



Central Ohio Regional Water Study: Perry County



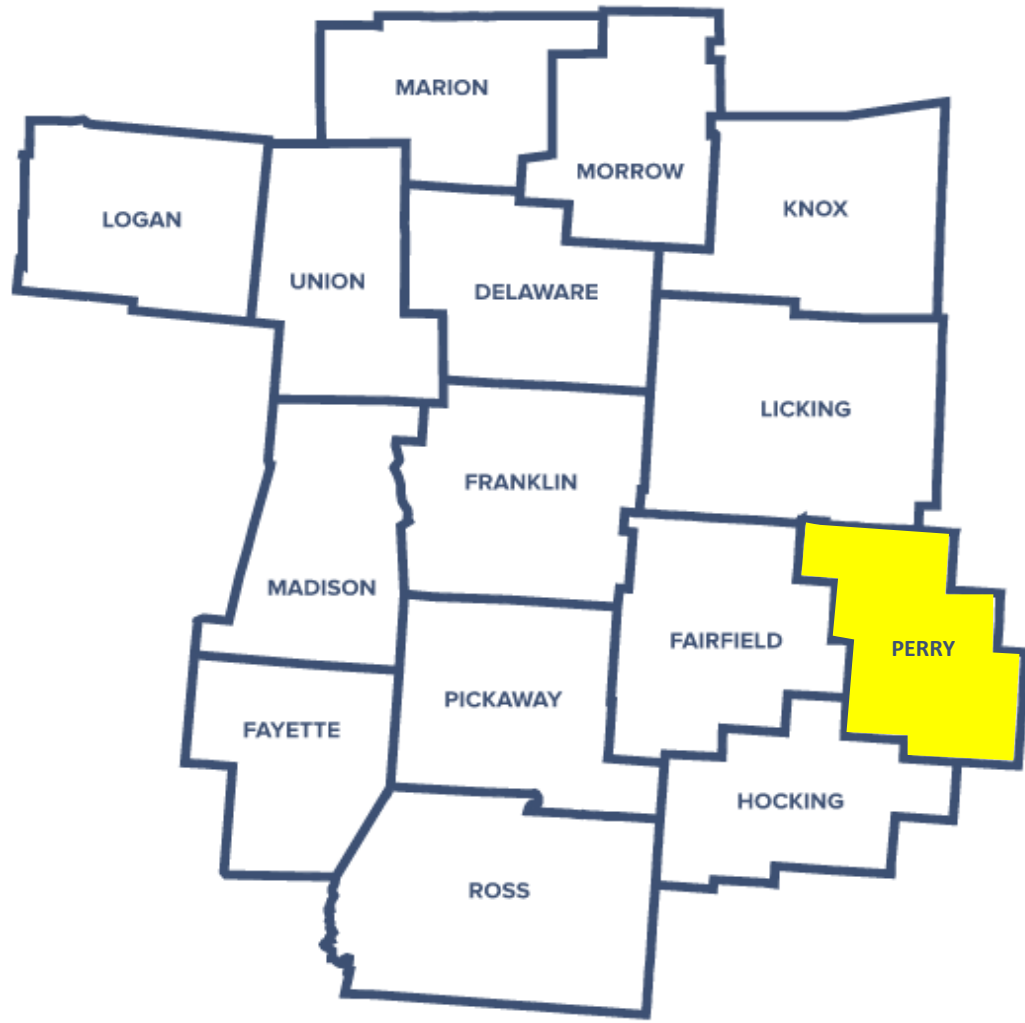
March 1, 2025





Agenda

- Introduction
- Current Conditions
- Future Conditions
- Needs Analysis
- Resource Gaps and Potential Project Options
- Areas of Opportunity
- Water Quality





Introduction



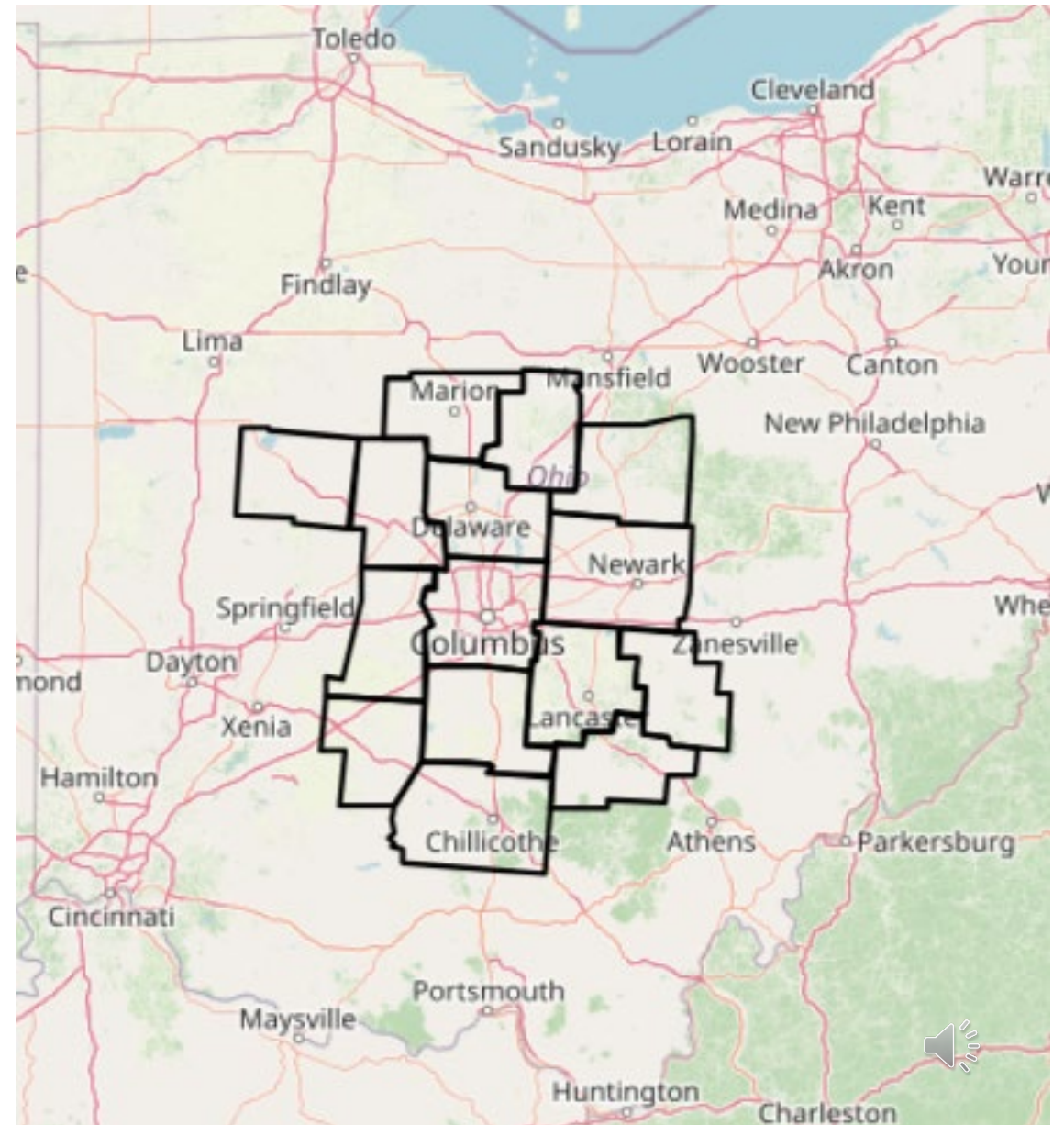
Central Ohio Regional Water Study

Overview

Integrated water resources and infrastructure model

15-county area

Goal: Identify opportunities and gaps in system's ability to meet local and regional water needs under potential future conditions (2030, 2040, 2050)





Project Objectives



Improve, Maintain and Optimize Resources While Planning for Growth



Identify Opportunities for Collaboration and Regionalization



Maximize Funding Impacts through Sustainable Infrastructure Improvements



Identify Future Needs



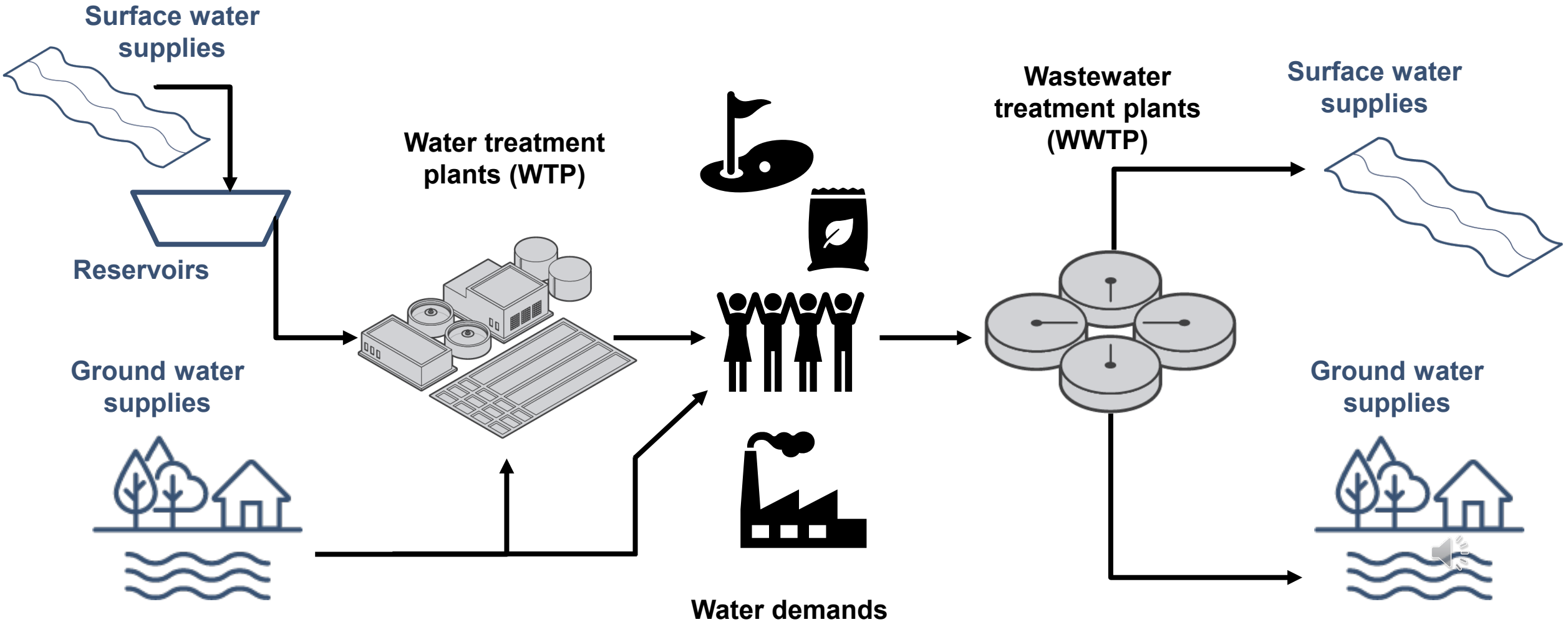


Current Conditions



Central Ohio Regional Water Study

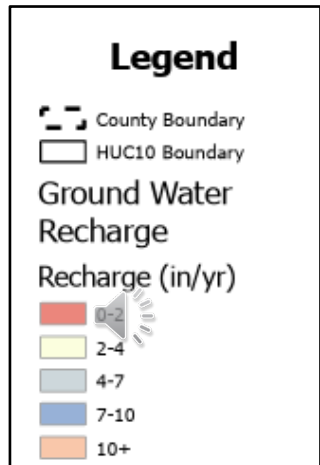
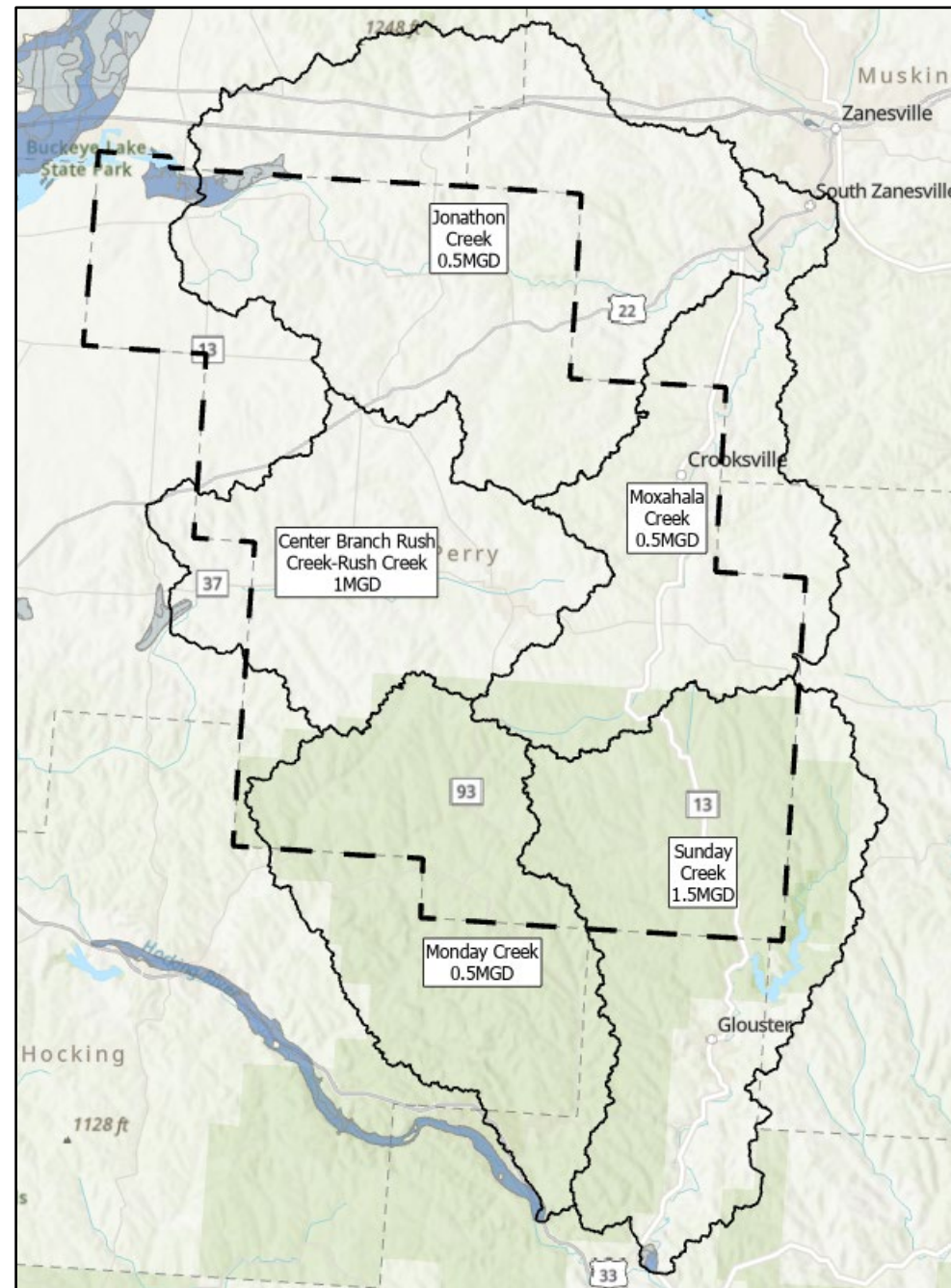
Model Components



Perry County

Ground Water Availability

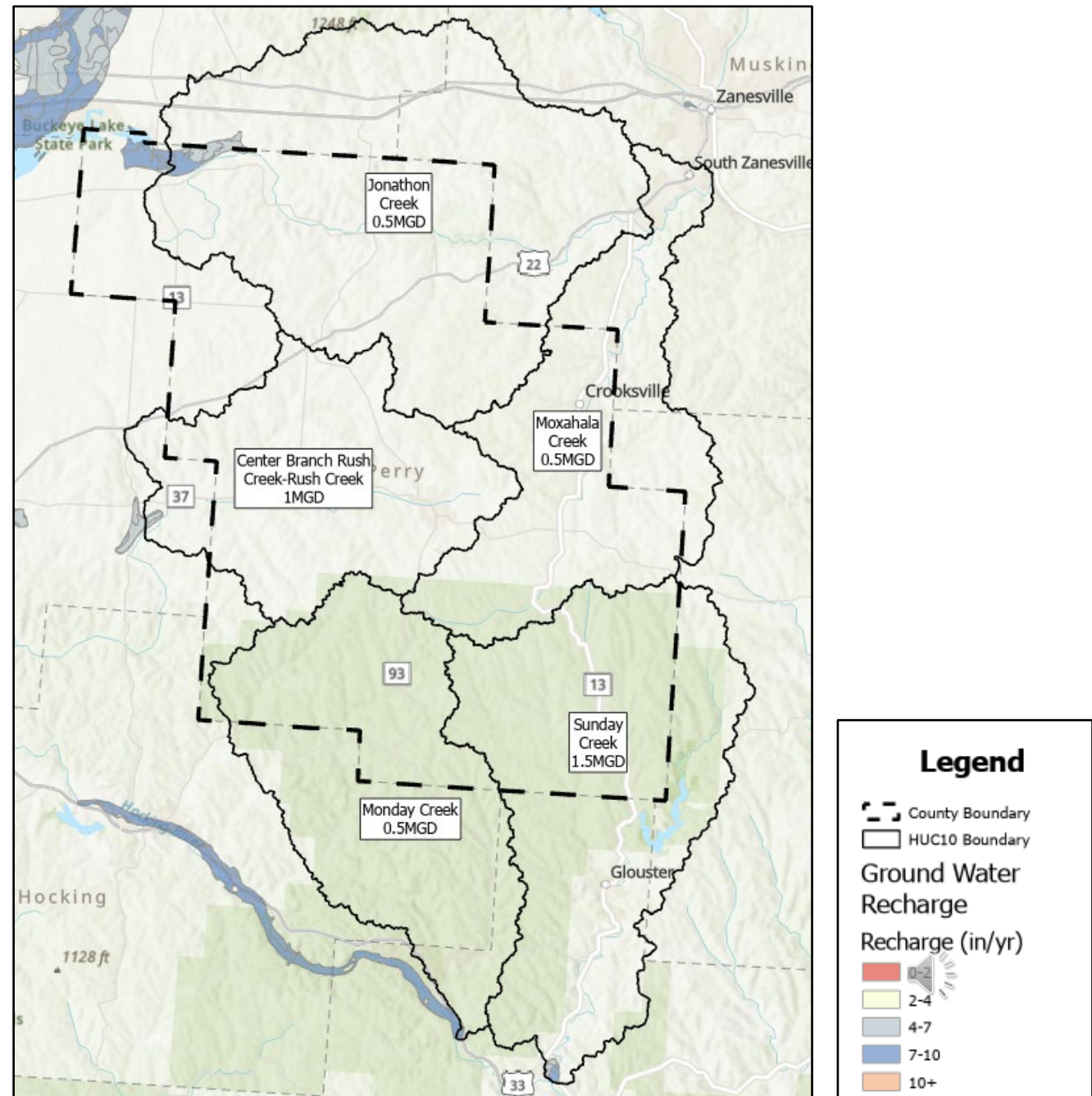
- Ground water supplies within or nearby Perry County range from 0.5 to 1.5 million gallons per day of availability per HUC10
- Total of 4 MGD in Perry County



Perry County

Ground Water Availability

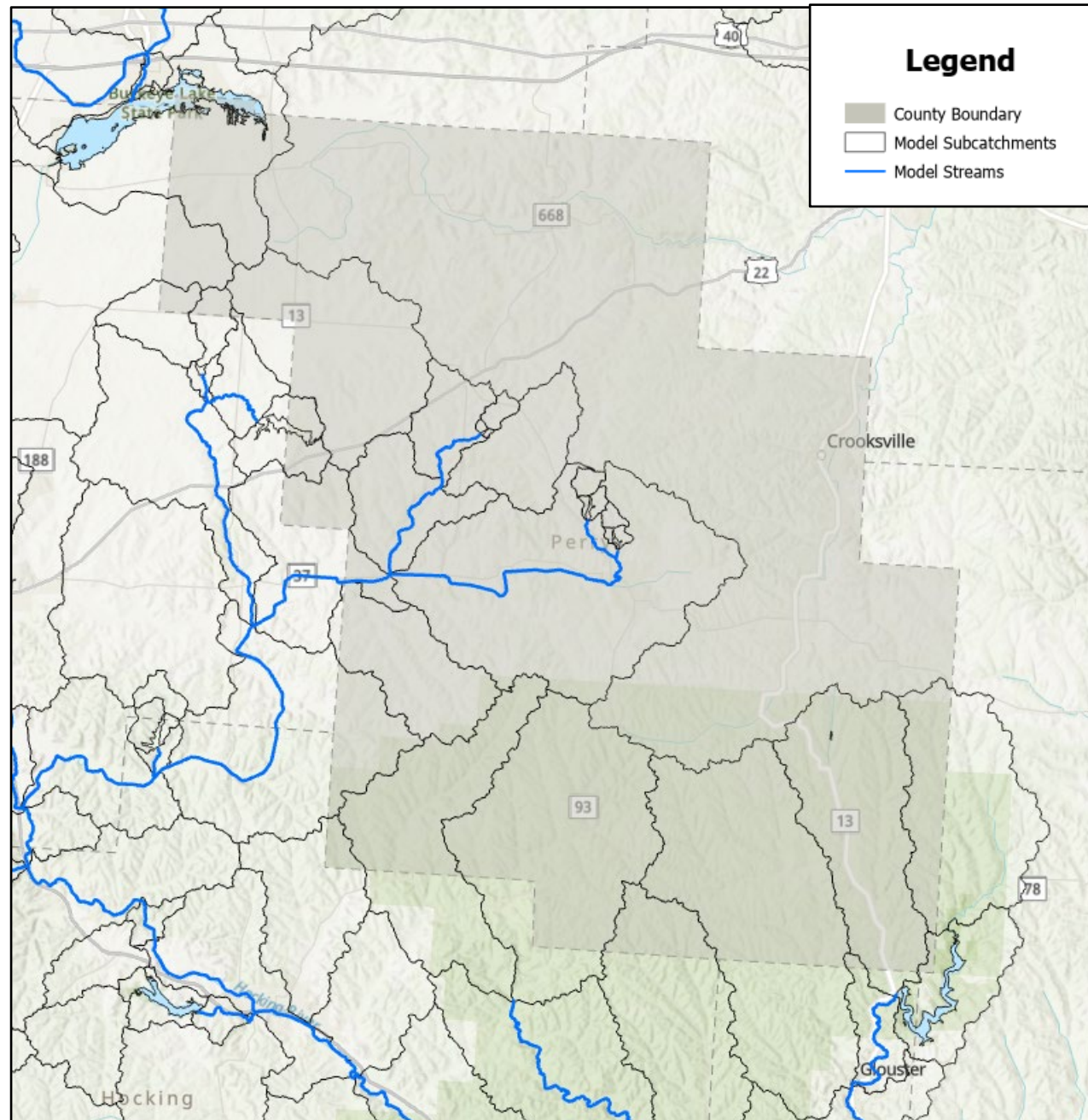
- Each HUC10 has unique aquifer characteristics that determine ground water availability.
- Eagon and Associates assisted with the ground water analysis and provided information regarding ground water resources and conditions throughout the study area.



Perry County

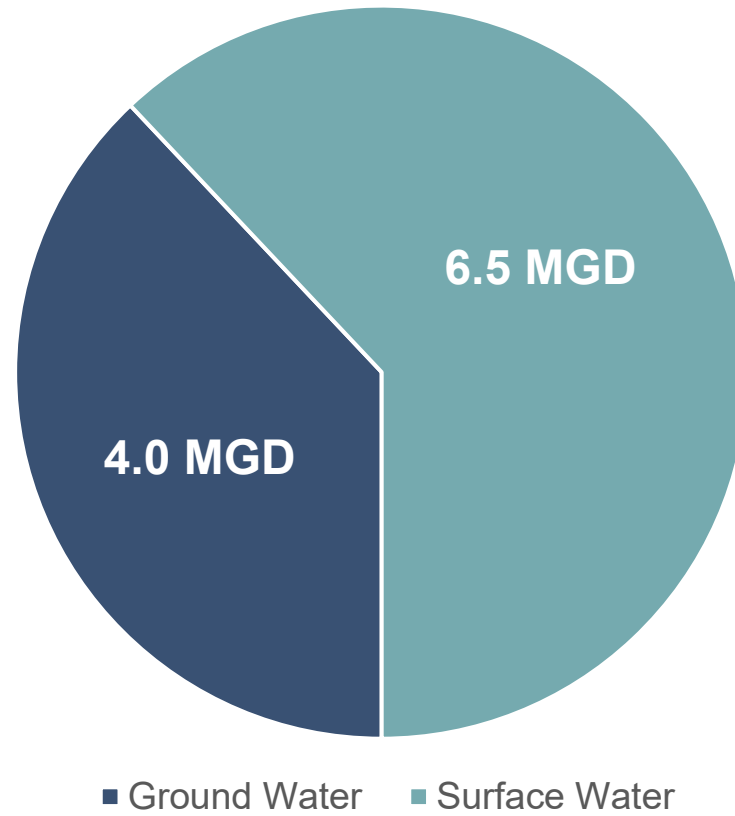
Surface Water Availability

- Surface Water supplies in Perry County total to roughly 6.5 MGD for the minimum monthly average

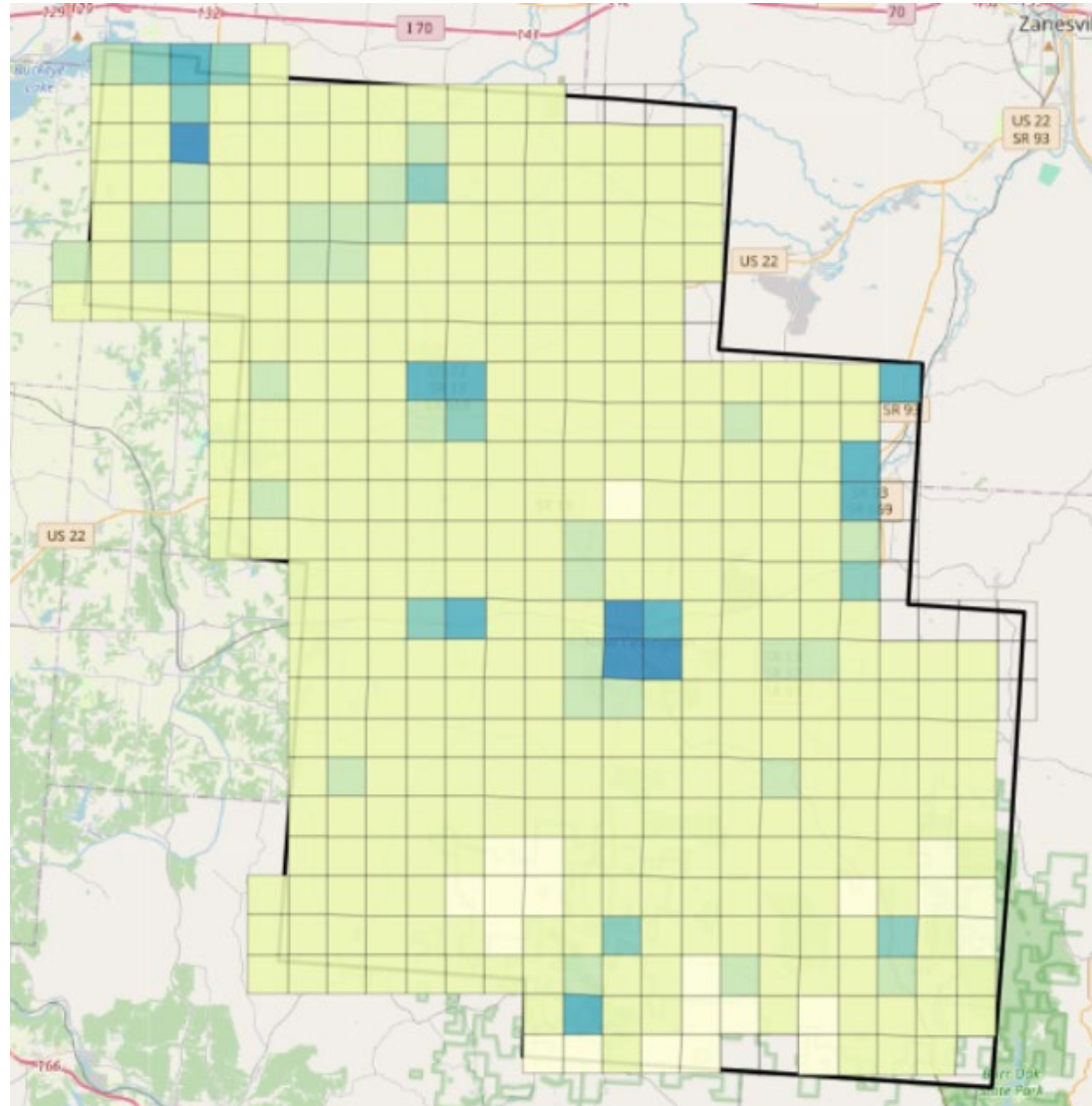


Current Conditions: Supply Availability

Water Supply (Base Year, MGD)



Current Conditions: Community Composition



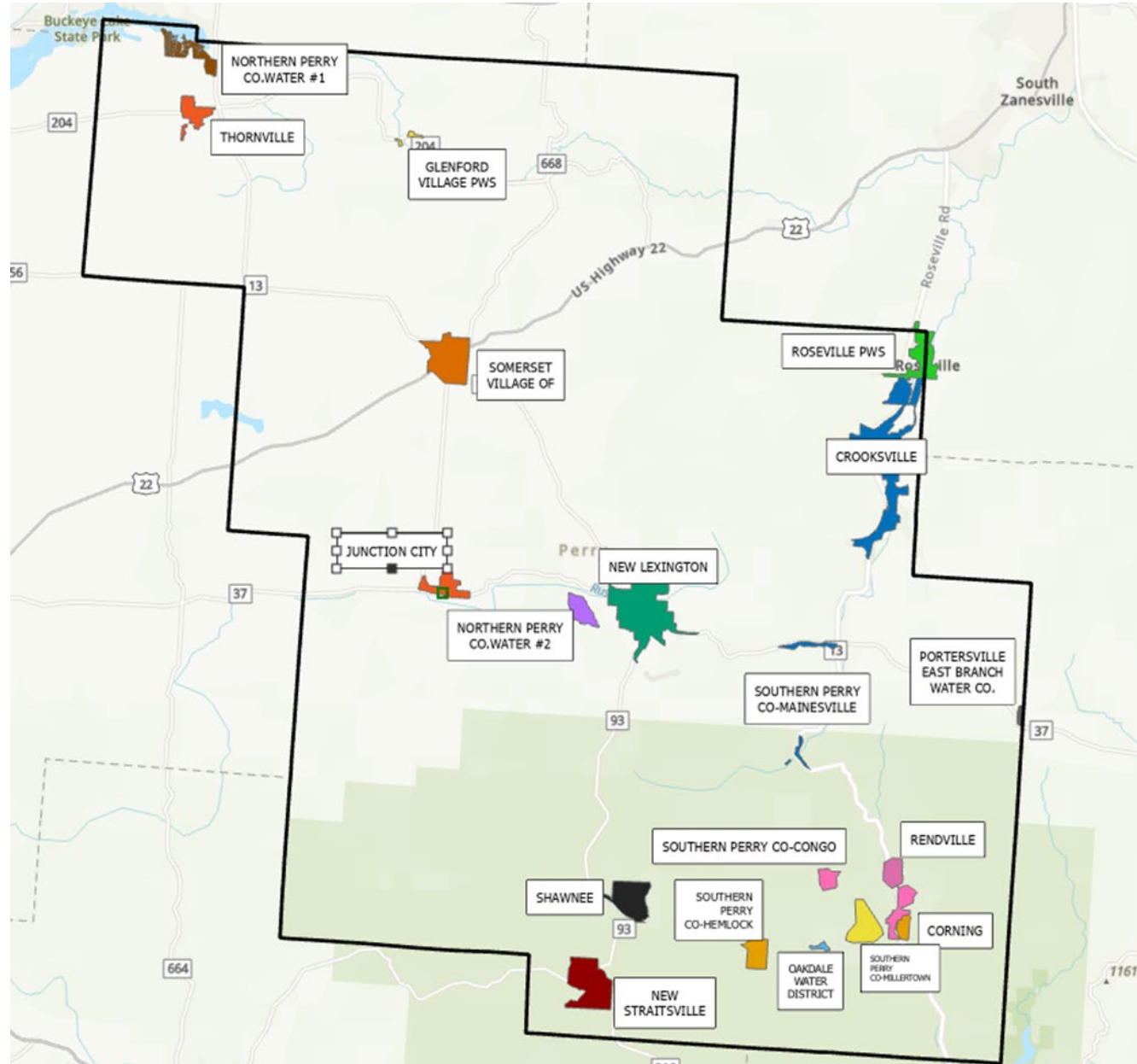
| # | Label | Symbol |
|----|---|--------|
| 1 | Counties | □ |
| 11 | Grid (1.0mi): Population Unavailable | □ |
| 19 | Grid (1.0mi): Population 0 to 1 | □ |
| 20 | Grid (1.0mi): Population 1 to 100 | □ |
| 21 | Grid (1.0mi): Population 100 to 200 | □ |
| 22 | Grid (1.0mi): Population 200 to 500 | □ |
| 23 | Grid (1.0mi): Population 500 to 1000 | □ |
| 24 | Grid (1.0mi): Population 1000 to 5000 | □ |
| 25 | Grid (1.0mi): Population 5000 to 10000 | □ |
| 26 | Grid (1.0mi): Population 10000 to 1000000 | □ |

Base Year (2021) Population



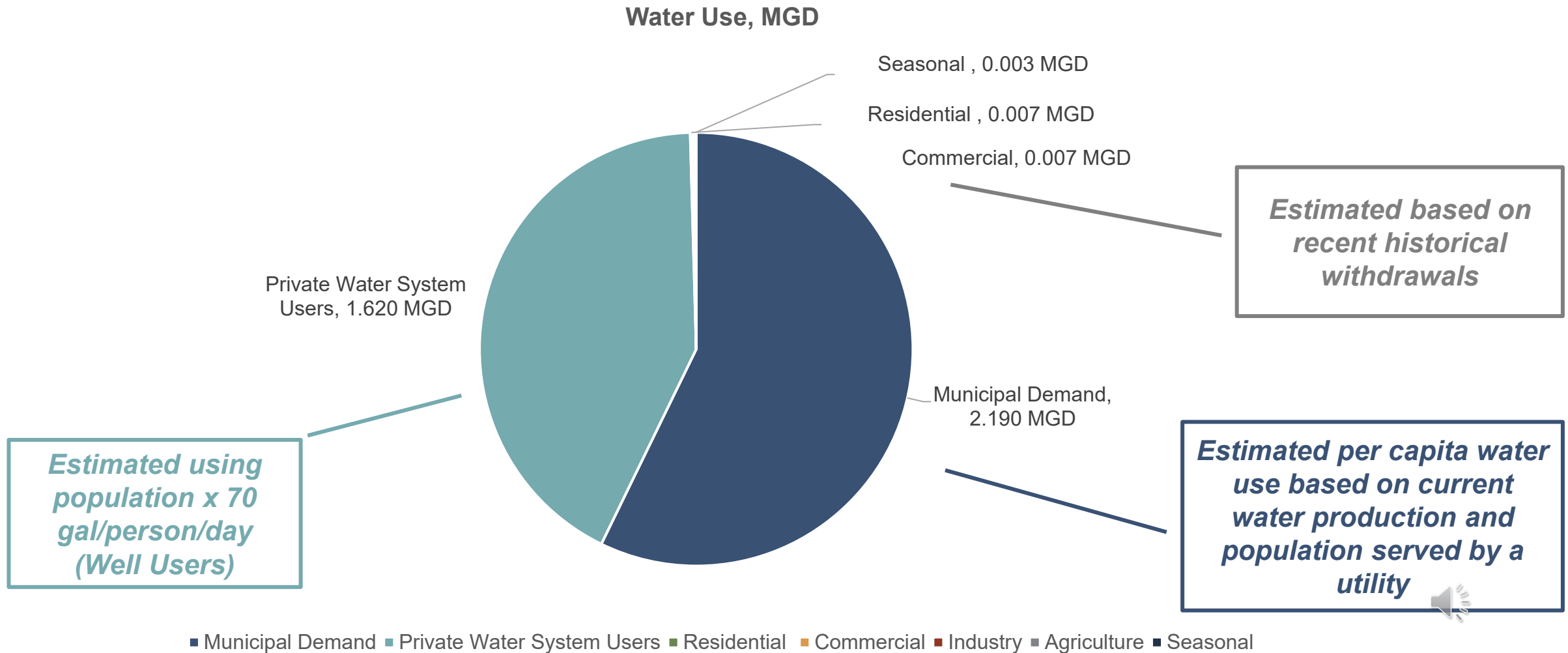
Perry County

Assumed Water/Wastewater Service Areas



Current Conditions: Water Demands

Max Month, 3.8 MGD Total





Current Conditions: Wastewater Flows

Max Annual Average
Wastewater Flow =
1.55 MGD



Current Conditions: Infrastructure

Water Treatment Plant
Capacity
6.4 MGD
(~78% ground water,
22% surface water)

*Recall that max
annual average
wastewater flows
are ~1.6 MGD*

Wastewater Treatment
Plant Capacity
2.6 MGD

*Recall that total
max water demands
are ~3.8 MGD*

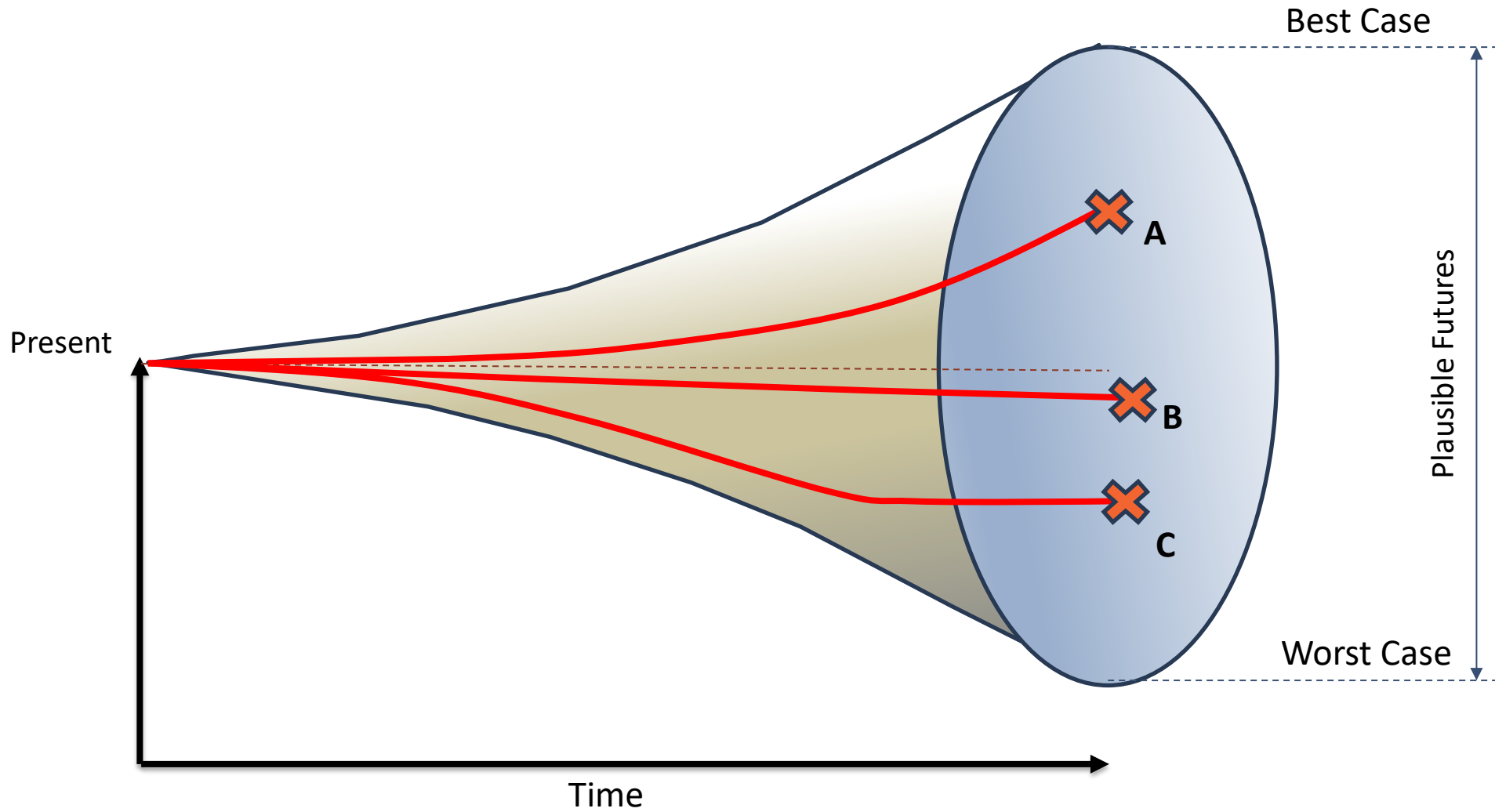




Future Conditions

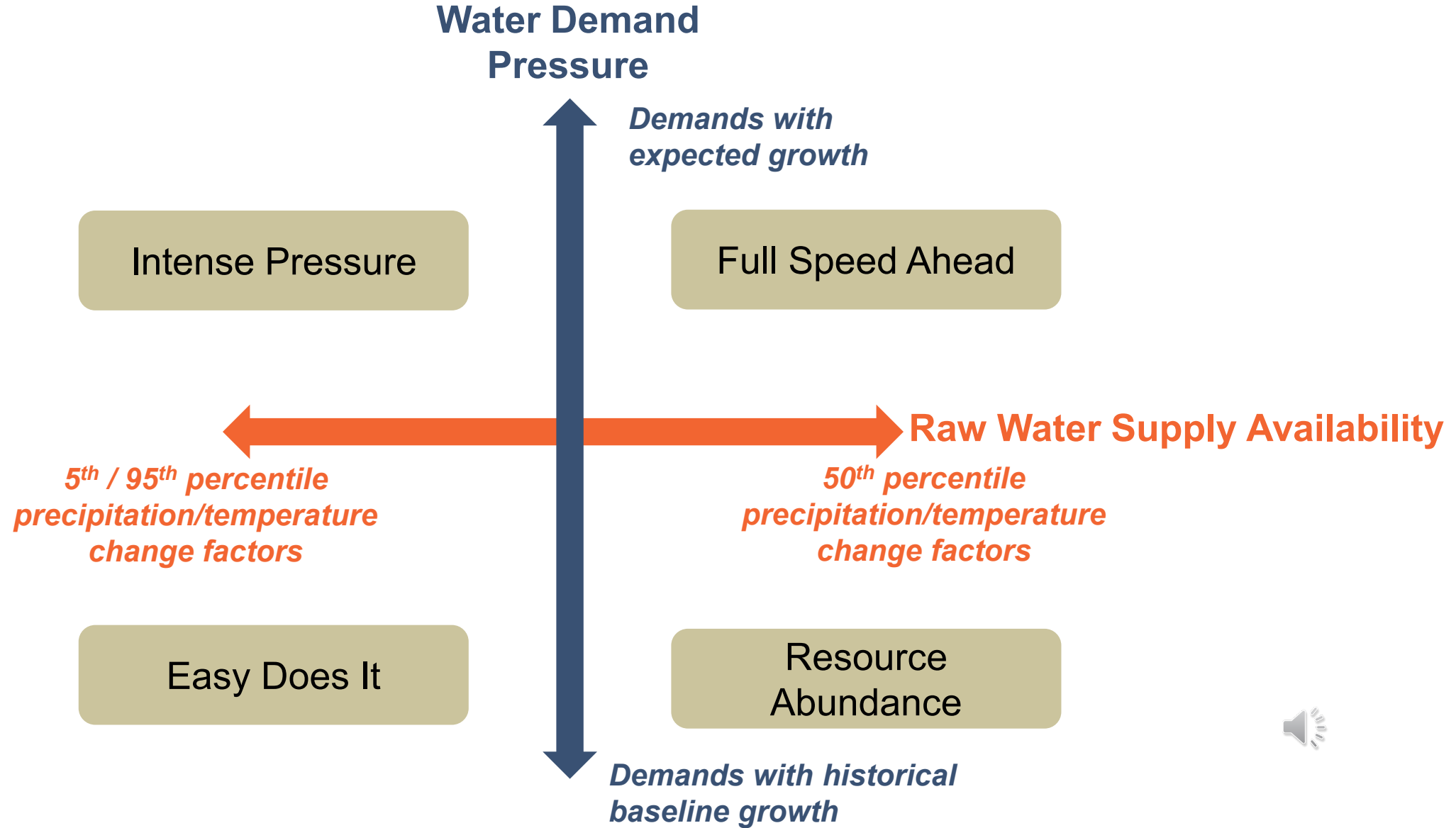


Scenario Planning





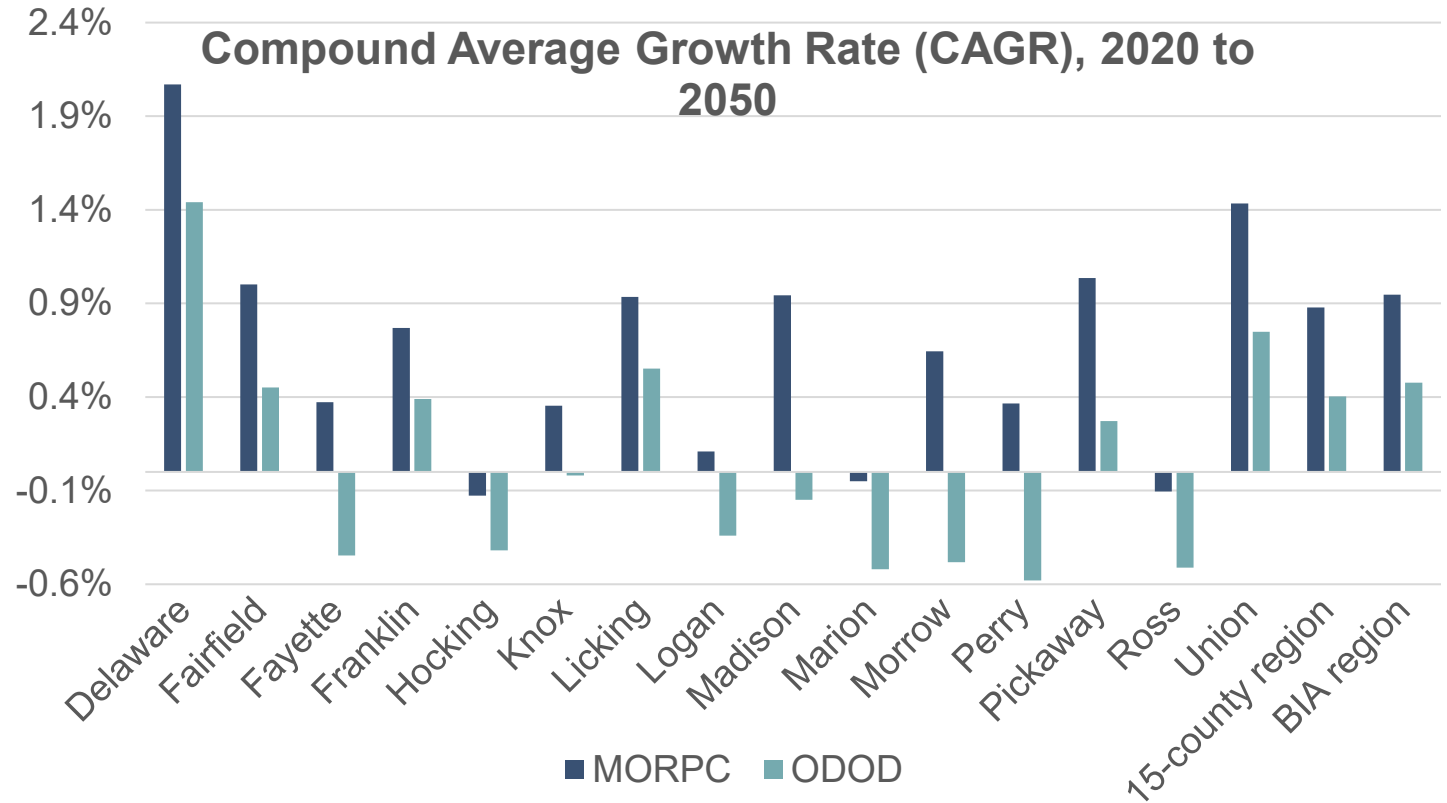
Model Scenarios





MORPC vs ODOD Population Data

Perry County

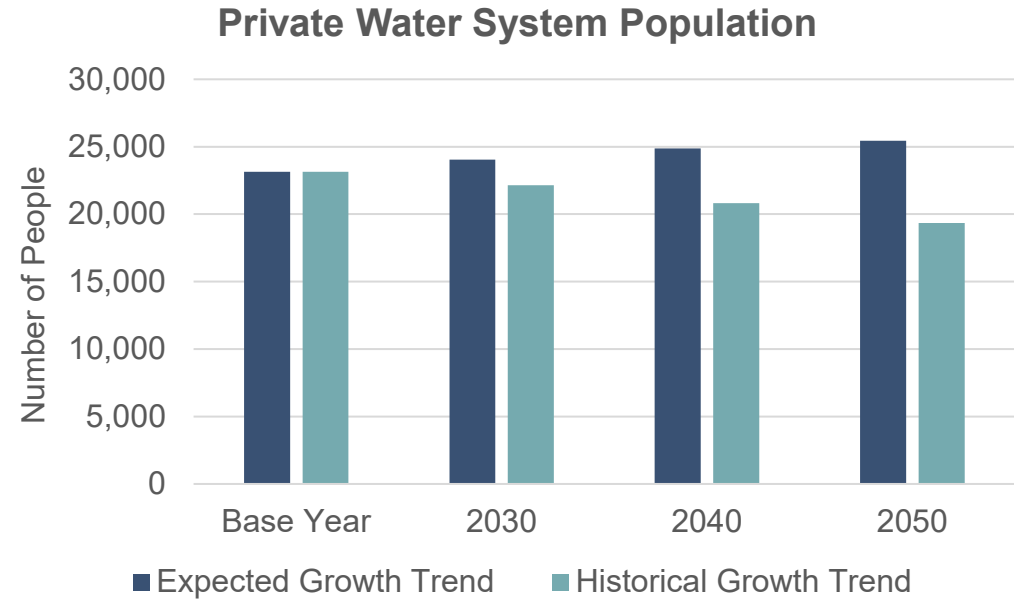
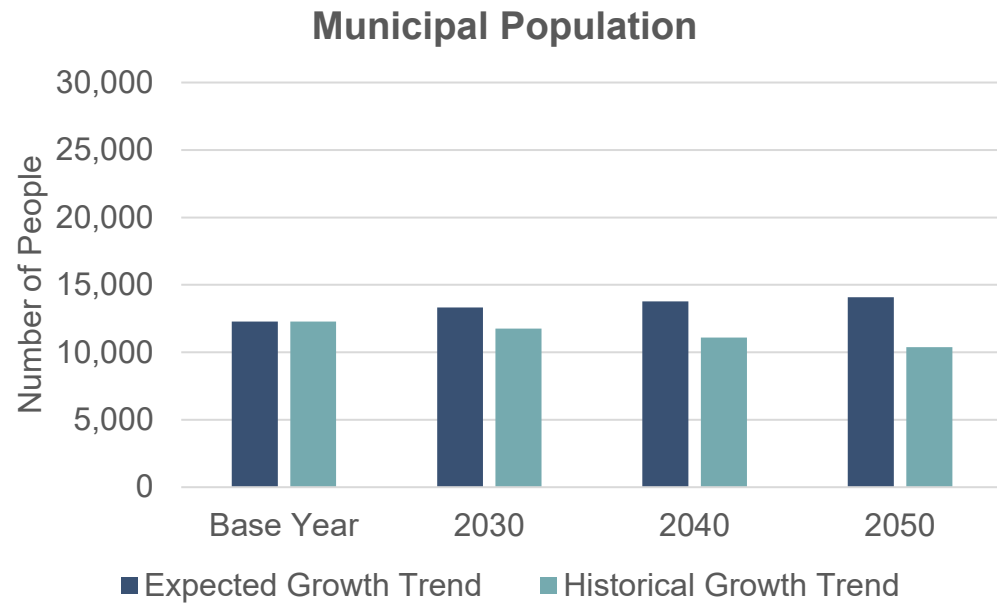


| | 2021 County Population | 2050 County Population |
|--------------------------------|------------------------|------------------------|
| MORPC (Expected Growth Trend) | 35,431 | 39,519 |
| ODOD (Historical Growth Trend) | 35,431 | 29,715 |





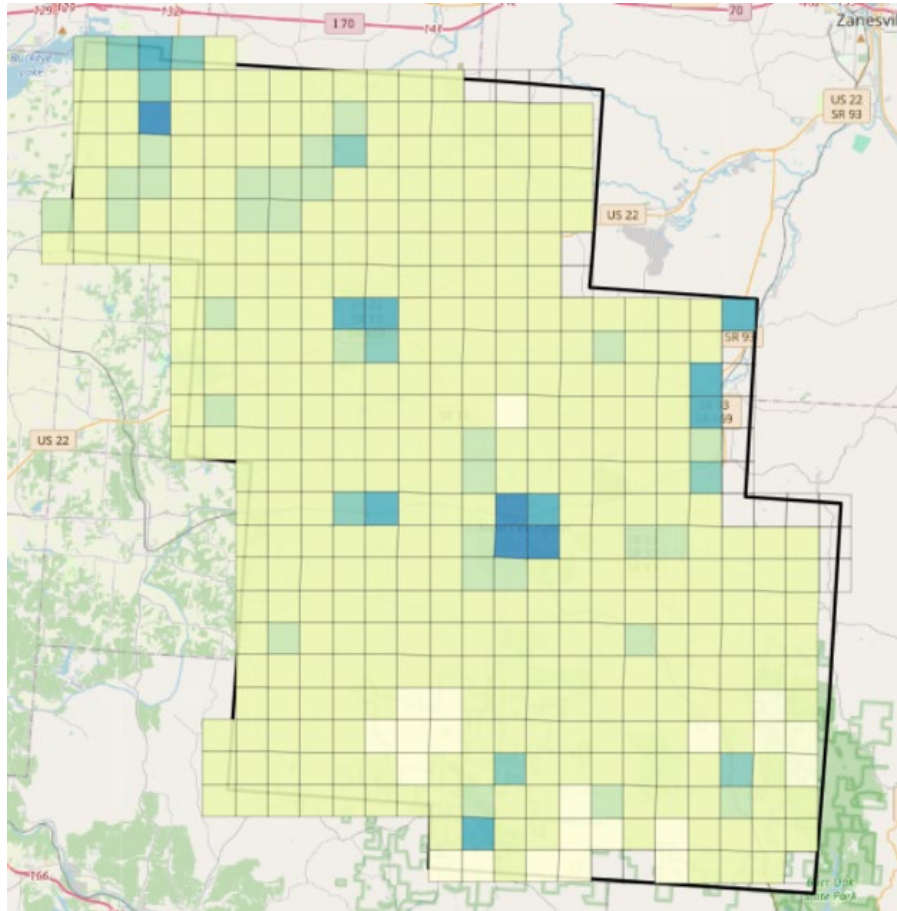
Future Conditions: Community Composition



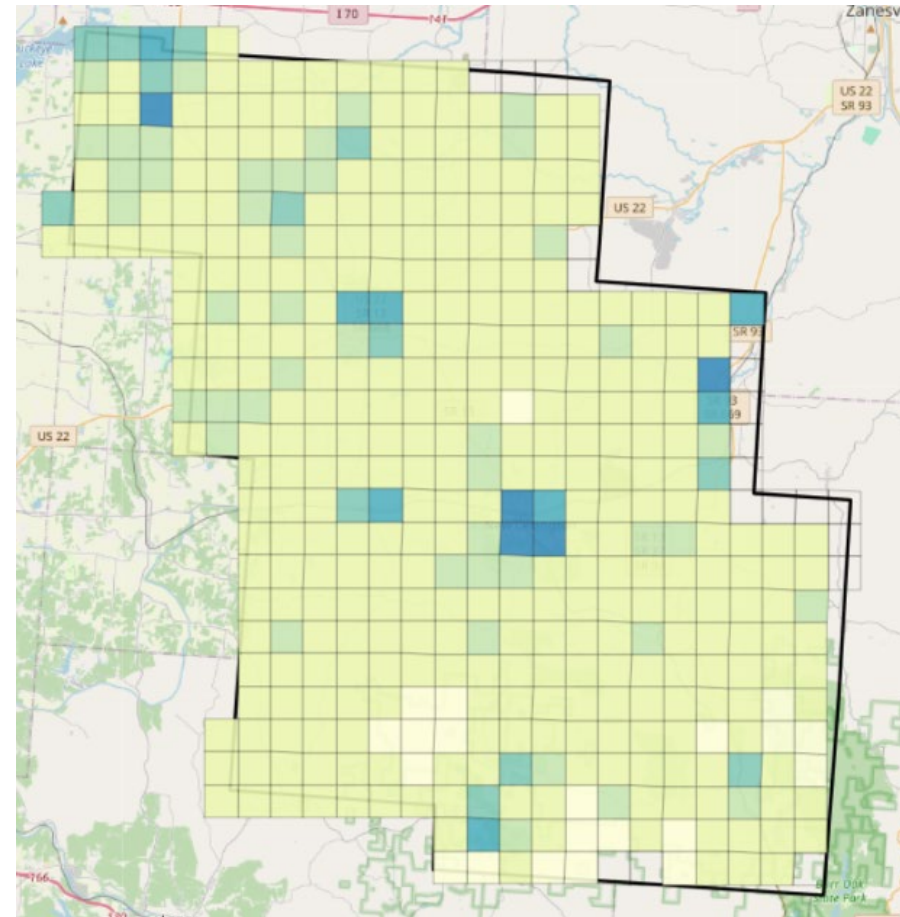
Future Conditions: Community Composition

Perry County

| # | Label | Symbol |
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| 11 | Grid (1.0mi): Population Unavailable | □ |
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Base Year (2021) Population

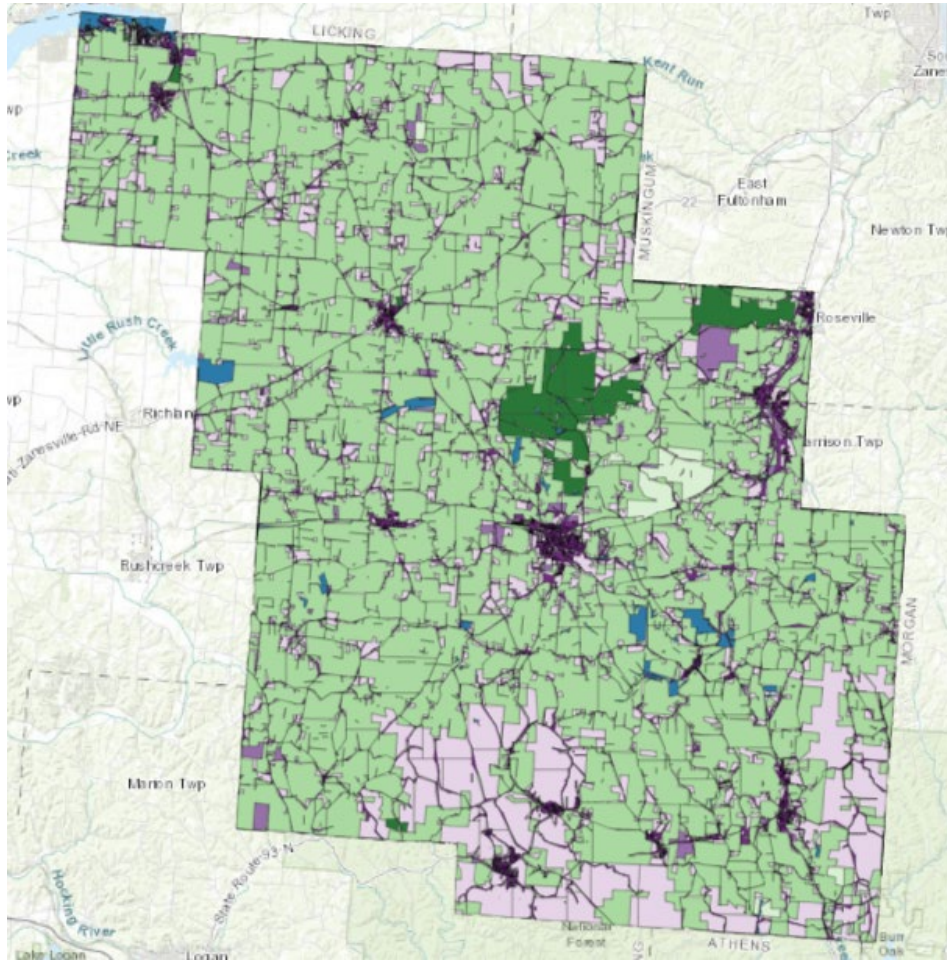


2050 Expected Growth Population

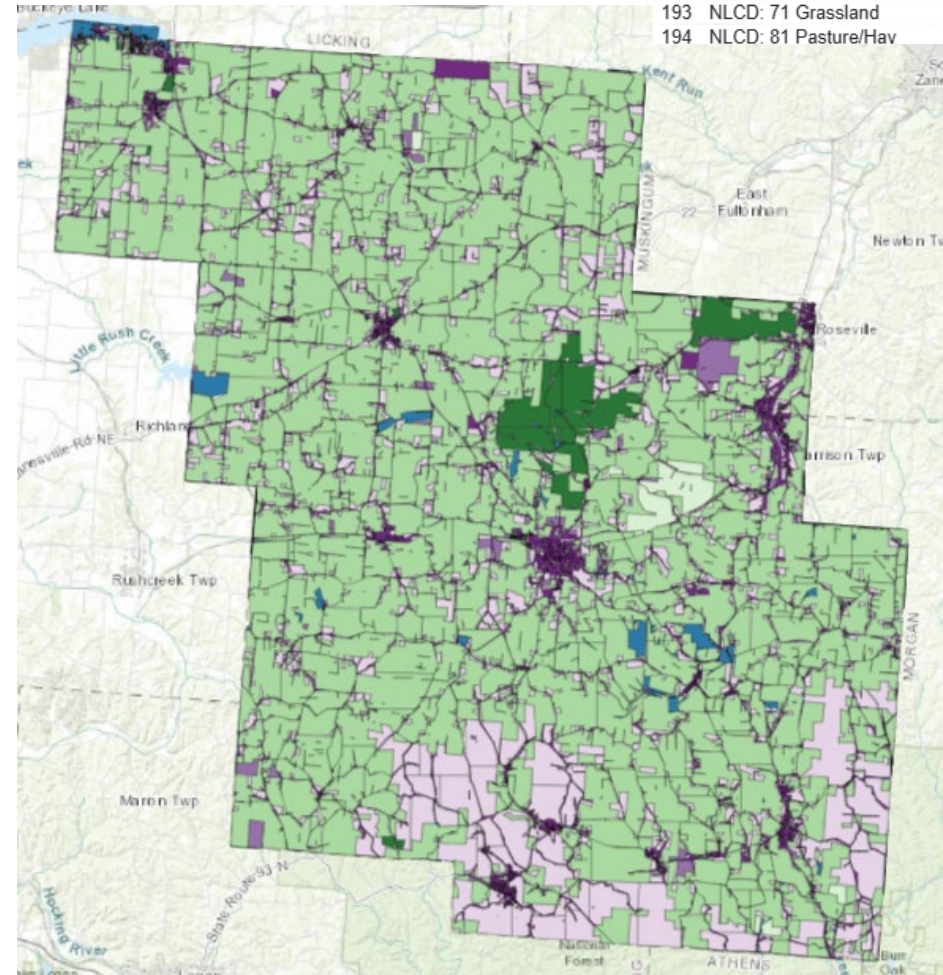


Existing and Future Land Use

| # | Label | Symbol |
|-----|-------------------------------------|--------|
| 1 | Counties | □ |
| 185 | NLCD: 0 None Specified | □ |
| 186 | NLCD: 11 Water | ■ |
| 187 | NLCD: 21 Developed Open Space | □ |
| 188 | NLCD: 22 Developed Low Intensity | □ |
| 189 | NLCD: 23 Developed Medium Intensity | □ |
| 190 | NLCD: 24 Developed High Intensity | ■ |
| 191 | NLCD: 31 Barren | □ |
| 192 | NLCD: 43 Mixed Forest | ■ |
| 193 | NLCD: 71 Grassland | □ |
| 194 | NLCD: 81 Pasture/Hav | ■ |

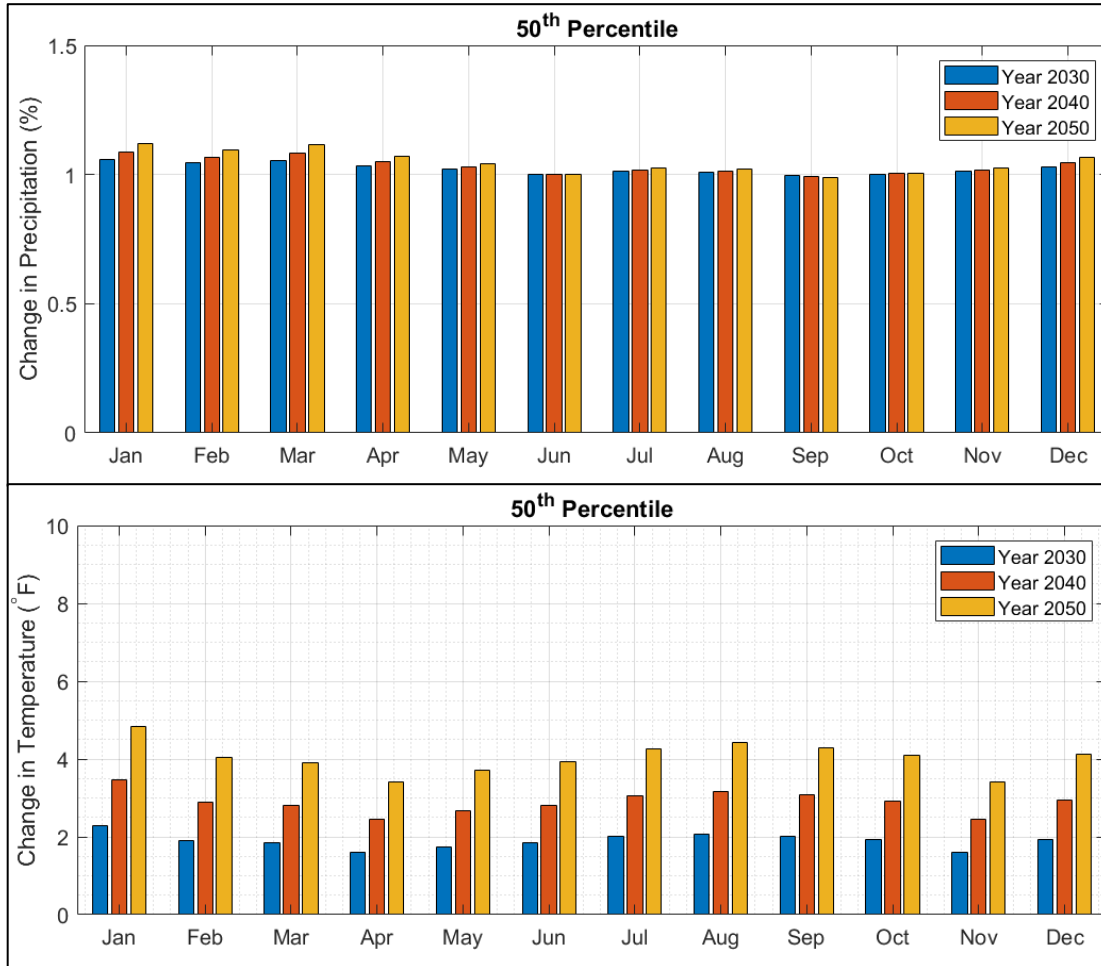


Existing (2021)

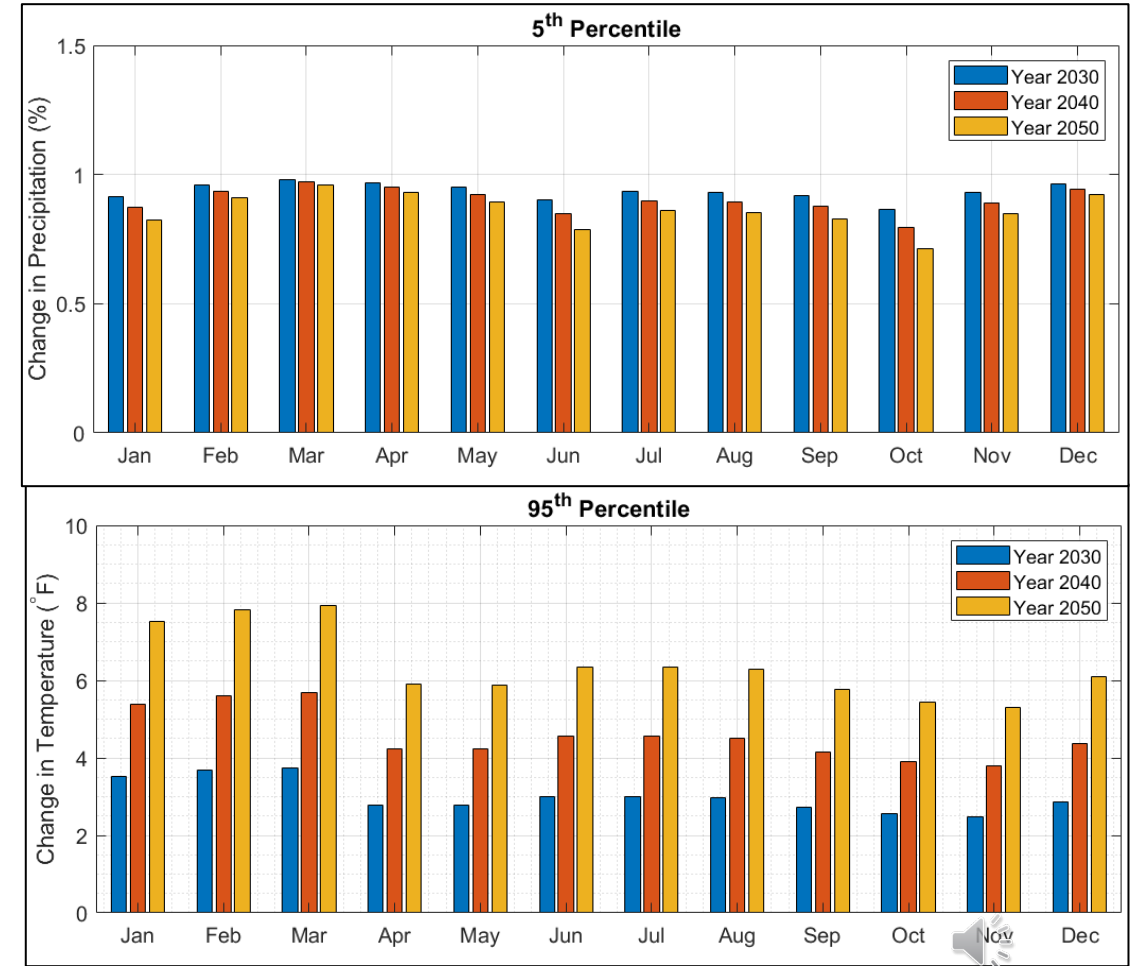


Future (2050)

Future Scenarios – Temperature and Precipitation Change

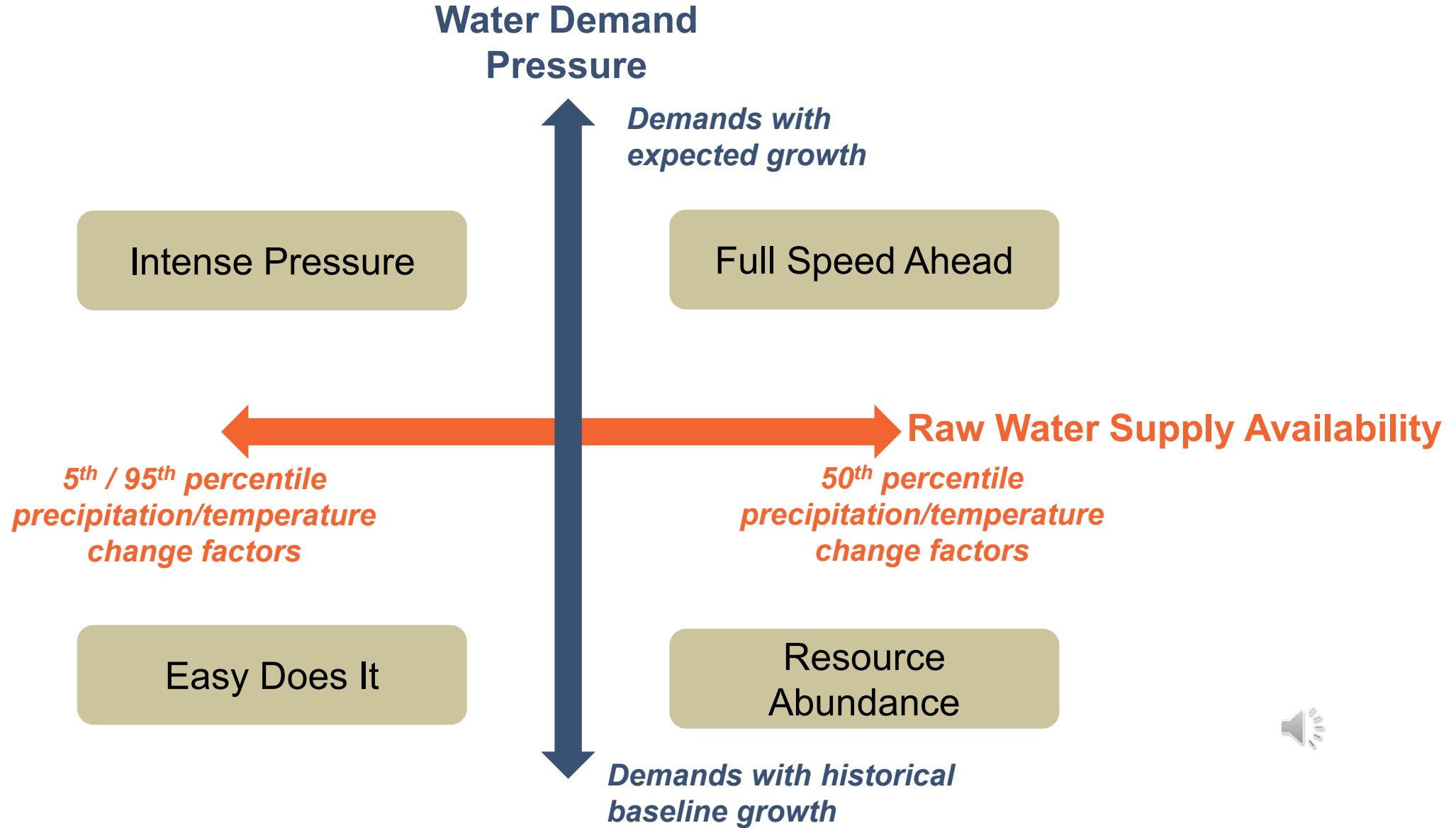


Moderate Change (50th Percentile Temperature and Precipitation)



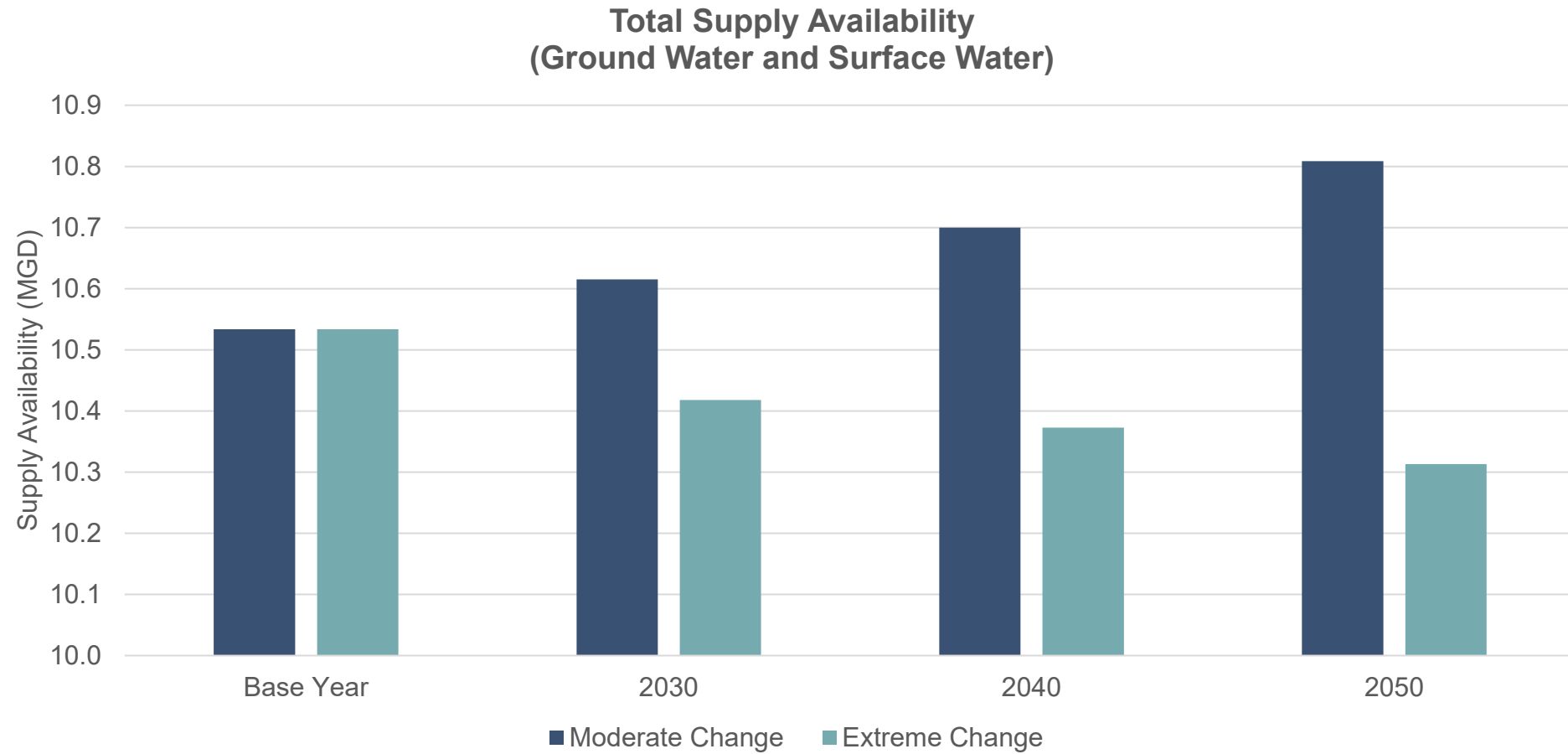
Extreme Change (5th Percentile Precipitation and 95th Percentile Temperature)

Model Scenarios



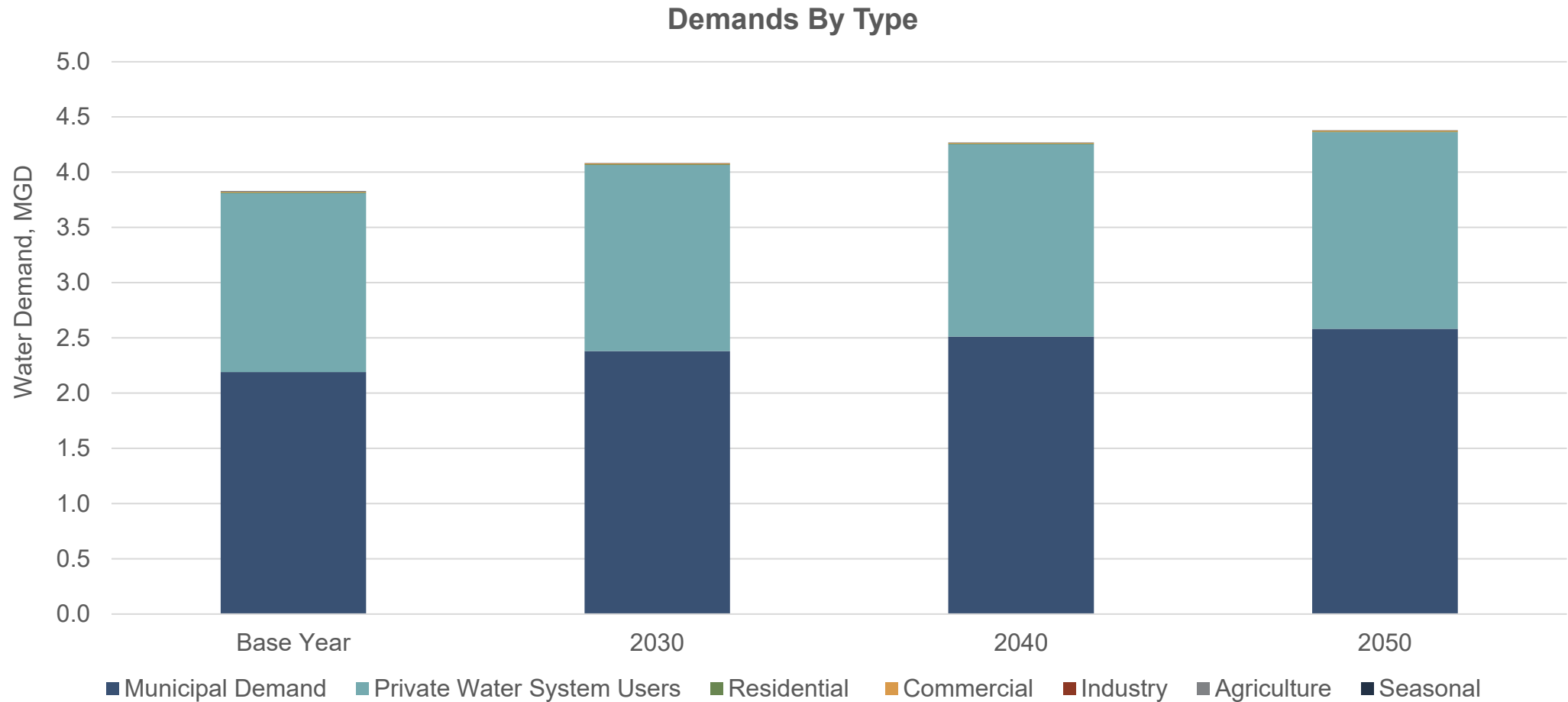


Future Conditions: Supply Availability



Future Conditions: Water Demands

Municipal and private water system growth shown in the graph are based on the expected growth trend





Future Conditions: Infrastructure

WTP Capacity
6.4 MGD

No Assumed Projects by 2030

WWTP Capacity
2.6MGD

No Assumed Projects by 2030





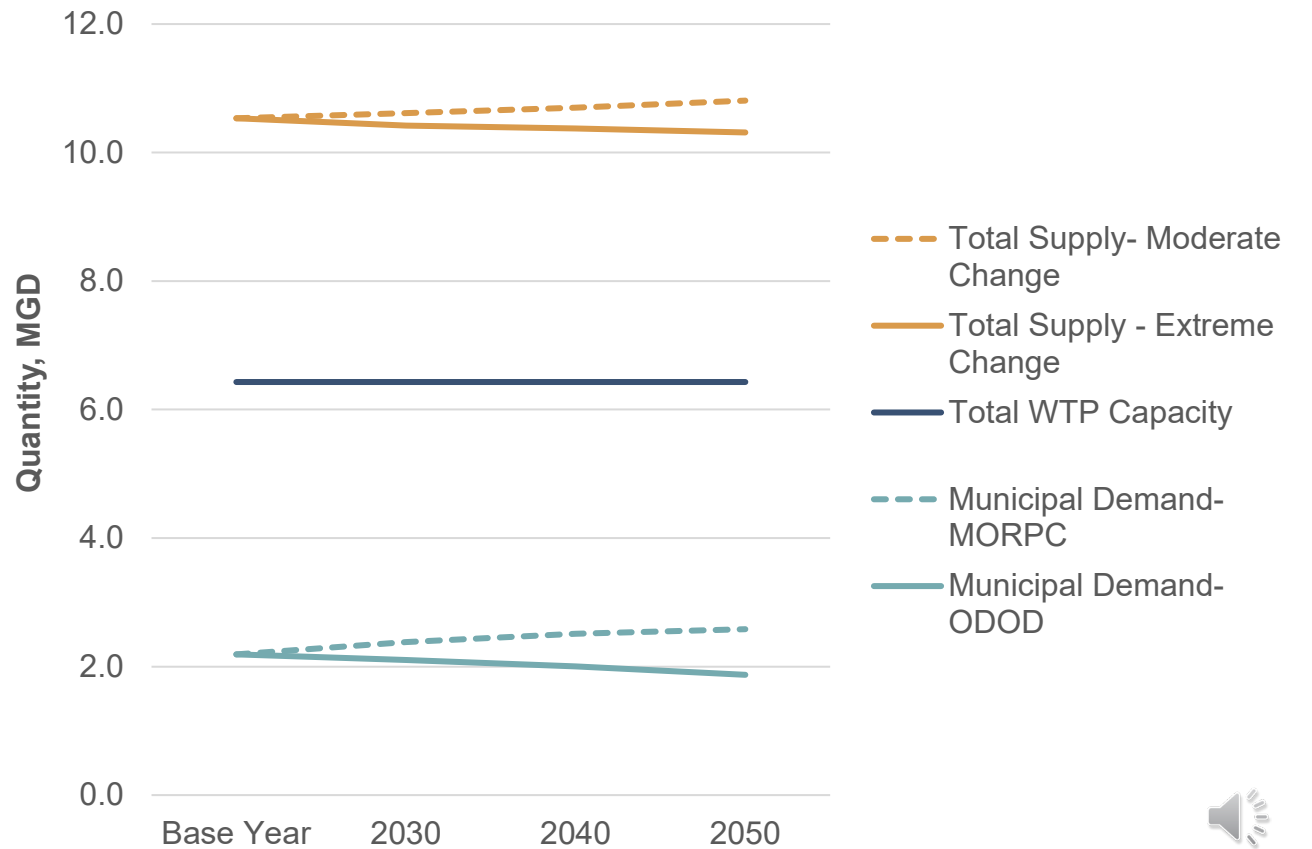
Needs Analysis





Needs Analysis: Municipal Water Demands

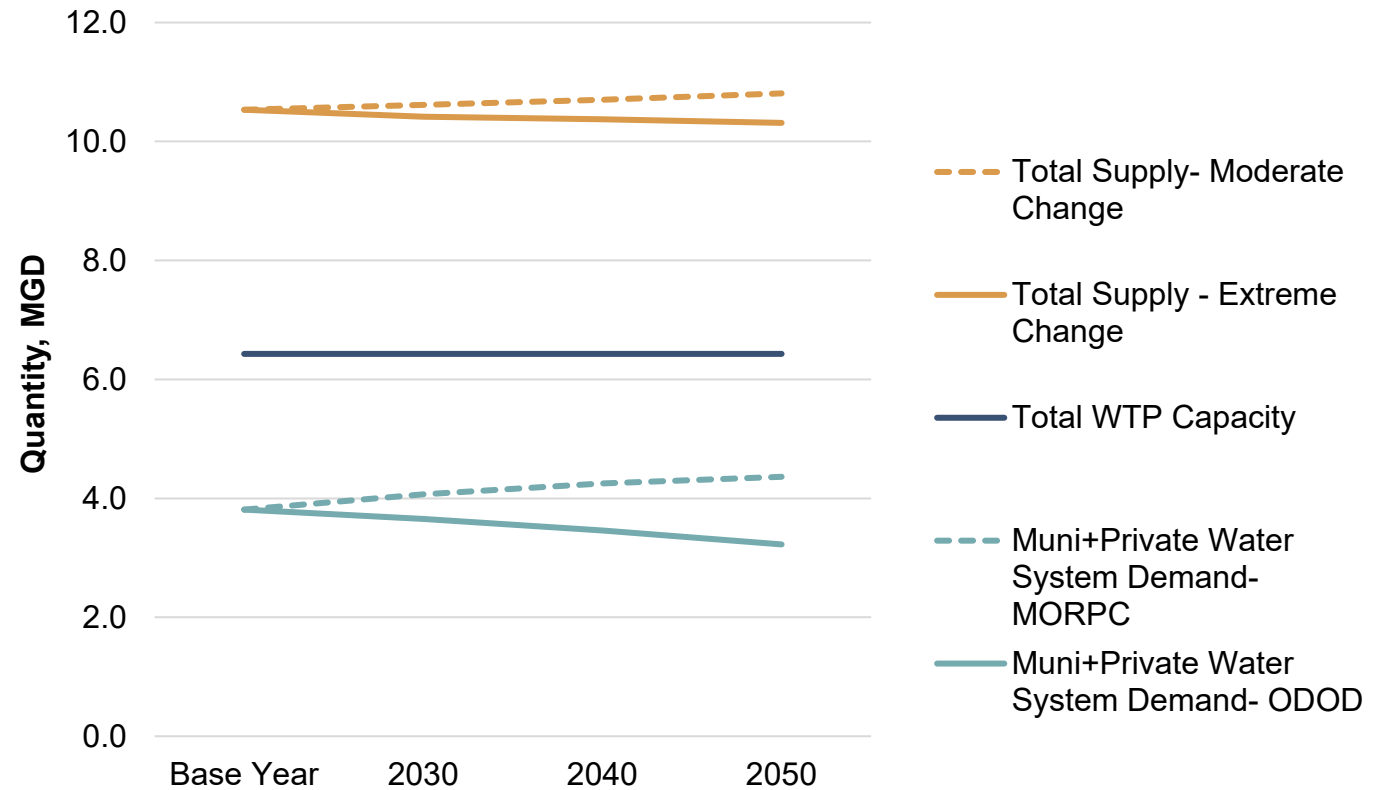
- Existing raw water supplies and water treatment capacity are sufficient to meet future municipal demands **at the county-level**





Needs Analysis: Municipal + Private Water System Water Demands

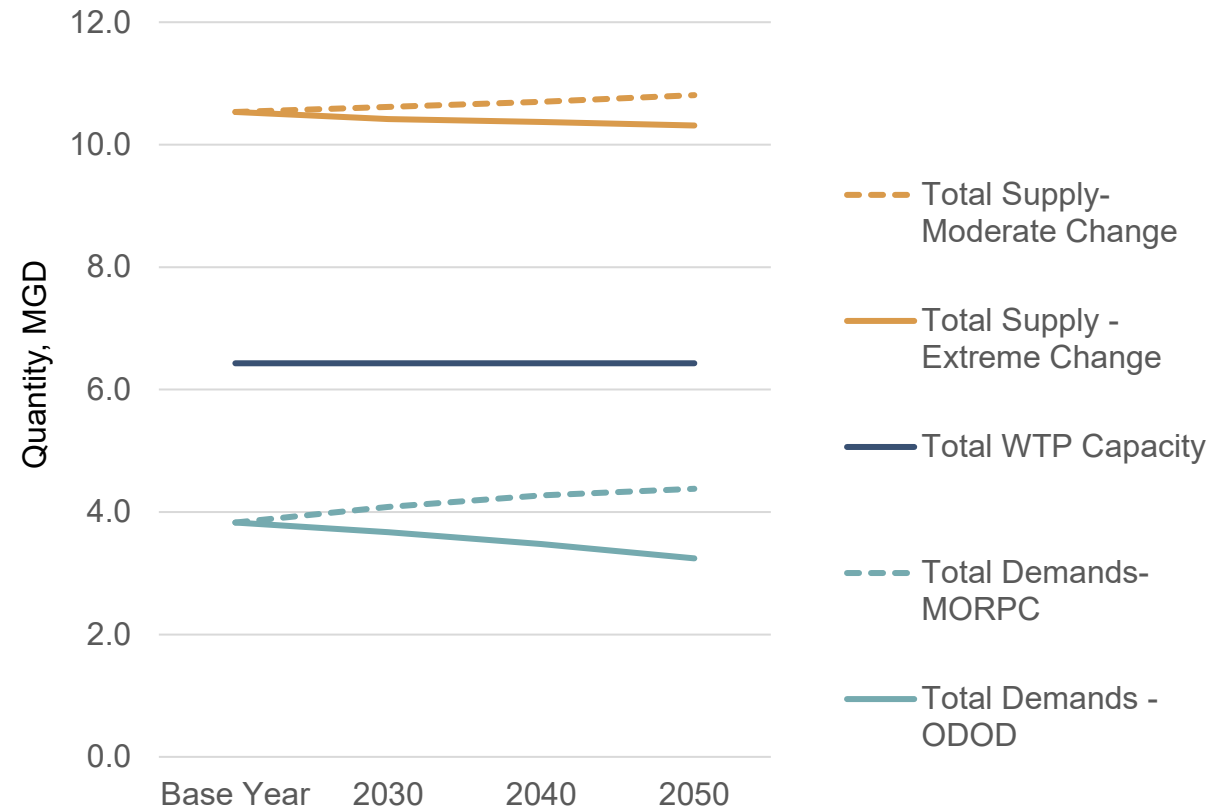
- Existing raw water supplies and water treatment capacity are sufficient to meet future municipal demands and private water system demands **at the county-level**





Needs Analysis: Total Water Demands

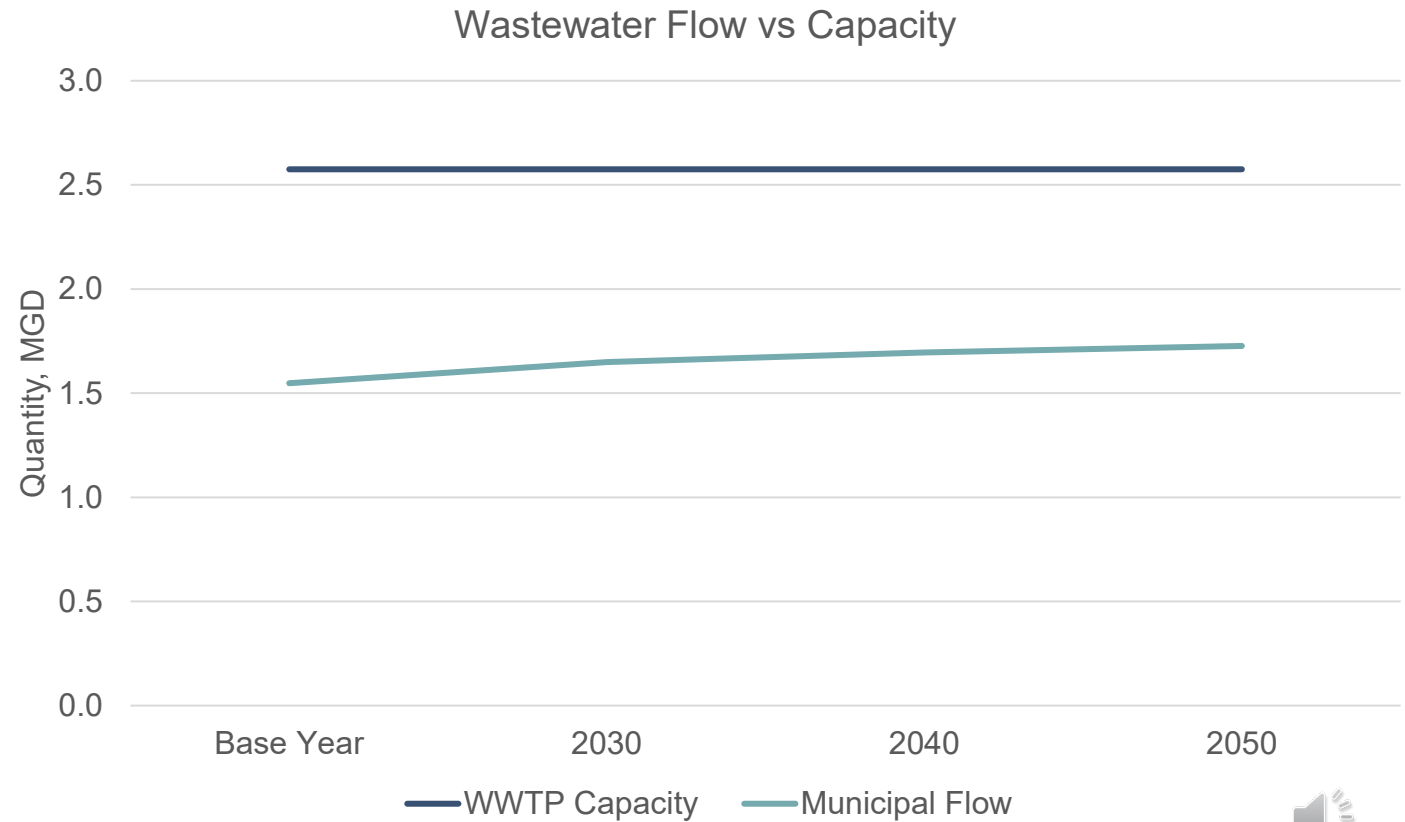
- Existing raw water supplies and water treatment capacity are sufficient to meet municipal, private water system, and non-municipal demands through 2050 **at the county-level**
- There are no assumed industrial or agriculture demands **at the county-level**





Needs Analysis: Municipal Wastewater Demands (Max Annual Average)

- Existing wastewater treatment capacity are sufficient to meet future municipal demands **at the county-level**
- Non-municipal wastewater demands are not expected to be met by municipal WWTPs **at the county-level**





Resource Gaps and Abundances

County Level Overview



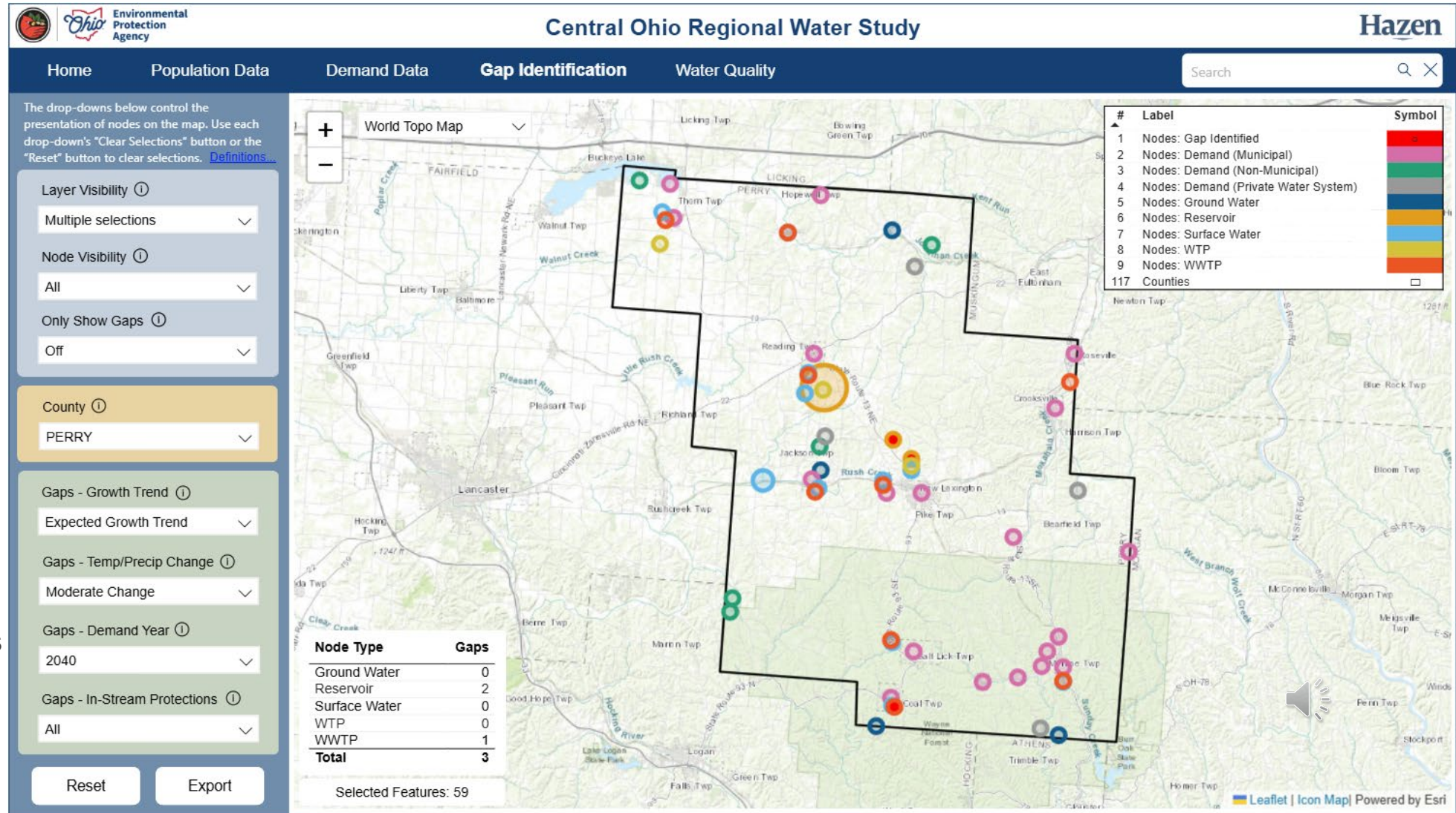
Findings – Resource Gaps

Planning Tool Visualization – Perry County 2040, Moderate Precipitation / Temperature Change

Red nodes represent “gaps”:

- SW: Is any shortage observed?
- Reservoir: Does the usable storage ever reach 20%?
- GW: Does the remaining ground water amount ever reach zero?
- WTP: Is the max month average flow > 80% of the permitted capacity?
- WWTP: Is the max annual average flow > 100% of the permitted capacity?

Node sizing reflects magnitude of gap or surplus



Findings – Resource Gaps

Full Summary of Gaps – Perry County

| Scenario | | GW | Reservoir | SW | WTP | WWTP | Total |
|---|------|----|-----------|----|-----|------|-------|
| Base Year | | 0 | 2 | 0 | 0 | 1 | 3 |
| Intense Pressure <i>(expected growth + high temperature/precipitation stress)</i> | 2030 | 0 | 2 | 0 | 0 | 1 | 3 |
| | 2040 | 0 | 2 | 0 | 0 | 1 | 3 |
| | 2050 | 0 | 3 | 0 | 0 | 1 | 4 |
| Full Speed Ahead <i>(expected growth + moderate temperature/precipitation stress)</i> | 2030 | 0 | 2 | 0 | 0 | 1 | 3 |
| | 2040 | 0 | 2 | 0 | 0 | 1 | 3 |
| | 2050 | 0 | 2 | 0 | 0 | 1 | 3 |
| Easy Does It <i>(historical growth + high temperature/precipitation stress)</i> | 2030 | 0 | 2 | 0 | 0 | 1 | 3 |
| | 2040 | 0 | 2 | 0 | 0 | 1 | 3 |
| | 2050 | 0 | 2 | 0 | 0 | 0 | 2 |
| Resource Abundance <i>(historical growth + moderate temperature/precipitation stress)</i> | 2030 | 0 | 2 | 0 | 0 | 1 | 3 |
| | 2040 | 0 | 1 | 0 | 0 | 1 | 2 |
| | 2050 | 0 | 1 | 0 | 0 | 1 | 2 |



Resource Gaps and Potential Project Options





World of Project Options to fill Gaps.... Solution Strategies

- Gaps exist across supply, treatment, and water quality. Gaps can be filled by developing a set of solutions that could consist of several projects to develop an overall strategy
- Supply: Ground Water Wells, Reservoirs, Intakes, Dams, Other Storage, Emergency connections
- Treatment: Expand Capacity, Optimize treatment, Modify for water quality
- Policy: Restrictions, Adjust location of demand, Funding, Regionalization
- Discharge/Reuse: Receiving stream water quality, non-potable water reuse, potable reuse





Scenario Scorecard Criteria



Scenario applicability

- Project that addresses more gaps across scenarios



Favorability across gaps

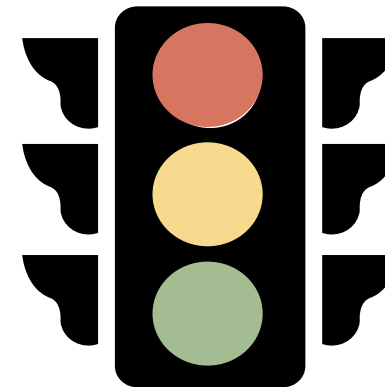
- Project that addresses more gaps within the same scenario ranks higher



Life cycle cost

- Projects with the lowest combined capital and O&M costs ranks higher. Capital costs are provided. Relative O&M considered.
- Green: <\$75 million
- Yellow: \$75 - \$125 million
- Red: >\$125 million

*Recall the scenarios:
Base, Intense Pressure,
Full Speed Ahead, Easy
Does It, Resource
Abundance*



Red – Low Favorability

Yellow – Medium Favorability

Green – High Favorability

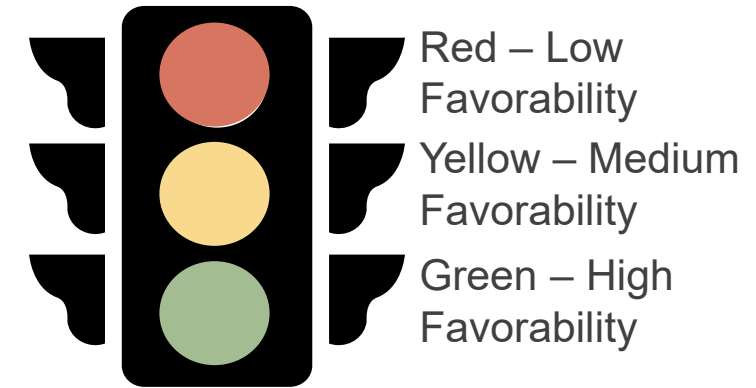




Scenario Scorecard Criteria

Water Quality Impact

- Projects that provide higher water quality ranks higher
- Green: Minimal water quality concerns, minimal industrial influence anticipated
- Yellow: Water quality conditions that need to be evaluated, increased permitting requirements, withdrawal from or discharge into a Superior high quality water
- Red: Elevated water quality concerns, high permitting requirements, withdrawal from or discharge into an Outstanding state water



Implementation Timeline

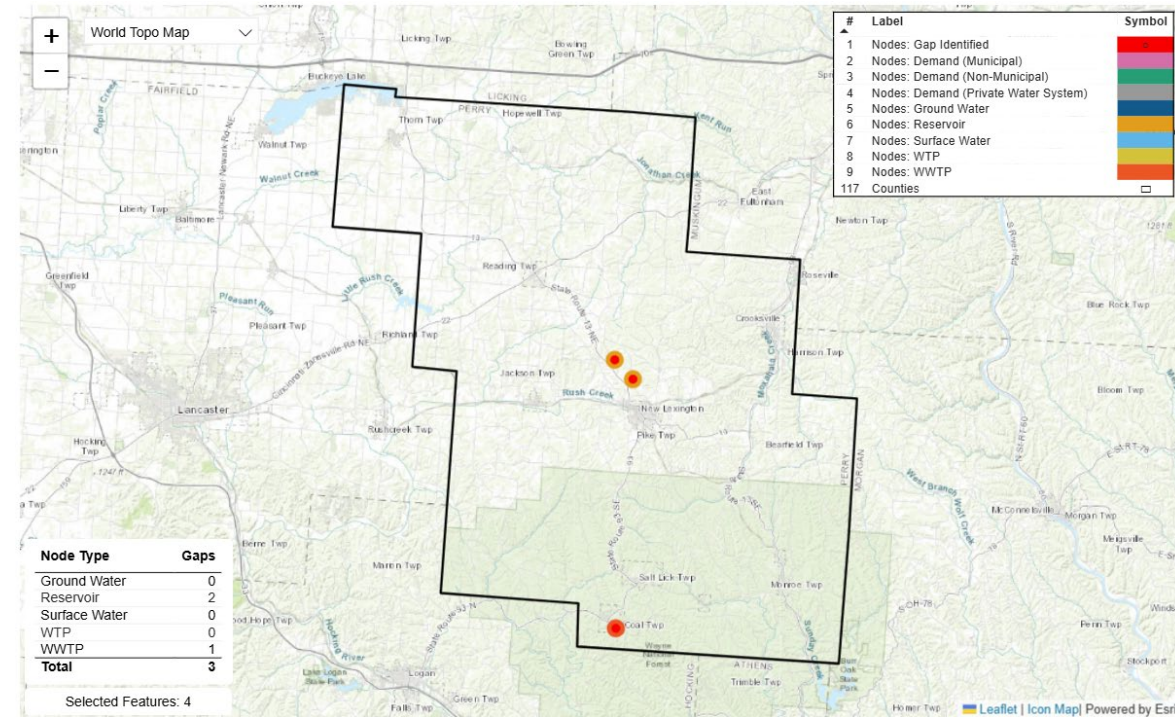
- Projects with shorter timelines ranks higher
- Includes project planning, funding, design, construction, and start-up
- Larger infrastructure projects have longer durations
- Green: < 3 years
- Yellow: 3 – 5 years
- Red: 5 – 10 years



Approach to Resource Gaps

2040 Full Speed Ahead Scenario

- Solution strategies developed for the 2040 Full Speed Ahead Scenario (*expected growth + moderate temperature/precipitation stress*) to provide guidance on what planning might be considered in the near term
- The 2040 Full Speed Ahead Scenario was selected as the target planning scenario to allow stakeholders to assess current and future project needs without extending too far into the future while using reasonable temperature/precipitation projections.
- Pre-planning level projects developed to fill gaps that provide conceptual solutions.
- Project next steps include:
 - Project development
 - Alternatives development with economic and non-economic evaluation
 - Regulatory evaluation and approval
- Cost models for comparative purposes and are in 2024 costs.



- Projects to fill gaps categorized by type:
 - Local – Utility largely uses its own assets to fill gap or industrial provides its own onsite solutions
 - Regional – Utility collaborates with other utilities
 - Reuse – Utility leverages reuse water to provide non-potable water to an industrial user to reduce potable water demand

Resource Gaps

2040 Full Speed Ahead Scenario

- Perry County Gaps are summarized in the table below:

| Name | Node No. | Capacity (MGD) | 2030 Flow (MGD) | 2040 Flow (MGD) | 2040 Gap (MGD) | 2050 Flow (MGD) |
|-----------------------|----------|----------------|-----------------|-----------------|----------------|-----------------|
| New Straitsville WWTP | 6444 | 0.1 | 0.12 | 0.12 | 0.02 | 0.12 |

Projects on next slides based on 2040 gap

| Name | Node No. | 2040 Gap (MGD) |
|--------------------------------------|----------|--|
| New Lexington Reservoir | 6461 | 0.0 (Min Day Remaining Usable Storage) |
| New Lexington Water Supply Reservoir | 6462 | 0.0 (Min Day Remaining Usable Storage) |

Note – Both reservoirs only have 0 remaining usable storage during a dry period in the early 2000's, but all New Lexington demand was met.

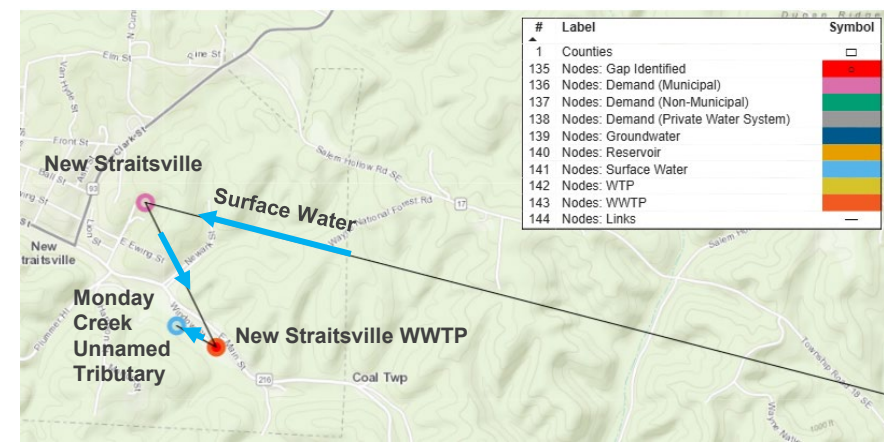
- New Straitsville WWTP has no industrial demands and only has one municipal demand. This municipal demand receives water from Burr Oak, which serves water to a majority of Perry County.
- Both New Lexington Reservoir and New Lexington Water Supply Reservoir are used for source water for New Lexington WTP and low surface water supplies predicted in these two reservoirs could affect the New Lexington WTP.



New Straitsville WWTP

Overview (2040 Full Speed Ahead Scenario)

- Population growth driven WWTP gap of 0.02 MGD
- Monitor growth and consider equalization tank
- Local upgrade options is a potential solution
- Reuse is not a viable project option as the New Straitsville WWTP has no industrial demands and only has one municipal demand.



| Project | WTP Need(s) | WWTP Need(s) | Outside Fence Need(s) | Total ^{1,2} | O&M Relative Requirements | Notes |
|------------------------------|-------------|---|-----------------------|----------------------|---------------------------|--|
| Expand New Straitsville WWTP | None | 0.1 MGD (Total Capacity, 0.2 MGD) \$20,800,000 | + Conveyance | \$20,800,000 | Low | 1. New Straitsville WWTP has no industrial demands and only has one municipal demand. 2. Supply gap is 0.02 mgd. WWTP design based on 0.5 mgd to provide operation flexibility. |

| | Construction Cost ^{1,2} | Favorability Across Scenarios | Favorability Across Gaps | Life Cycle Cost | Water Quality Impact | Implementation Timeline |
|---|----------------------------------|-------------------------------|--------------------------|-----------------|----------------------|-------------------------|
| Option A – Expand New Straitsville WWTP | \$20,800,000 | Green | Green | Green | Yellow | Yellow |



Notes:

1. Total excludes outside fence needs that cannot be evaluated at this planning level.
2. Construction cost estimates are for comparative purposes and should not be used for budgeting purposes. Projects costs should be developed based on additional planning and defined scope of work.

New Lexington Water Supply Reservoirs

- Two reservoirs used in parallel to supply raw water to the New Lexington Water Treatment Plant
- Simulations indicated no remaining usable storage during dry period in early 2000's for both reservoirs
- Remaining storage does not remain at zero for entirety of simulation and demands were met, but alternative water sources should be evaluated to provide long term water supply reliability
- Explore regional connections such as Burr Oak to provide emergency water supply

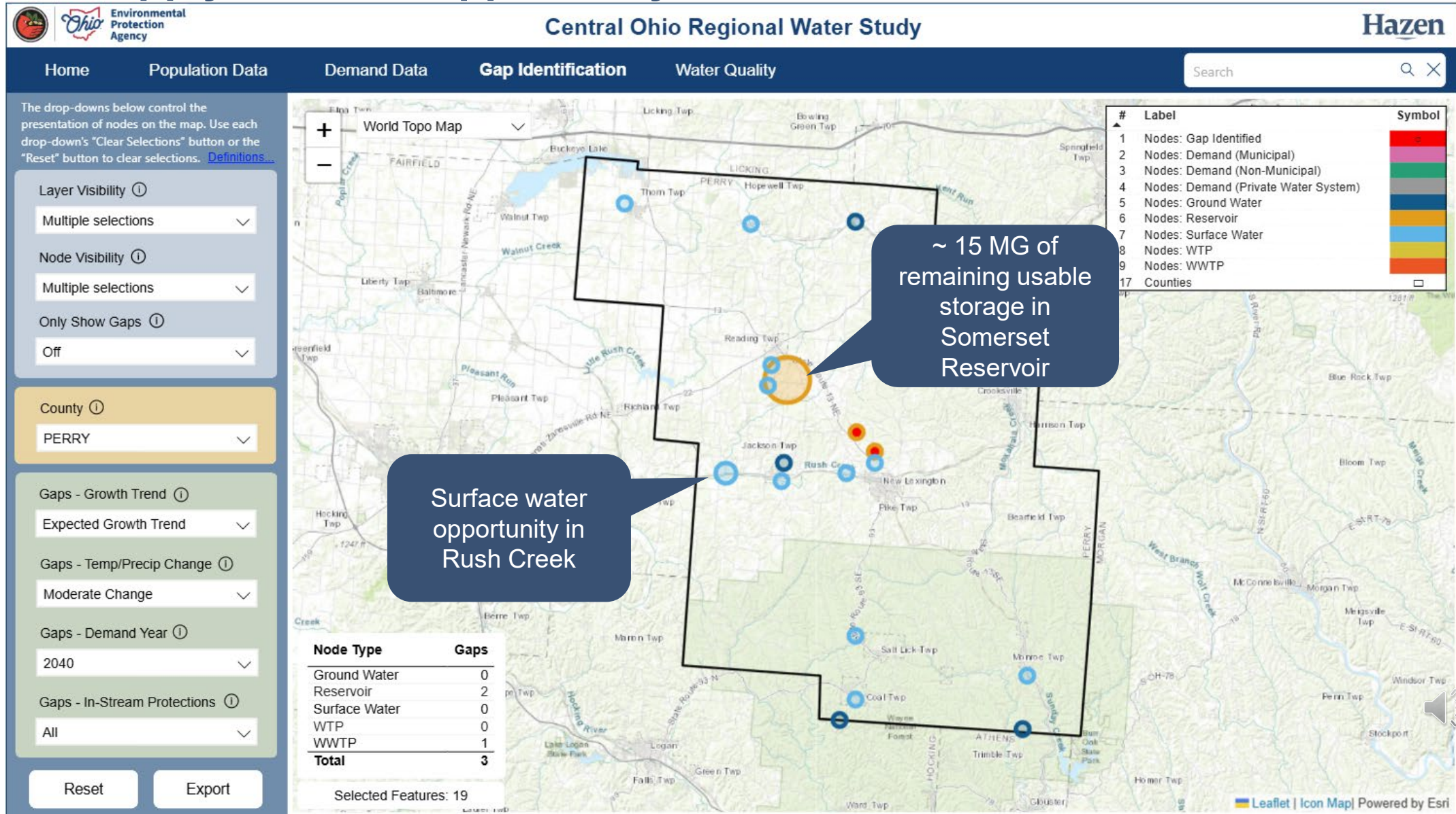




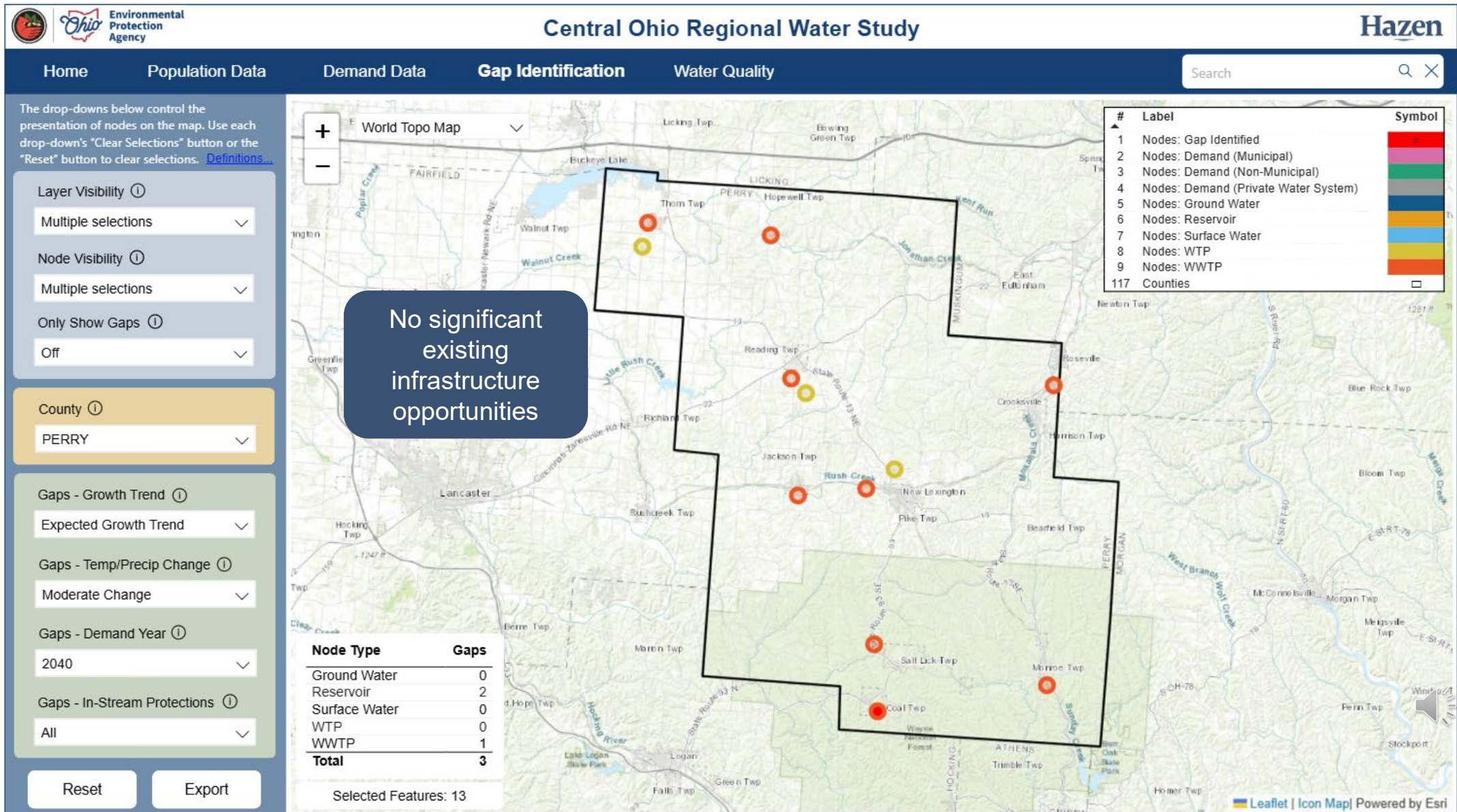
Areas of Opportunity



Water Supply Areas of Opportunity



Infrastructure Areas of Opportunity





Water Quality

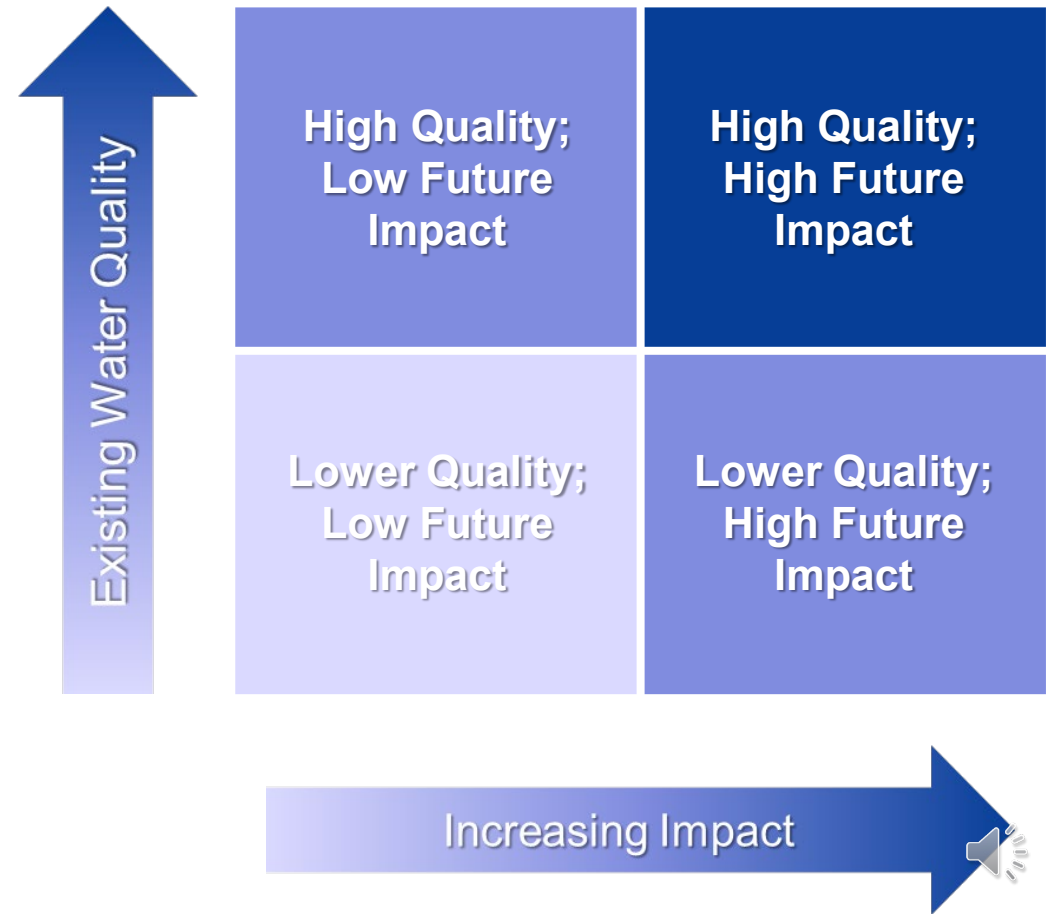




Water Quality

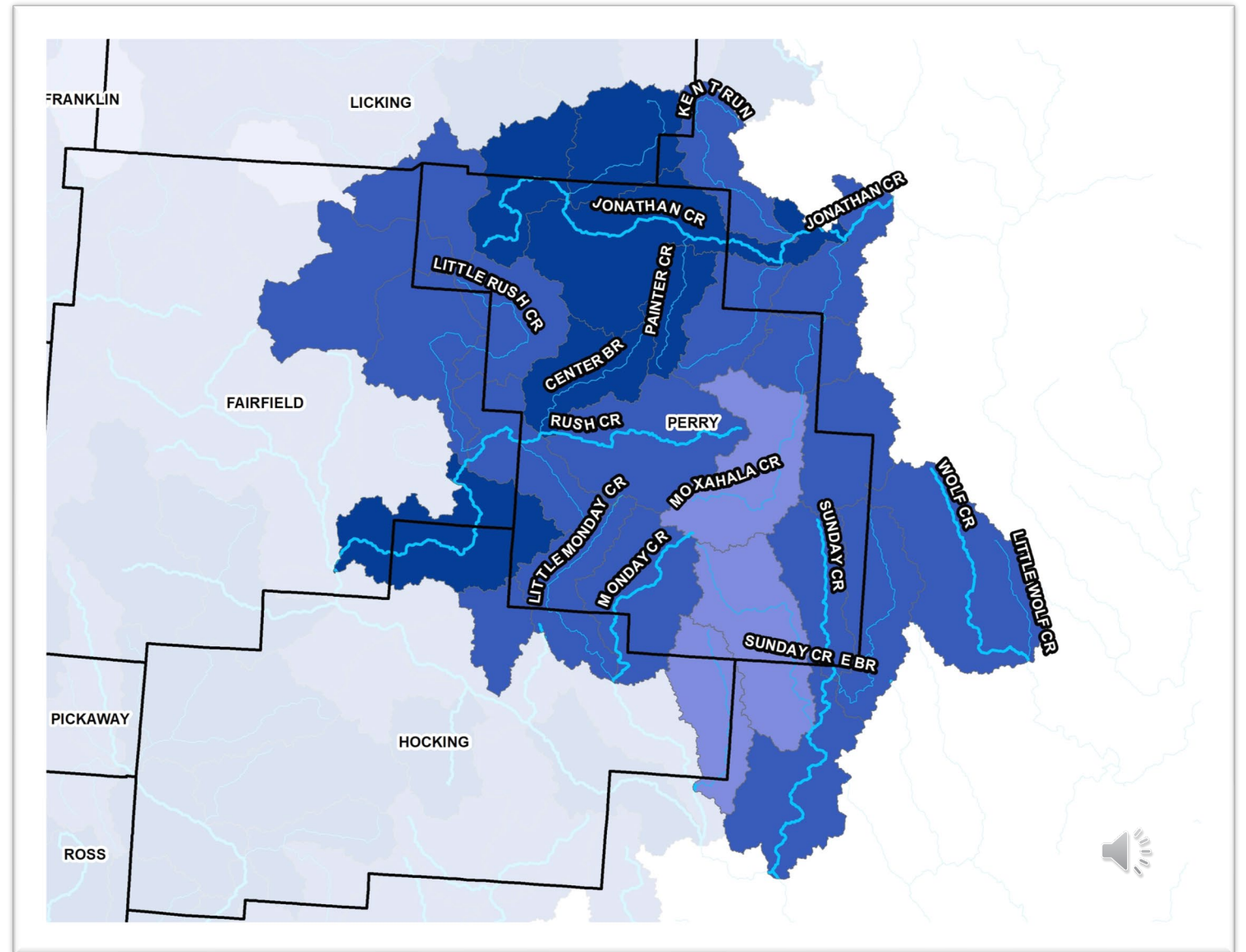
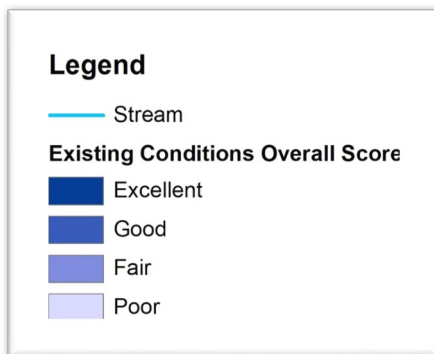
- **Goals:**

- Characterize current water quality at the local watershed level (HUC-12)
- Determine potential challenges based on a suite of possible future scenarios
- Characterize watersheds and identify potential for future water quality impacts
- Identify activities that may support the protection and improvement of streams and water quality



Existing Water Quality

- Watersheds are characterized by:
 - Quality of aquatic habitat (QHEI)
 - Targeted water quality standards
 - Stream biological health
- Majority of Perry County watersheds have good to excellent water quality





Future Water Quality Scenarios

- Future scenarios were examined for ***potential impacts*** to water quality due to:
 - **Land use**
 - *Increased impervious area may lead to degraded streams due to loss of riparian corridor, increased flows, and reduced ground water recharge*
 - **Hydromodification**
 - *Higher flows in frequently occurring events may contribute to increased erosion and reduced water quality*
 - **Increased occurrence of low flows**
 - *Lower and longer base flows during dry periods may disrupt aquatic habitats and lead to more restrictive permitting requirements*
 - **Temperature and Precipitation Impacts**
 - *Hotter/drier conditions may result in more frequent and lower base flows*

Land Use

Hydromodification

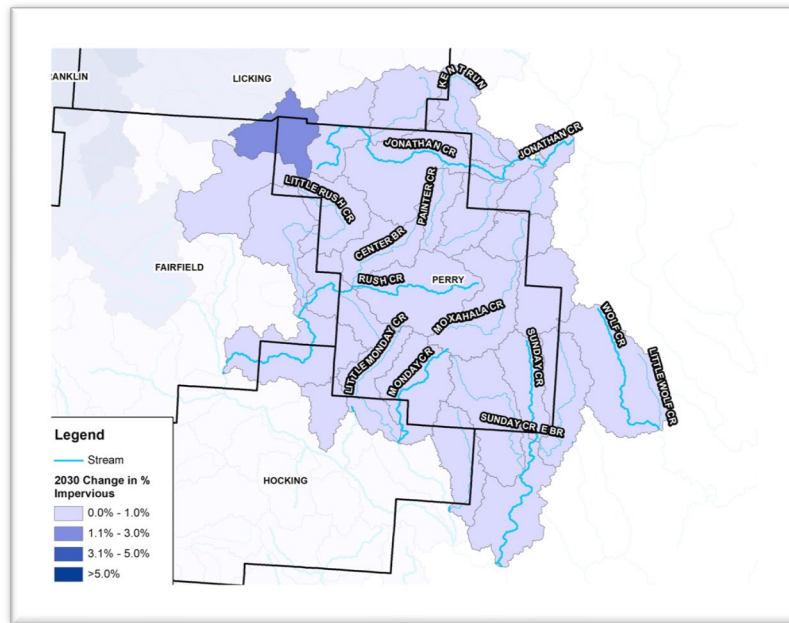
Low Flows

Temperature & Precipitation

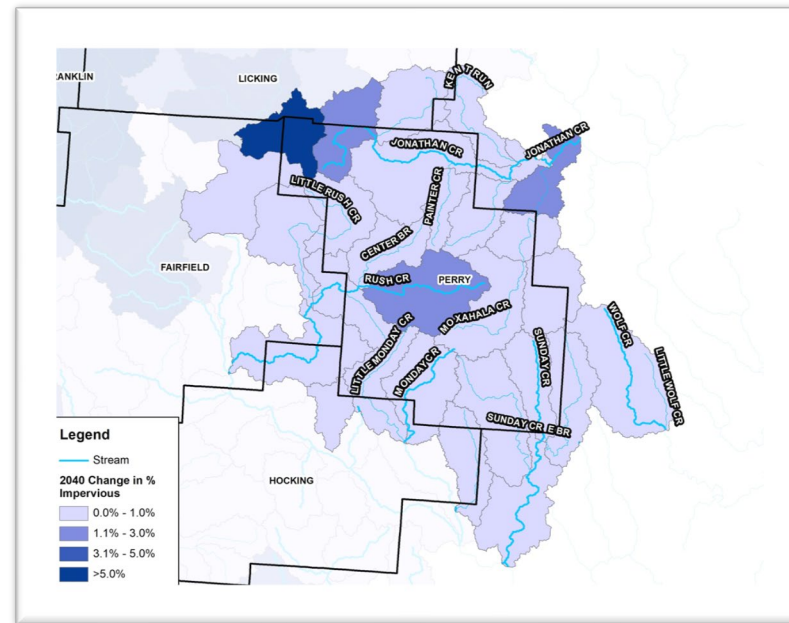


Potential Land Use Impacts

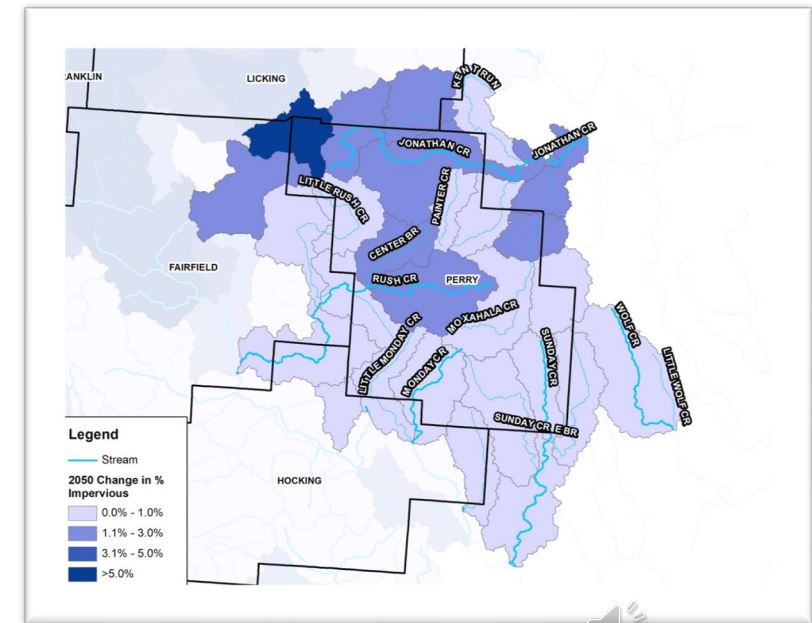
- *Land Use: Increased impervious area without appropriate setbacks, mitigation, or stormwater controls may lead to degraded streams due to loss of riparian corridor, increased flows, and reduced ground water recharge*



2030



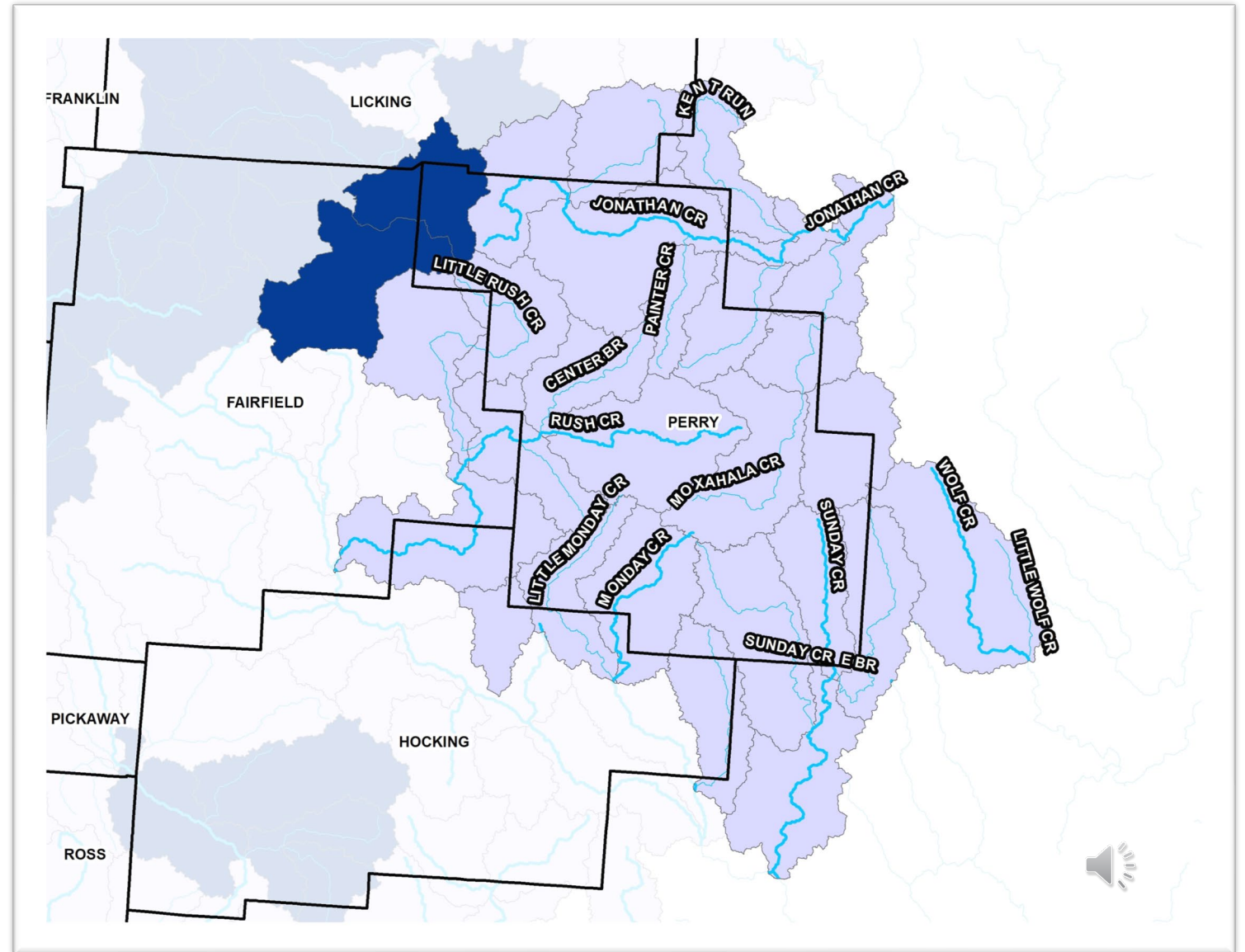
2040



2050

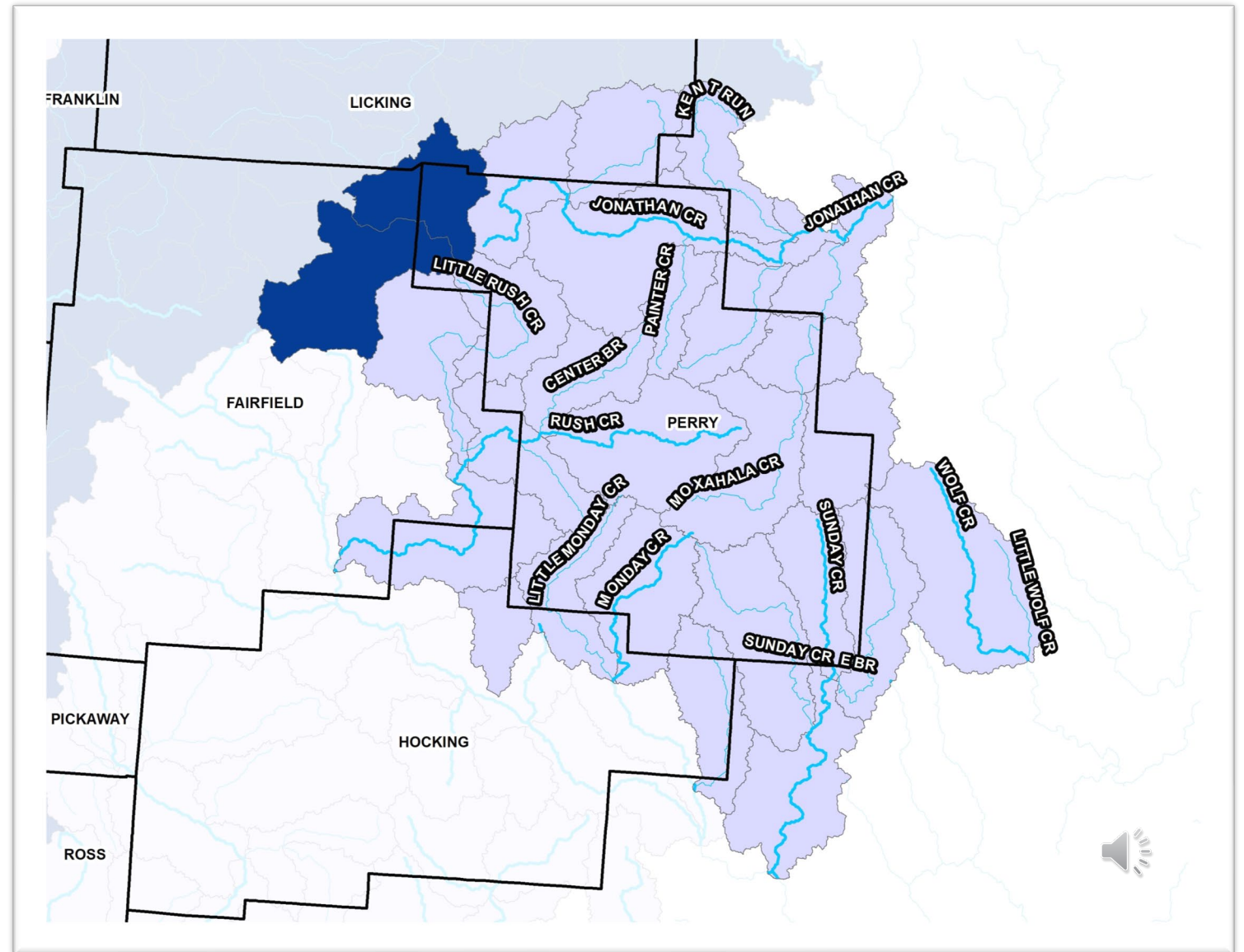
Hydromodification Impacts

- *Hydromodification: Higher in-stream flows in frequently occurring events resulting from increased development may result in streambank erosion and channelization, contributing to increased sediment load and reduced water quality*
- Watersheds in dark blue have higher potential for future hydromodification impacts
- Watersheds in light purple have lower potential for future hydromodification impacts



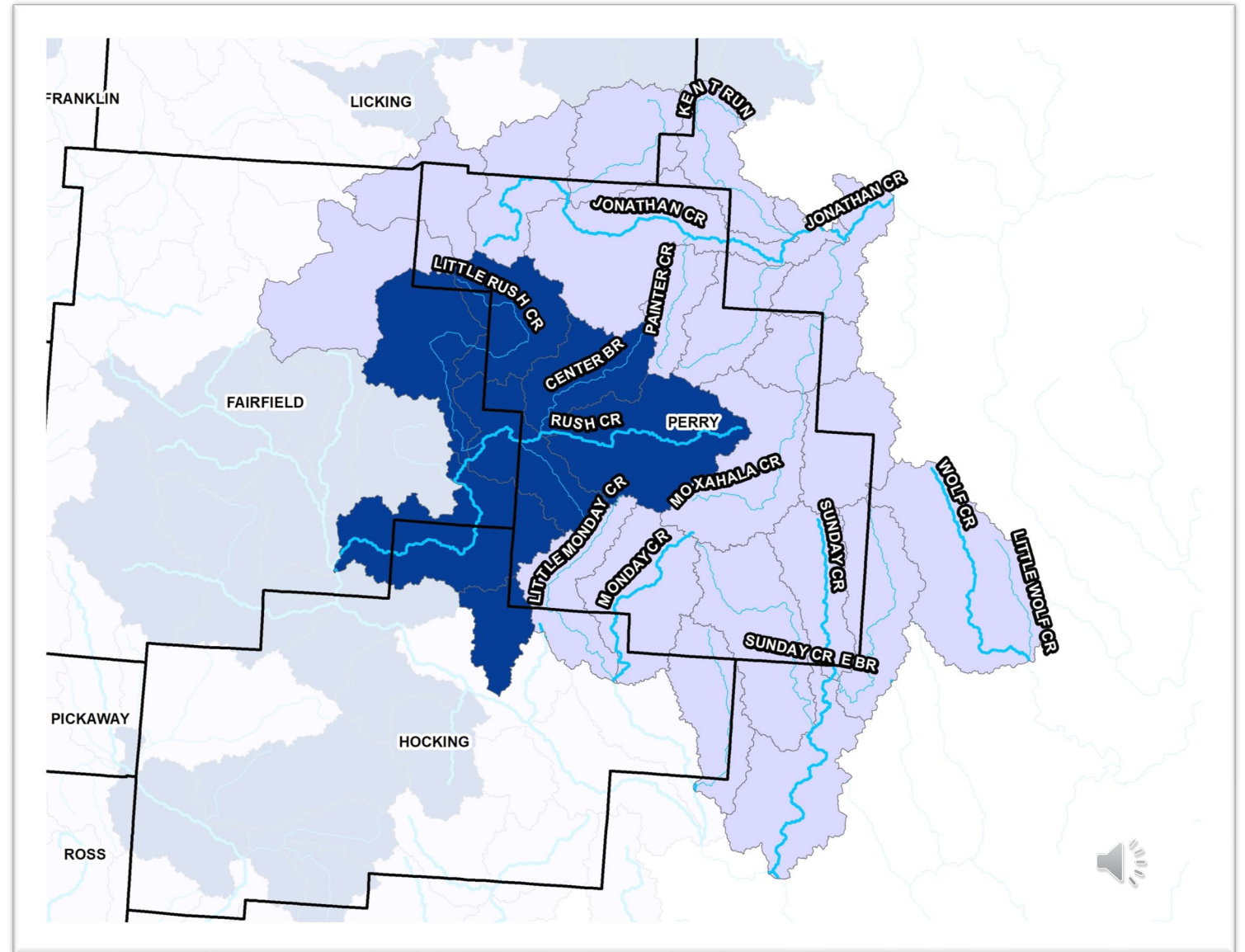
Low Flows Impacts

- *Low Flows: Lower base flows during dry periods resulting from reduced ground water levels or a decrease in pervious areas may disrupt aquatic habitats and lead to more restrictive permitting requirements*
- Watersheds in dark blue have higher potential for future water quality impacts and more restrictive permitting requirements due to low flows
- Watersheds in light purple have lower potential for future water quality impacts and more restrictive permitting requirements due to low flows
- *Note: Low flows areas are not indicative of potential water supply/availability issues but rather where changes could impact local aquatic habitat and permitting requirements*



Temperature and Precipitation Impacts

- *Temperature and precipitation: Hotter/drier conditions may result in more frequent and lower base flows*
- Watersheds in dark blue have higher potential for future low flow impacts due to temperature and precipitation conditions
- Watersheds in light purple have lower potential for future low flow impacts due to temperature and precipitation conditions





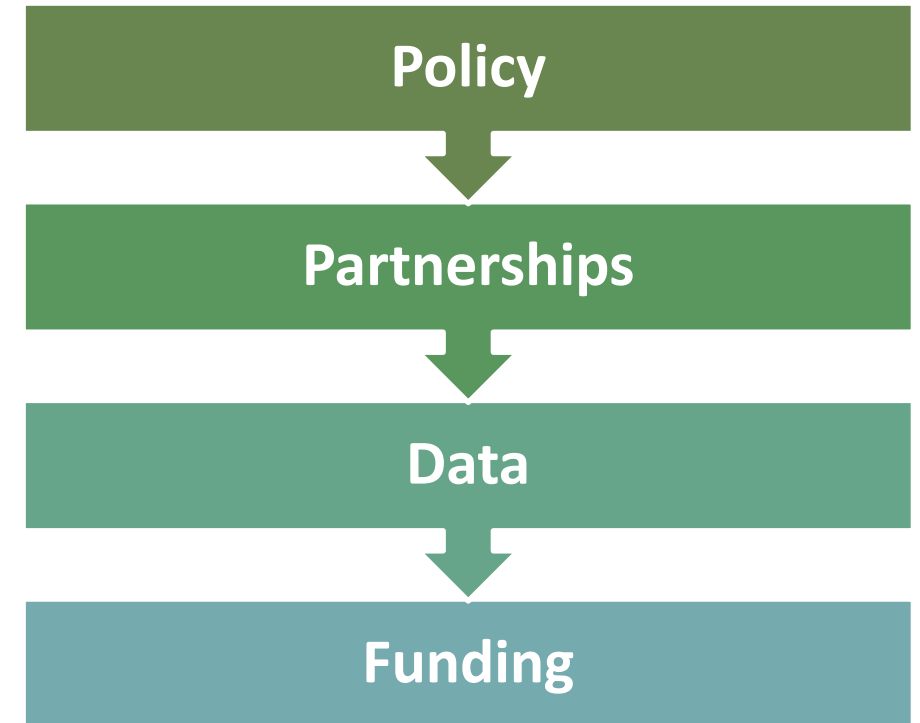
Water Quality Protection

All watersheds are living systems and are constantly changing.

The **magnitude** of change will vary across the region based on several variables.

- Due to the enhanced benefits they provide, watersheds with high quality features should be prioritized for protection.
- Best management practices should be implemented across all watersheds to protect existing water quality.
- Opportunities for conservation should be explored along stream corridors in all watersheds to preserve riparian areas.

When properly implemented and aligned, these mechanisms may adequately protect ecosystems alongside land use changes:



Water Quality Protection Mechanisms

- **Review Local Regulations**

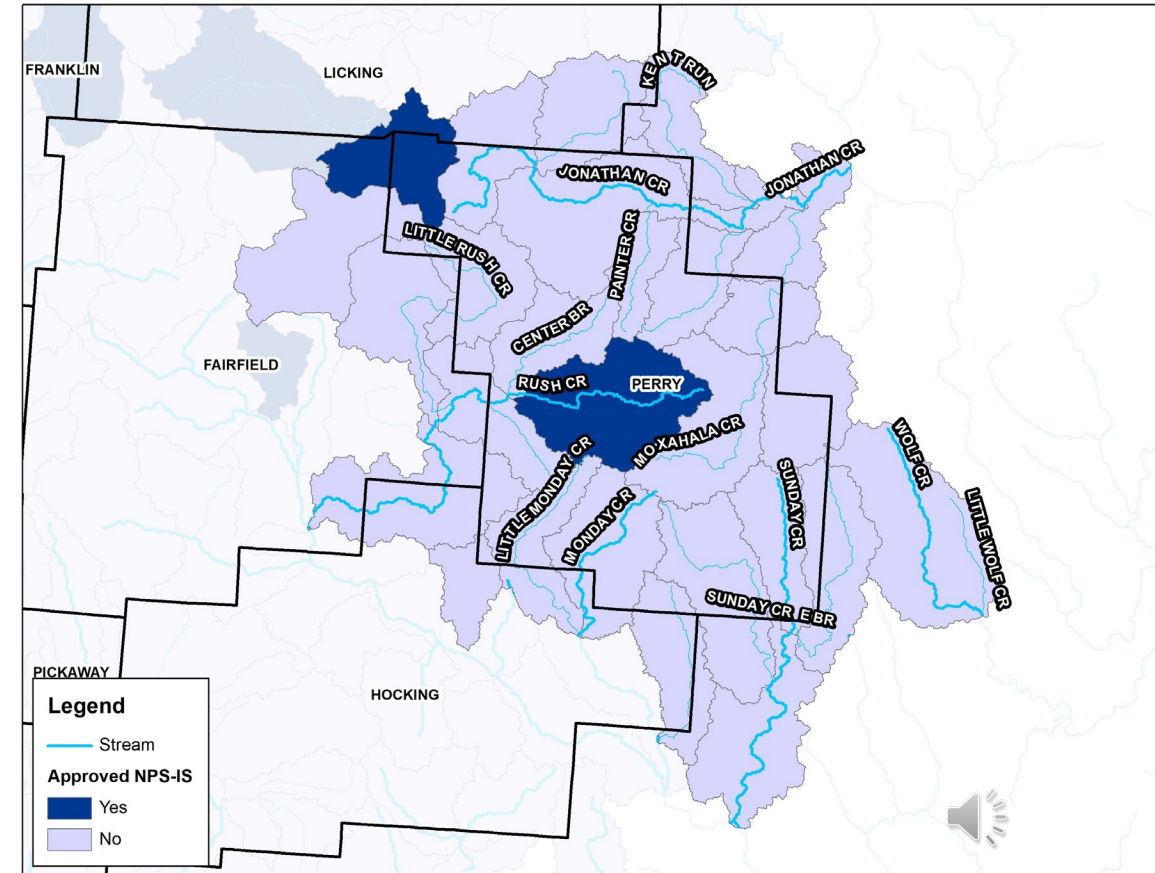
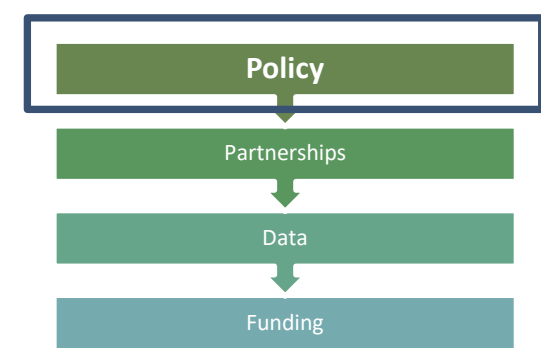
- Riparian Setbacks
- Floodplain Requirements
- Stormwater Management Plans
- Tree Codes
- Zoning and Planning
- Application and review fee rates

- **Develop 9 Element Nonpoint Source Implementation Strategies (NPS-IS)**

- Perry County includes all or part of **27 HUC-12 watersheds**
- Currently, **2 HUC-12 watersheds** have an Ohio EPA approved NPS IS

- **MS4 Compliance**

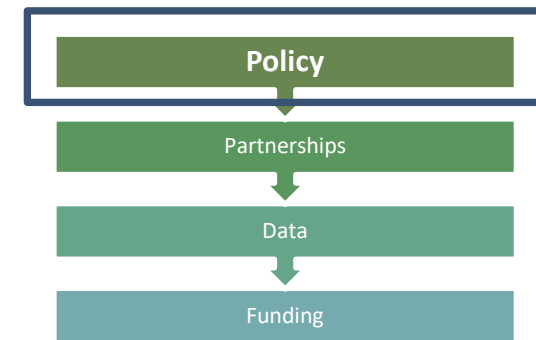
- Ensure communities approaching Urban Area designation are prepared for the regulatory responsibilities under the CWA
- MS4 communities can leverage an approved NPS-IS plan to meet permit requirements



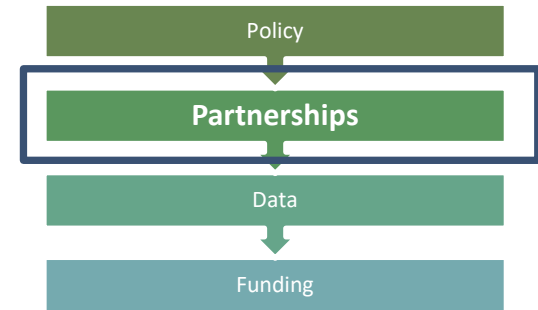


Water Quality Protection Mechanisms

| MS4 Requirement | How a NPS-IS Plan Can Help |
|-------------------------------|--|
| NPDES Permit | Guide permit applications and support permit reviews |
| Planning and Development | Encourage Low Impact Development and watershed friendly land use |
| Stormwater BMP Implementation | Identify green infrastructure and restoration projects |
| Public Education and Outreach | Offer resources, partners, and initiatives |
| TMDL Compliance | Provide baseline data and pollutant load estimates. |
| IDDE | Identify high risk areas for inspection and monitoring |
| Funding Opportunities | Support Section 319 grant applications |



Water Quality Protection Mechanisms

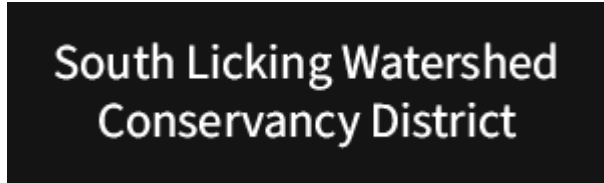


- **Pool Resources**

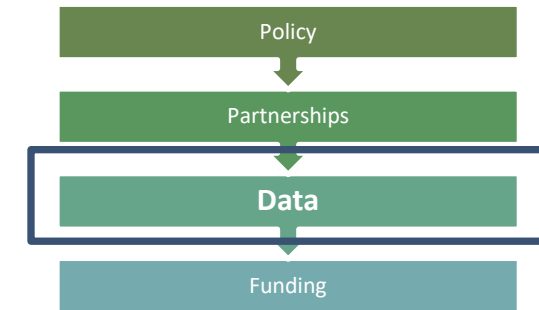
- Meet routinely to discuss trends, projects, and upcoming plans
- Invite guest speakers to learn about new opportunities
- Delegate data collection and permit review responsibilities
- Access technical expertise, resources, and cost sharing opportunities

- **Increase Community Engagement**

- Organize public facing programs including clean up events, tree plantings, and citizen monitoring
- Use NPS-IS fact sheets, reports, and maps in public education material



Water Quality Protection Mechanisms



- **Monitor Water Quality**

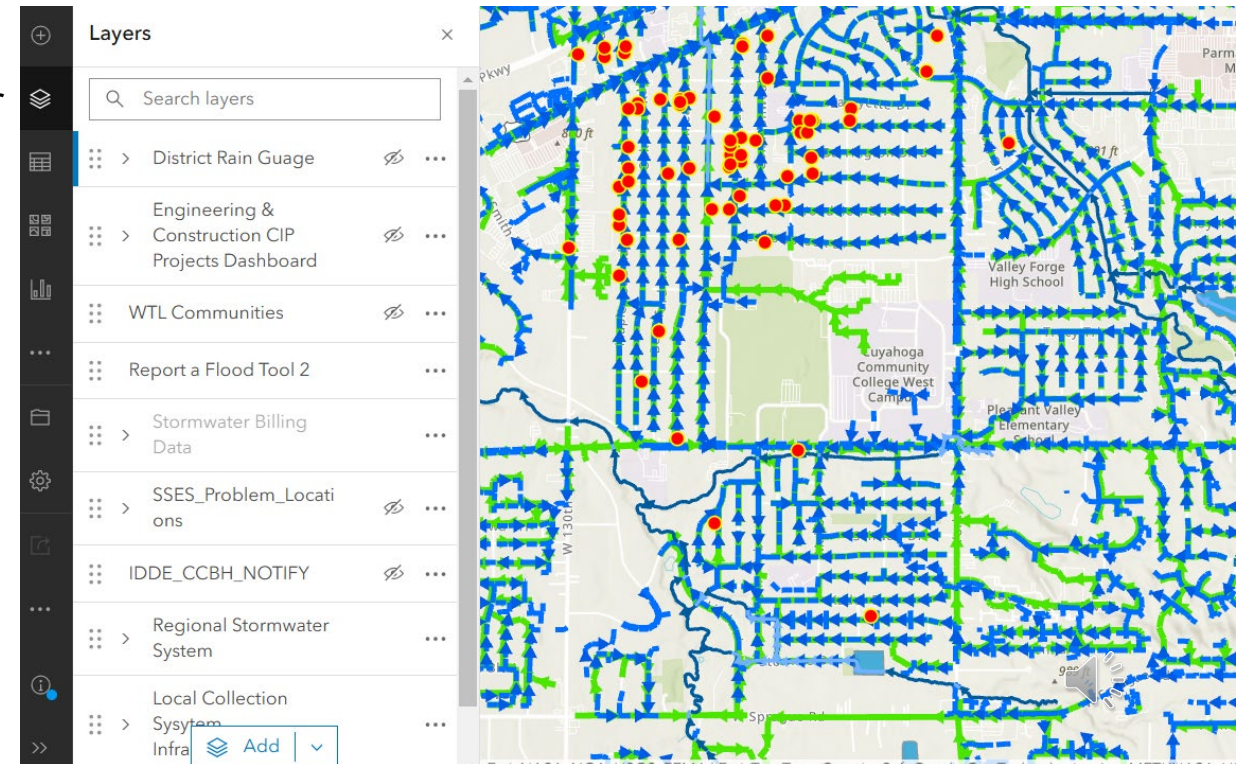
- Offer trainings to promote Citizen Science
- Develop monitoring plans: identify locations to monitor or identify restoration and protection needs
- Compare data to note new trends that may emerge

- **Digitize Records**

- Georeference data to spatially analyze trends
- Expand data collection efforts as needed

- **Public Reporting**

- Collect observations from the public
- Make findings and data accessible



Water Quality Protection Mechanisms

- **Prioritize Infrastructure Upgrades**

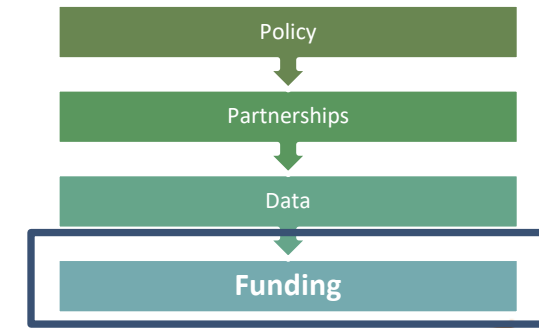
- Focus on areas identified as current or near-term gaps
- Consider future scenarios for conservative planning efforts
- Assess regional optimization of services as early as possible

- **Incentivize Sustainable Practices**

- Establish funding programs to encourage developers to adopt green infrastructure
- Encourage redevelopment strategies

- **Leverage Grant Programs**

- District 18 NRAC Clean Ohio Green Space funding
- Ohio EPA Water Resource Restoration Sponsor Program
- Muskingum Watershed Conservancy District offers a Partners in Watershed Management Project Assistance Program and NPS-IS Development grant funding
- Foundation for Appalachian Ohio offers multiple grants (Community, Research, and Innovation)
- Section 319 Grant Funding (Limited to HUC-12s with Ohio EPA approved NPS-IS plan)
- ODNR Division of Mineral Resources Management AMD Set-Aside Program



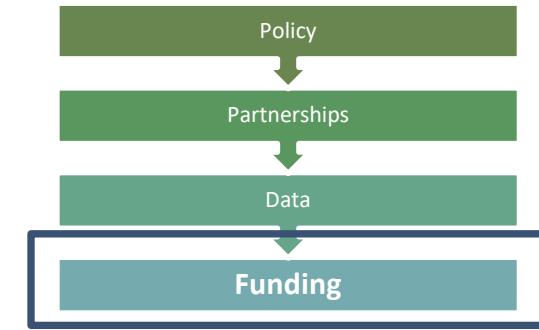
**Denotes counties in the Muskingum Watershed also eligible for this opportunity.*



Water Quality Protection Mechanisms

H2Ohio Program

- **H2Ohio Rivers Program**
 - Agricultural Incentive Program – Expanded to be statewide in 2024 (ODA)
 - Chloride Reduction Grant Program (OEPA)
 - Equipment Grants (OEPA)
 - Healthy Rivers Livery Grant Program (ODNR)
 - Dam removals (ODNR/OEPA)
 - Water Infrastructure Funding (OEPA)
- **H2Ohio Statewide Wetland Grant Program (ODNR)**



H2Ohio Rivers Program

Monitoring & Data Collection
Restoring River Health
Preserving Healthy Rivers

The new H2Ohio Rivers program will maintain and improve the health of Ohio's large rivers. H2Ohio Rivers will ensure community health, support economic development, and provide opportunities for recreation across the state.

\$47M INVESTMENT FY24-25

- PFAS Prevalence Study**
Ohio will undergo a statewide survey to measure its large rivers for the existence of PFAS substances, which will help Ohio remediate any contamination.
- Dam Removal**
Removing deteriorating dams that have outlived their intended use will improve water quality and wildlife habitat.
- Aquatic Species Survey**
A statewide survey of Ohio's aquatic species including freshwater mussels and fish, which are important indicators of water quality, will inform future strategies to improve healthy river ecosystems.
- Land Conservation**
A new Conservation Reserve Enhancement Program in the Great Miami River Watershed will incentivize farmers to voluntarily set aside acreage into conservation practices to reduce nutrient and sediment runoff and protect water quality.
- Road Salt Reduction**
Local municipalities can receive funding for equipment upgrades that prevent the overapplication of salt on Ohio roads and reduce the amount of salt running off into Ohio's waterways.
- Litter Prevention**
A strong litter prevention and clean up program will improve the quality of Ohio's waterways that have been historically plagued by litter, waste and debris.

KEY STEPS

- Monitoring & Data Collection**
Expand survey of contaminants in Ohio's rivers and expand monitoring of Ohio's fish and mussel populations.
- Restoring River Health**
Clean and restore Ohio's waterways in need.
- Preserving Healthy Rivers**
Preserve Ohio's high-quality riparian areas to maintain healthy waterways for the future.

MIKE DEWINE GOVERNOR OF OHIO
Department of Agriculture | Department of Natural Resources | Environmental Protection Agency | Lake Erie Commission

Central Ohio Regional Water Study

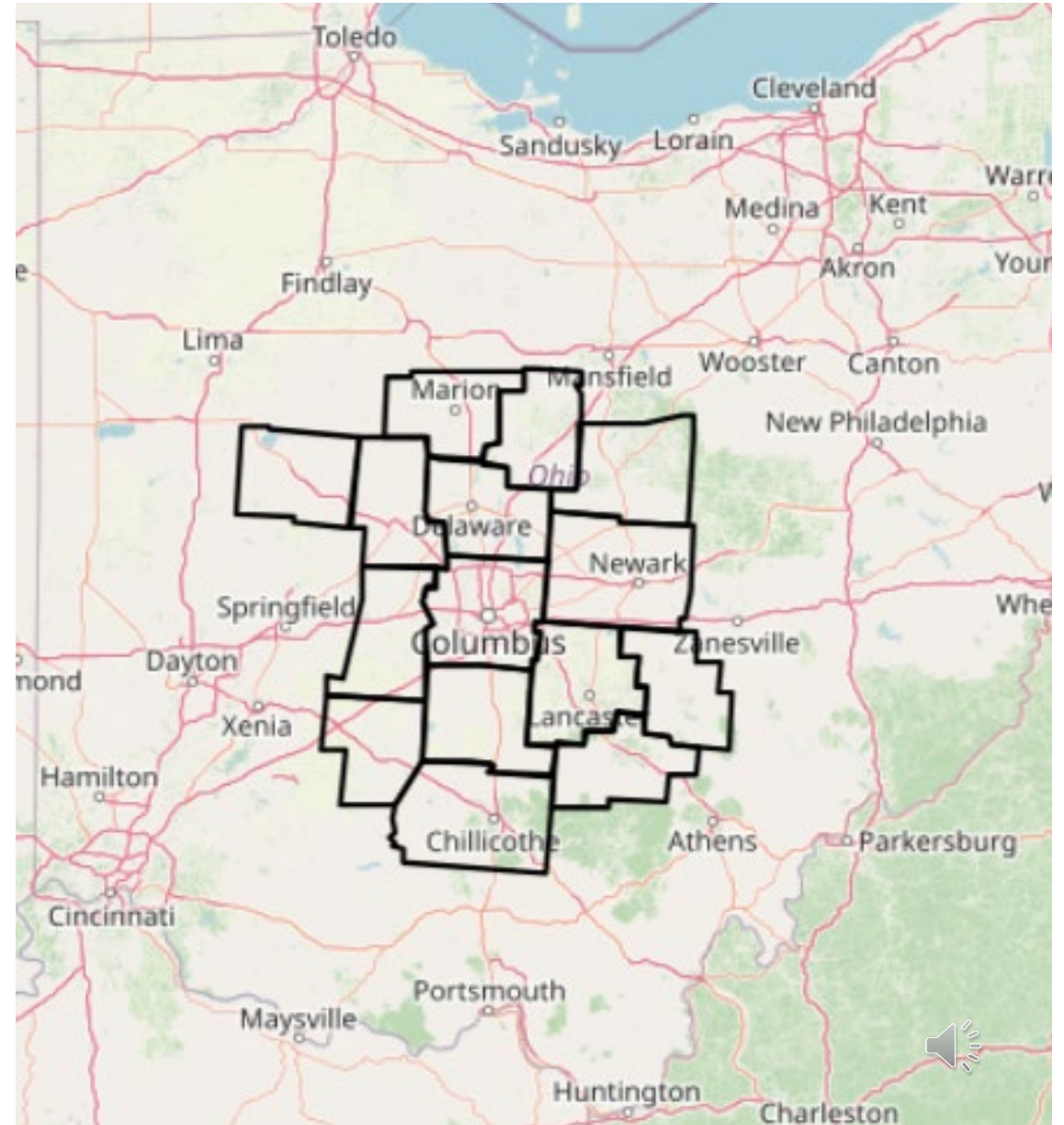
Overview

Residential & Industrial Growth

Water Resource & Infrastructure Adequacy

Future Projects and Opportunities

Planning for Water Quality Protection





Central Ohio Regional Water Study: Perry County



March 1, 2025

