# Scenario Planning: Water Findings

## Committee of the Whole

METROPOLITAN COUNCIL

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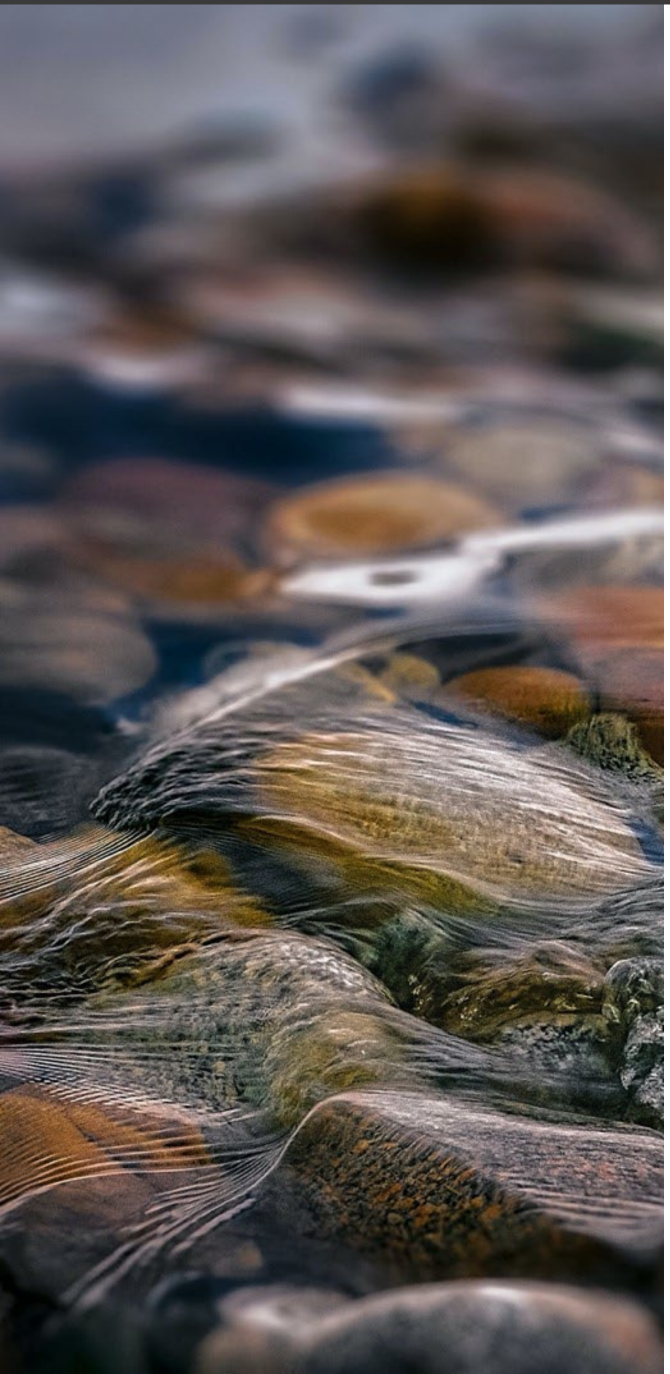
# Overview



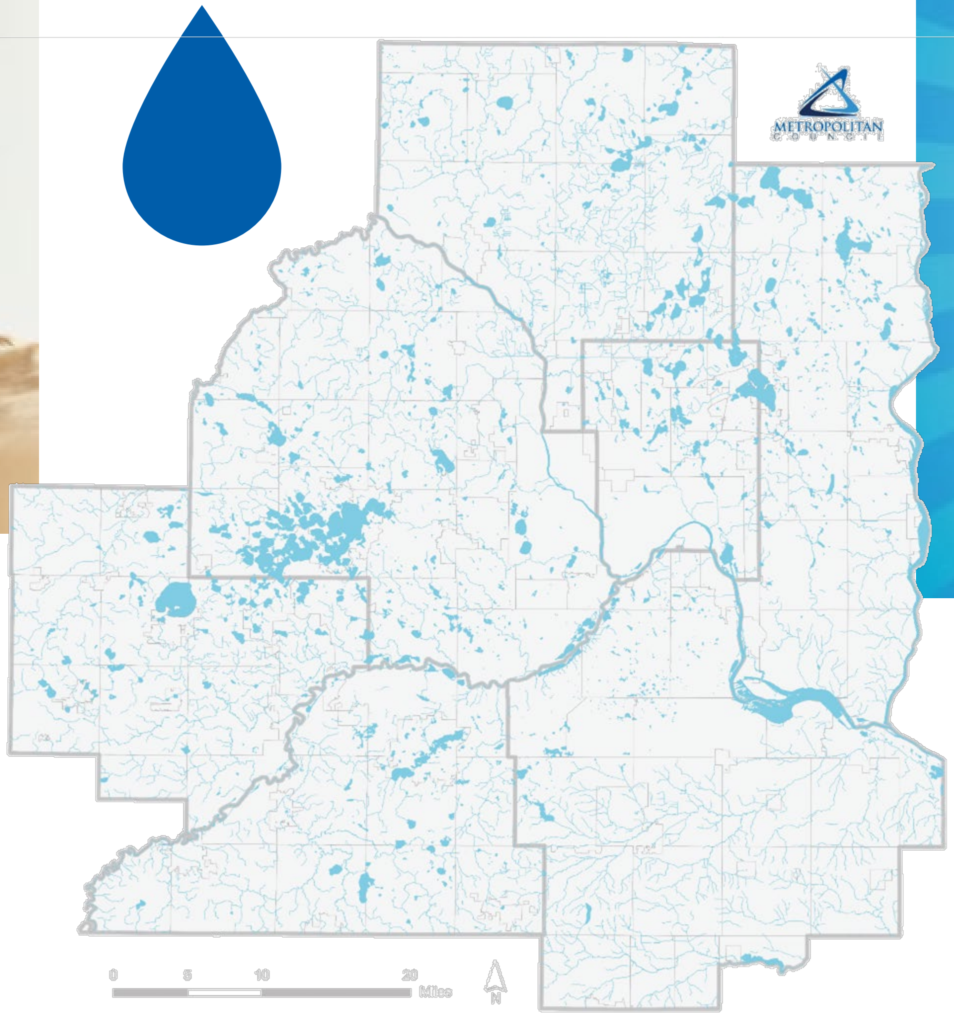
Water resource policy and system plan update

Surface water findings

Water supply findings

Wastewater system findings

# Water, water everywhere…

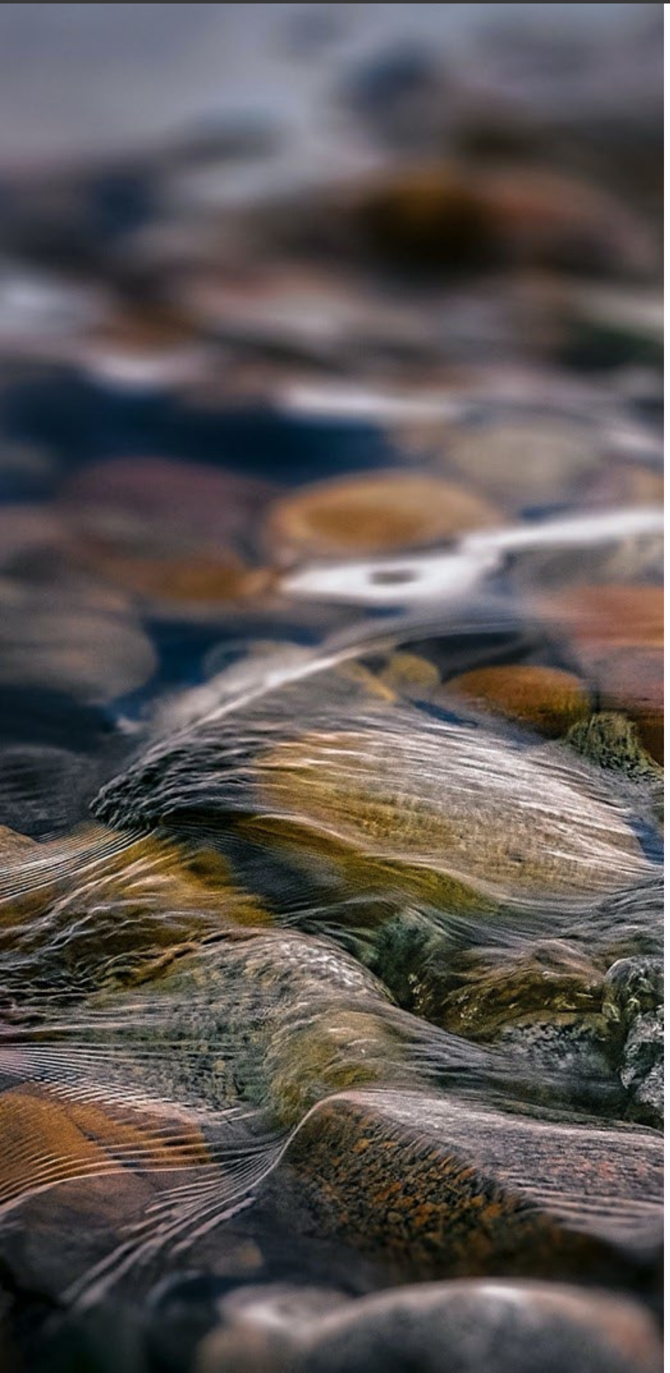



# Separated Systems – Connected Water

# Key Considerations

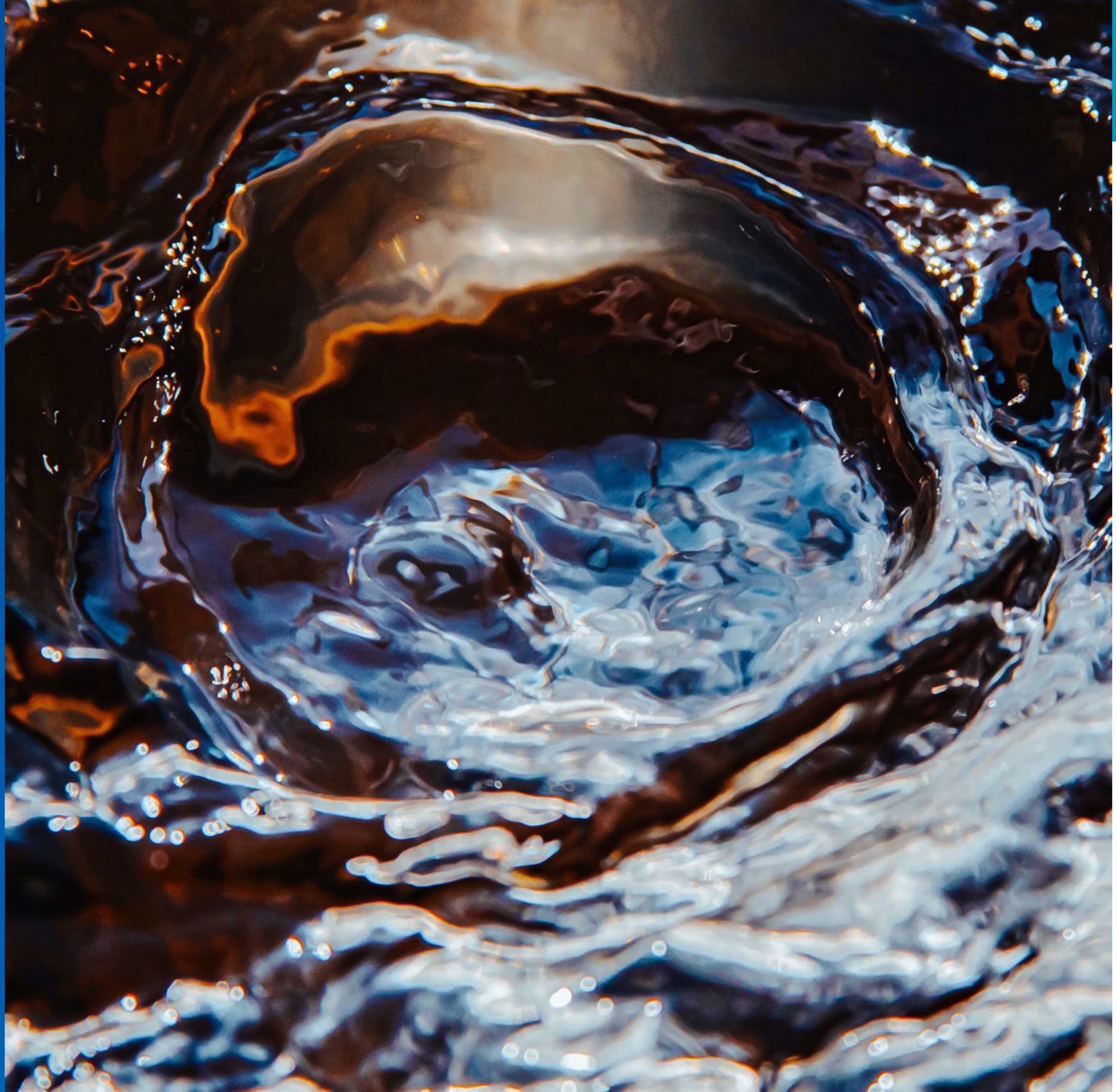
| | |
|---|---|
| Collaboration | Integrated water planning (thinking about water resources, water supply, and wastewater) with land use planning is the best way to see the big picture for regional waters. |
| Infrastructure | Infrastructure requires maintenance. As we build out further into the region, we will have to support the larger system. |
| Climate | The climate is forcing us to develop with resiliency in mind – for both abundant and scarce water. |
| Equity | We must learn from previous land use/water decisions that have negatively impacted vulnerable communities. Let's not repeat history and, instead, repair it. |

# Water measures: Connection to regional goals



| | Working Regional Goals | | | | |
|---|---|---|---|---|---|
| **Measure** | **Equitable Inclusive Region** | **Healthy Safe Communities** | **Dynamic Resilient Economy** | **Mitigated Adapted Resilient Climate** | **Natural Systems Protected Restored** |
| Pollutant loading to waterbodies | ✓ | ✓ | | ✓ | ✓ |
| Potential contaminants in vulnerable areas | ✓ | ✓ | ✓ | | ✓ |
| Water demand | | ✓ | ✓ | ✓ | ✓ |
| Wastewater system capacity | | ✓ | | ✓ | ✓ |

# Surface water scenario findings



# Key surface water concepts

## Land use change

Surface water runoff for scenarios is driven by land use change.

Primarily agricultural and undeveloped land (rural and urban) converting to single family residential.

## Nitrate load

Pollutant that enters local lakes and streams as well as traveling down the Mississippi River to pollute the Gulf of Mexico

Contributes to excess algae growth in local waters and the dead zone in the Gulf of Mexico

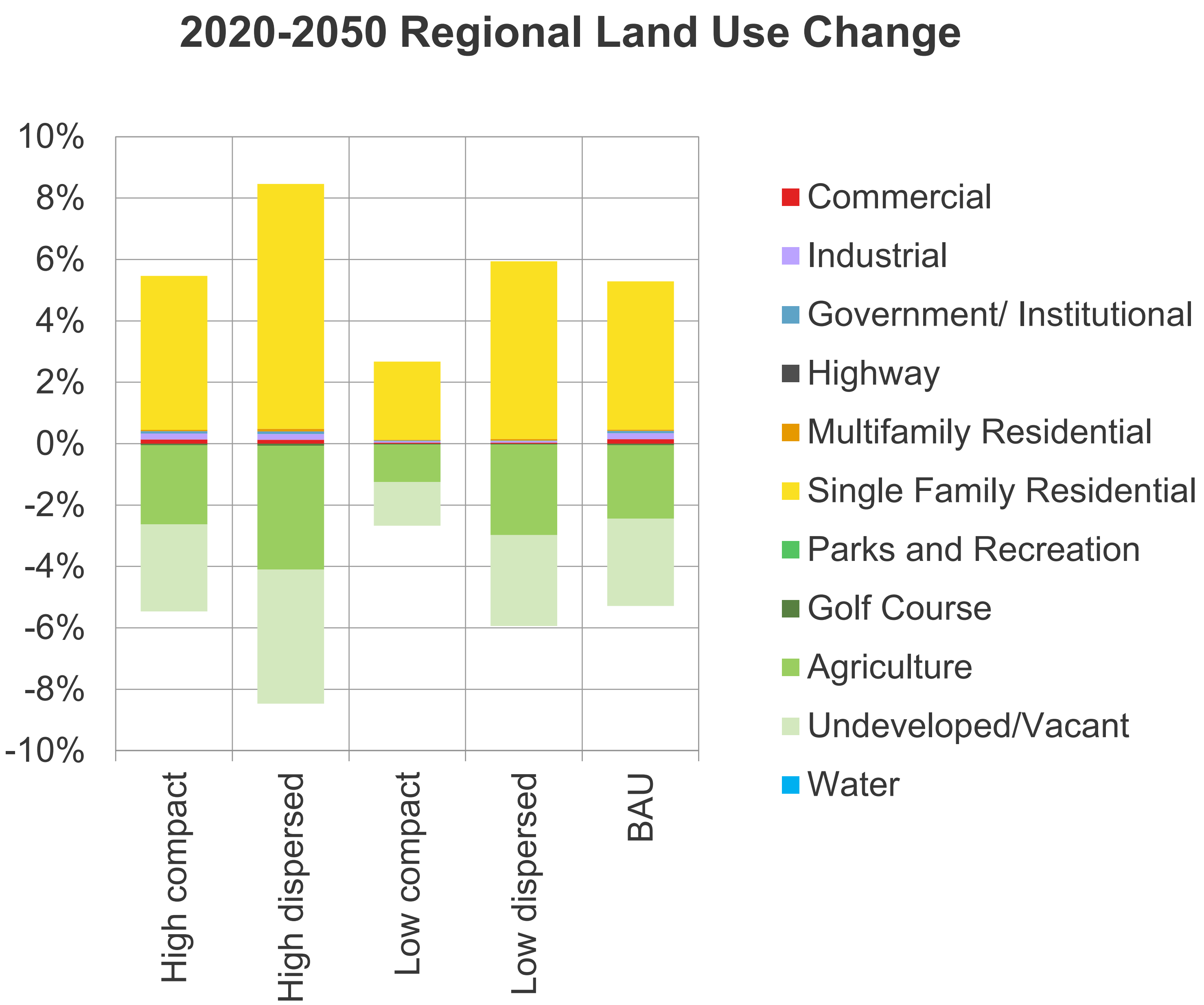
## Chloride load

Toxic to aquatic life at high concentrations in local waterbodies.

Primary source of chloride in the region is road salt.

# Land Use Change

- No scenario brings dramatic land use change.
- Almost all land use change is single family residential converted from undeveloped and agricultural.
- *High compact* and *Low dispersed* show very similar land use change to *Business as usual (BAU).*
- *High dispersed* and *Low compact* are the most different from *BAU*.

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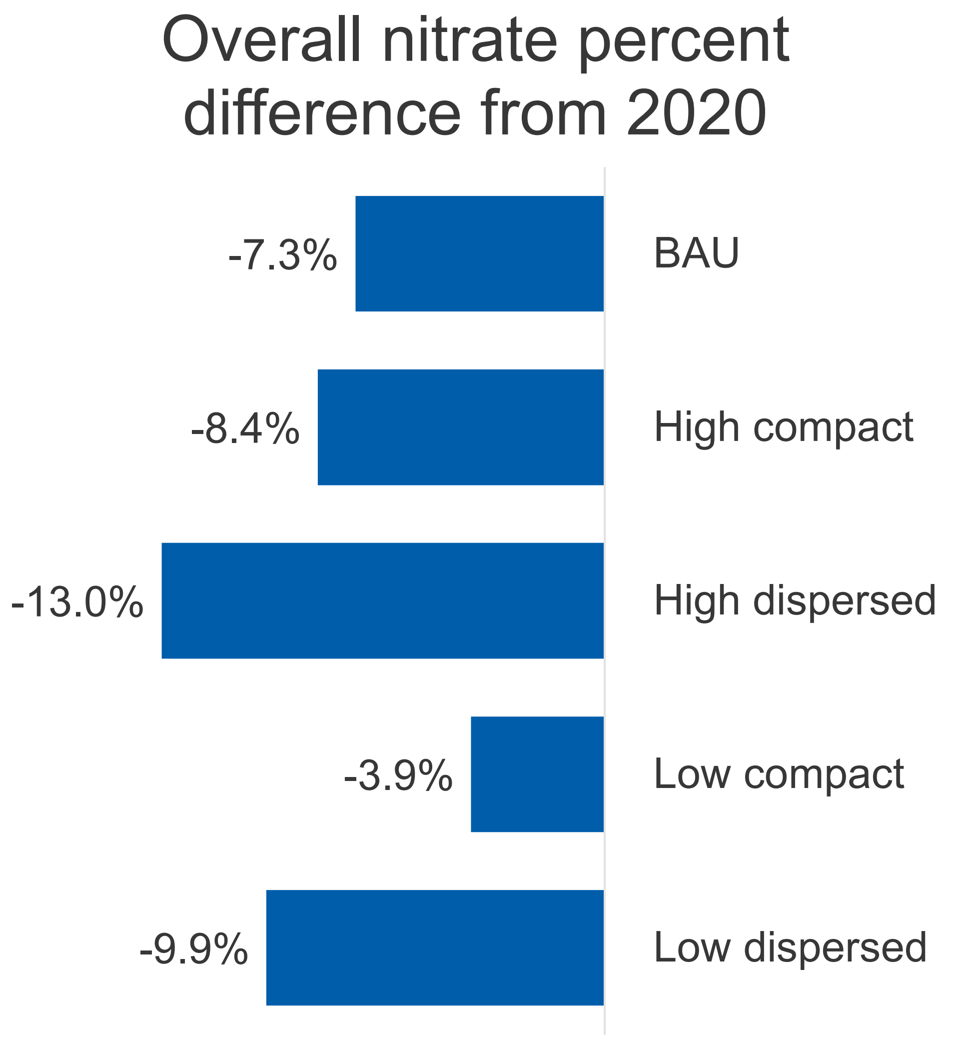
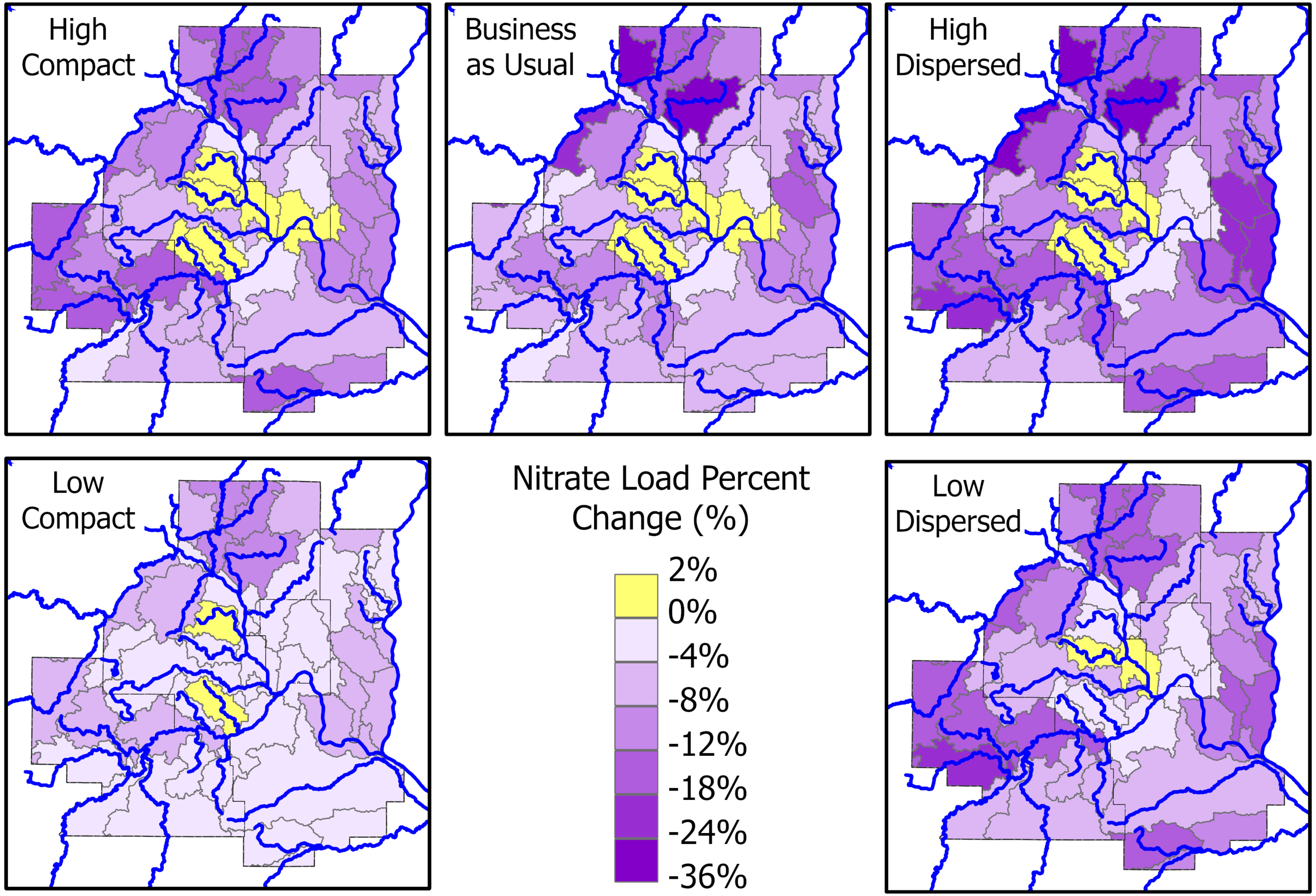
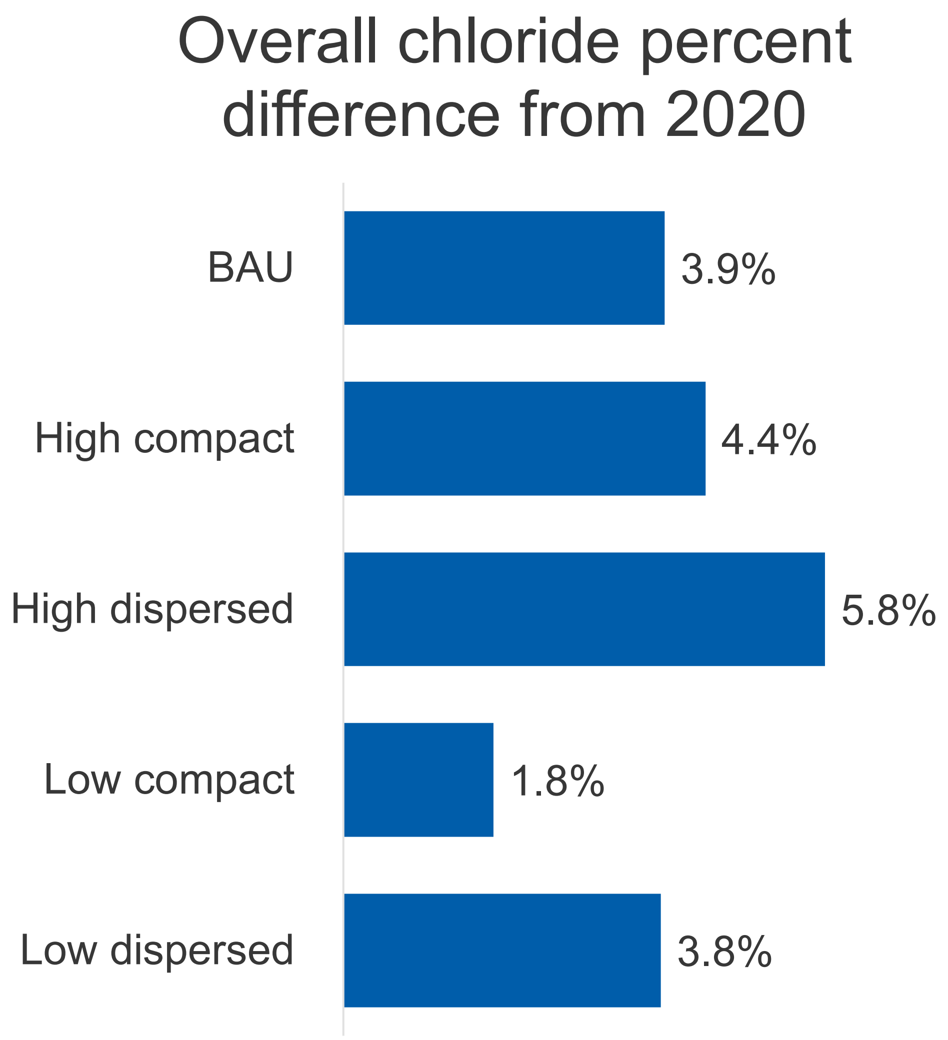
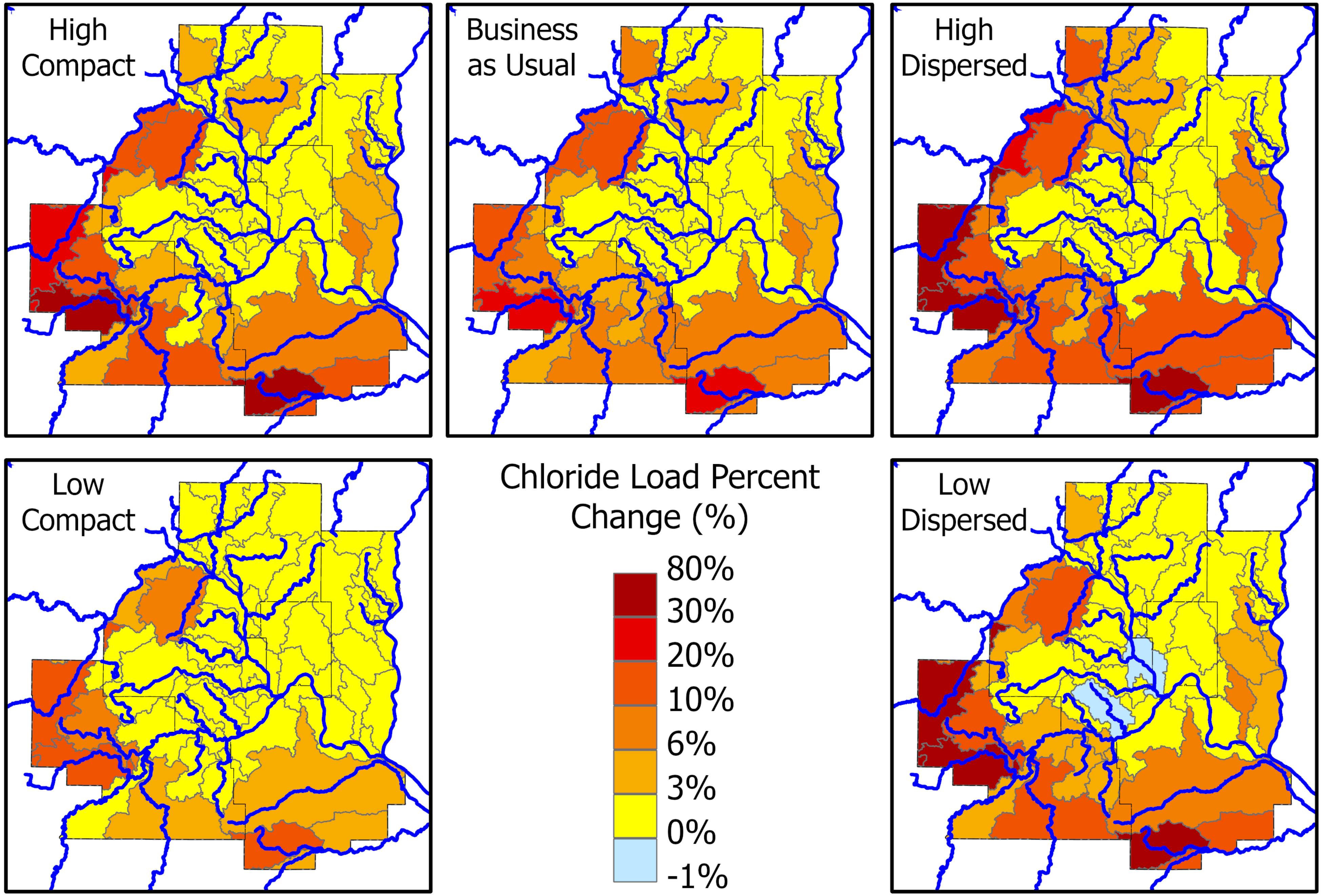
# Nitrate runoff



# Chloride runoff

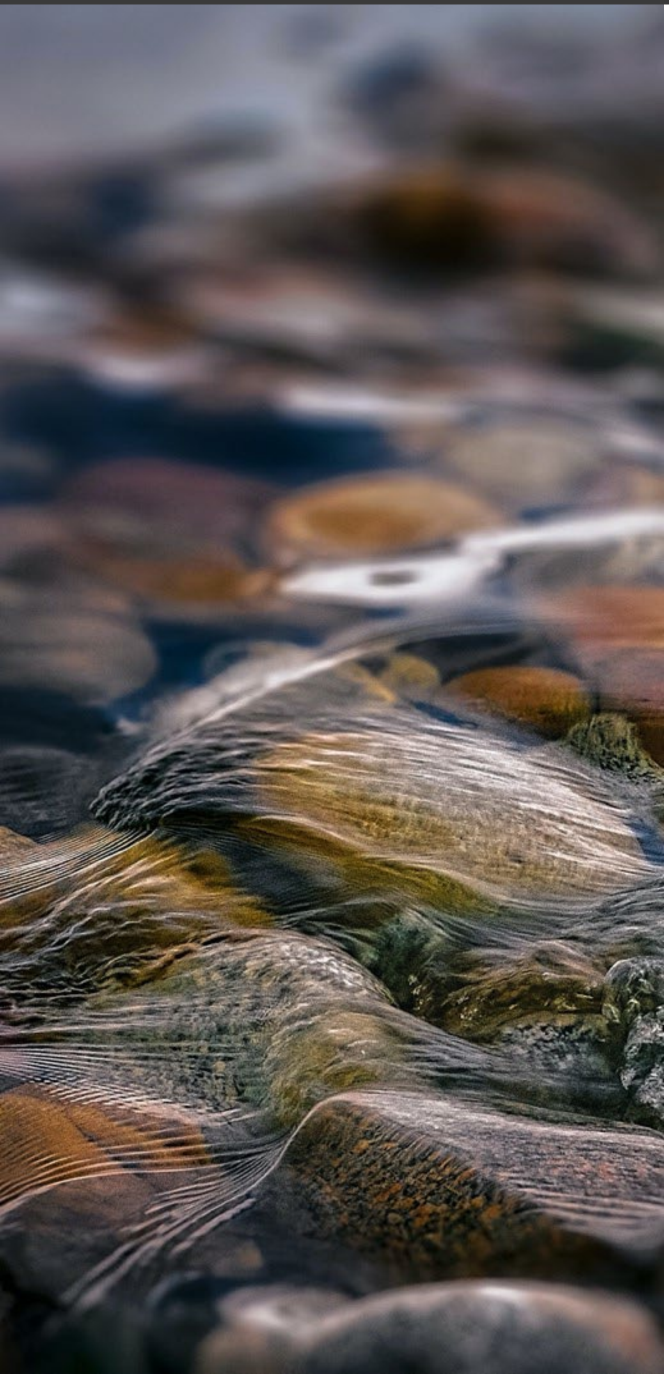


# Surface water findings


- One scenario is not universally “better” for surface water runoff. It depends on the pollutant of concern.
- Surface water impacts occur locally on small streams and lakes. Overall differences in scenario results at the metro scale don’t tell the whole story.
- Climate is likely to drive much bigger differences in surface water runoff than different land use scenarios will.

# Connections to land use

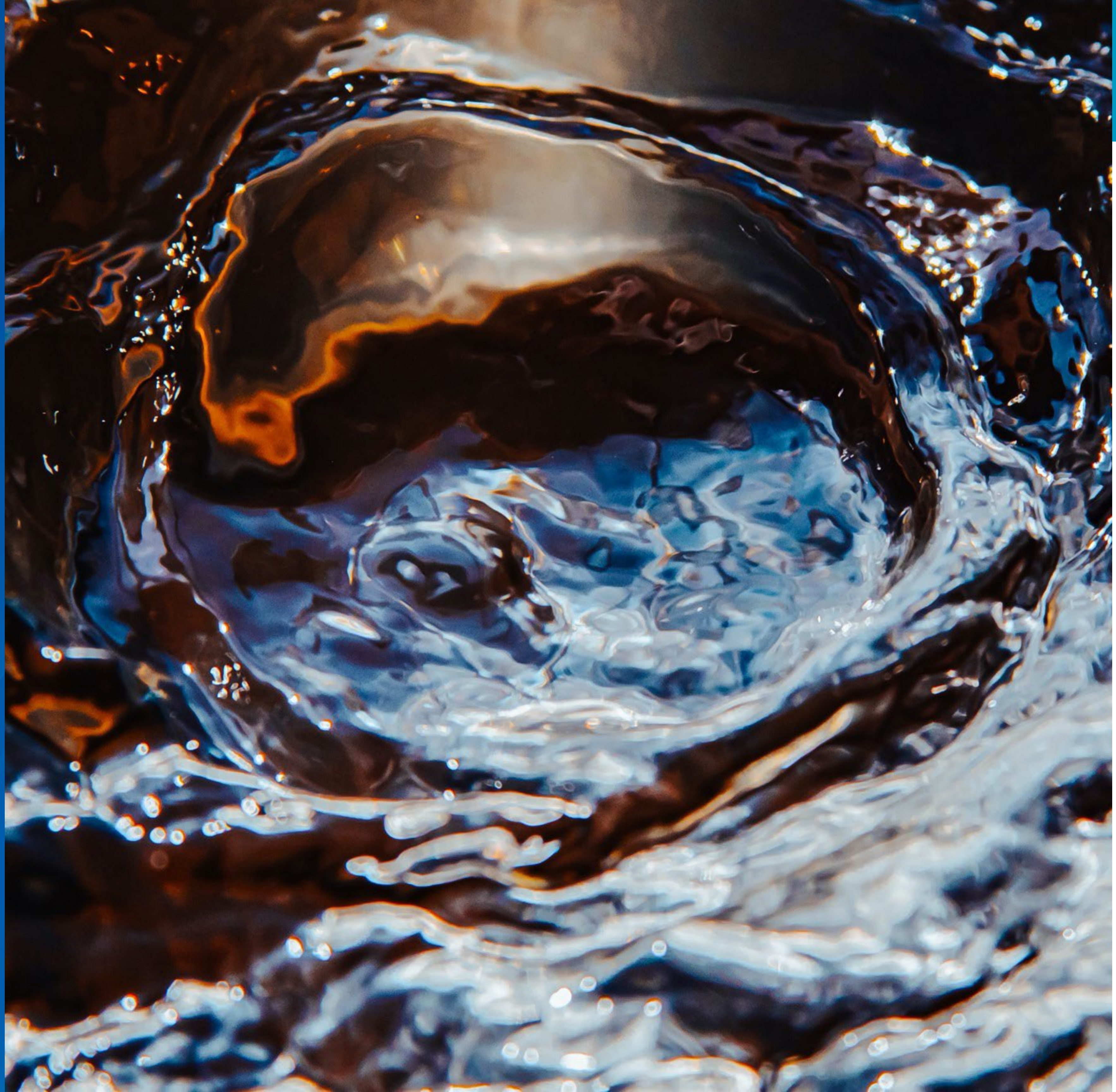


Single family residential (SFR) takes the most acres of new development.

Guidance should focus on ensuring new SFR is constructed to minimize water impacts.

Best management practices (BMPs) are key to offsetting impacts from development overall, regardless of scenario.

# Water supply scenario findings



# Key water supply concepts

## Potential contaminants in vulnerable drinking water supply areas

Different land use types are associated with different potential contaminants, as reported by the Minnesota Department of Health. Planning scenarios project different land use patterns in DWSMAs.

*Acres of different land use types in areas designated by communities and MDH as vulnerable DWSMAs*

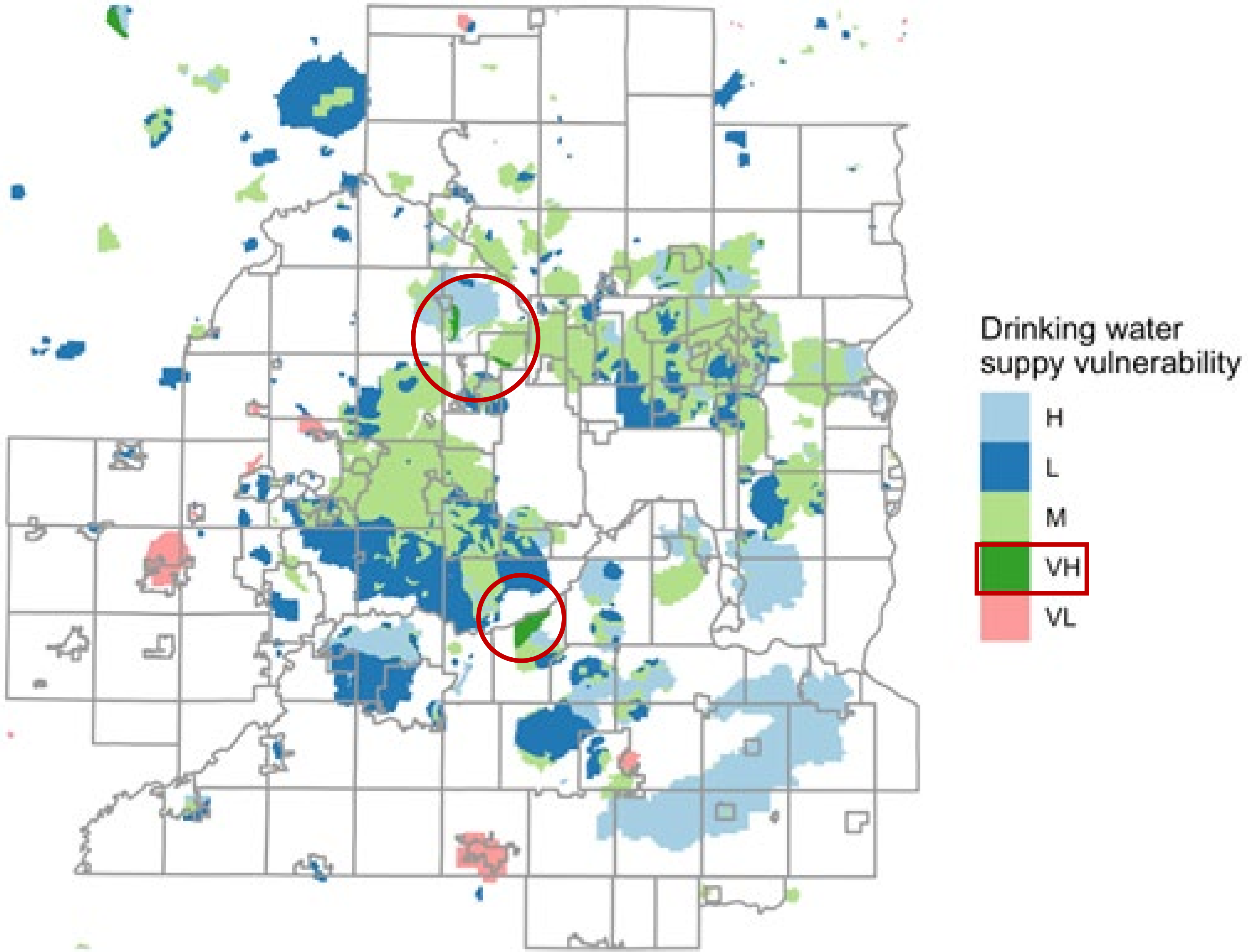
## Water demand

Changing population is related to changing water demand. Demand can be estimated based on population data and past assumptions of per person water use using the method published in the 2015 Twin Cities metropolitan area master water supply plan.

# Drinking Water Supply Management Area Vulnerability

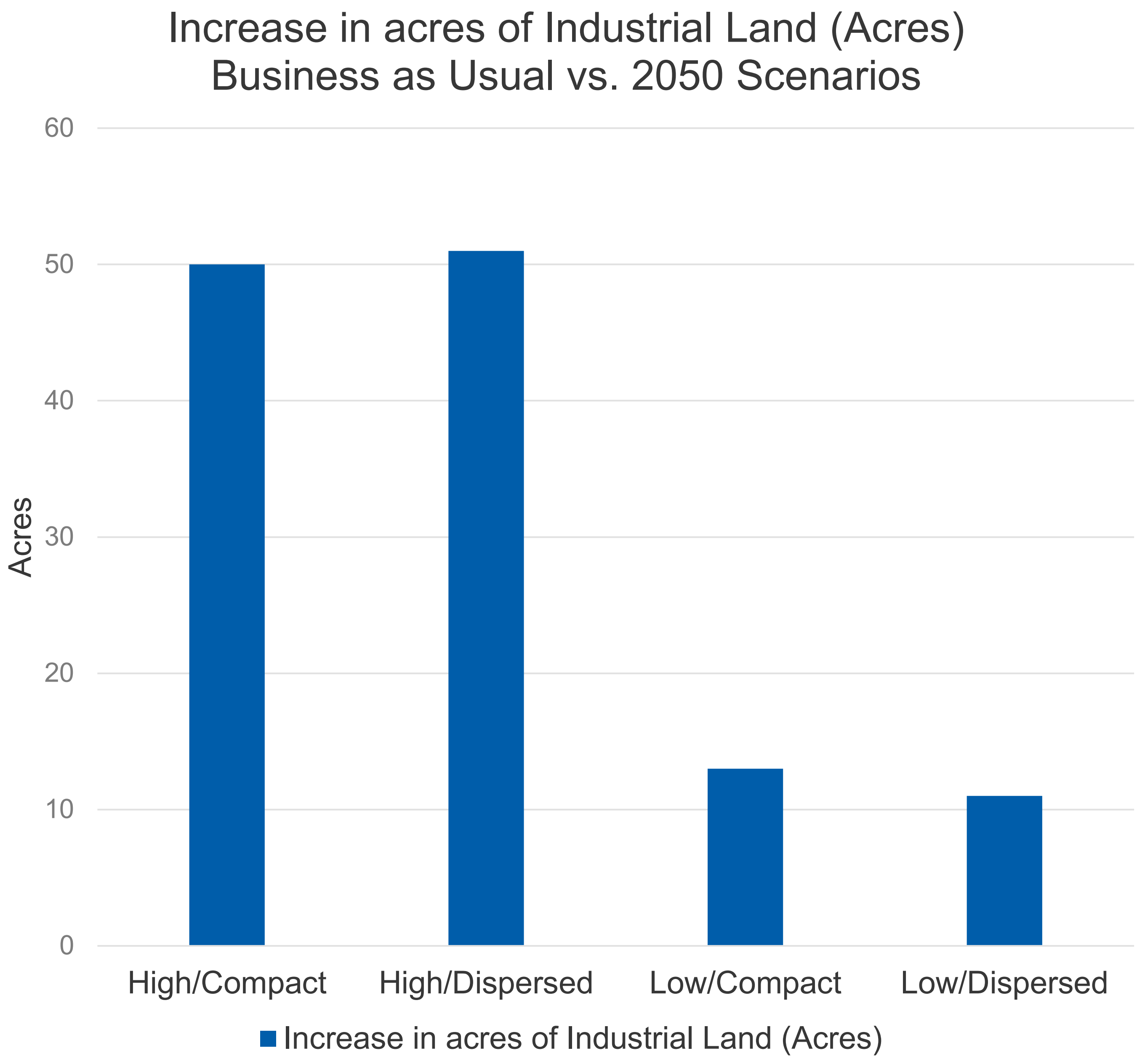
## 90% of the population drinks groundwater moving through drinking water supply management areas

- 1% (4,500 acres) of those areas are very highly vulnerable to contamination
- 11% (188,000 acres) are highly vulnerable to contamination
- 12% (217,000 acres) are moderately vulnerable
- 13% (223,000 acres) have either low or very low vulnerability



# Change in industrial land in very highly vulnerable drinking water source areas

- In all scenarios, industrial development increases in very highly vulnerable drinking water supply management areas
- More industrial development occurs in high growth scenarios



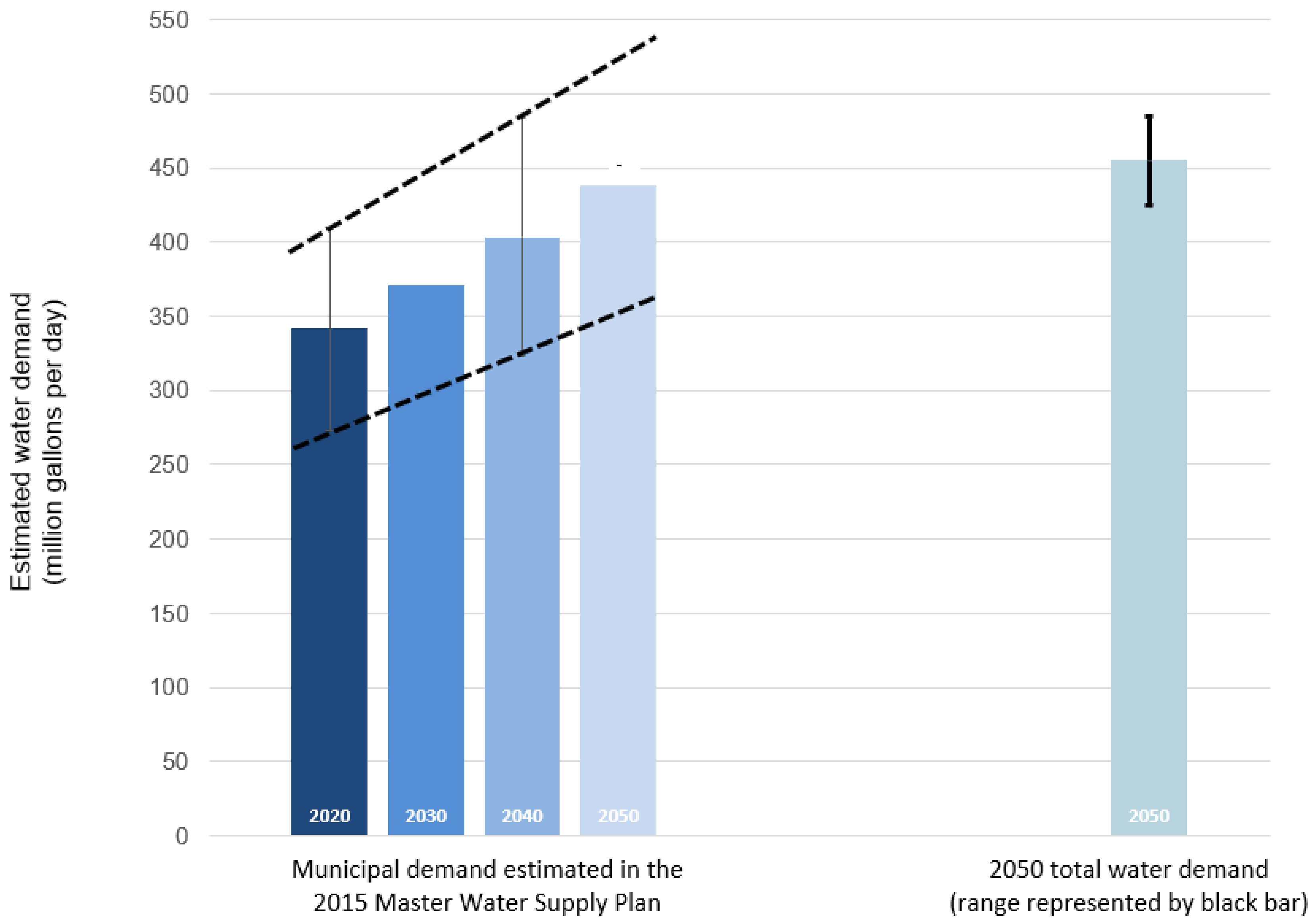
# Estimating Water Demand


## Different growth patterns impact water demand differently

Gallons per person per day × Community population in a given year = Gallons of water per community in a given year

All communities' water demand was summed to estimate a regional total.

# Regional Results: Overall Water Demand




- The range of 2050 water demand estimated for all four scenarios is within the 20% range of uncertainty built into the current approach to water demand projection (dotted lines).
- Growth is one of multiple drivers of water demand, including climate and others.

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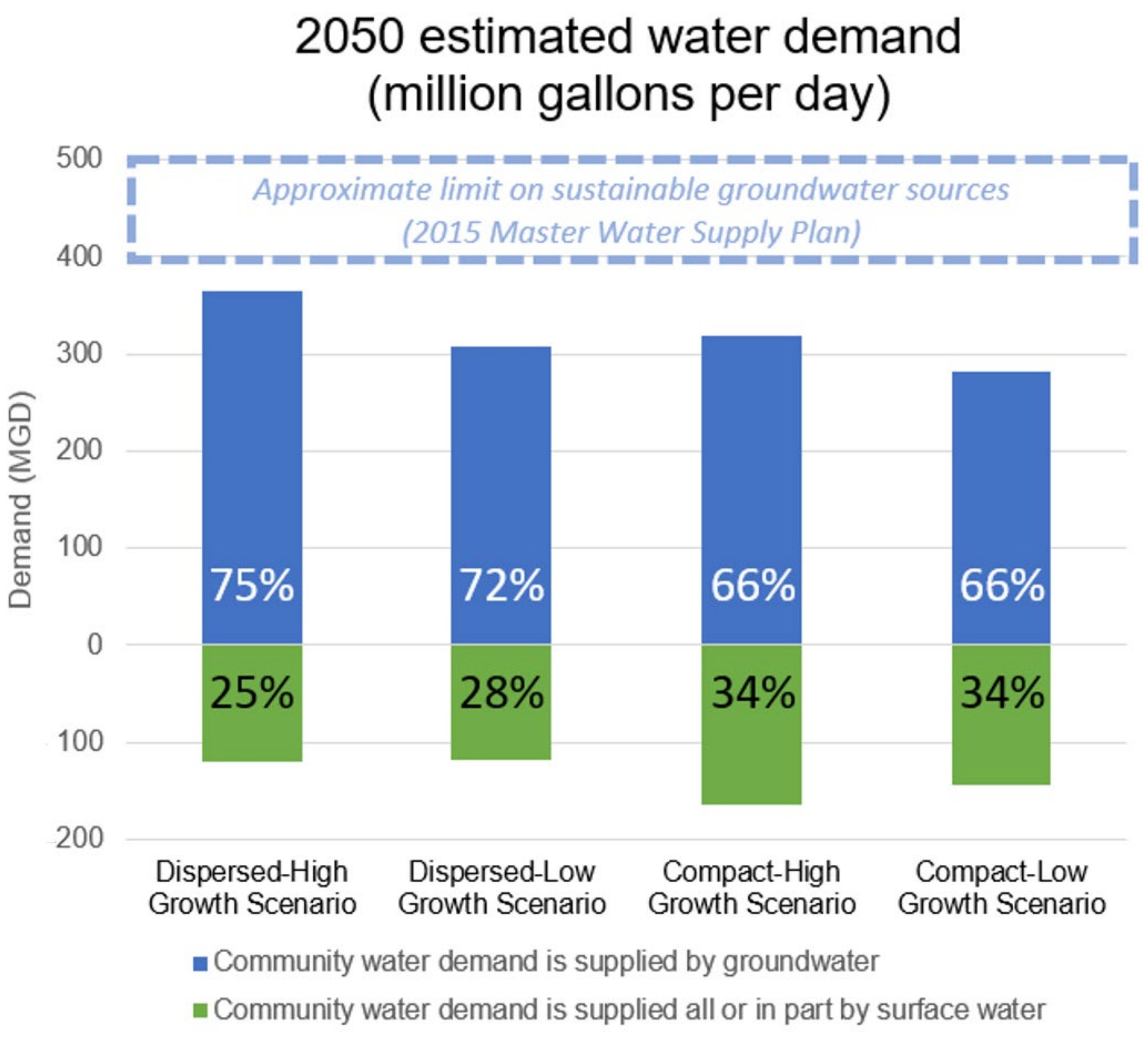
# Regional Results:
# Water Demand by Source




## Dispersed growth scenarios:

- More groundwater than surface water use, bringing us closer to limits of groundwater sustainably
- More pressure to provide water through additional private wells in areas not served by municipal systems

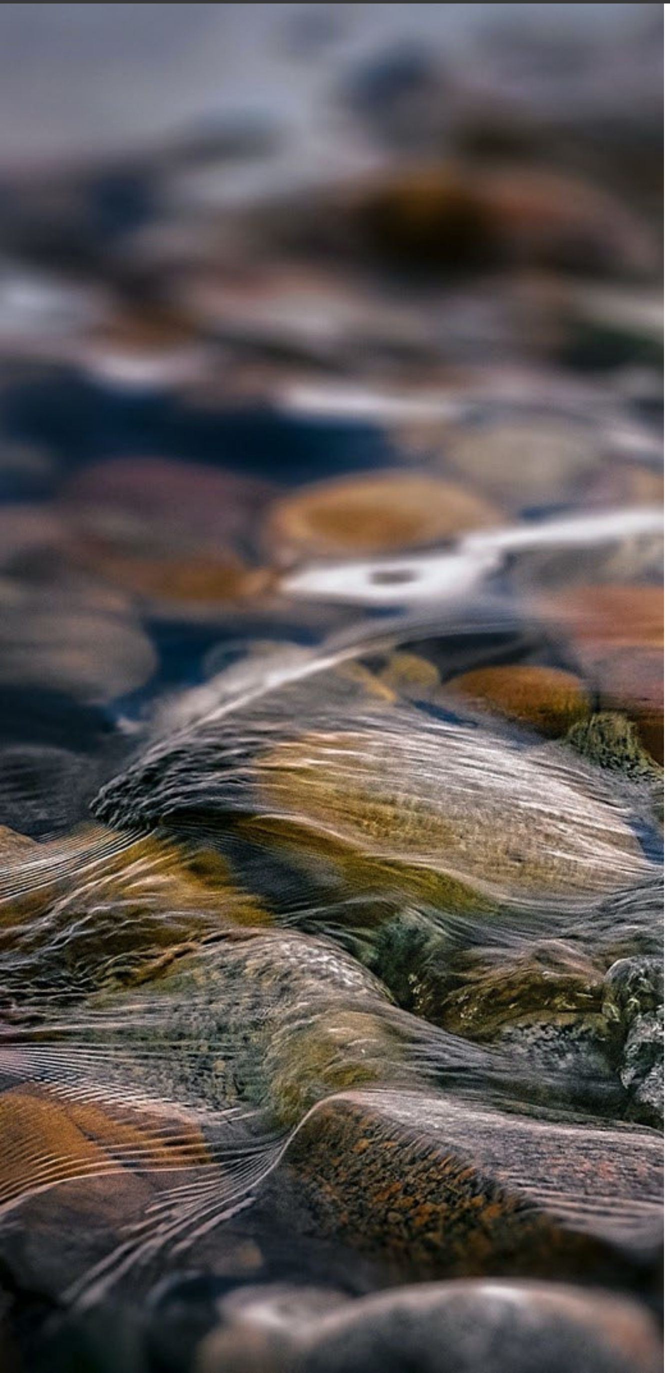
## Compact growth scenarios:

- Increased use of existing surface water systems (Mississippi River), which currently has higher monitoring requirements, treatment, and costs.
- Higher risk of impact from sudden drought.

## High growth versus low growth scenarios:

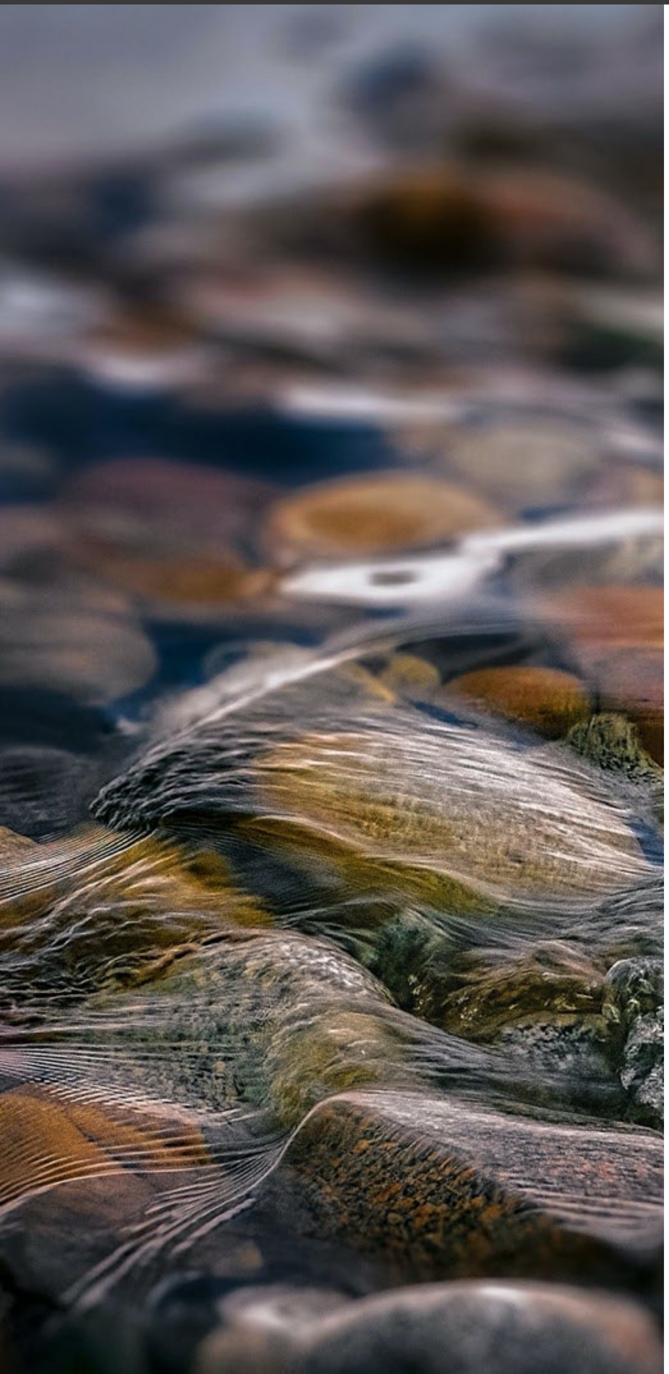
- More pressure to expand or create new public and private water supply systems

# Water supply findings



- In all scenarios, industrial development increases in very highly vulnerable drinking water supply management areas. More industrial development occurs in high growth scenarios.
- Growth patterns impact future water demand. In all scenarios, regional water demand increases. However, other factors such as climate are also significant.
- Dispersed scenarios rely more on groundwater than surface water, compared to compact scenarios.

# Connections to land use



## Water supply findings

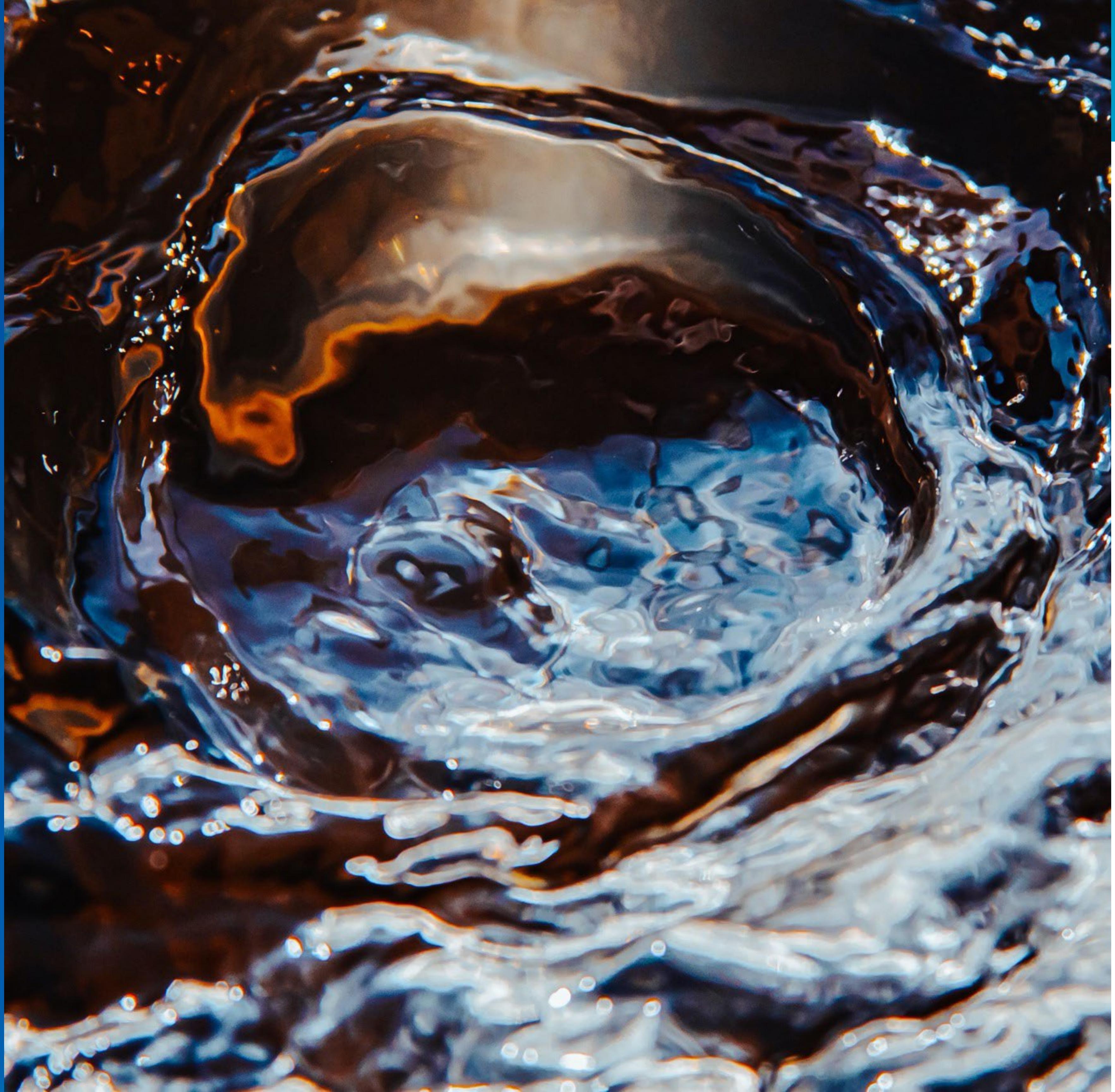
Compact development uses a larger percentage of surface water to meet future growth versus dispersed development.

Consider managing growth in ways that balance communities' use of surface water and groundwater.

Industrial development takes the most acres of new development in highly vulnerable drinking water supply management areas.

Consider ways to ensure new industrial – and all other development –
is constructed to minimize water impacts.

# Wastewater scenario findings



# Key wastewater concepts

## Regional System Capacity

Capacity utilized is impacted by the amount of growth as well as where that growth is occurring.

Capital investments are tailored to regional system capacity needs.

## Regional Service Area (RSA)

Growth within the RSA is planned to be served by the regional wastewater system.

Growth outside the RSA is assumed to be served by individual sewage treatment systems (septic tanks) or local, rural wastewater treatment plants.

The amount of growth served in the RSA changes by scenario.

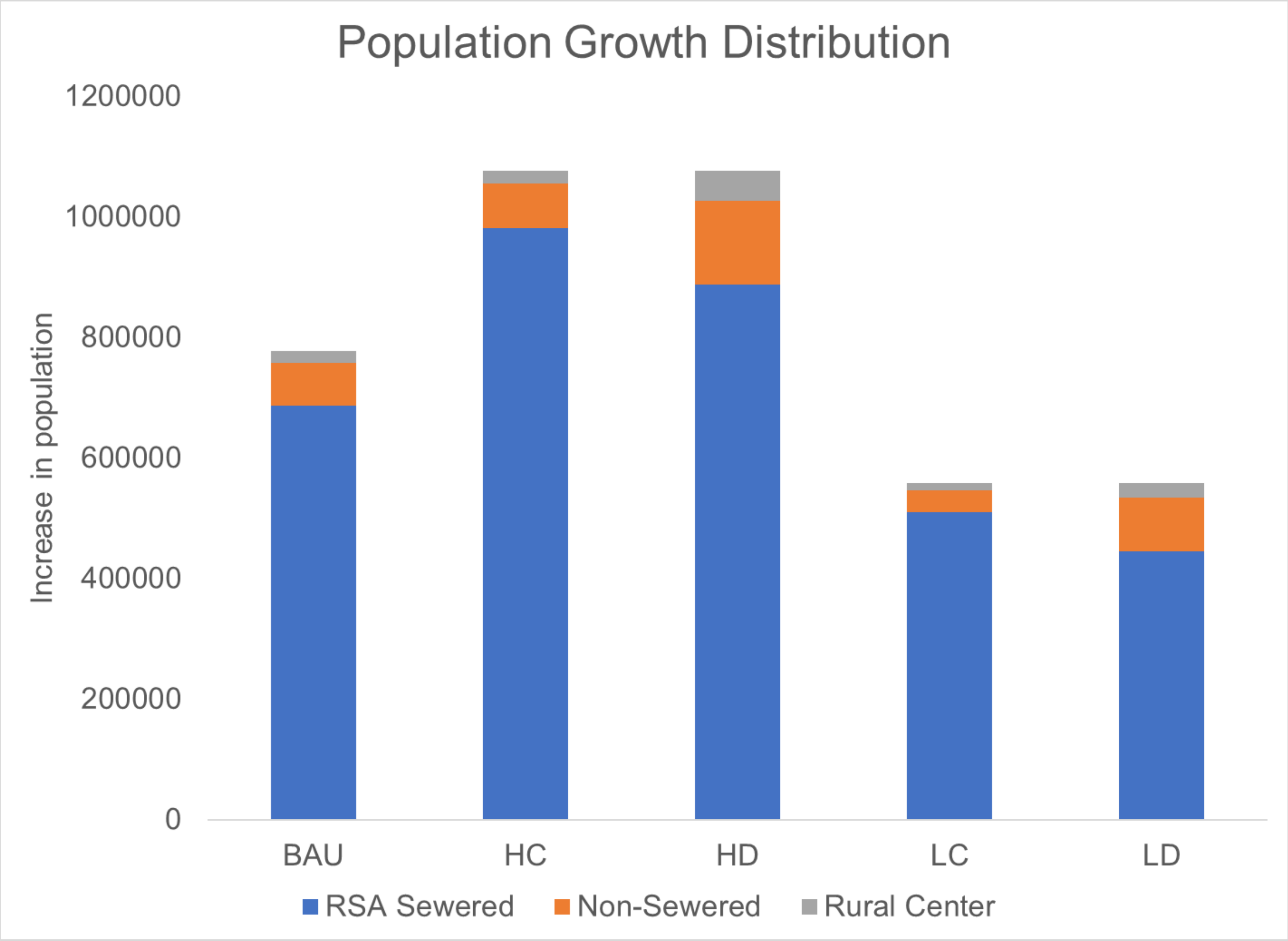
## Other Facilities

Demand for, location, and composition of regional facilities and services will change by scenario.

- Liquid waste receiving facilities
- Vactor waste facilities
- Solids processing

# Distribution of Growth

- High growth scenarios result in more wastewater flow than low growth scenarios
- Compact growth results in more flow generated within the regional service area than dispersed growth

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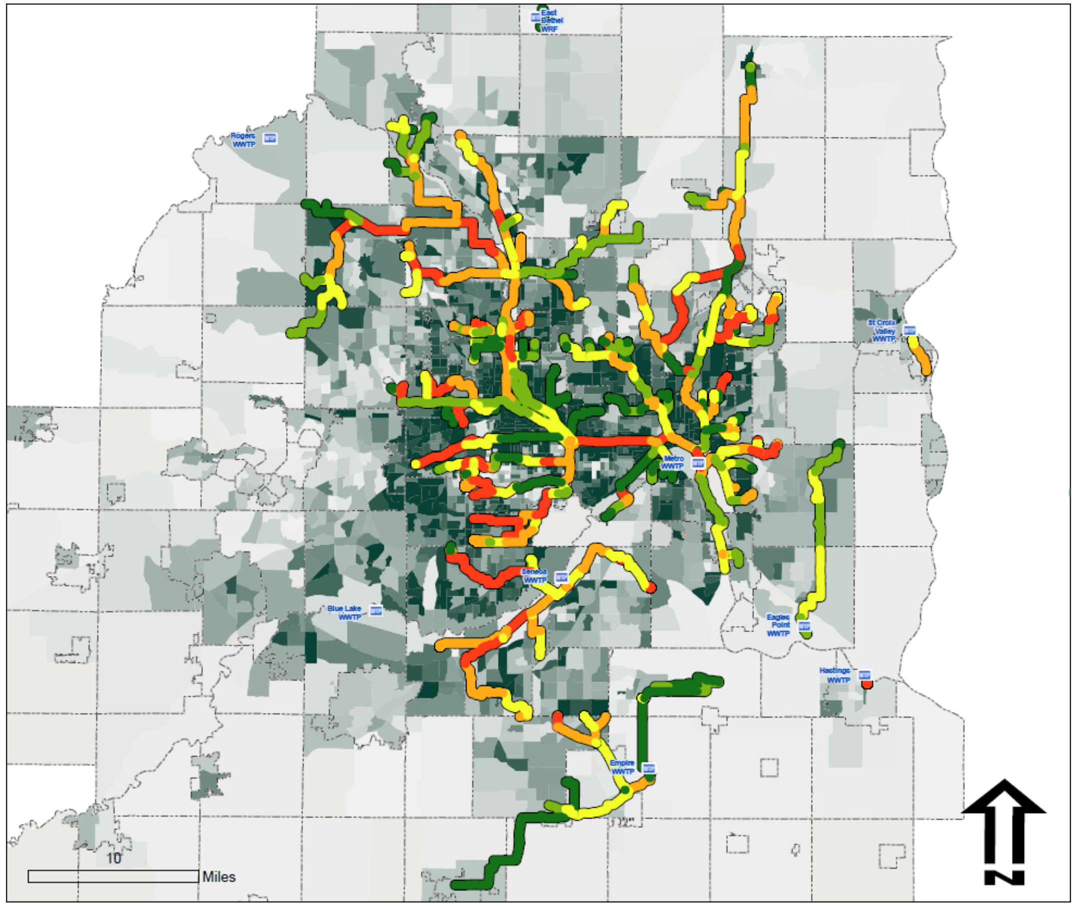
# Regional System Capacity



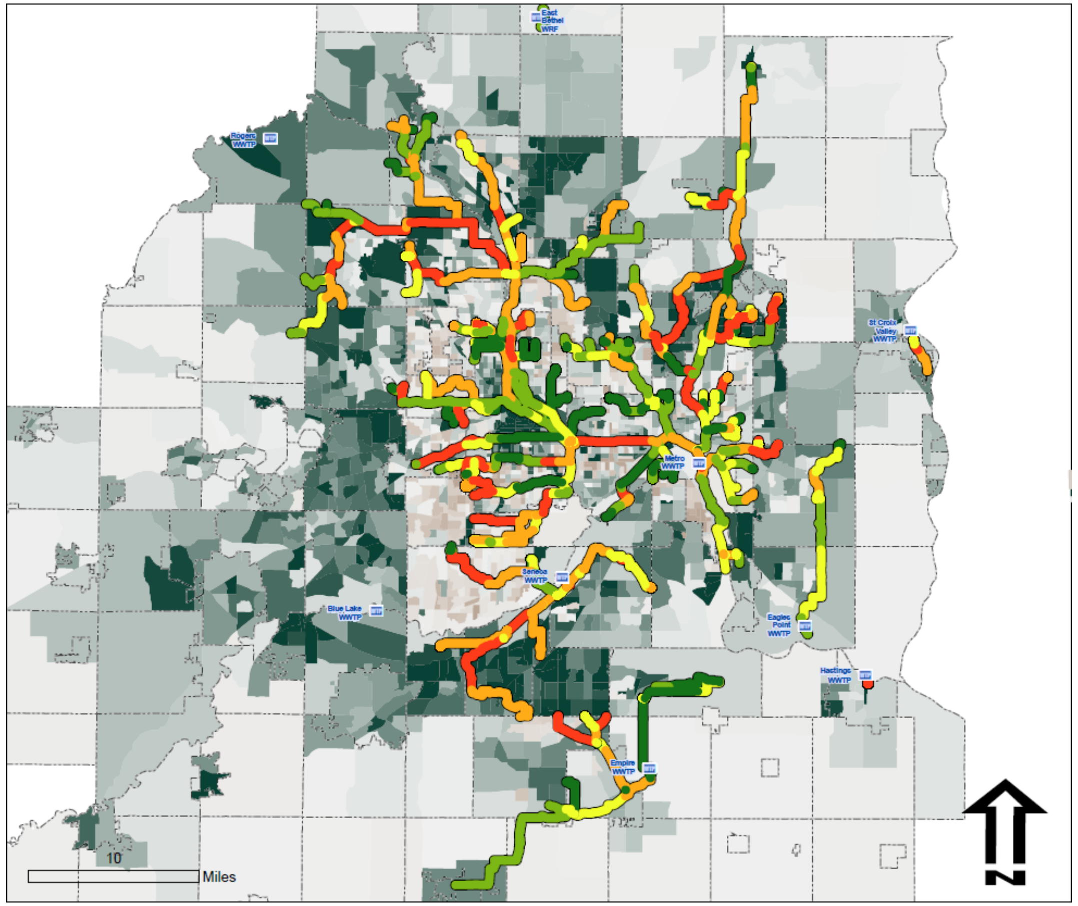


2050% Capacity Utilized
- 0% - 20%
- 21% - 40%
- 41% - 60%
- 61% - 80%
- >80%

Population per acre change 2020-2050*

2
1
0

High Compact

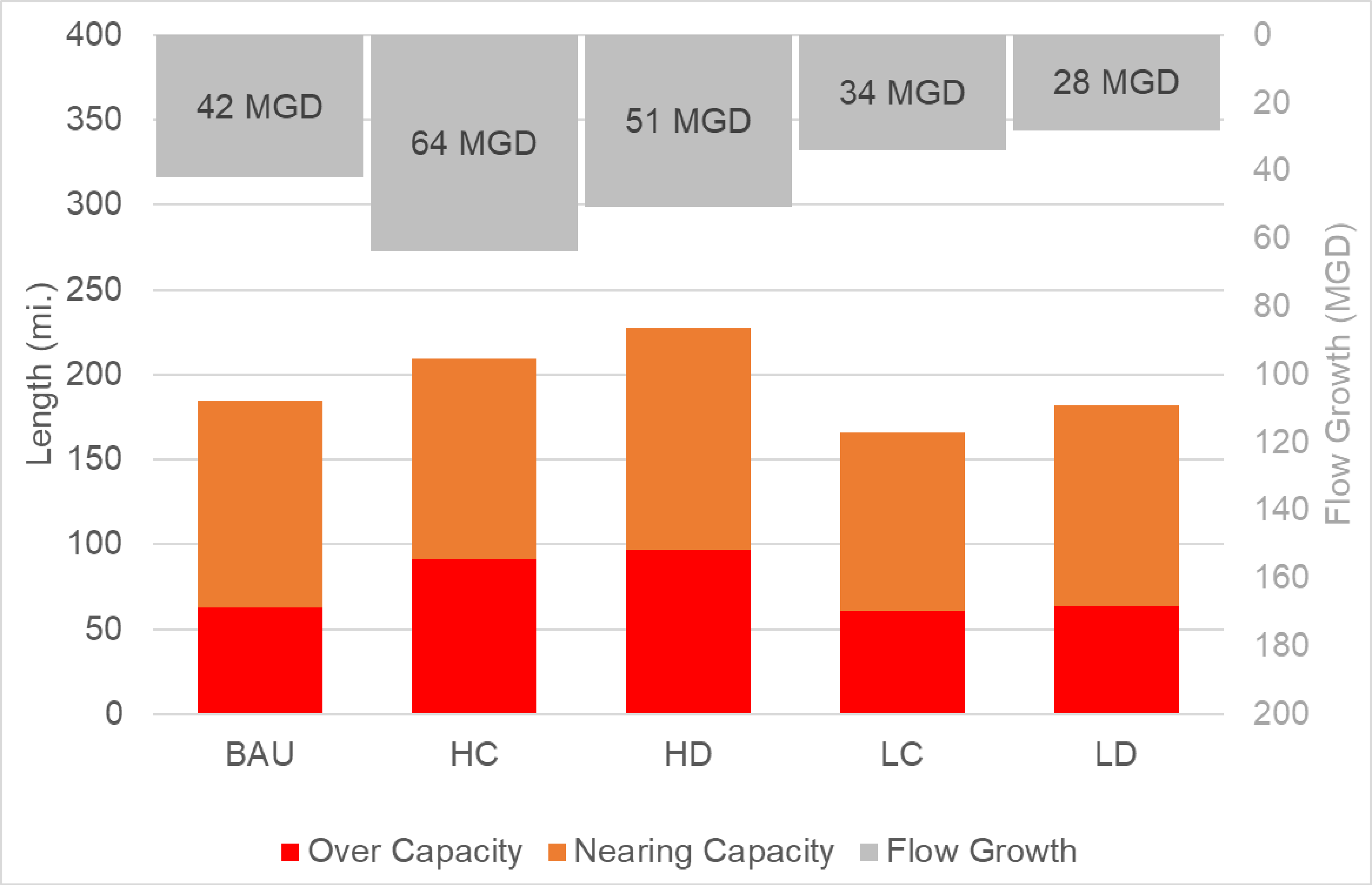




High Dispersed

# Regional System Capacity

- Despite High Compact growth resulting in 25% more wastewater flow within the regional service area than High Dispersed, less interceptors are over or nearing capacity.
- Compact growth utilizes our existing infrastructure more efficiently.

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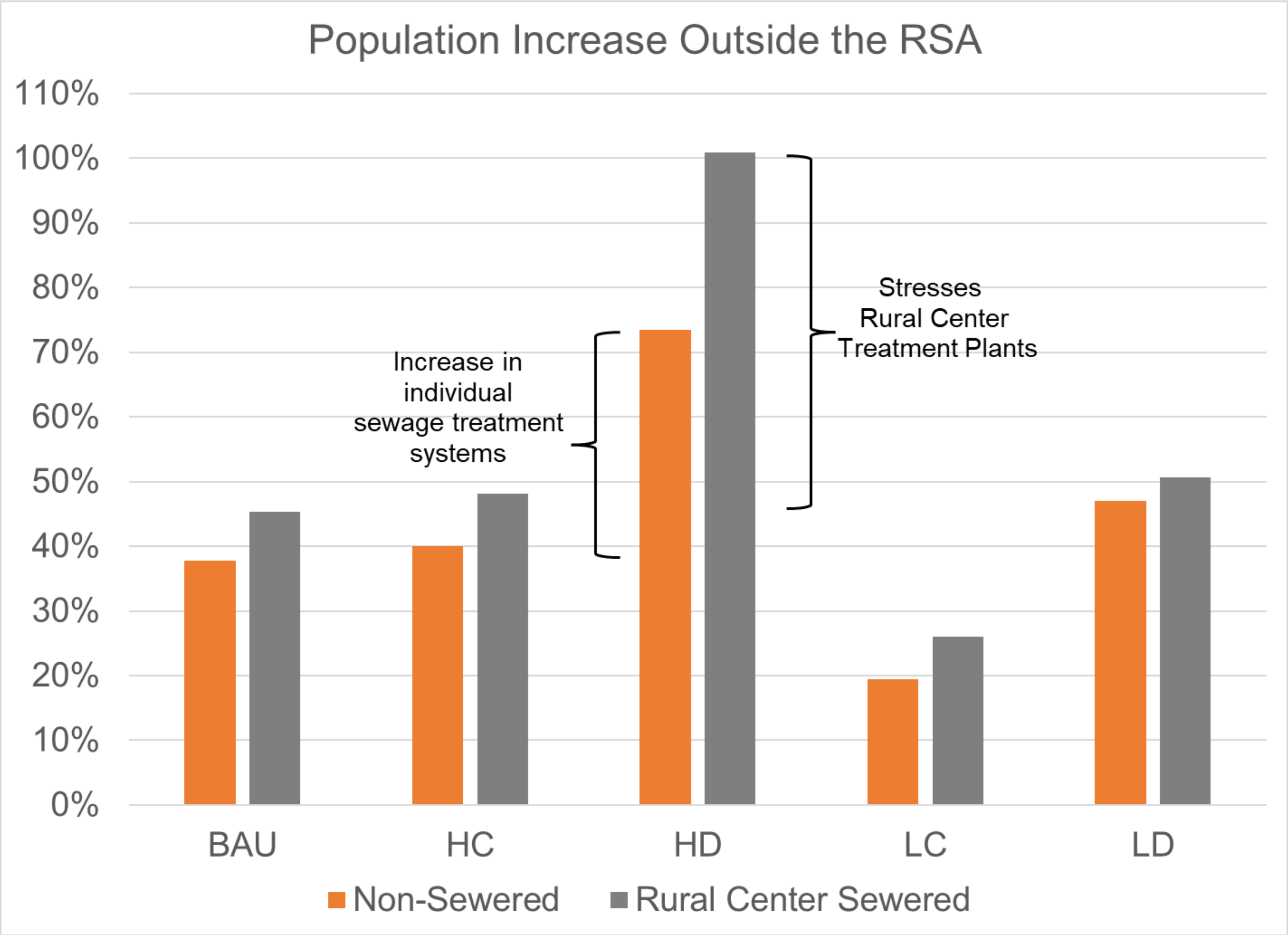
# Regional Service Area

- High-Dispersed scenario increases growth the most in areas served by individual sewage treatment systems and rural, local treatment plants.
- Individual sewage treatment system growth can potentially lead to long-term environmental degradation.
- Growth in rural centers can put pressure on and stress their treatment systems,  which could necessitate costly improvements.

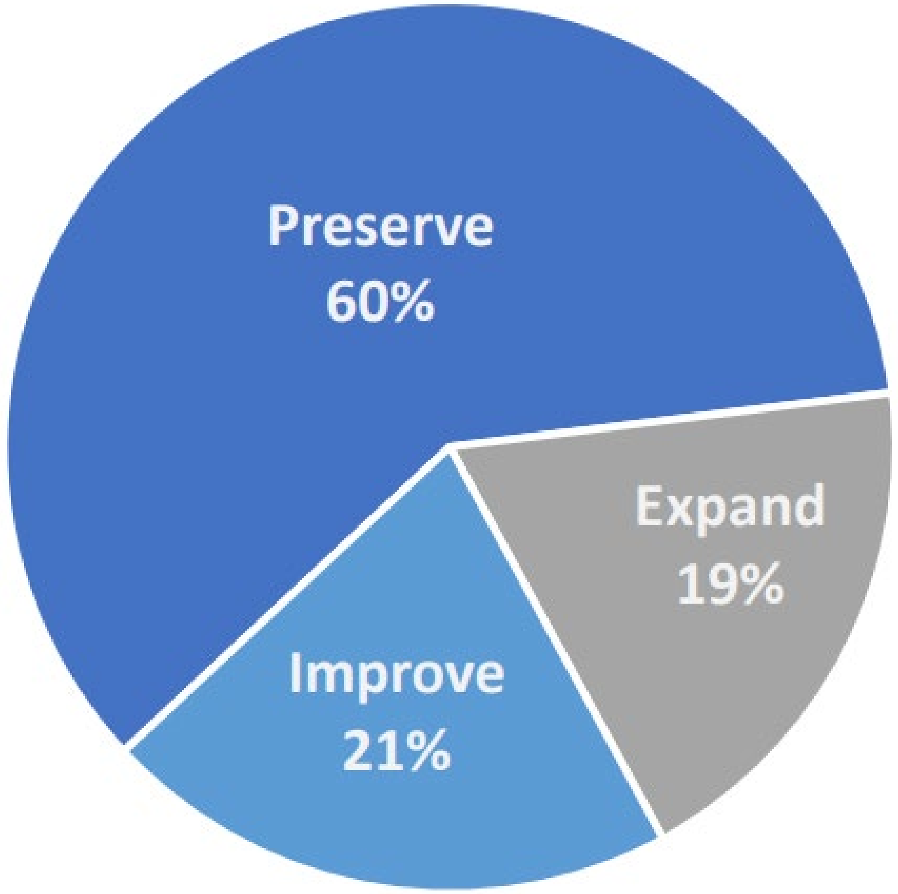


# Regional Service Area

- High-Dispersed has the highest potential to shift resources toward early or unplanned expansion efforts:

    - Excess non-sewered growth resulting in increased sewage treatment systems, could lead to long-term environmental degradation which could necessitate expansion of the regional service area.

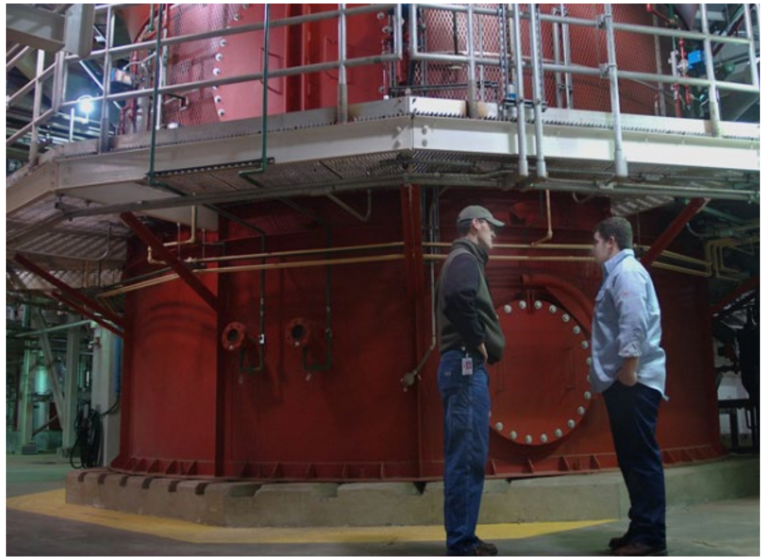
    - Significant growth in rural centers could pressure local treatment plants, pushing up timing for upgrades or lead to request of Council acquisition.




Current capital budget distribution

# Other Facilities

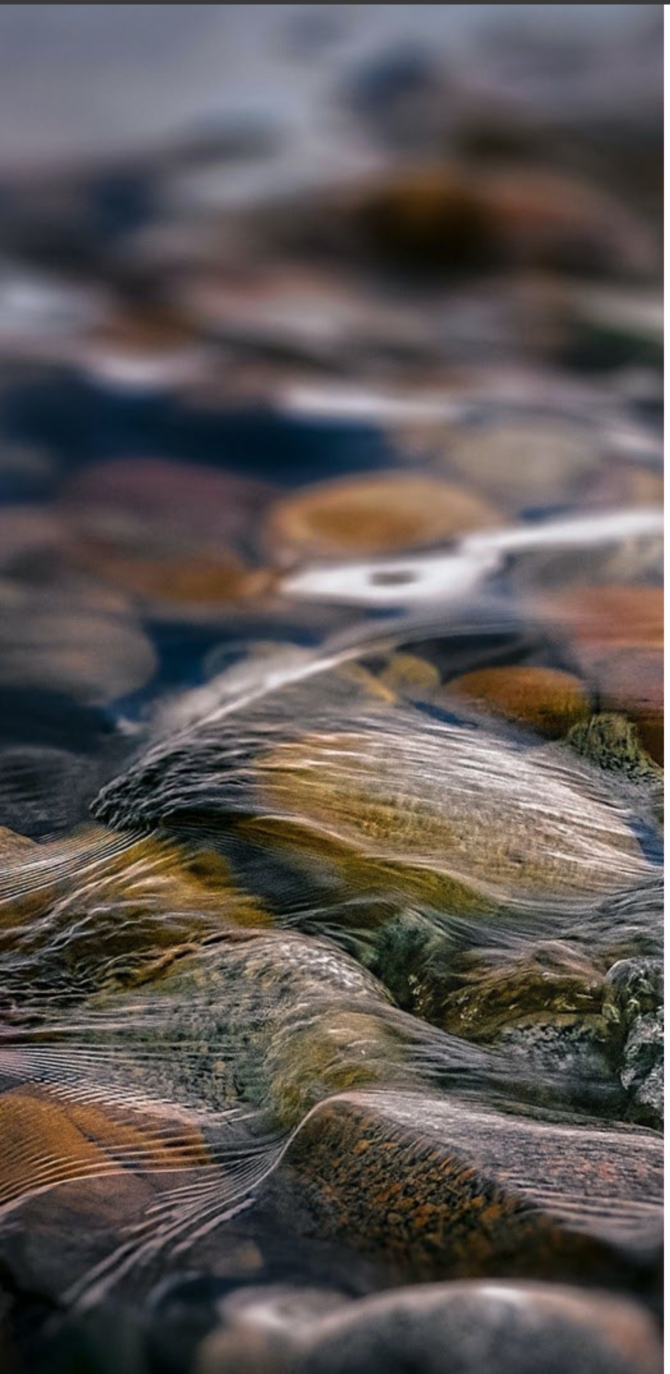
- High-Dispersed has the most potential to increase demand for regional facilities farther out in the regional service area.
  - Pressure on smaller regional treatment plants, upstream interceptors, and lift stations.



# Wastewater analyses conclusions

| Regional System Capacity | Regional Service Area (RSA) | Other Facilities |
| --- | --- | --- |
| • High-Compact displays the most efficient use of our existing infrastructure.<br>• Dispersed scenarios are less efficient than compact. | • High-Dispersed has the greatest potential to shift resources toward early or unplanned expansion efforts. | • High-Dispersed has the most potential to increase demand for regional facilities farther out in the regional service area. |

# Connections to land use



## Inside the Regional Service Area

Compact development utilizes existing wastewater infrastructure more efficiently.

High-Dispersed development puts pressure on outlying areas of the regional service area:

- Infrastructure expansion
- Timing of extension or acquisition of infrastructure

## Outside the Regional Service Area

High-Dispersed development puts pressure outside the regional service area:

- Significant growth in individual sewage treatment systems
- Rural wastewater treatment plant pressures
- Induced growth
- Incentivizing large lots

# Land use and water are linked


- Water is foundational to land use.
- We need to balance our regional growth while limiting impacts to regional waters.
- Council land use and water policies are our best tool to connect water and land use planning for the region.
- If you have any additional questions after today, please consider us a resource.

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