbishment
Phase: **Planning & Design**
[View PRISM Project Dashboard](#)

1123626 - SP Biogas and Heat Systems Improvements
Waste gas burner facility - Assumed Project Area
Phase: **Planning & Design**
[View PRISM Project Dashboard](#)

1123626 - SP Biogas and Heat Systems Improvements
Digester Bldg - Assumed Project Area
Phase: **Planning & Design**
[View PRISM Project Dashboard](#)

1134065 - SPTP Influent Pump Station Seismic Upgrades
Pump building
Phase: **Planning & Design**
[View PRISM Project Dashboard](#)

< 1 2 3 4 5 ... 18 >

Project Details

App Development Notes

Drone mission (October 2025)

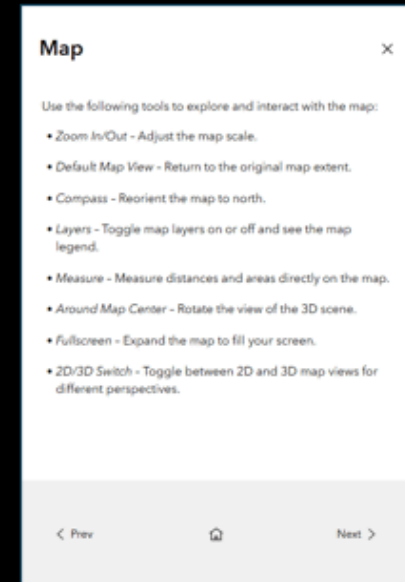
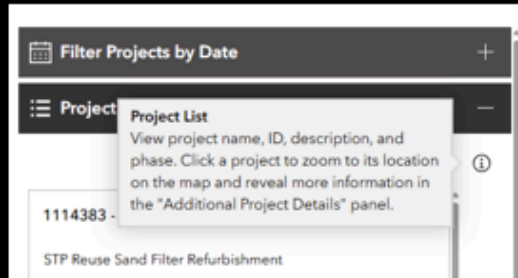
Web scene development

ExB app development

- Hosted in ArcGIS Online
- Shared internally and with select stakeholders
- Map-centric template
- Out-of-the-box widgets only!

Other Resources in the App

- A comprehensive help menu and tooltip buttons for most widgets
- Access to external resources from the footer
- A link to a Survey123 feedback form



WTD Facility Capital Project Viewer



South Plant

Brightwater

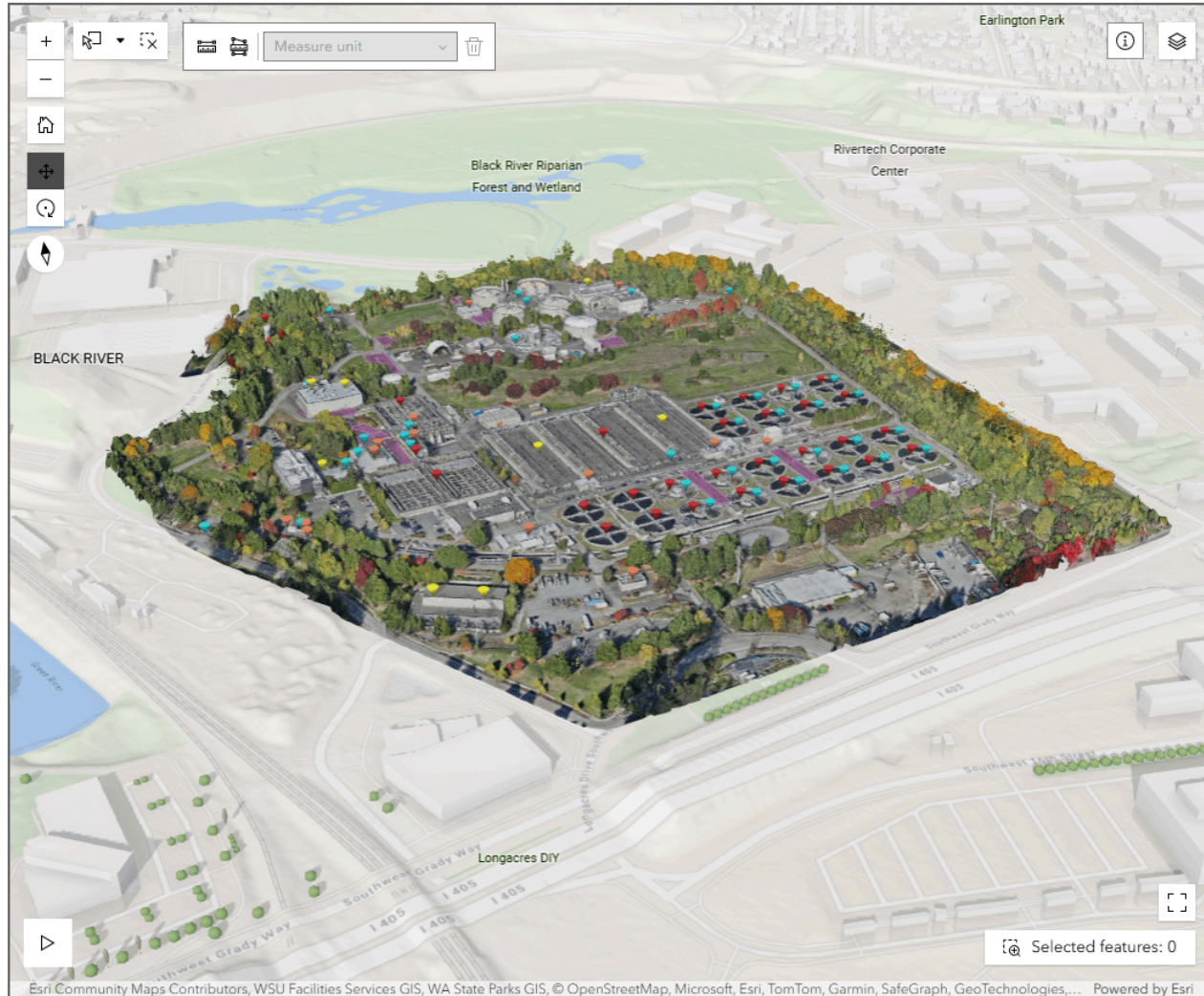
West Point

Offsite

Help

South Plant

Find Projects at South Plant



- Filter Projects by Date +
- Project List +
- Project Details +
- Critical Area Details +
- Building Details +

Esri Community Maps Contributors, WSU Facilities Services GIS, WA State Parks GIS, © OpenStreetMap, Microsoft, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, ... Powered by Esri

Other Resources:

[FAQ](#)

[PRISM](#)

[Email PMOA Team](#)

[Submit feedback](#)

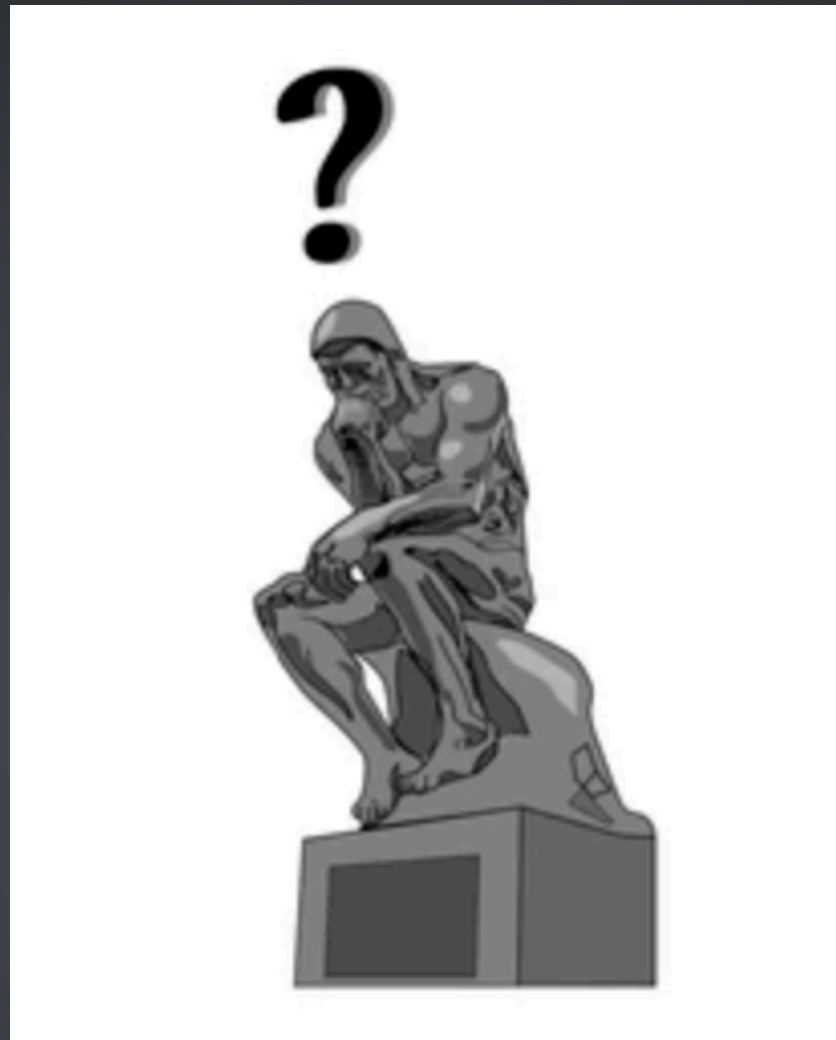


END
for now
Thank You

jceleste@kingcounty.gov

jgeigel@kingcounty.gov

peter.keum@kingcounty.gov



peter.keum@kingcounty.gov