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

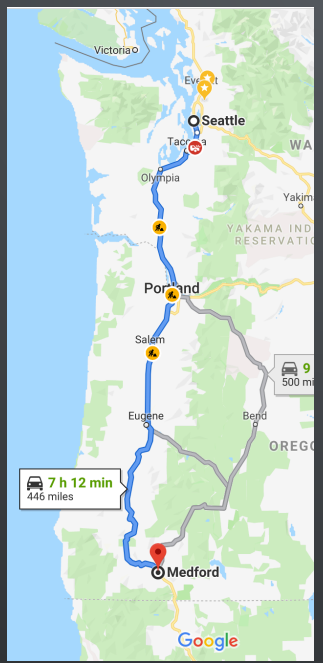
WTD Drone Program

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

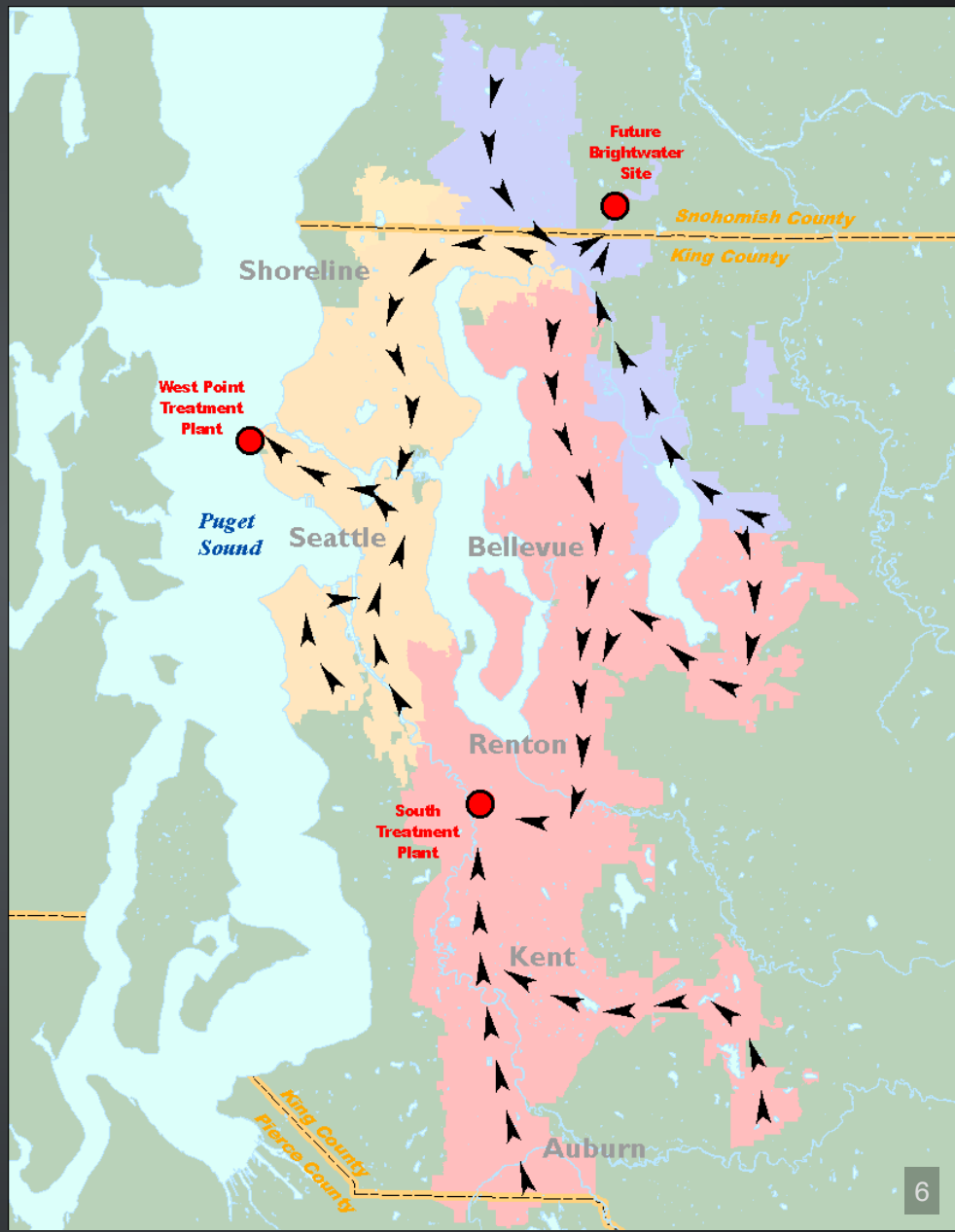
- WTD Drone Program
- GIS Data
- Integration Product

King County Wastewater Treatment by Numbers

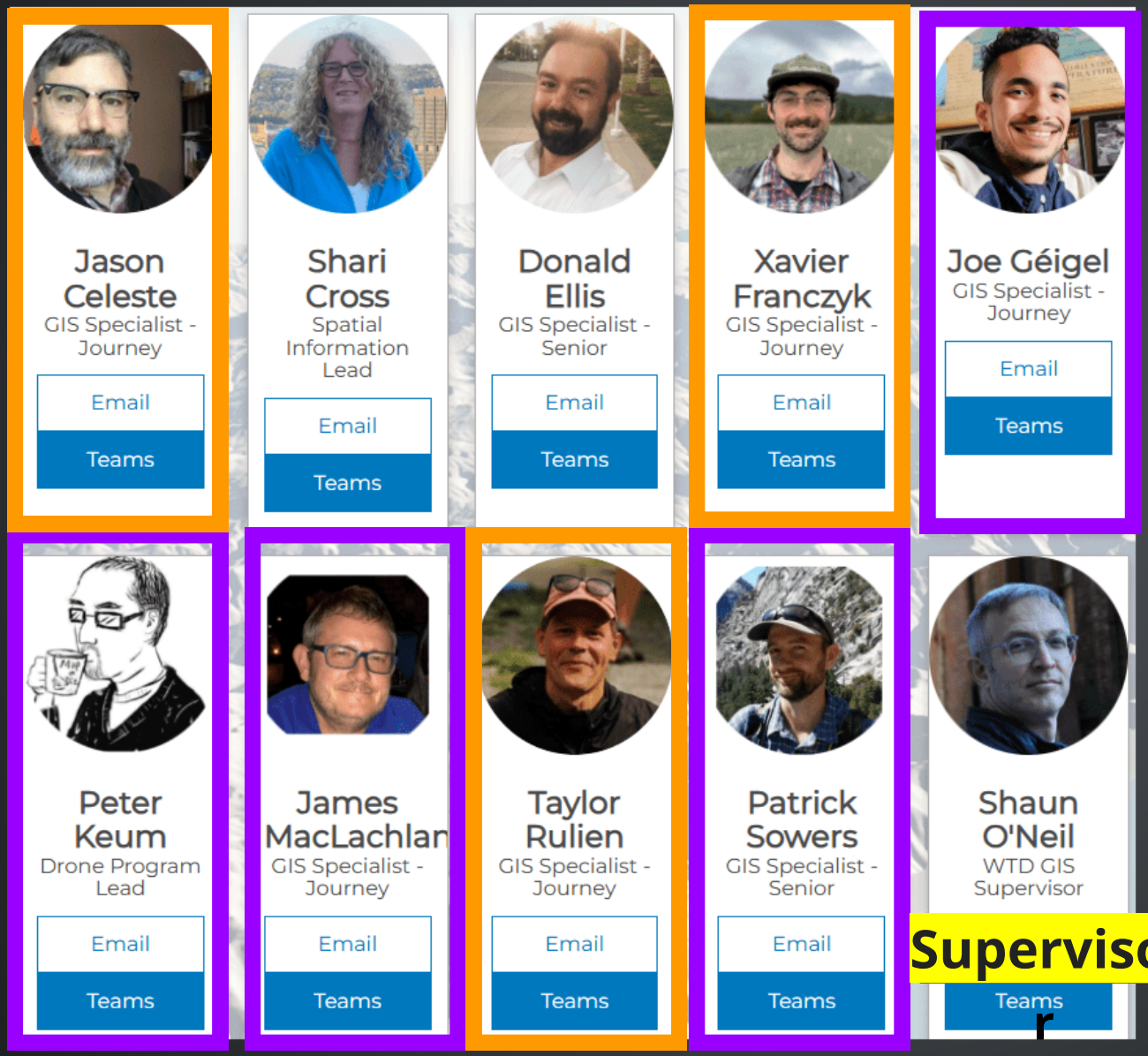
- **2** million residents
- **34** Agencies
- **424** square miles
- **383** miles sewer pipeline (2.5 inch to 14 ft)
- **74** facilities (PS & RS)
- **3** Treatment Plants: 180 MGD ~ Max. 460 MGD



Seattle, WA --> Medford, OR



WTD GIS Team

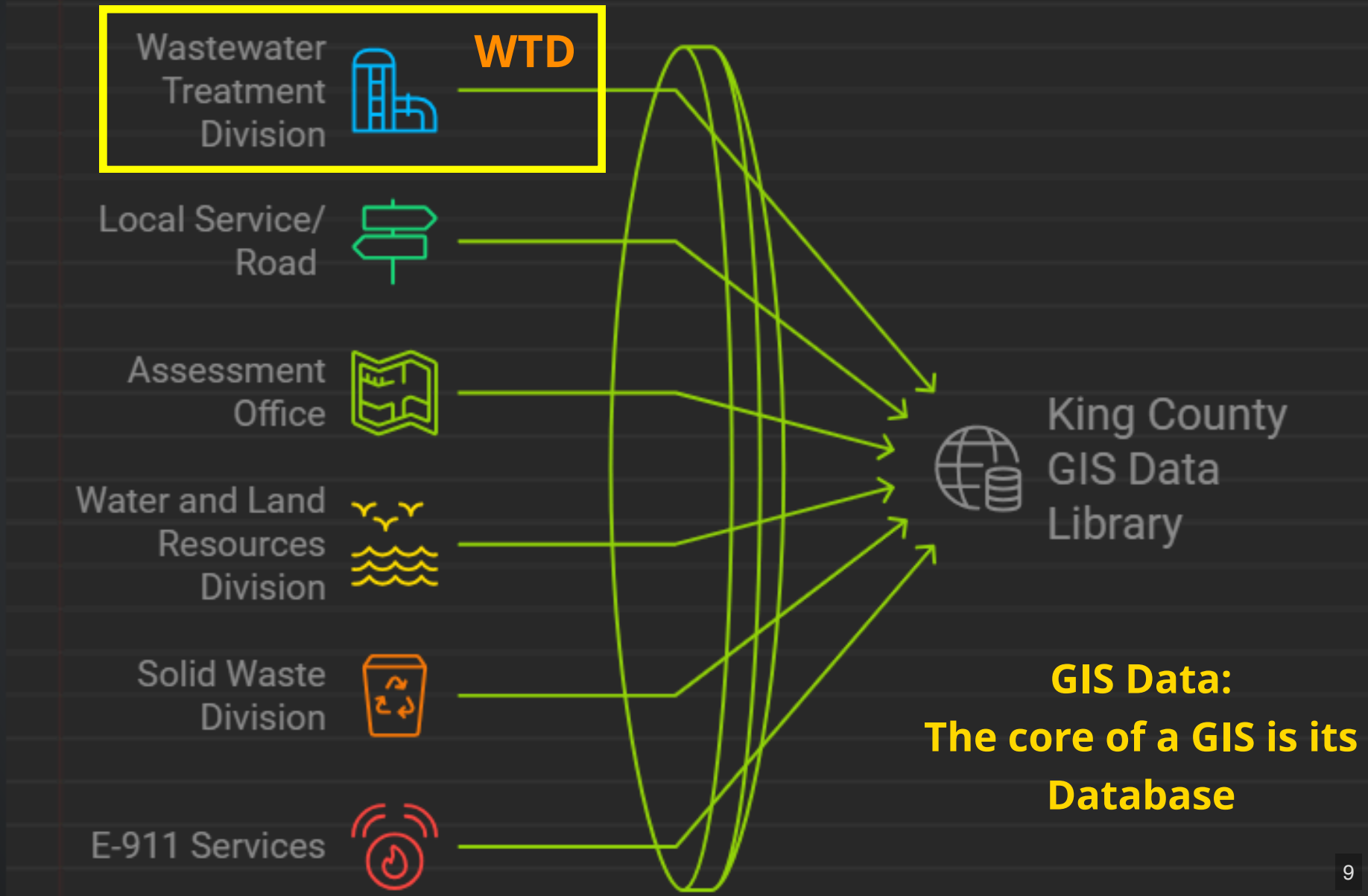


- 10 GIS Specialists
- 4 FAA Certified Pilots
- 3 Studying to be Certified
- Two Interns
  - Olivia
  - Max

WTDGIS

WTD Summary
Organizational Structure

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



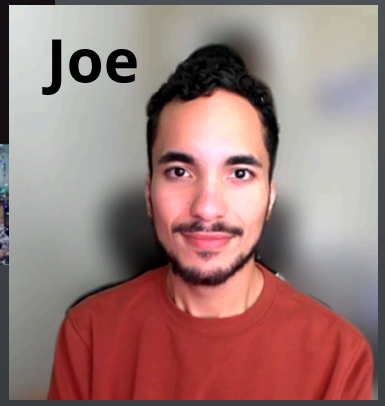
GIS Data:
The core of a GIS is its Database

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)



WTDGIS

Matrice 4 Ent. (1)

2025

Mavic 3 Ent (2x)

2023

Mavic 2 Ent. Adv. (1)

2022

DJI Mavic 2 Pro (1)

2021

Total: ~ $27,000

Latest Hardware

$11,000

All WEather

H30T - Thermal

~ $ 12,000

L3 - lidar

~ $ 18,000

Sensors Payload

Thermal Infrared

Multi-spectral

Methane Gas Dector

Lidar Camera

High resolution digital camera (100 MP)

1. Aircraft + Sensor (Data Collection)

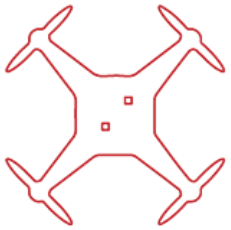
+

2. Data Processing & Analyzing (GIS)

=

3. Information Products

1. Platform + Sensor (Data Collection)



Collect

2. Data Processing & Analyzing (GIS)

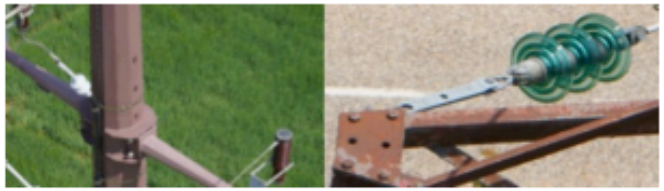
Process and Analyze

3. Information Products

Deliver and Action

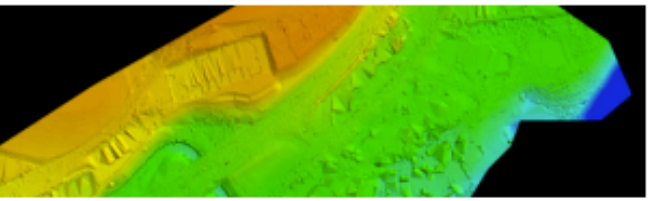
Orthomosaics

Asset photo collections

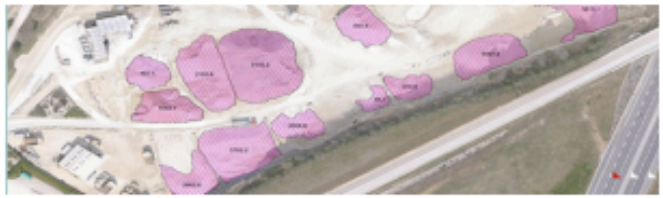


Thermal Imagery

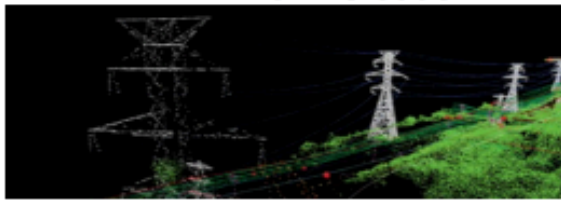
DSMs, DTMs



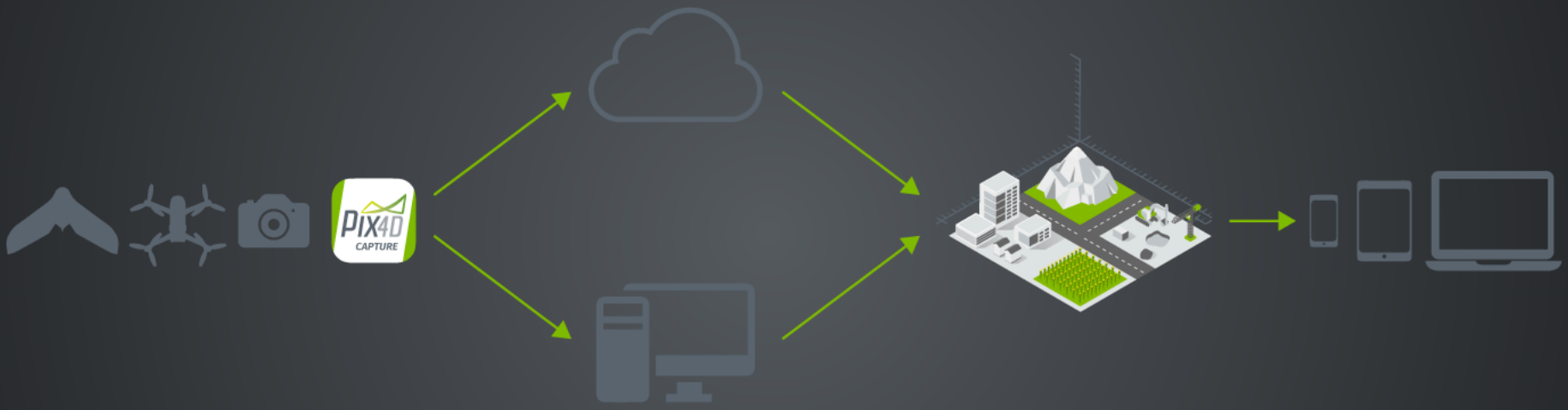
Volumetrics



Point Clouds

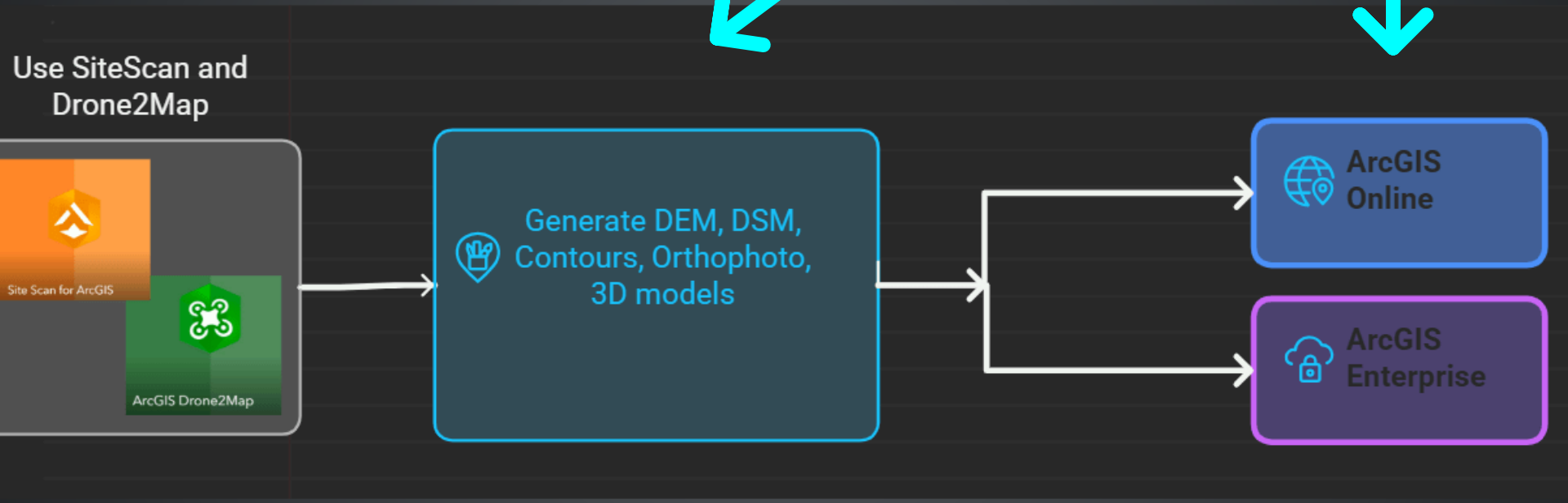


Standard Drone Workflow



CAPTURE PROCESS ANALYZE SHARE

CAPTURE PROCESS ANALYZE SHARE



Drone & GIS

Great Combo?

Great combo !

GIS & DRONE

Great combo !

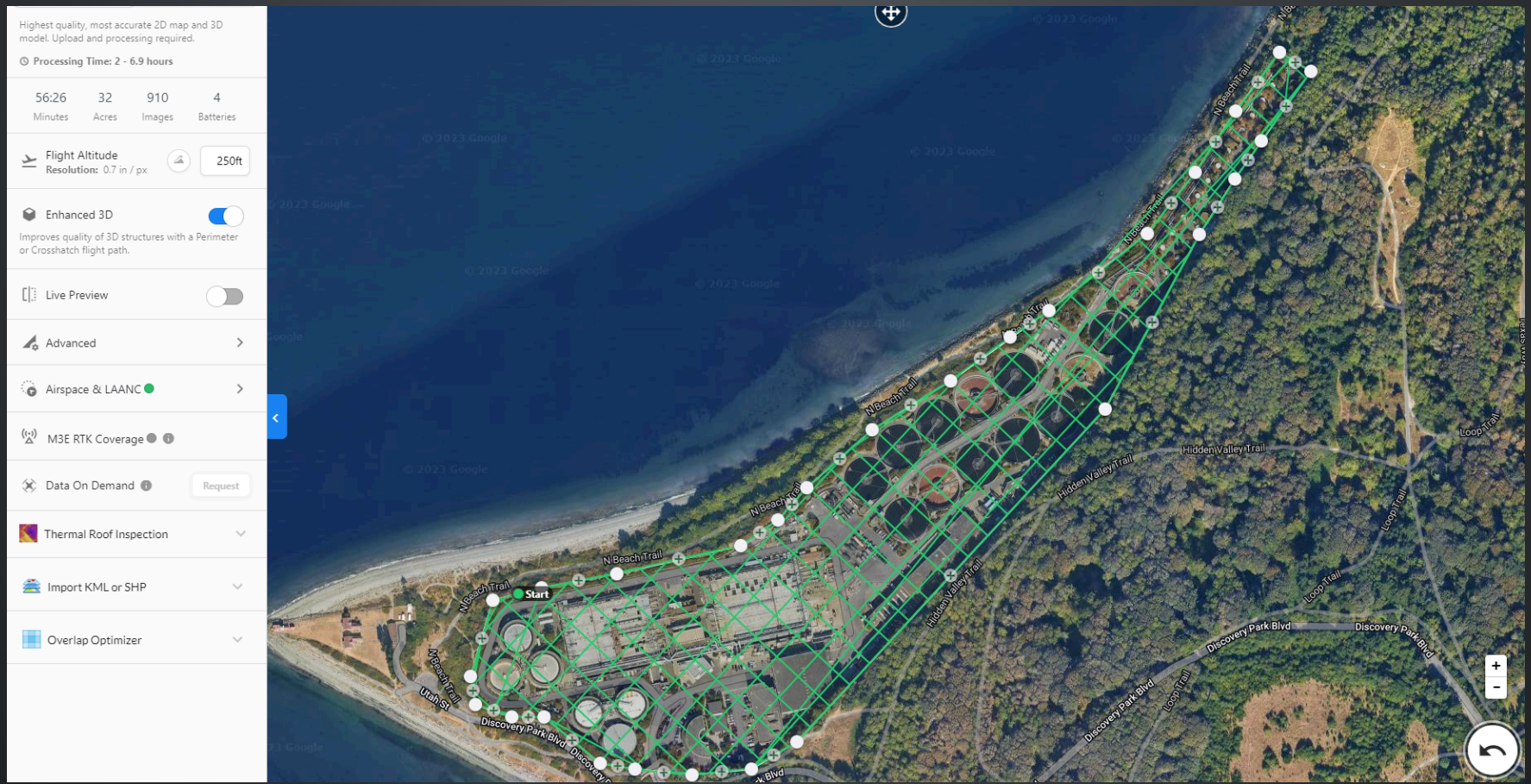
GIS &
DRONE

Why Use Drones?

1. Easy - Simple with little effort

Automatic

Repeatable



Why Use Drones?

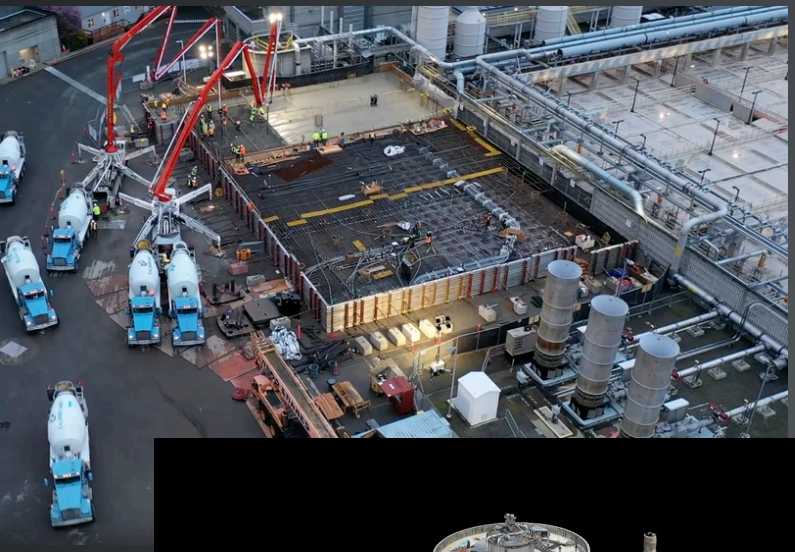
2. Efficient - Results without waste

Safety of staffs & Save Time & $$

South Treatment Plant

Why Use Drones?

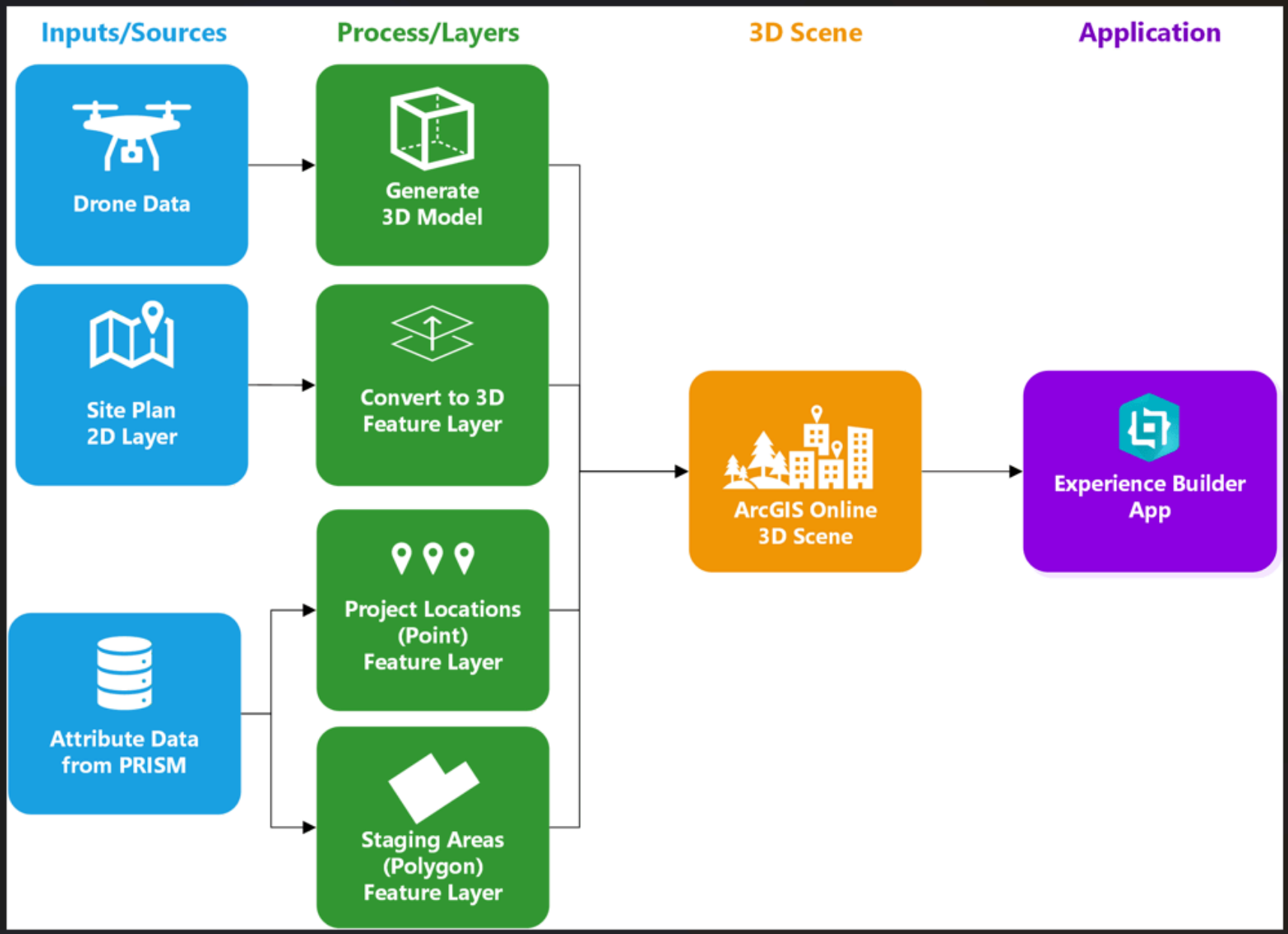
3. Effective - Producing Results



6x time the resolution

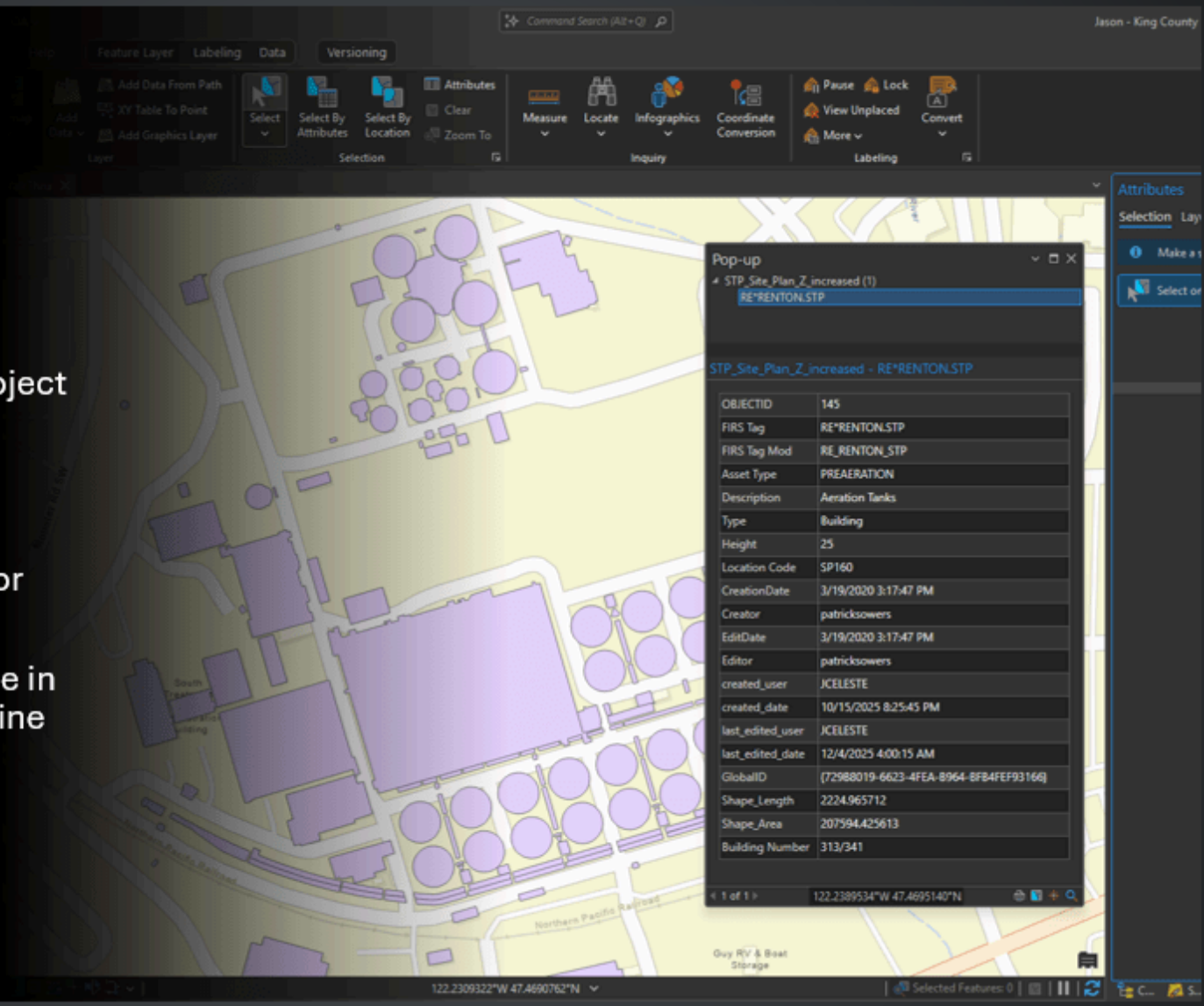
(from KC Aerial Imagery - June 2025)

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?

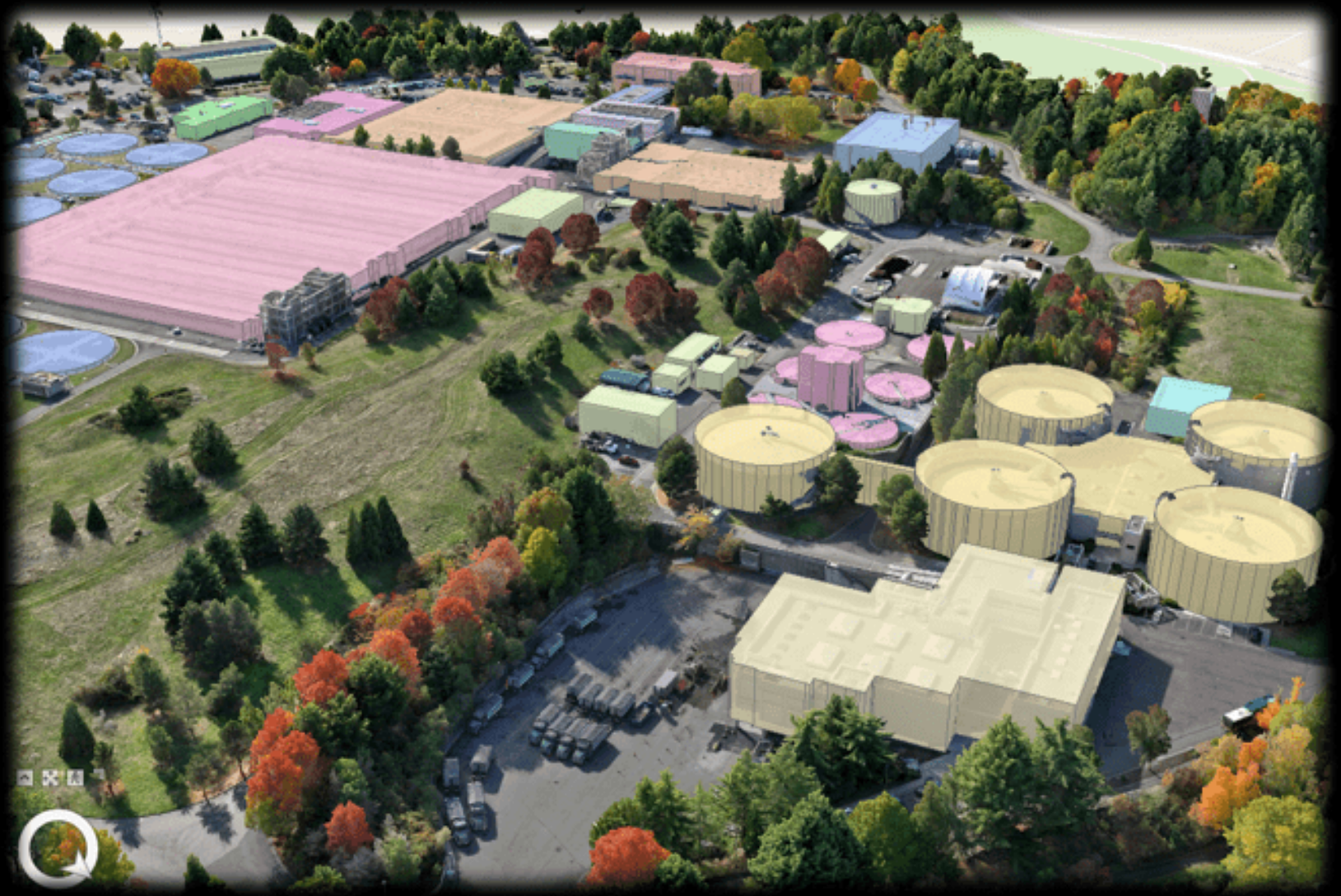


2D → 3D Data: How?

How do you go from this:

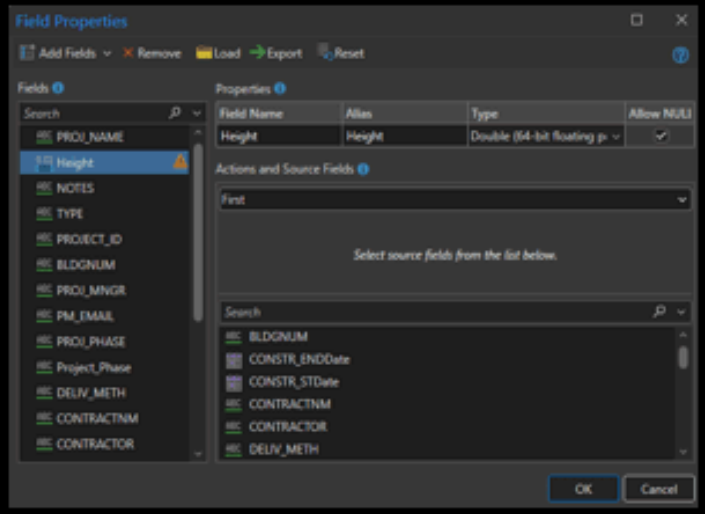
2D → 3D Data: How?

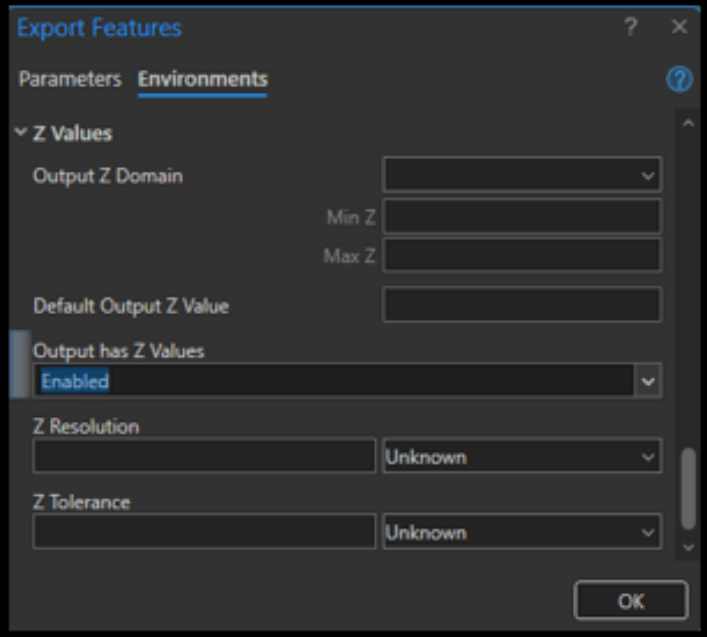
To this:



Considerations

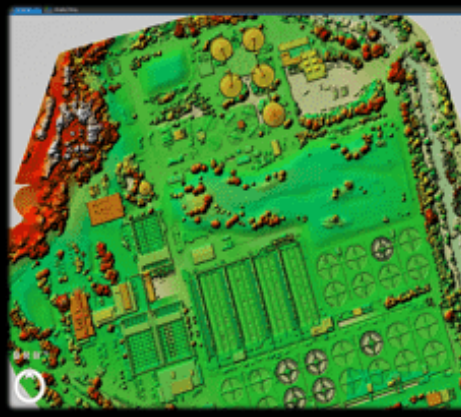
- Does your 2D feature class have Z values enabled?
  - Yes – proceed to establishing height data
    - Add Height field (use Double precision)
  - No – Export feature class to new feature class
    - Enable Z Values (Environments)
    - Add Height field

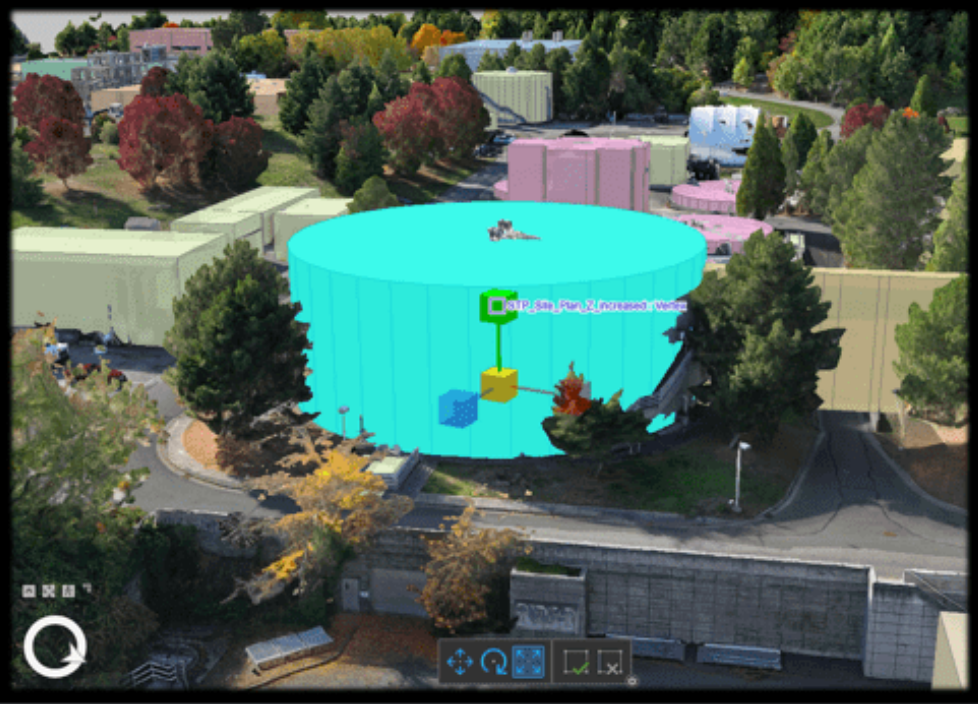




Populate Height Field

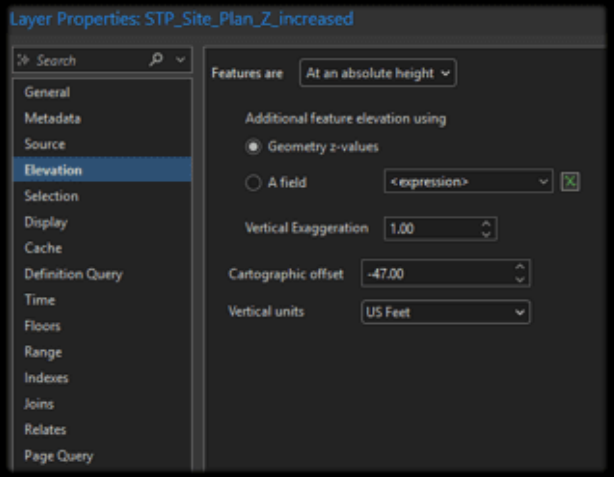
- Methodology:
  - Approach 1 – Eyeball Estimate
    - If precise height measurements are not required
    - For visualization only
  - Approach 2 – Using DSM & DTM
    - Extensions required
      - Spatial Analyst, Image Analyst or 3D Analyst
    - Minus tool, Raster Calculator, Zonal Statistics
  - Approach 3 – Interactive Editing
    - Raise polygon using Scale tool – populates height field automatically

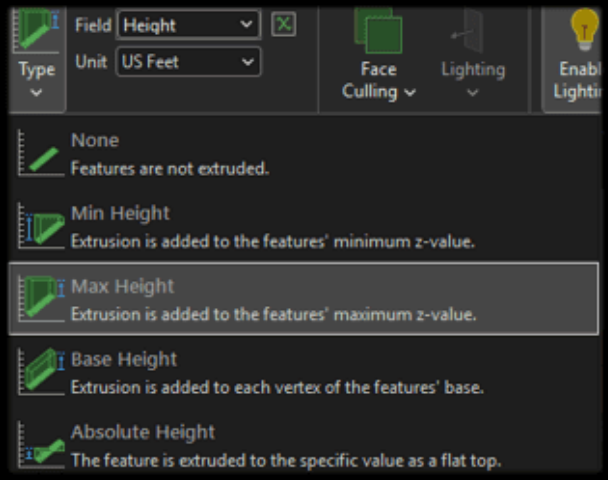




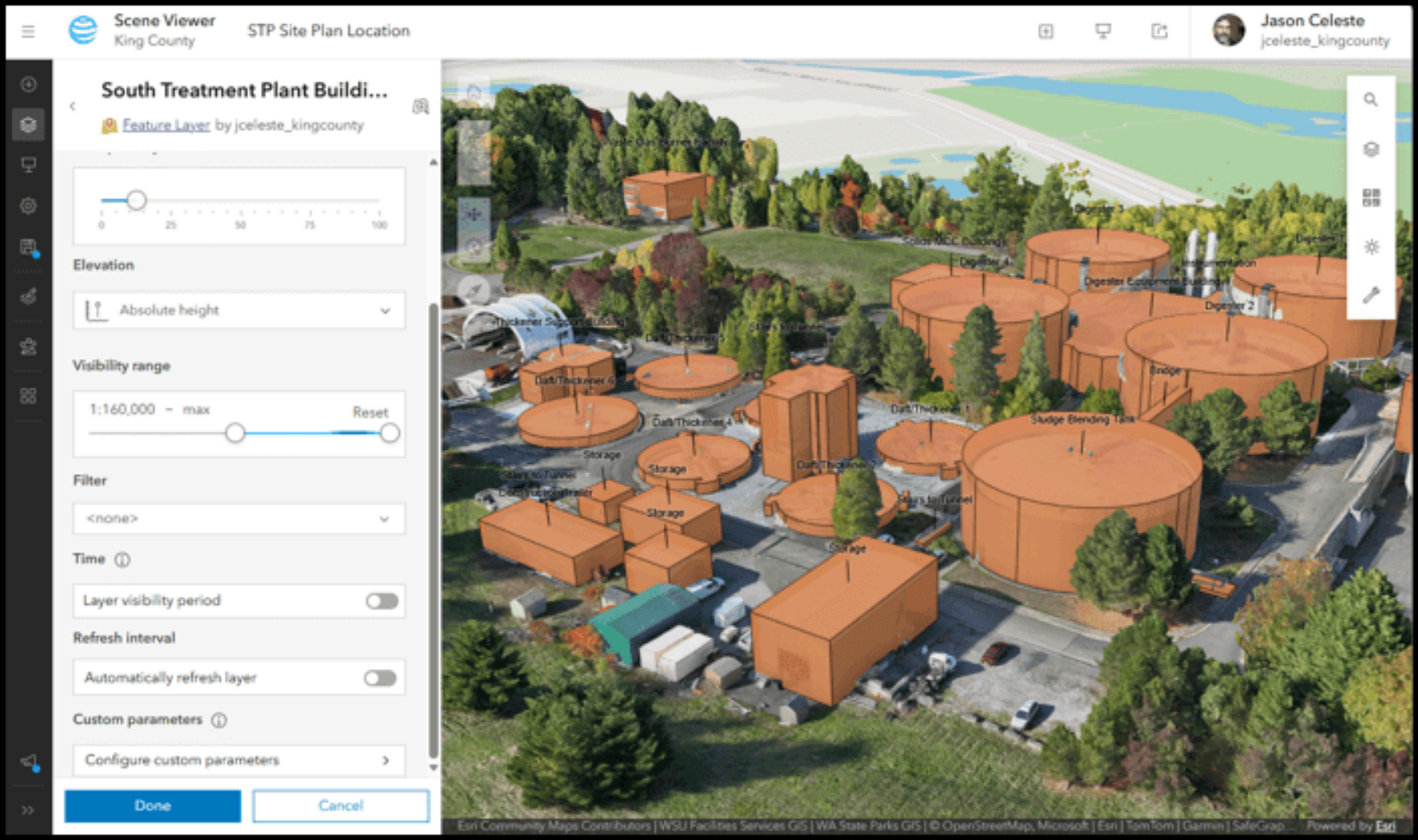
Extrusion in ArcGIS Pro or AGOL WebMap

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





Extrusion in ArcGIS Pro or AGOL WebMap



You're now ready to add to an Experience Builder or Instant App

Examples - Integrating with GIS

Brightwater Treatment Plant

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

Why Experience Builder?

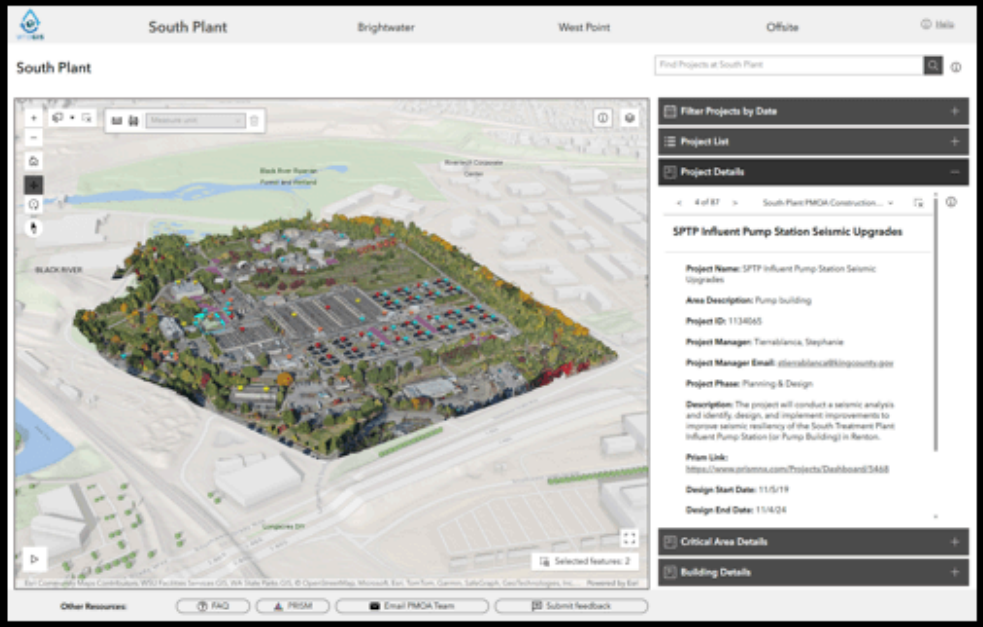
- Highly configurable, low-code
- Integrates directly with our ArcGIS Online environment
- Easy to update and maintain

- **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

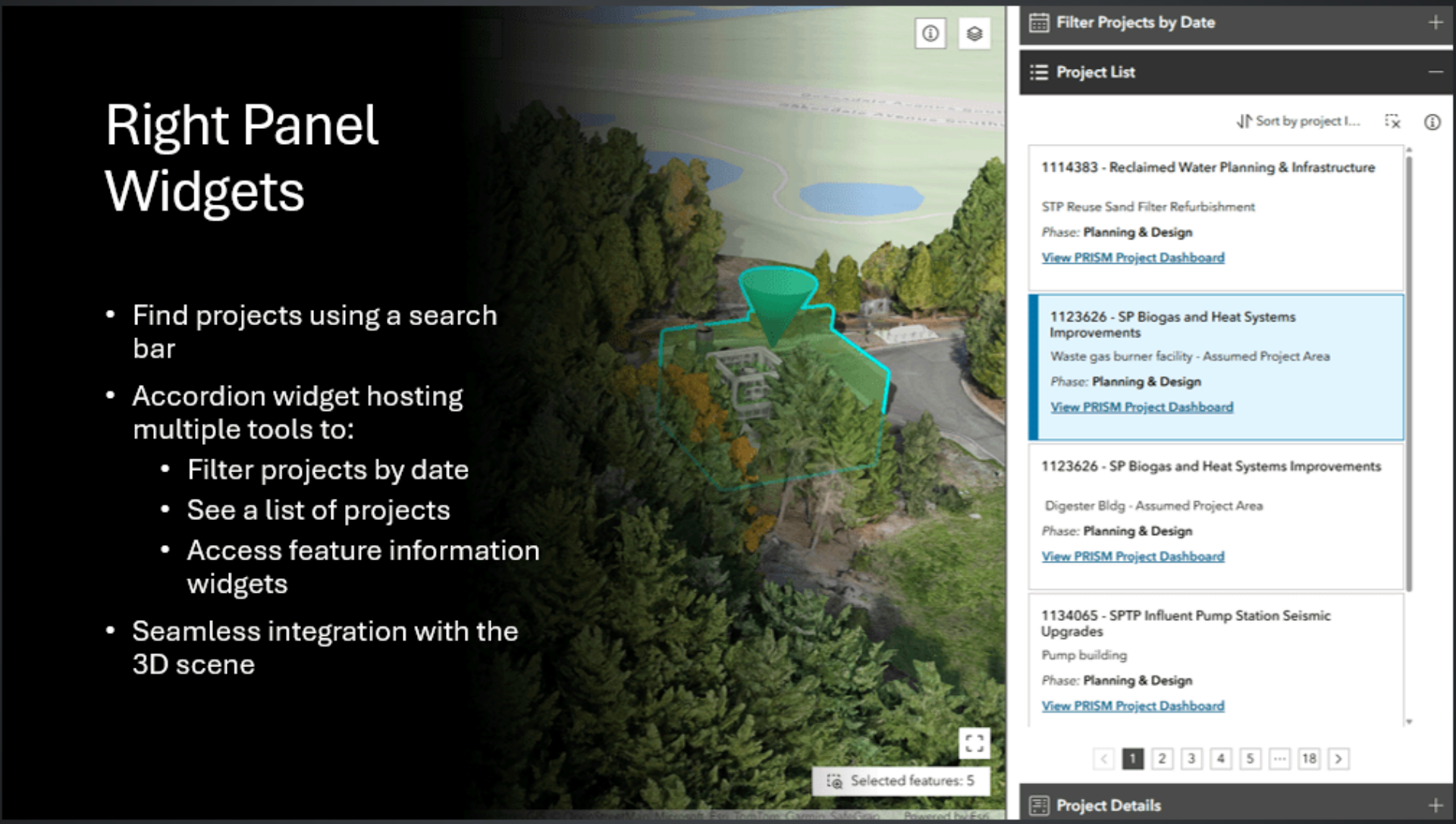


Map Widget

- 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



App Development Notes

Drone mission (October 2025)

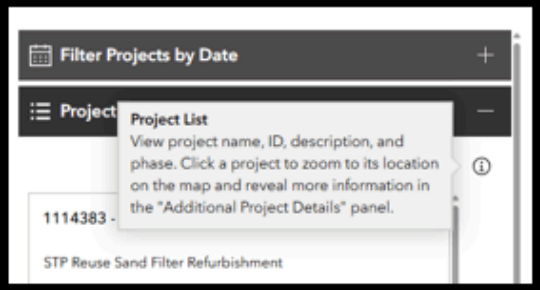
Web scene development

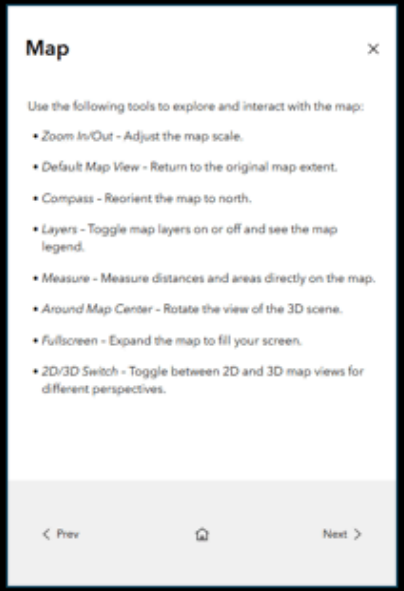
ExB app development

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

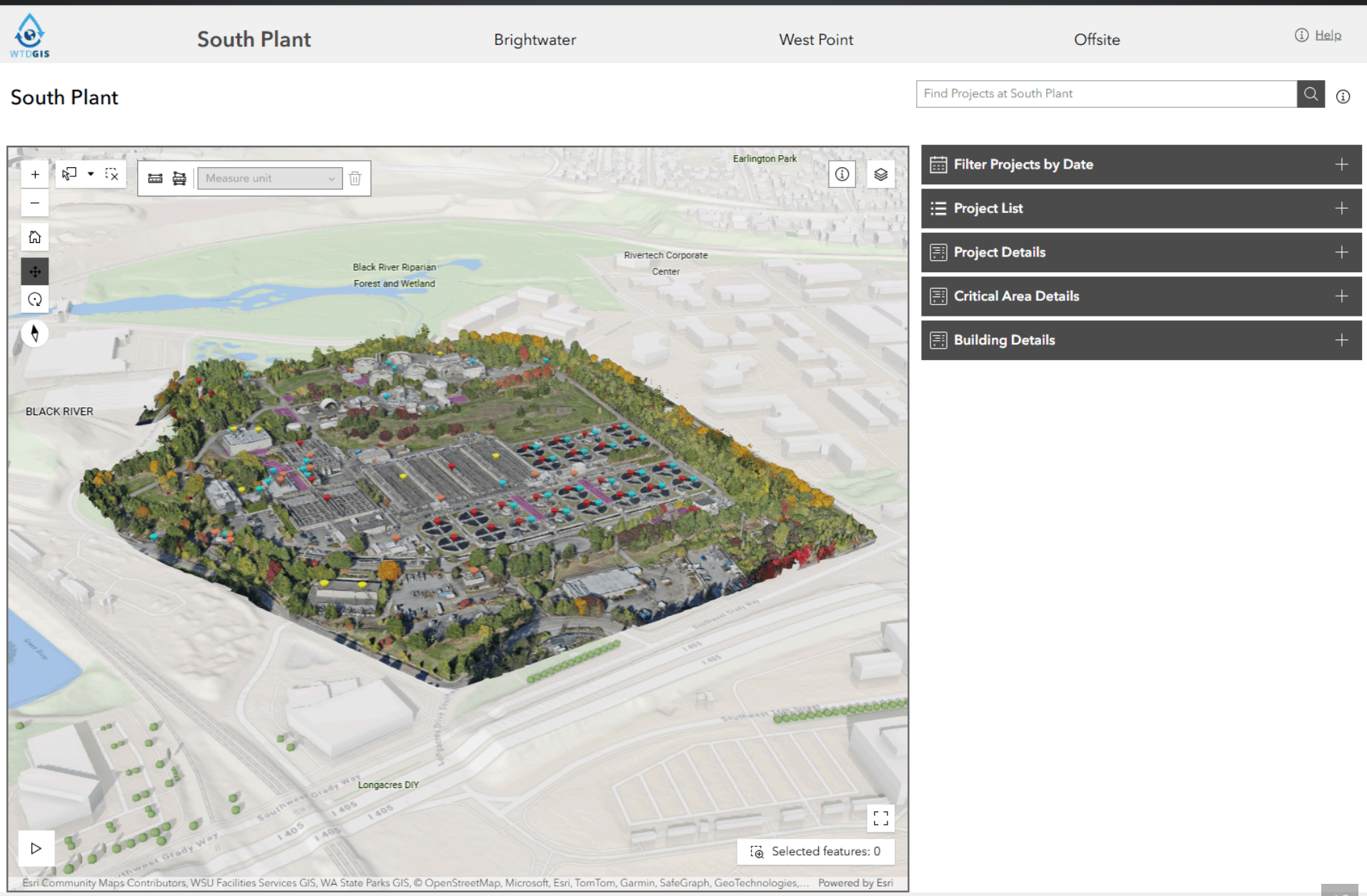
Other Resources in the App

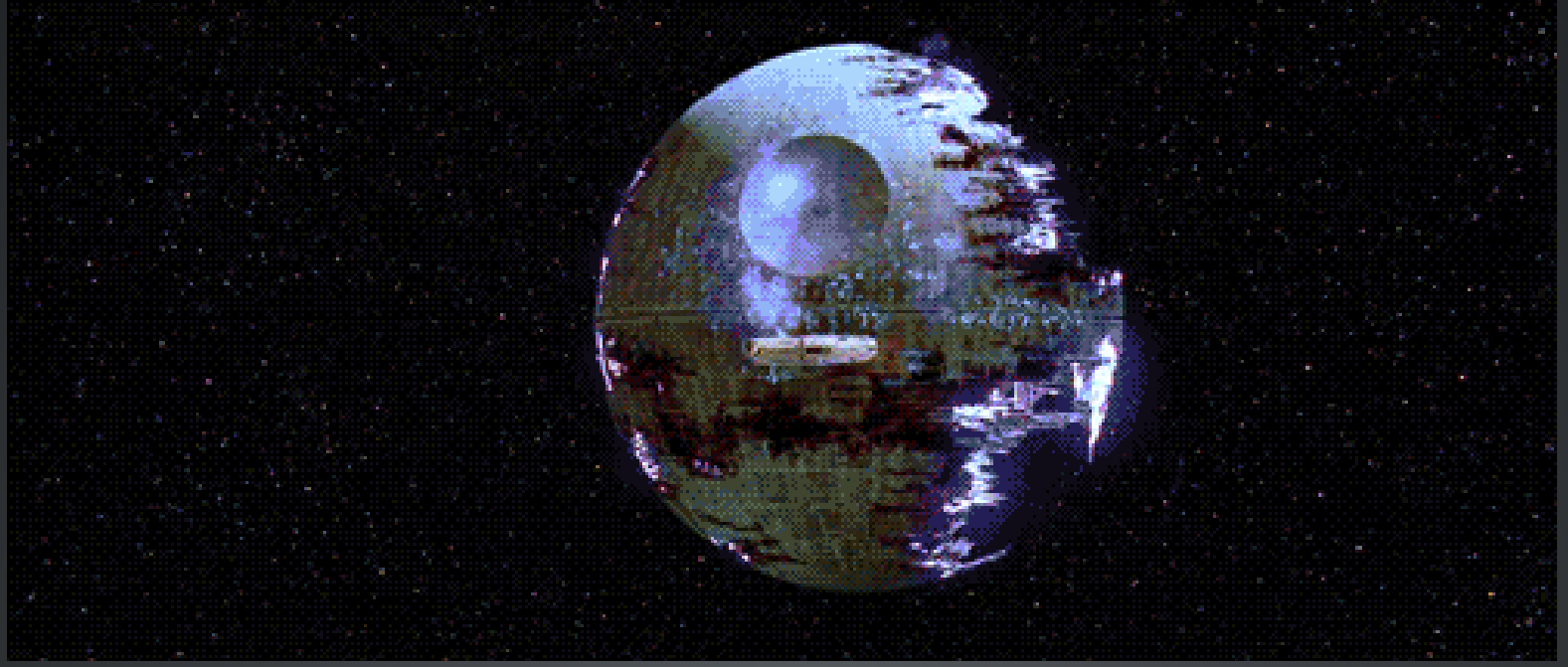
- A comprehensive help menu and tooltip buttons for most widgets
- Access to external resources from the footer
- A link to a Survey123 feedback form





WTD Facility Capital Project Viewer





END

for now

Thank You

jceleste@kingcounty.gov

jgeigel@kingcounty.gov

peter.keum@kingcounty.gov

peter.keum@kingcounty.gov