Reclaimed Water Infiltration Study

LOTT Clean Water Alliance
Lacey • Olympia • Tumwater • Thurston County

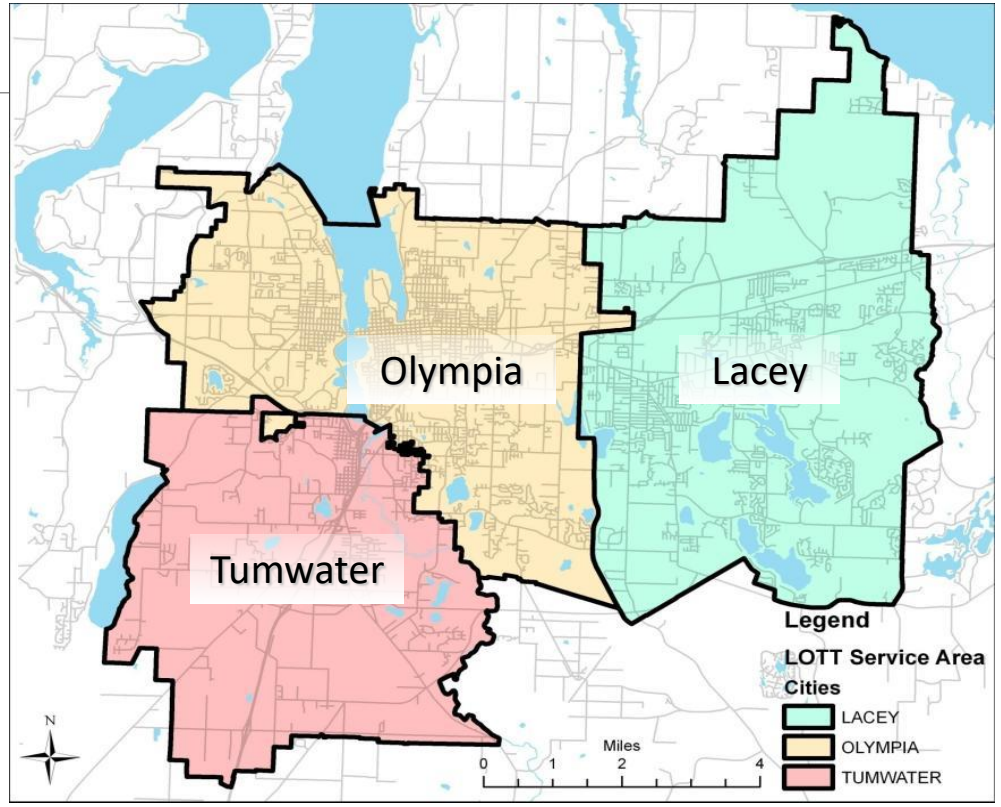
The Reclaimed Water Infiltration Study

Human and Ecological Health Risk Assessment

October 20, 2022

What is LOTT?

- Regional wastewater utility
  - Lacey
  - Olympia
  - Tumwater
  - Thurston County
- Mission: protect public health and the environment by cleaning and restoring water resources



LOTT™ Clean Water Alliance

Budd Inlet Treatment Plant

- LOTT's main treatment facility
- Treats 13 million gallons per day
- Discharges to Budd Inlet; southernmost point of Puget Sound
- Meets strict discharge limits to protect water quality

Budd Inlet Reclaimed Water Plant

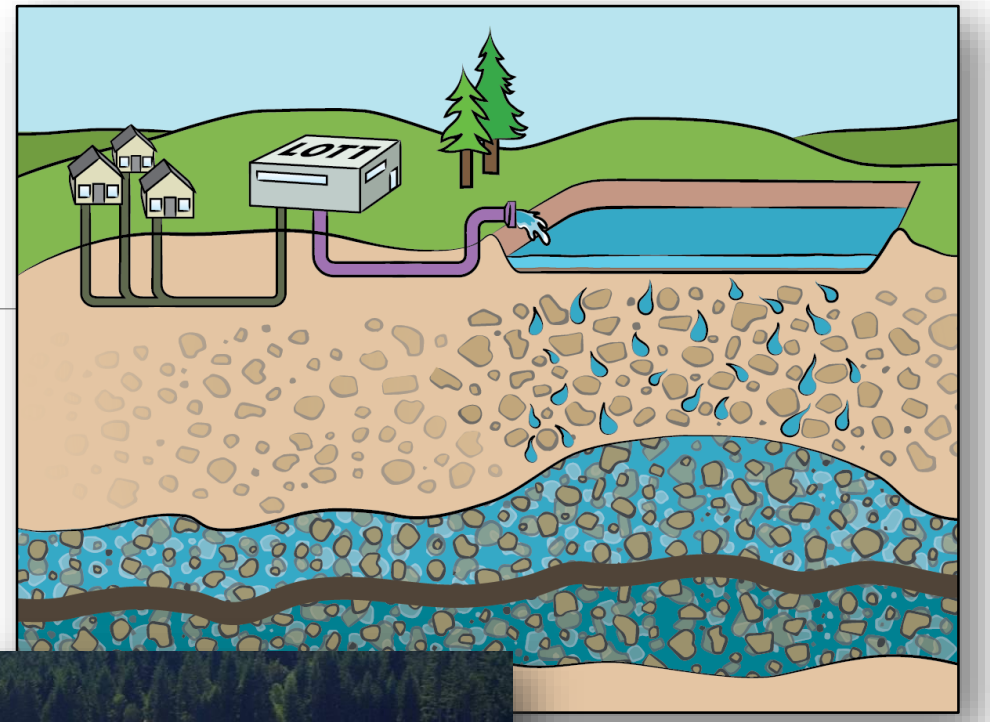
Martin Way Reclaimed Water Plant

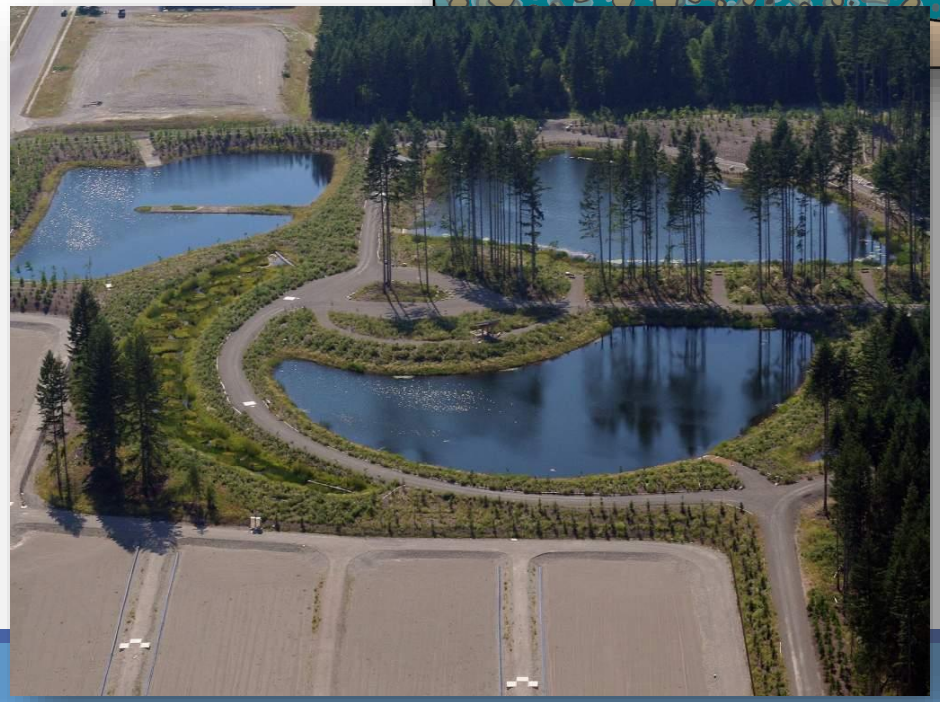
Class A Reclaimed Water

- Recycled water
- Treated to a very high standard
- Highly regulated and monitored
- Approved for non-drinking purposes
- Locally used primarily to:
  - Irrigate landscaping
  - Infiltrate to replenish groundwater

Infiltration

- Similar to natural processes
  - Water flows into a shallow basin
  - Percolates through the soil
  - Flows eventually into an aquifer

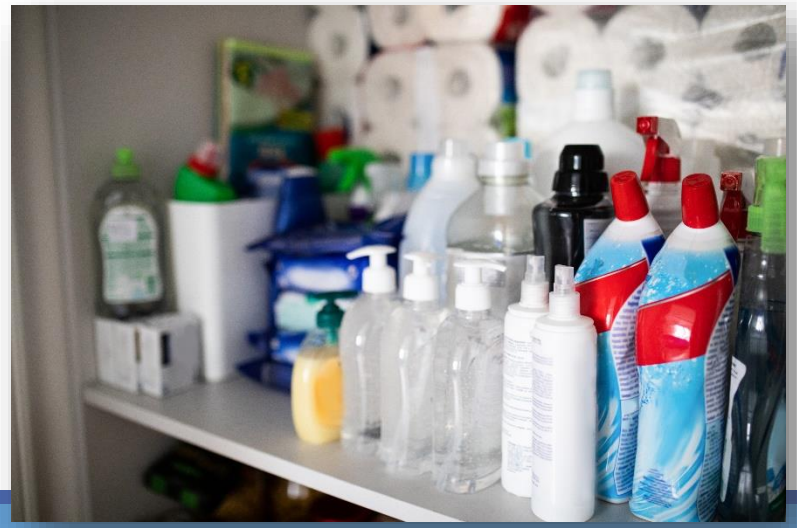




Hawks Prairie Ponds and Recharge Basins

Primary Study Question

What are the risks from infiltrating reclaimed water into groundwater because of chemicals that may remain in the water from products people use every day, and what can be done to reduce those risks?

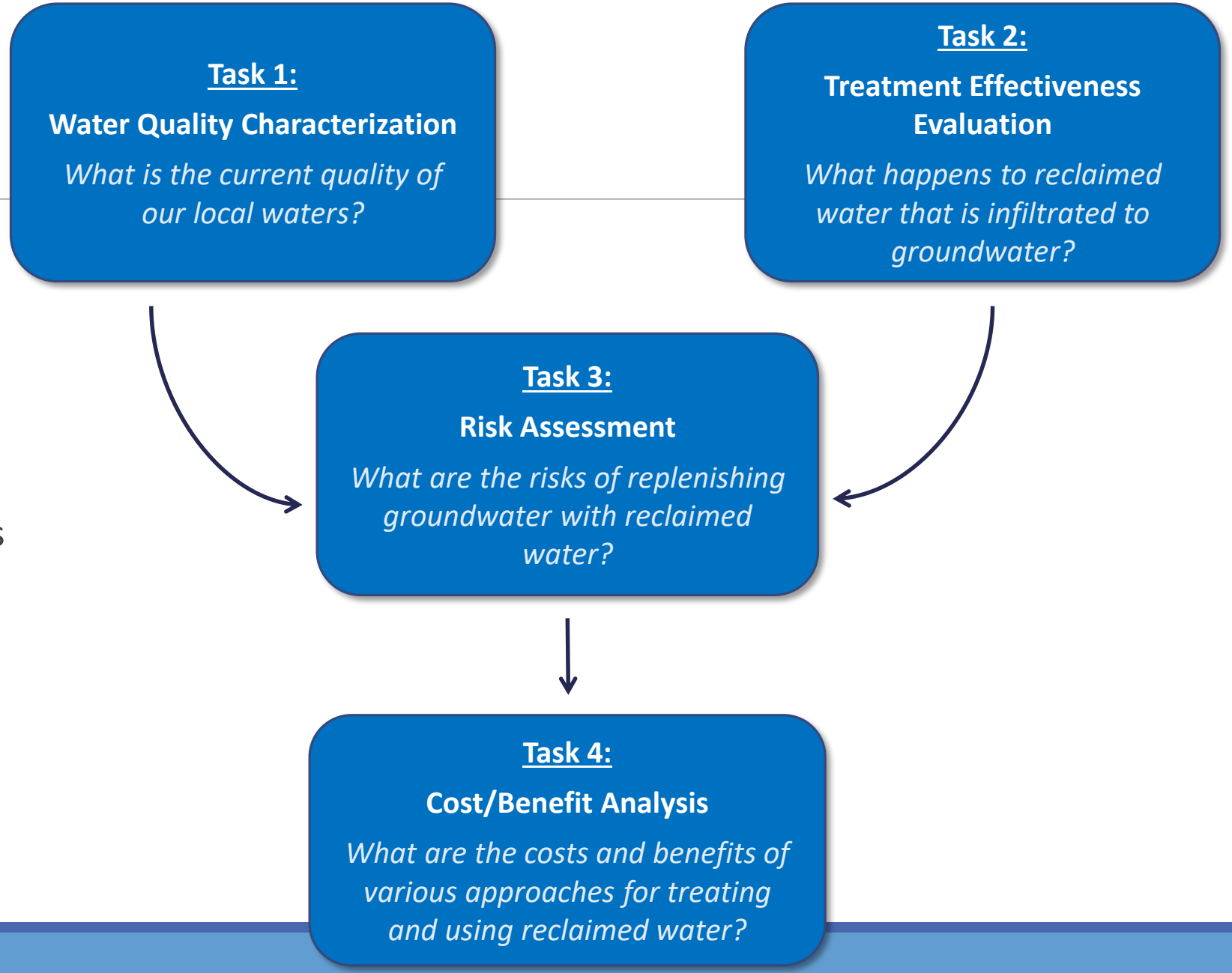


Residual Chemicals

- Medicines / Personal Care Products / Food Additives / Household Chemicals/ Industrial and Commercial Uses
- 134 chemicals in total
- Chemicals were chosen that are:
  - Used in similar research elsewhere
  - Of interest due to potential human or environmental health impacts
  - Representative of broader classes of chemicals
  - Likely to be found in wastewater and reclaimed water

Study Framework

- Community questions distilled into four key questions
- Those questions defined the four main study tasks



Key Findings
Water Quality Characterization

- Residual chemicals were found at very low levels (parts per trillion) in all types of water tested
- LOTT's treatment processes are effective at removing many residual chemicals in wastewater, but some chemicals do remain after treatment
- Residual chemicals are found in our environment – in areas where reclaimed water is infiltrated to replenish groundwater – and in areas where it is not
- These findings are consistent with similar studies conducted in other places in the country and the world

Key Findings
Treatment Effectiveness Evaluation

- Residual chemical concentrations decrease with time and distance as reclaimed water mixes with groundwater and moves away from the site
- Some residual chemicals remain at low concentrations in water that may be used by people or wildlife

Task 3: Risk Assessment

- Determine which residual chemicals pose a risk, using a step-wise process
- Identify potential risk
  - Human Health
  - Ecological Health
- Identify thresholds at which a chemical could pose risk
- Compare measured and estimated chemical concentrations with risk thresholds

Human Health Risk Assessment
Who May be Exposed and How?

- People considered
  - Residents (adults, children)
  - Maintenance worker
  - Child recreator
  - Fishing recreator
- Pathways considered
  - Ingestion/drinking
  - Inhalation
  - Skin contact
  - Fish consumption

Human Health Risk Assessment Results

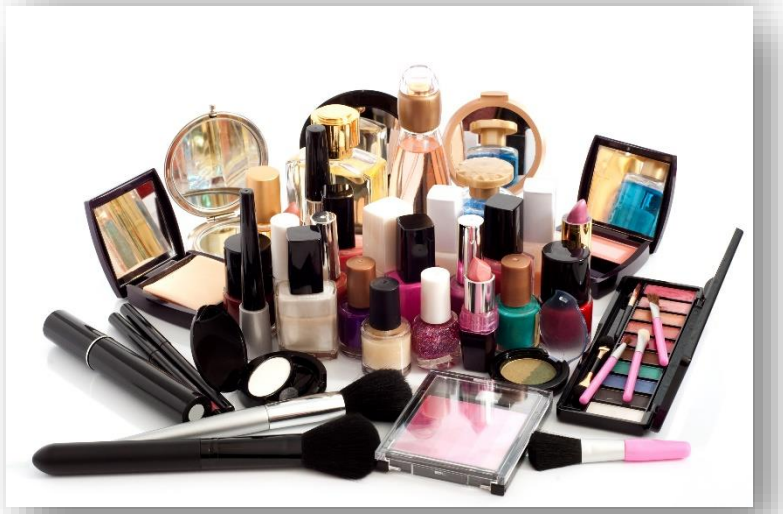
- Risk to human health is very low
- Nearly all the chemicals analyzed were below levels of concern
- Two chemicals slightly exceeded minimum levels of concern
  - Perfluoropentanoic Acid (PFPeA)
  - N-Nitrosodimethylamine (NDMA)
- Multiple layers of protective assumptions
  - Exposure much higher than average level
  - No degradation of these two chemicals in the environment (when there likely will be some)
  - Chemical concentrations remain same over time (though some will likely decrease, as their use is phased out)

PFPeA

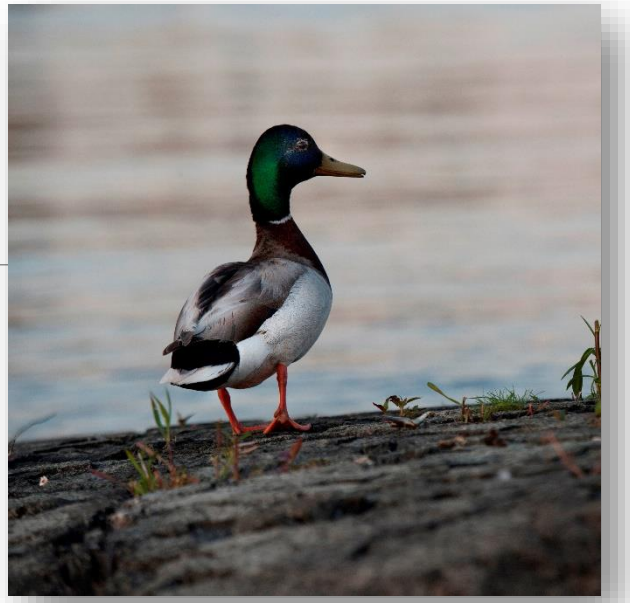
- What is PFPeA?
  - By-product from breakdown of PFAS substances
    - per- and polyfluoroalkyl chemicals, such as PFOA and PFOS
  - Used in many products for stain, oil, and water resistance
    - food packaging, clothes, furniture, carpet, non-stick cookware
    - fire fighting foams
- What is the estimated risk?
  - A non-cancer risk index of 1.3, slightly above the threshold of 1.0
  - At this level, experts consider adverse health effects unlikely

NDMA

- What is NDMA?
  - Found in many products: cured meats, beer, fish, cheese, tobacco, shampoo, cleansers, detergents, cosmetics, and solvents
  - Also a by-product of some water disinfection processes
- What is the estimated risk?
  - A lifetime excess cancer risk of 2.9 in 1,000,000, slightly above the threshold of 1 in 1,000,000
  - This is within the range of risk considered acceptable by the EPA (1 in 10,000 to 1 in 1,000,000)
  - NDMA was not consistently detected in reclaimed water, but was retained in the assessment to be health protective



Ecological Risk Assessment
What May be Exposed and How?



- Wildlife considered
  - Species in Woodland and McAllister Creek watersheds
  - Plankton and other small aquatic organisms
  - Fish
  - Birds
  - Fish-eating mammals
- Pathways considered
  - Acute toxicity
  - Bioaccumulation

Ecological Risk Assessment Results

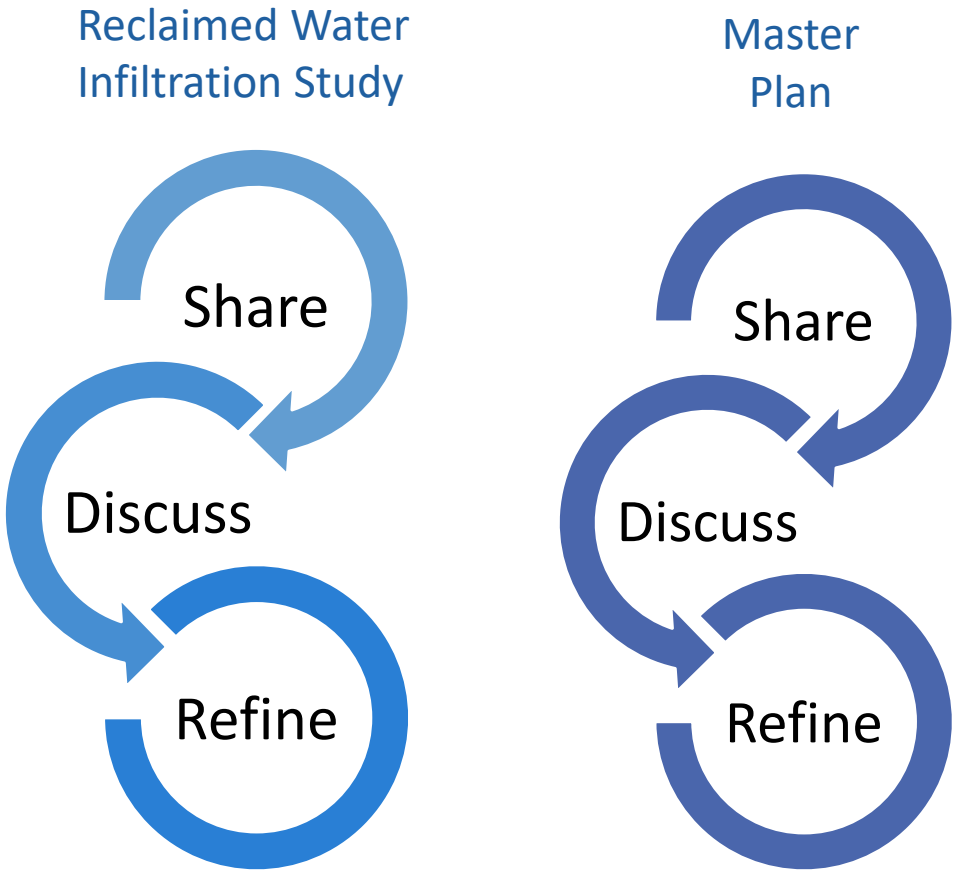
- No risk to ecological health was identified
- None of the residual chemicals were predicted to harm wildlife
- Chemicals in these watersheds were far below levels of concern

Key Findings
Risk Assessment and Cost Benefit Analysis

- Risks are quite low
- Peer Review Panel indicated the assessments were well designed and protective of human and ecological health
- If advanced treatment is desired, multiple options exist to further remove residual chemicals from reclaimed water
- Advanced treatment costs are substantial compared to risk reduction benefit
- Other actions, such as targeted monitoring and source control, can help further understand and address identified risks

Next Steps

- Integrate study findings and input into the master planning effort
- Refine long-term strategy for managing the wastewater system into the future



Questions?

Wendy Steffensen, Environmental Project Manager
LOTT Clean Water Alliance, Olympia WA
wendysteffensen@lottcleanwater.org

Jeff Hansen, Project Manager
HDR Engineering, Inc., Olympia, WA
Jeff.hansen@hdrinc.com