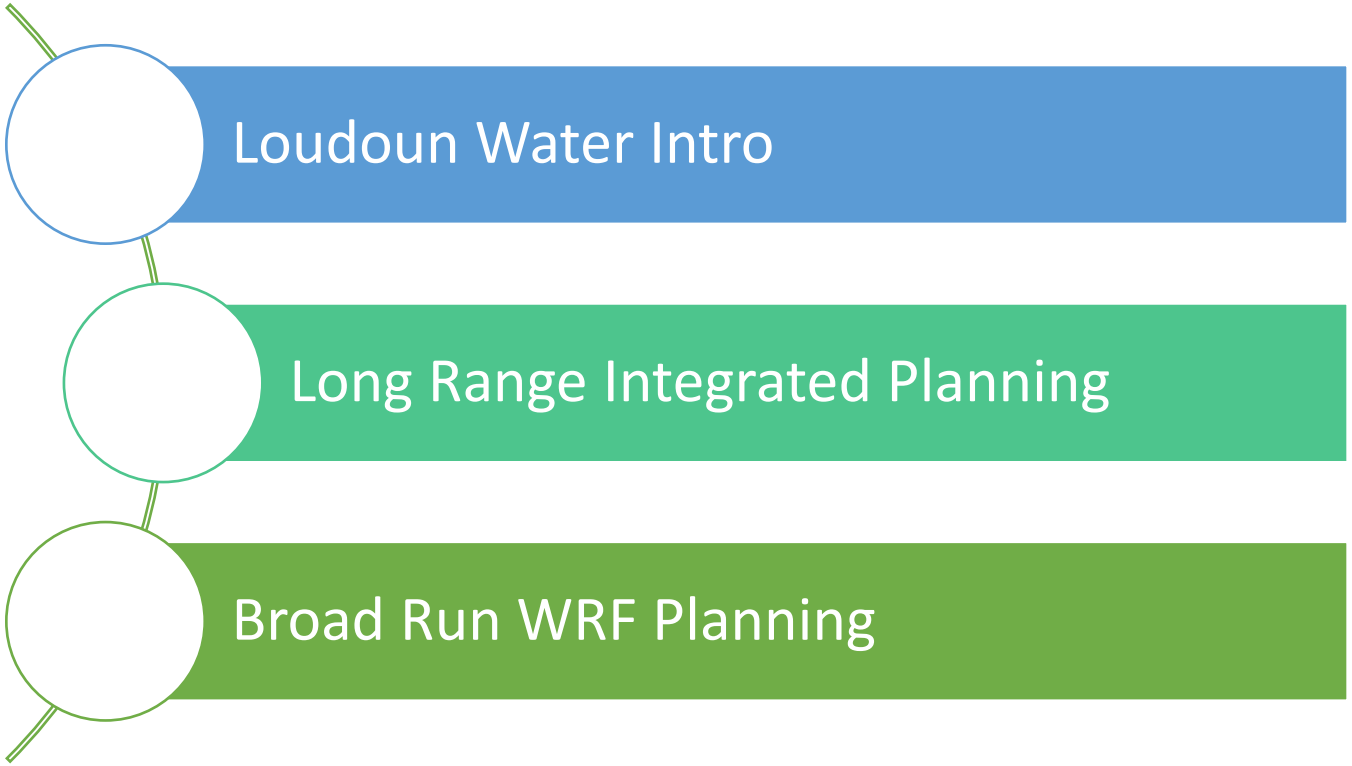
LOUDOUN WATER

# Strategic Planning

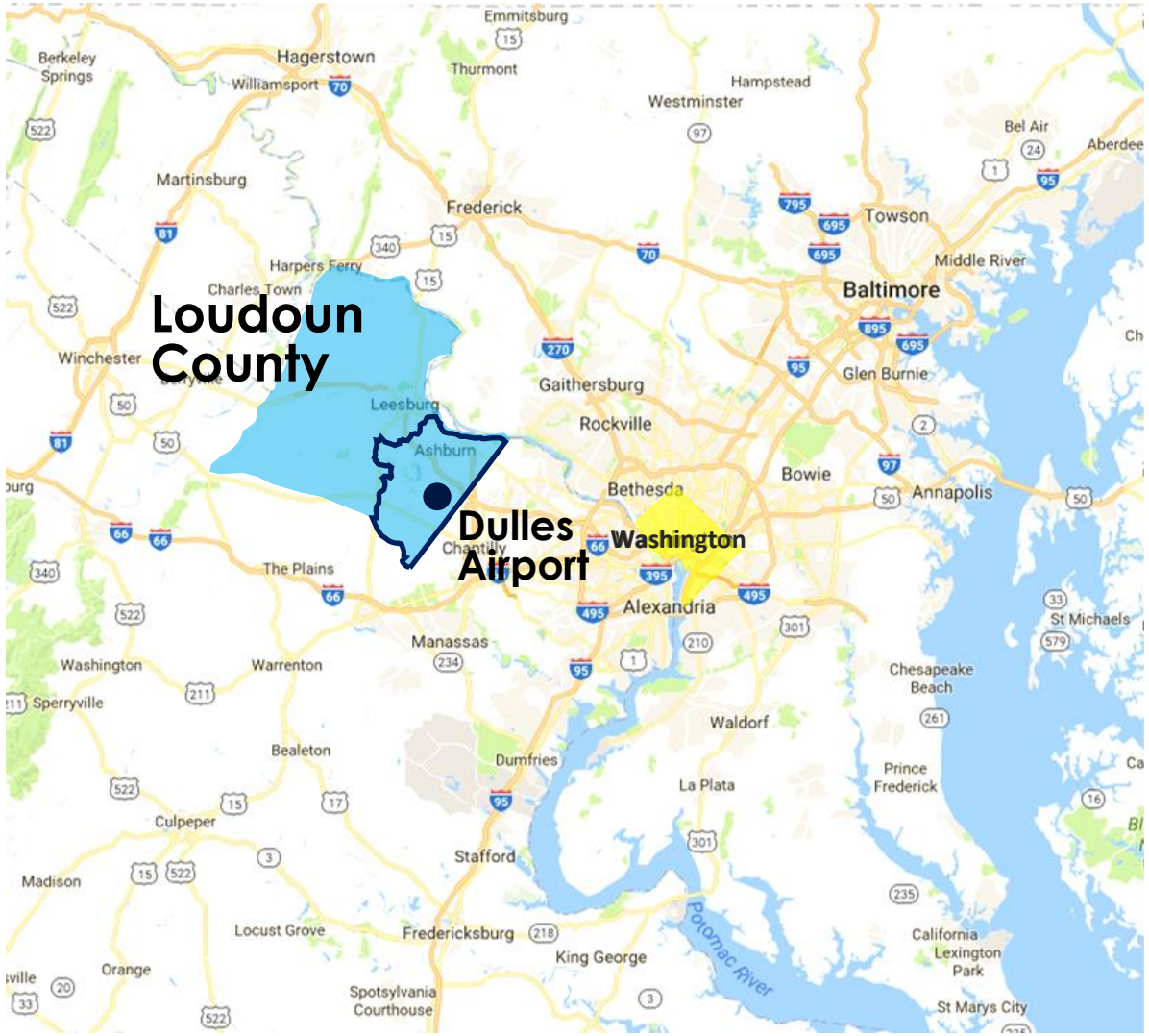
## Water Resources Technical Committee

November 10, 2022

# Agenda


Loudoun Water Intro
Long Range Integrated Planning
Broad Run WRF Planning

# Loudoun Water - Loudoun Co., VA




## Population (County)

2020

425,000

## Customers (Loudoun Water)

2019

300,000
RESIDENTS

140,000
EMPLOYEES

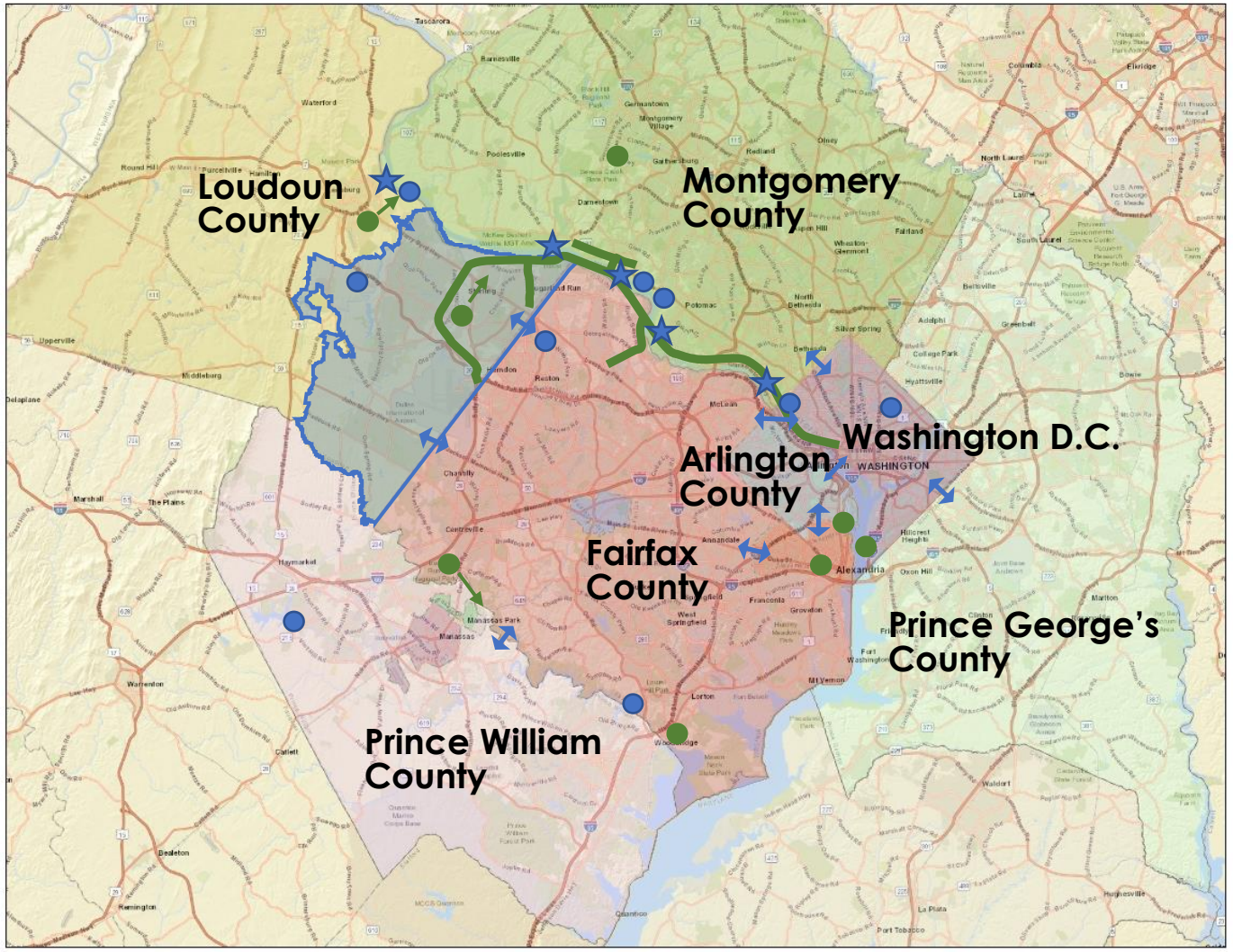
24 MGD
AVERAGE

43 MGD
MAXIMUM

1.5 MGD
AVERAGE

REUSE

# We are Connected

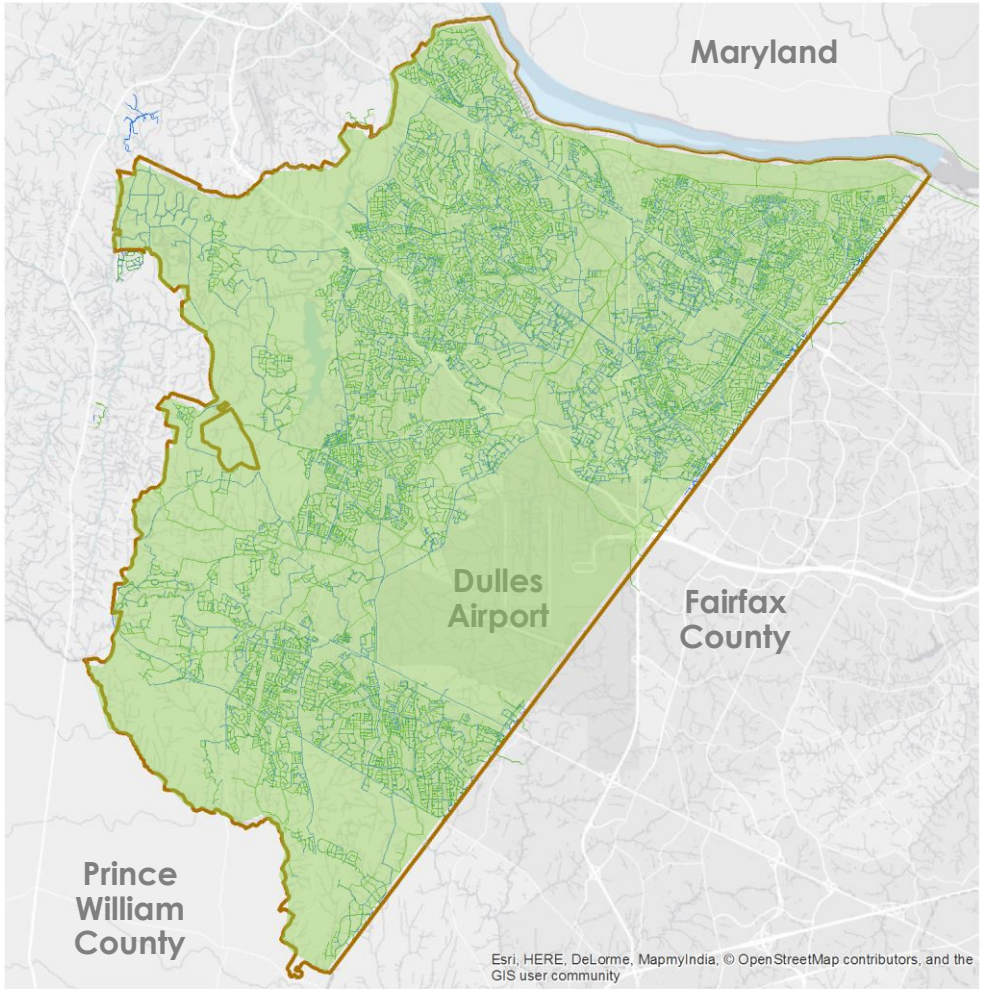



## Legend

- Loudoun Water Central Service Area
- Connection to Neighboring System
- Potomac River Raw Water Intake
- Water Treatment Facility
- Wastewater Treatment Facility
- Potomac Interceptor

# Central Systems (Suburban)

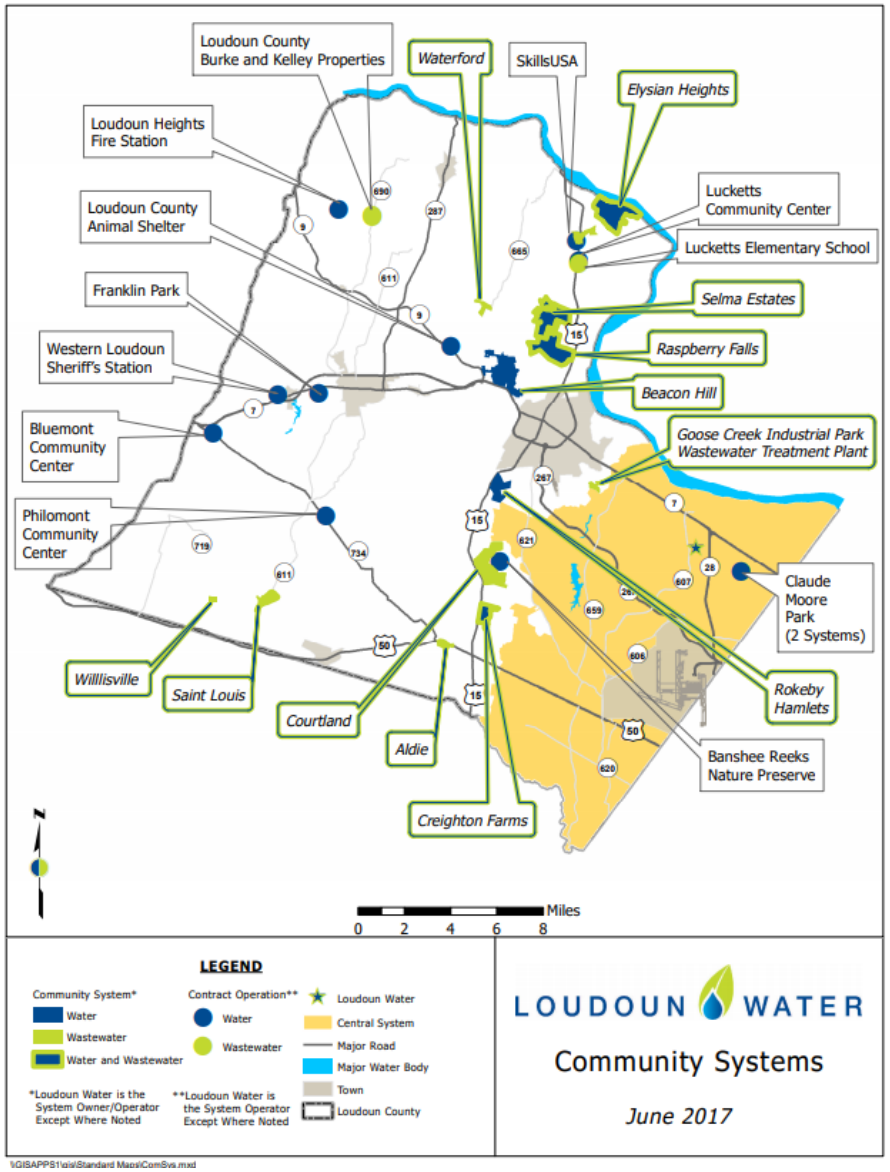
- Wastewater
  - Broad Run Water Reclamation Facility (10 MGD)
  - *Blue Plains & UOSA (contracts)*
  - 1,300 miles of sanitary sewer mains
  - 18 sewage pumping stations
- Water
  - Trap Rock Water Treatment Facility (20 MGD)
  - Goose Creek Water Treatment Facility (9 MGD)
  - *Fairfax Water (contract)*
  - 1,400 miles water mains
  - 5 booster pumping stations
  - 8 storage tanks (19 MG)
- Reclaimed Water
  - 1 pumping station (7 MGD)
  - 19 miles "purple" reuse mains
  - 2 storage tanks



# Community Systems (Rural)

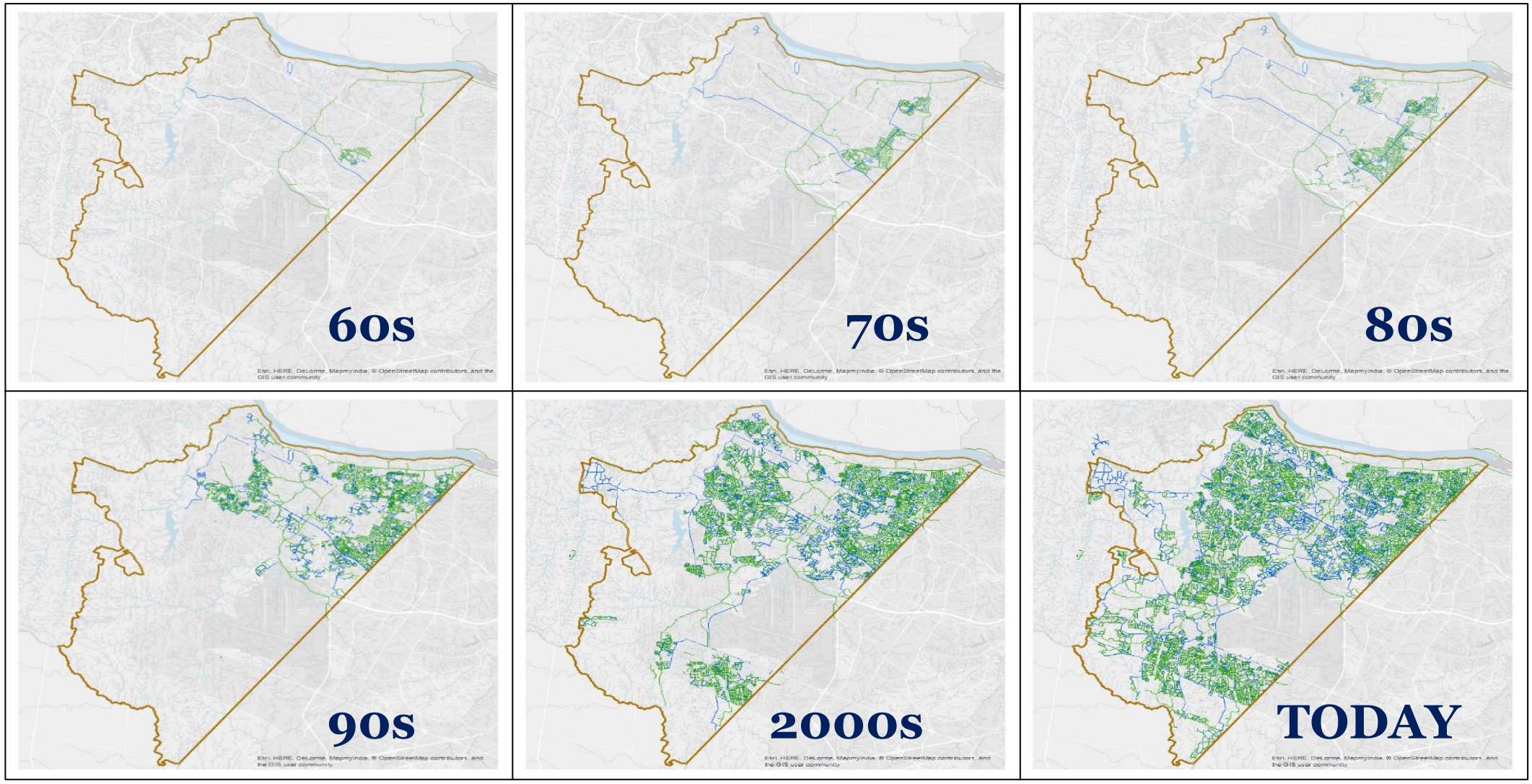
- Wastewater
  - 11 wastewater treatment plants
  - 36 miles of sanitary sewer mains
- Water
  - 16 water treatment plants
  - 48 miles of water mains

Treatment plants range in size from <1,000 GPD up to 250,000 GPD



# Long Range/Integrated Planning

# A Tale of Two Utilities



# Growth as Significant Driver

| | | |
|---|---|---|
| +1/3 | 2015-40 | **Population will increase by one-third,** bringing another 135,000 residents |
| +2/3 | 2015-40 | **Jobs will increase by two-thirds,** adding another 110,000 employees |
| | 2021 | **Washington DC Metro** (light rail) to connect Loudoun to nation's capital |
| | 2020 Data Centers | **20 million S.F.** in Loudoun **+ 5 million S.F.** currently under construction **+ millions S.F.** more in development |

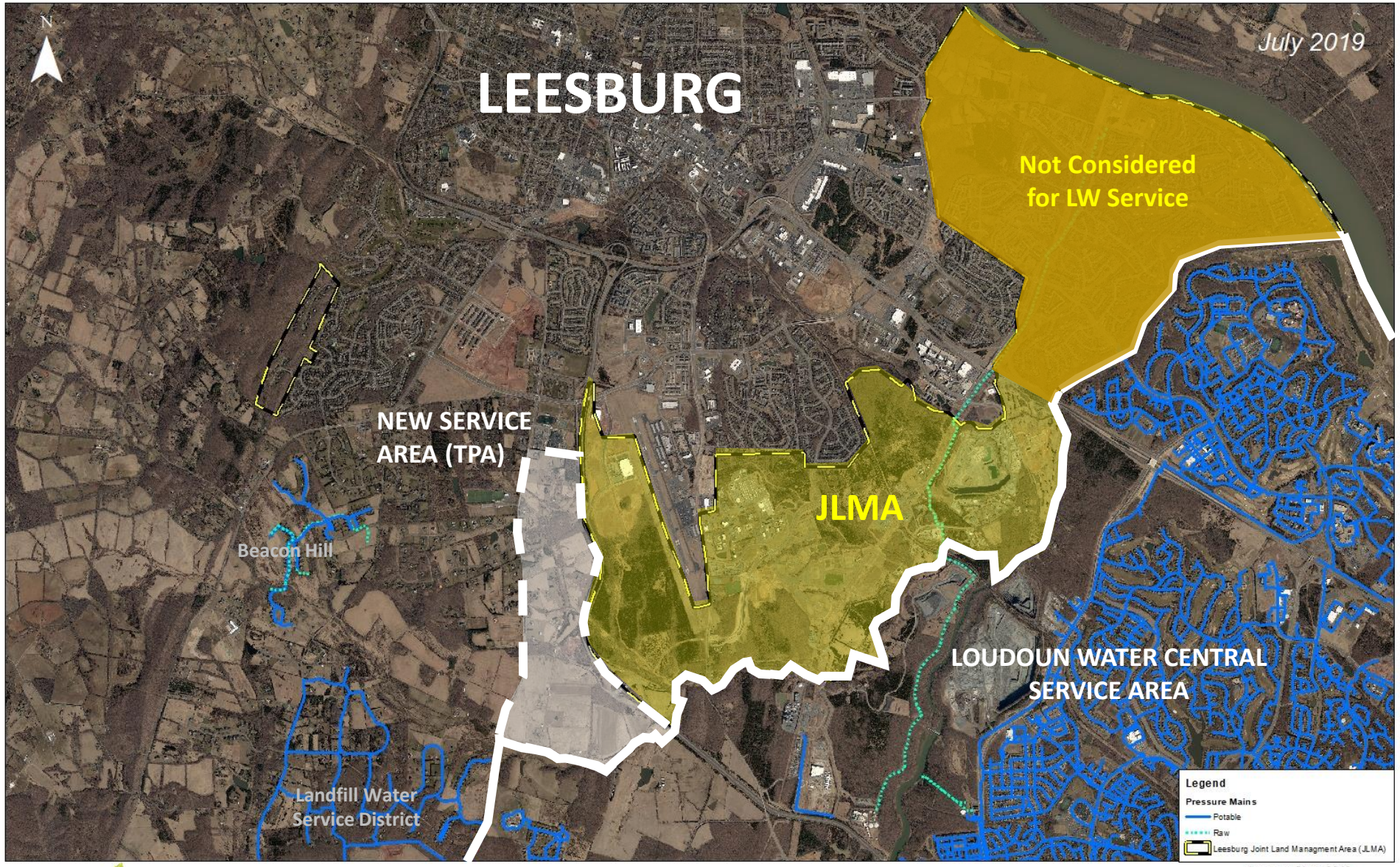
Loudoun Population

| | |
|---|---|
| 368,700 | 2015 |
| **424,000** | **2020** |
| 460,000 | 2025 |
| **480,000** | **2030** |
| 495,000 | 2035 |
| **502,000** | **2040** |
| 507,000 | 2045 |

# 2019 – Service Area Added

Approximately 8 sq. miles of JLMA/TPA

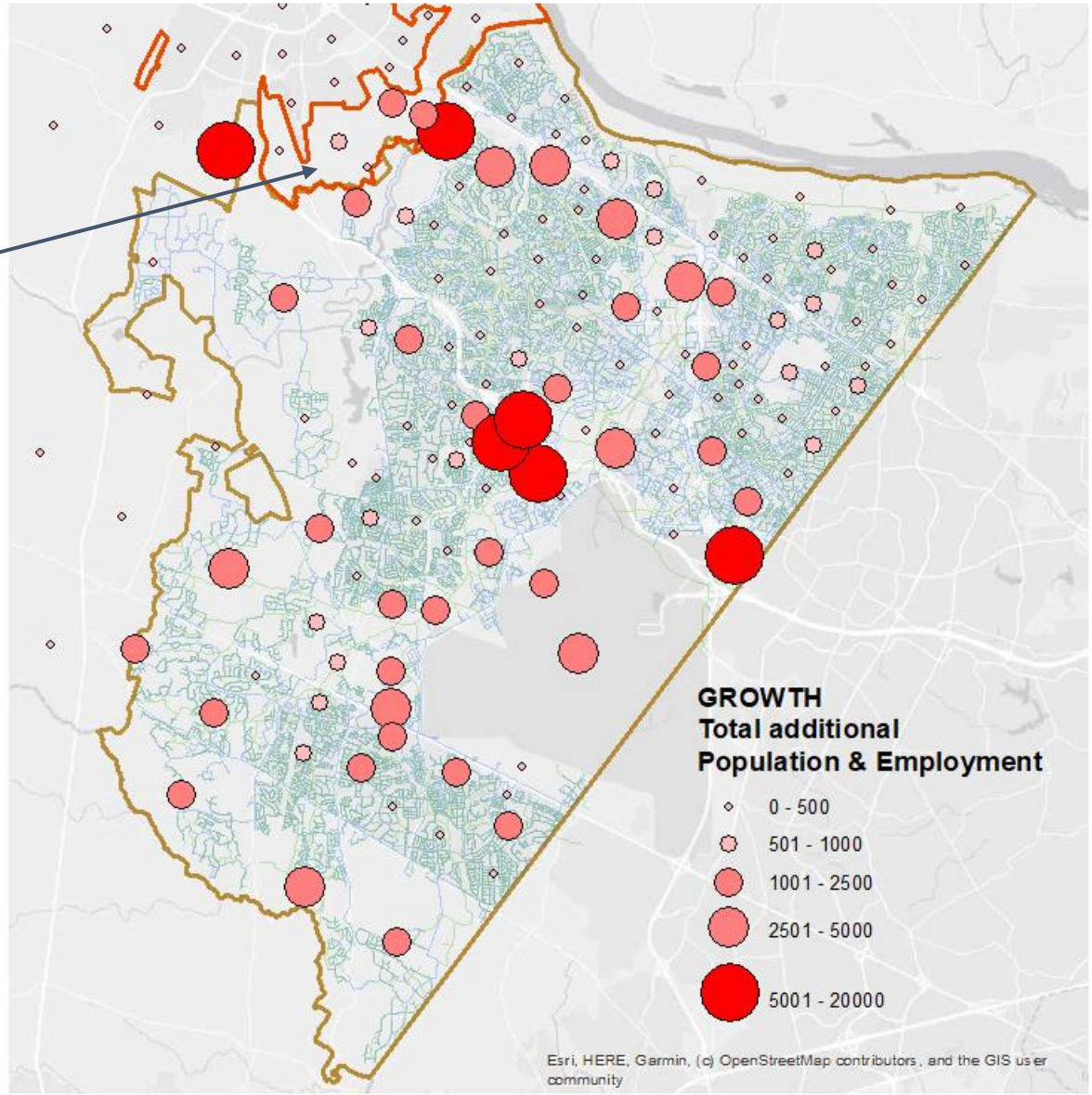
- Residential
- Commercial
- Data center
- Parks
- Rock quarries




LOUDOUN WATER

# Customer Growth

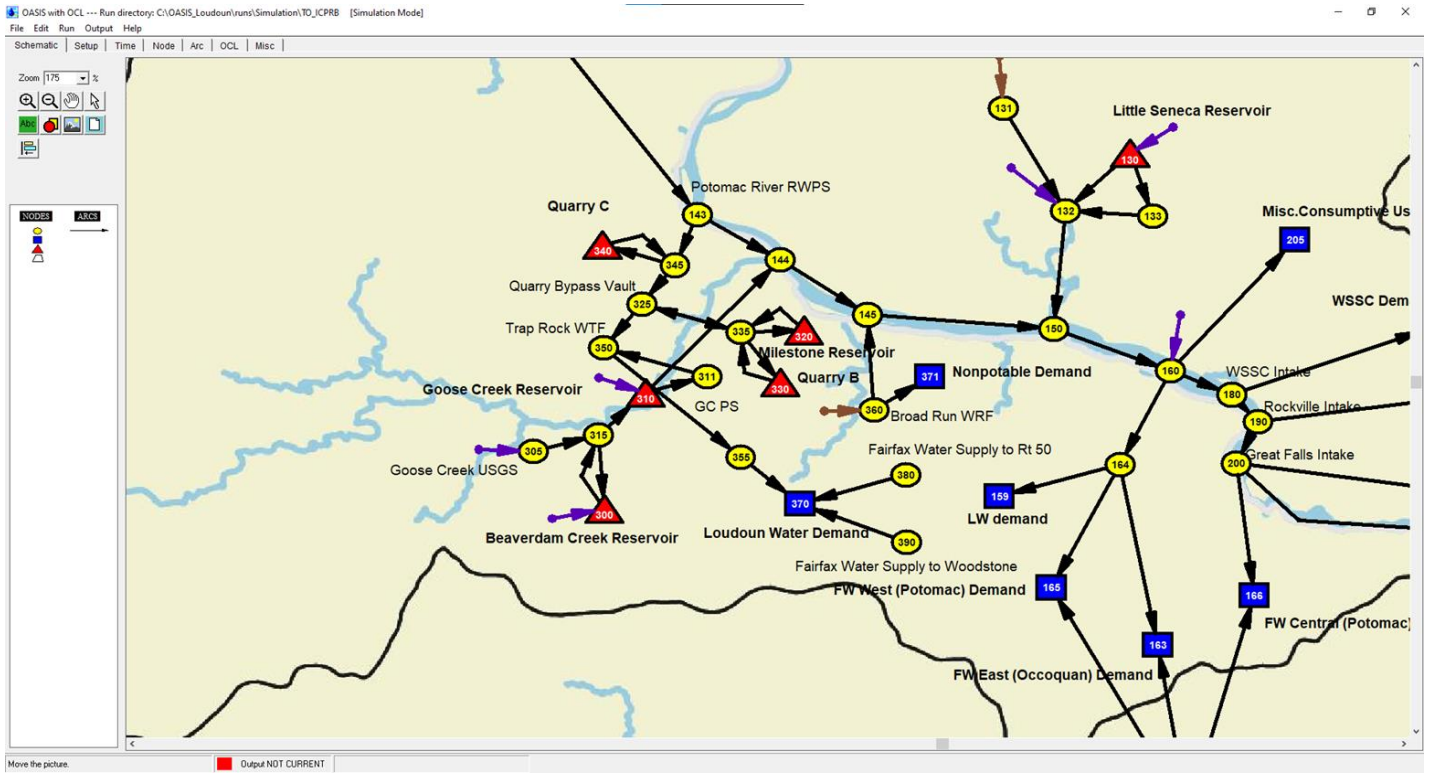
Service Area Additions




Loudoun County establishes service area and land use policies

Loudoun Water provides utilities to meet the resulting community growth needs

# Water Supply Planning

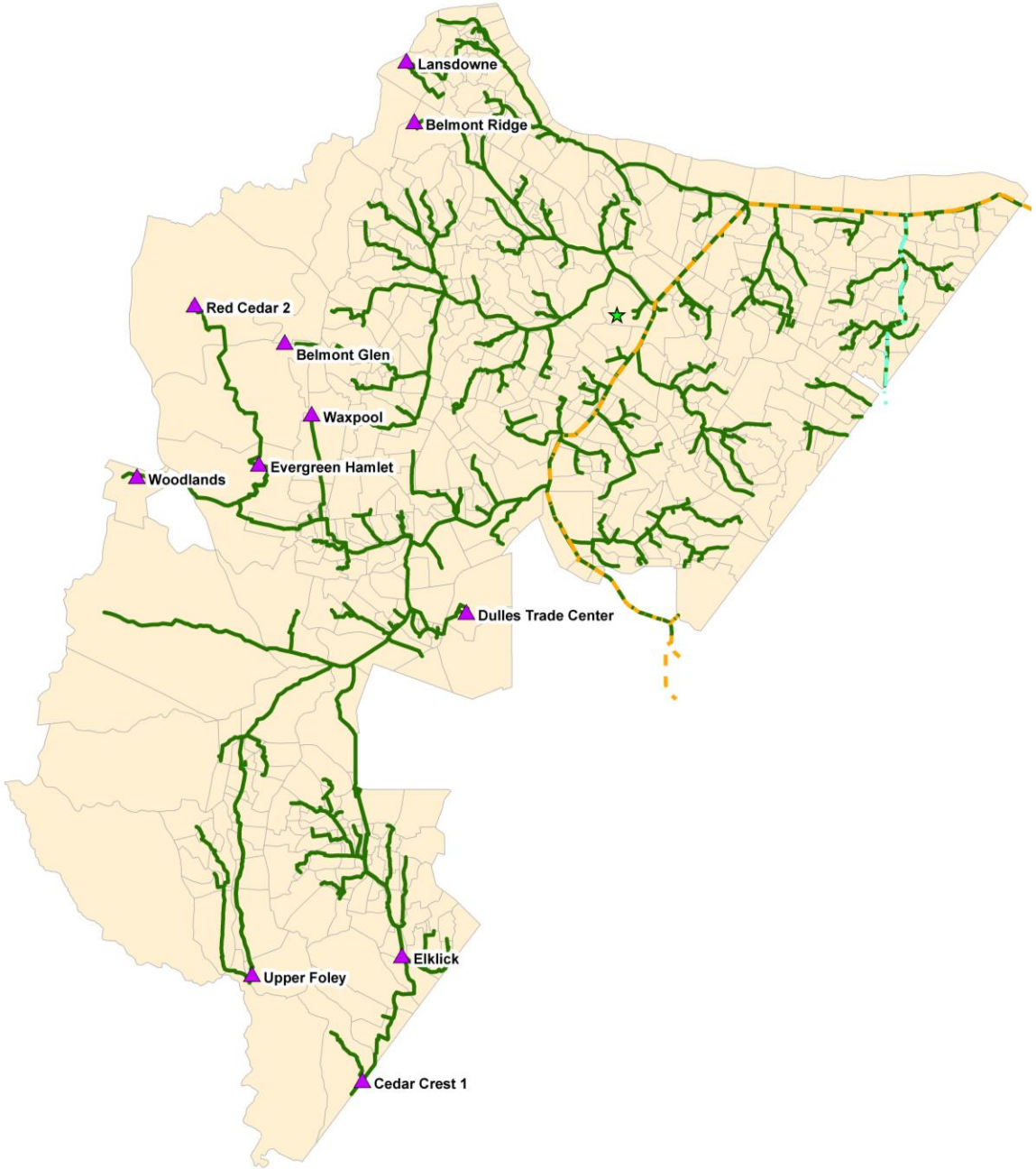



*OASIS Water Supply Modeling*

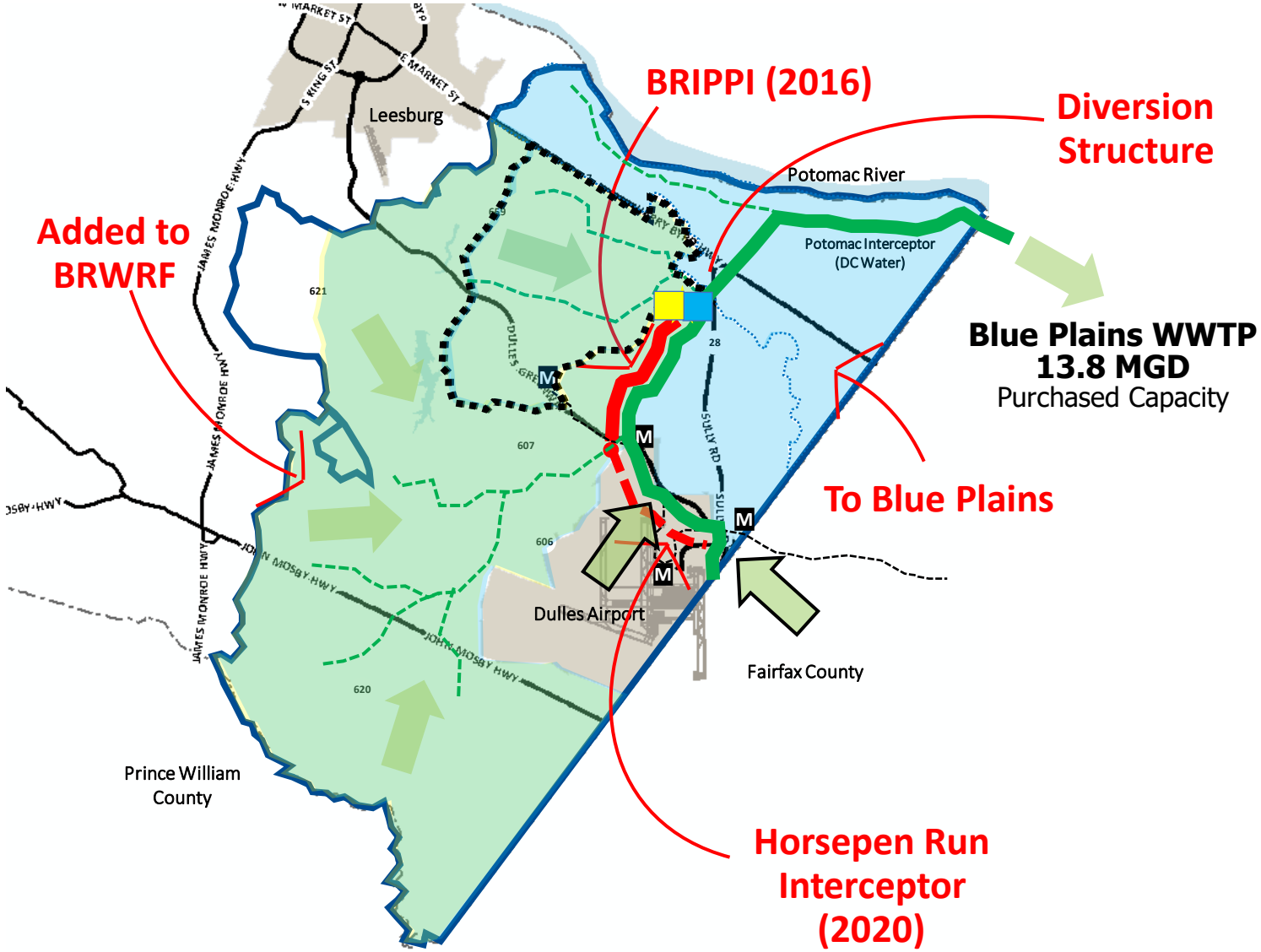
- Explore future scenarios
  - Potable reuse
  - Drought
  - Contamination
- Plan resiliency goals

# Collection System Master Planning

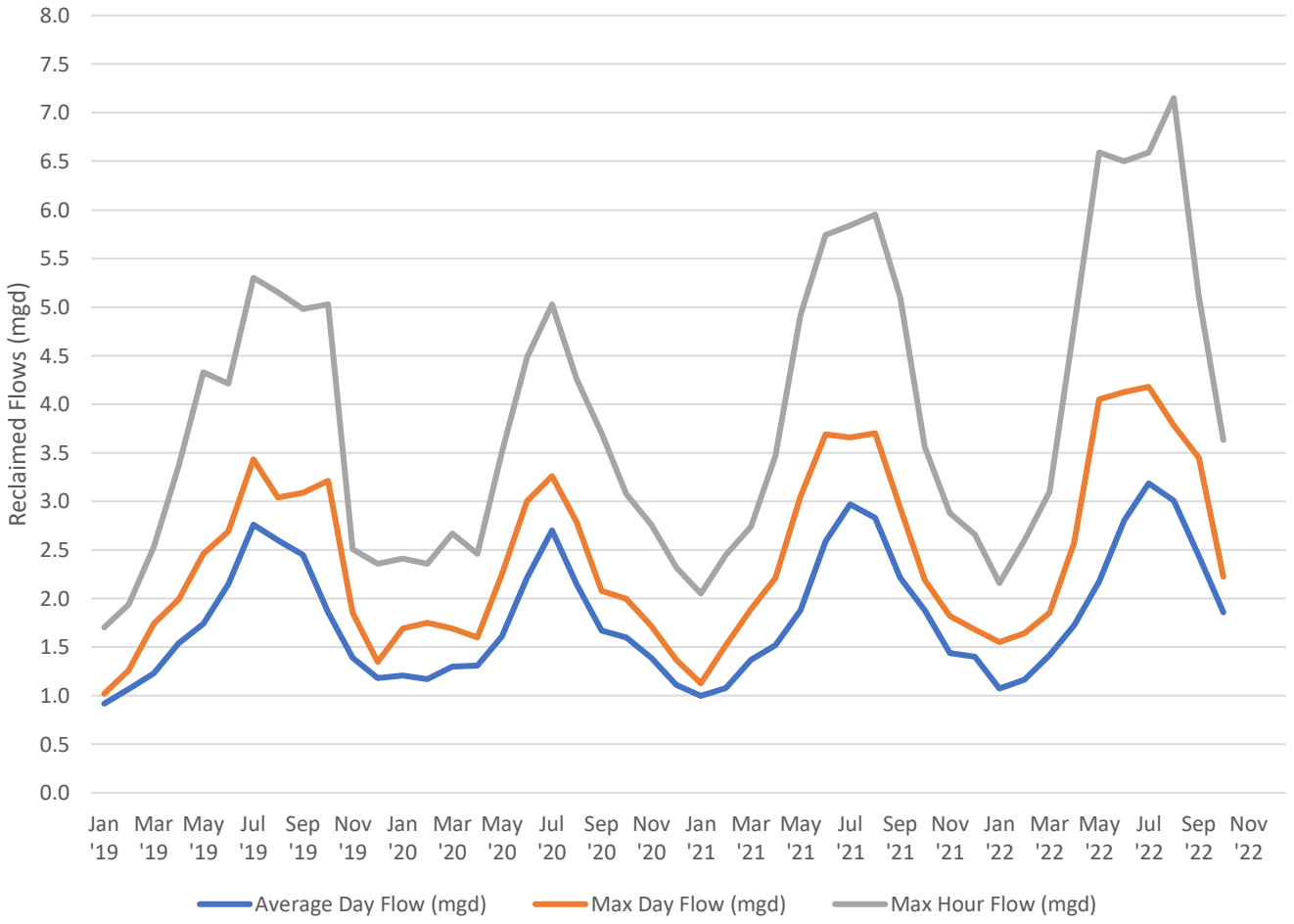
- Completed in 2016
- Will be updated in 2023
  - Flow Projections to 2040 (COG), extrapolated to 2070
  - Multiple Design Storms

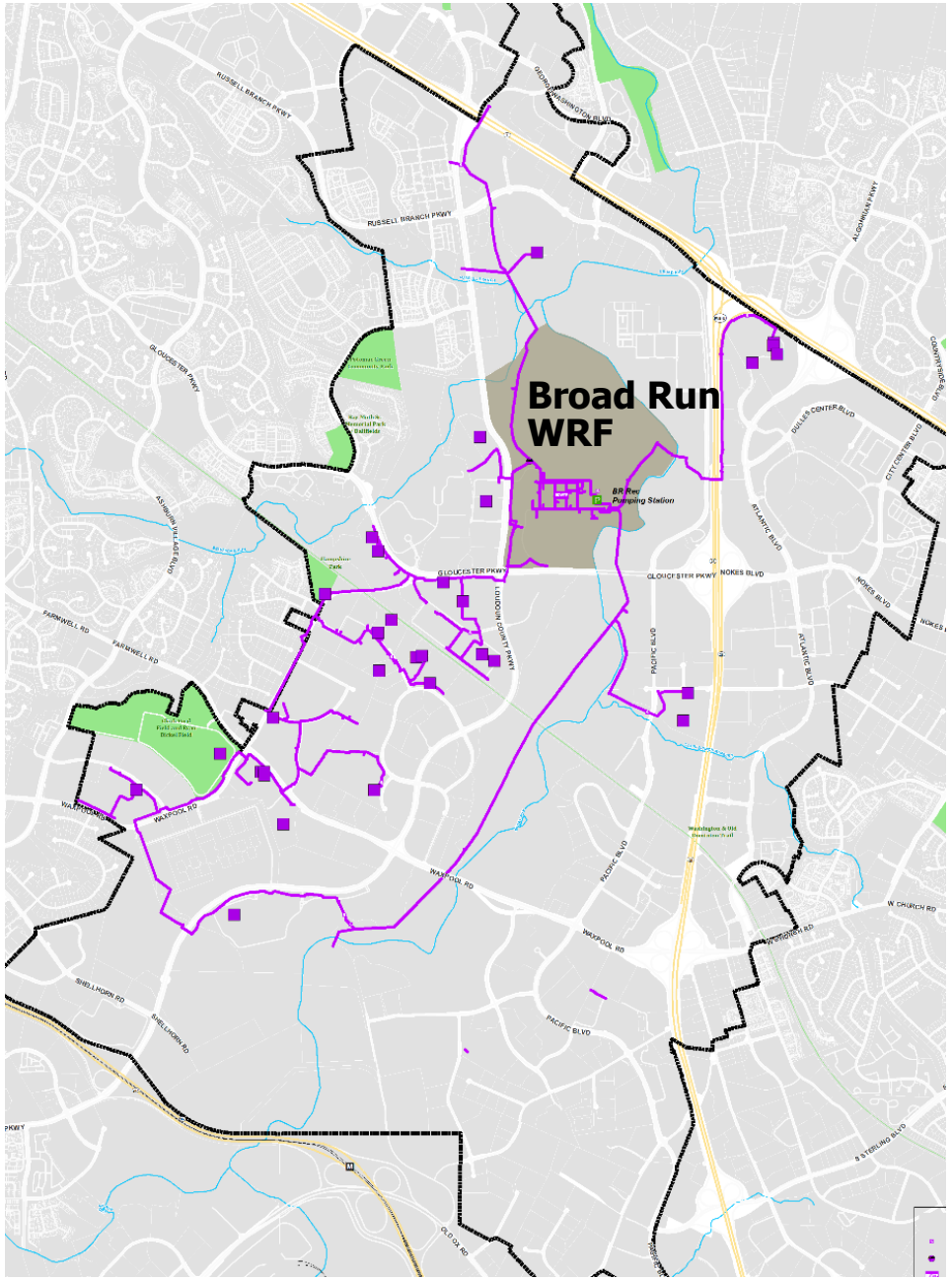


# Collection System Flexibility

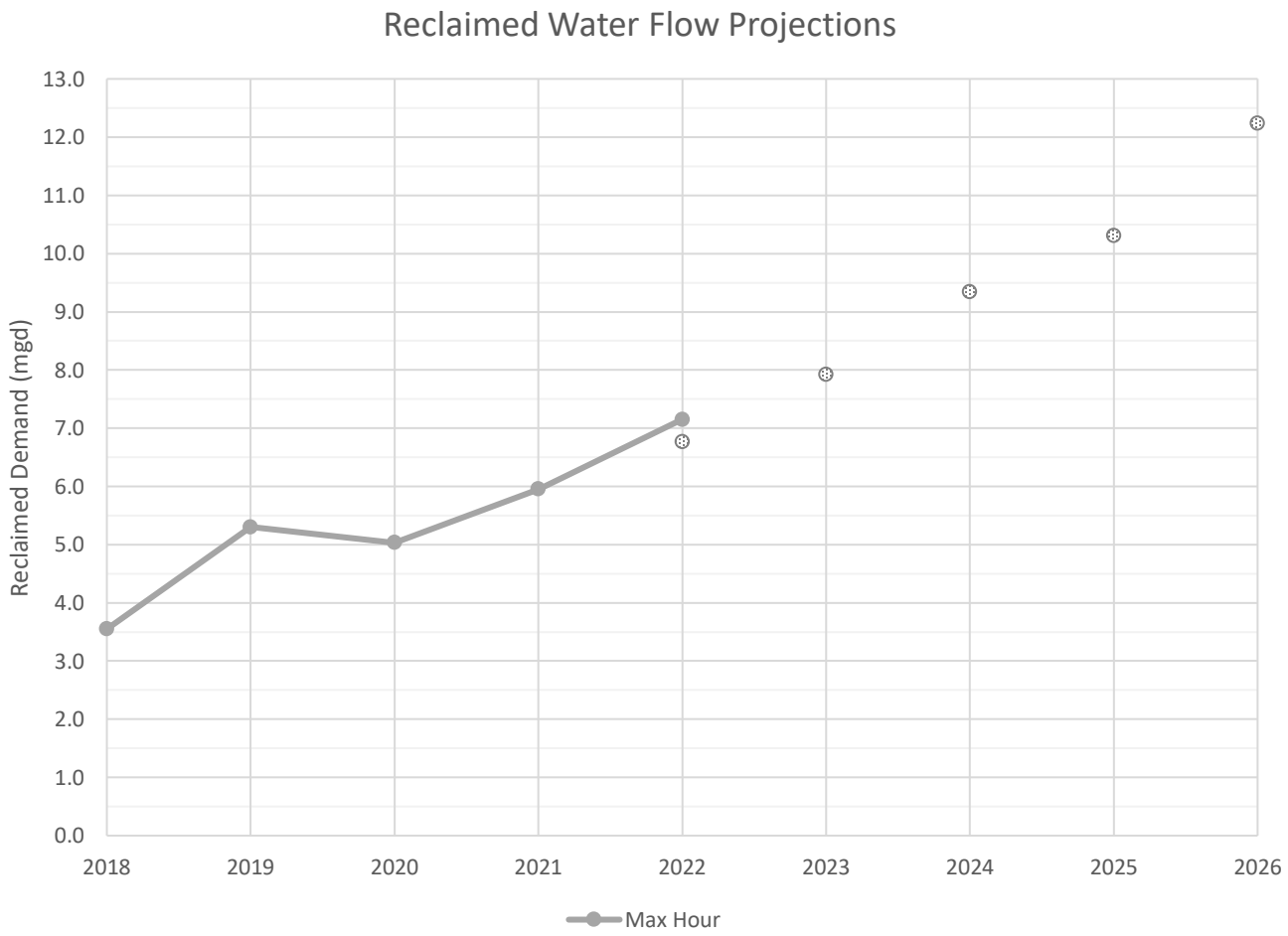


# Reclaimed Water



# Reclaimed Water Planning



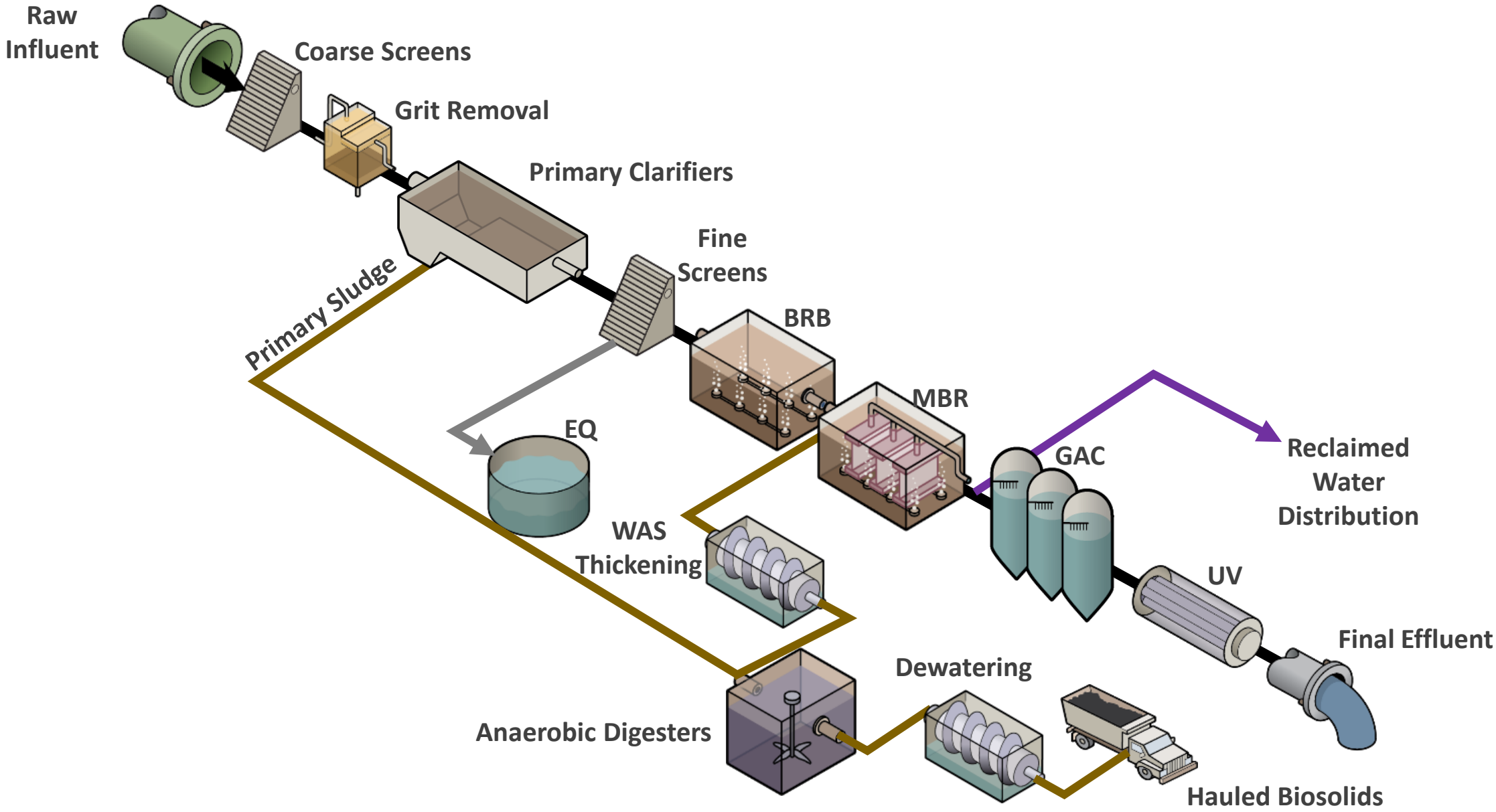

- How best to manage seasonal peak demands
- How to manage additional requests for reclaimed water
- Do we continue to improve system
  - Elevated storage
  - Surge management
- How to manage permitted capacity with BRWRF expansions

# Broad Run WRF Planning

# Dulles Area Watershed

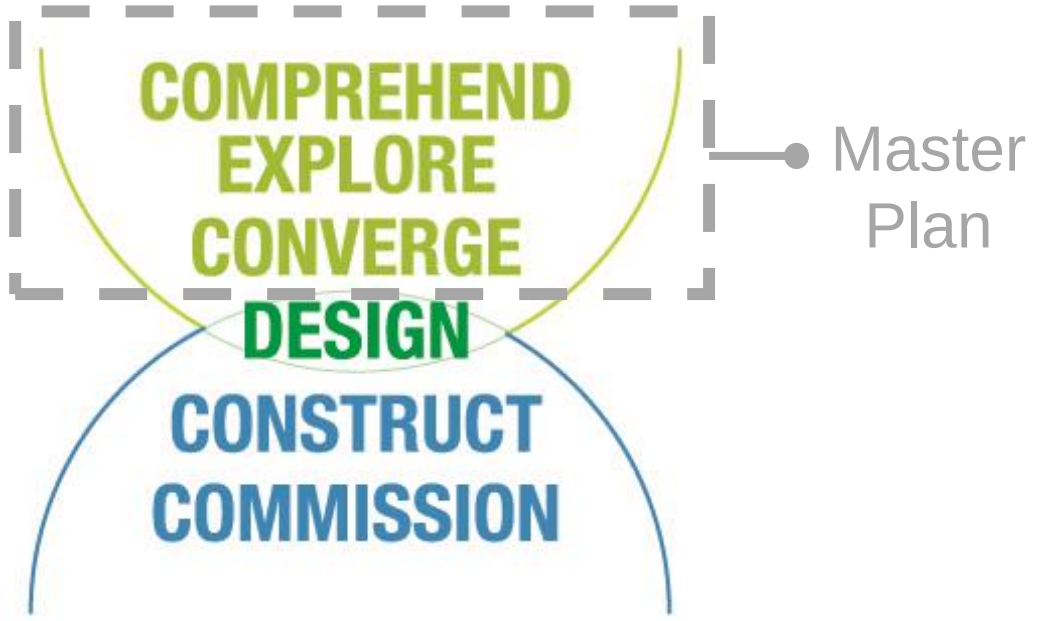
# Broad Run WRF Treatment Requirements

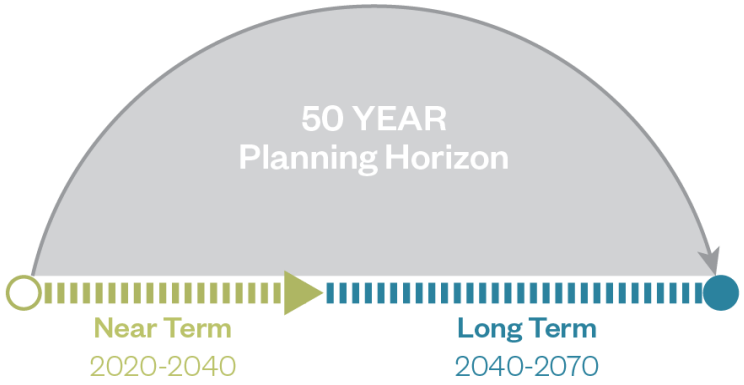
| Water Quality Parameter | Monthly Average |
|---|---|
| Chemical Oxygen Demand (COD) | 10 mg/L |
| Total Suspended Solids (TSS) | 1.0 mg/L |
| Total Kjeldahl Nitrogen (TKN = DON + $NH_3$) | 1.0 mg/L |
| Total Nitrogen (TN) *Annual Concentration Limit* | *4 mg/L* |
| Total Phosphorus (TP) | 0.1 mg/L |
| Turbidity | 0.5 NTU |
| E. Coli | Less than 2 per 100 mL |


Raw Influent
Coarse Screens
Grit Removal
Primary Clarifiers
Fine Screens
BRB
MBR
GAC
Reclaimed Water Distribution
UV
Final Effluent
Primary Sludge
EQ
WAS Thickening
Dewatering
Anaerobic Digesters
Hauled Biosolids

# BRWRF Master Plan

- Long term framework (50 years)
- Supporting short term projects
- Clear direction for a continuous process



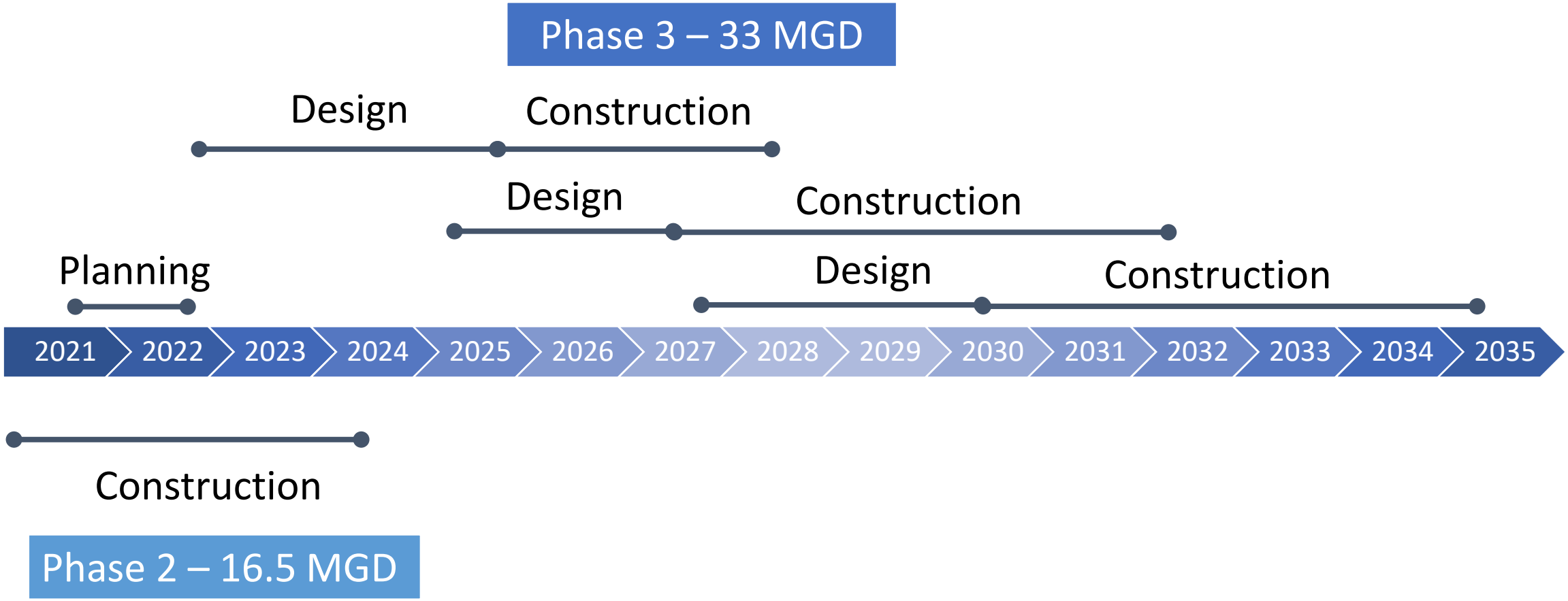




# Growth of BRWRF

## *Adaptive Planning*

- *Individual Modifications*
- *16.5 MGD Expansion*
- *Phase 3 Options*
- *Long Term Planning*

# Timeline


Phase 3 – 33 MGD
Design
Construction
Design
Construction
Planning
Design
Construction
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
Construction
Phase 2 – 16.5 MGD

# Impact of BRWRF Waste Load Allocation (WLA)

*Example of WLA Equivalent Concentrations*

| BRWRF Effluent Flow (mgd) | Equivalent TN (mg/L) | Equivalent TP (mg/L) |
|---|---|---|
| **11.0** | 4.00 | 0.100 |
| **16.5** | 2.67 | 0.067 |
| **22.0** | 2.00 | 0.050 |
| **30.0** | 1.46 | 0.036 |
| **40.0** | 1.10 | 0.027 |

*Unprecedented Permitted Treatment Levels*

**Regulatory Limits of Technology**

TN – 3.0 mg/L
TP – 0.18 mg/L

# Questions?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LOUDOUN WATER

# Key Biosolids Decisions Facing BRWRF

## Piloted Thermal Hydrolysis

*Recalcitrant COD, N, and P impact mainstream permit performance*

## Thermal Drying

*Advance to Class A Pellet with Expanded Capacity*

*PFAS*

*Regulatory Uncertainty*

*South Cary WRF (Cary, NC)*