# Detroit Dam Deep Drawdown – Risk, Avoidance, Minimization, Mitigation. (July 31, 2025)

The planned deep drawdown of Detroit Dam by the U.S. Army Corps of Engineers presents a significant and time-sensitive risk to the City of Stayton's potable water supply. While the drawdown supports federal mandates for fish passage and hydro power production, it is expected to cause prolonged and elevated turbidity in the North Santiam River—Stayton's sole source of drinking water. In addition, recurring summer cyanobacteria blooms further threaten raw water quality.

Stayton's primary water treatment system, a slow sand filtration (SSF) facility, is highly effective under typical, low-turbidity conditions but extremely vulnerable to high sediment or algal loading. The SSF system may experience rapid surface clogging, deep media contamination, or complete inoperability under extreme water quality degradation—resulting in a loss of drinking water, fire protection, and sanitary sewer support within hours to days.

This report outlines a three-tiered risk management strategy structured under **Avoidance, Minimization, and Mitigation**:

- **Avoidance** strategies include maximizing stored treated water, exploring interties and alternate supplies, engaging in interagency planning with the Corps and regulators, and evaluating legal avenues to ensure municipal water supply impacts are fully addressed in the federal planning process.
- **Minimization** actions focus on system preparedness: adjusting intake schedules, enhancing operational readiness, and exploring pretreatment options such as sedimentation and screening.
- **Mitigation** efforts prepare the City for emergency response, including increased filter maintenance, mobile treatment units, and public conservation messaging. Stayton is also evaluating whether a **local emergency declaration** may be warranted—particularly if such a declaration enhances access to funding or accelerates infrastructure response timelines.

In parallel with risk management efforts, the City is actively analyzing **technical alternatives** to improve system resilience. These include:

- Partnering with the **City of Salem** to secure a treated water intertie and potentially contribute to **groundwater development on Geren Island**.
- Accelerating development of **local groundwater wells** and investigating an enhanced (enlarged) **Aquifer Storage and Recovery (ASR)** system to reduce long-term reliance on surface water.

- Investing in **pretreatment infrastructure** such as **Dissolved Air Flotation (DAF)** systems to protect the SSF from sediment and algae loads. While costly (preliminary estimates range from $12M to $15M or more depending on ancillary needs), DAF offers the most self-sufficient and robust long-term protection.

A **six-phase timeline** has been established to guide the City's planning and implementation efforts—from preliminary assessment and scenario modeling, through options analysis, stakeholder engagement, and final implementation. This phased approach ensures that both short-term response and long-term system adaptation are pursued in parallel.

Ultimately, the drawdown of Detroit Dam is a regional issue with local consequences. The City of Stayton is committed to taking proactive steps to protect public health, preserve service continuity, and invest in a more resilient water system for future generations, noting, however, that the costs of such should not be borne by the Stayton water rate payers.

## Risk Treatment and Technical Option Effectiveness Table

| Risk Cat. | Technical Option | Addresses | Effectiveness | Timeline | Complexity | Notes |
|---|---|---|---|---|---|---|
| **Avoidance** | Legal/Reg. Advocacy to halt or alter drawdown schedule | Prevent excessive turbidity & biological loading | Moderate | Long-term | Moderate | Dependent on legal leverage, federal agency responsiveness |
| | City monitoring of legal avenues | Same | Low to Moderate | Ongoing | Low | Supports advocacy; not a technical fix |
| **Minimization** | Source water protection (upstream partnerships, BMPs) | Turbidity and algae reduction at intake | Low to Moderate | Long-term | Moderate | Requires regional coordination |
| | Enhanced monitoring & early warning systems | Operational readiness | Moderate | Short-term | Low | Helps anticipate treatment needs in real time |
| **Mitigation** | Pretreatment via Dissolved Air Flotation (DAF) | Removes high turbidity and algae before SSF | High | 12–24 months | Very High | Most effective pretreatment option for dual risks |
| | Declaring an emergency to access funding | Response to treatment failure or emergency need | Low to Moderate | Short-term to Immediate | Variable | Strategic pathway to external funding support and flexibility |
| | Short-term sedimentation/flocculation basins | Sediment reduction prior to SSF | Low to Moderate | 12 -18 months | Moderate | Can be integrated with future upgrades |
| | Permanent SSF replacement with membrane or rapid sand filters | Long-term filtration solution | High | 24 – 48 months | Very High | Requires comprehensive planning and funding |
| **Alternative Source Development** | Intertie/purchase water from City of Salem | Complete alternative source | High | 6 -18 months | Low | Contingent on regional infrastructure and agreements |
| | Stayton groundwater and ASR system development | Long-term supply resilience | High | 12-36 months | Very High | Capital-intensive, but improves system redundancy |

## APPENDIX

# Detroit Dam Deep Drawdown – Risk, Avoidance, Minimization, Mitigation. (July 31, 2025)

## Introduction

As part of our commitment to maintaining a safe, reliable, and resilient potable water system, we are providing the following information regarding the potential risks posed by the planned drawdown of Detroit Dam. This action, while necessary for federally mandated fish passage and structural assessments, will significantly alter water quality and availability in the North Santiam River—the source of Stayton's drinking water.

This message outlines our current understanding of the situation and details the measures we are undertaking to assess **Risks**, and implement **Avoidance**, **Minimization**, and **Mitigation** strategies to safeguard the City's water supply throughout the duration of the drawdown.

## Background

**Stayton's SSF and Turbidity Sensitivity:** The City of Stayton relies on a SSF system for its primary drinking water treatment. This type of system is highly effective under stable, low-turbidity conditions and is well-suited to the historically clean and consistent raw water quality of the North Santiam River. However, slow sand filters are particularly vulnerable to excessive or sustained increases in turbidity.

Unlike more mechanized treatment systems, slow sand filters function through a biologically active surface layer that can become rapidly overwhelmed or clogged when faced with high sediment loads. Elevated turbidity—especially from fine particulate matter—can reduce filter effectiveness, shorten run times, increase maintenance requirements, and in extreme cases, compromise treatment capacity.

Due to this operational sensitivity, any significant degradation of source water quality, such as that which is expected to result from sediment disturbances during the Detroit Dam drawdown, poses a direct risk to the City's ability to treat and deliver potable water in compliance with public health standards.

## Risk

**Risk of Potable Water System Failure Due to Excessive Turbidity:** In the event of significantly elevated turbidity in the North Santiam River—such as anticipated to occur during the Detroit Dam drawdown—the City of Stayton's SSF system faces a substantial risk of operational failure. This risk arises from the system's inherent vulnerability to high sediment loads, which can trigger multiple failure mechanisms in rapid succession:

- **Rapid Blinding of Filter Surface:** A sudden influx of fine sediment can cause the biologically active top layer of the filter to clog or "blind" within hours, severely limiting filtration capacity and throughput.
- **Deep Bed Penetration of Sediment:** If turbidity spikes exceed the protective capacity of the surface layer, finer particles can infiltrate deeper into the filter media, compromising the entire bed's integrity and functionality.
- **Pass-Through of Untreated Sediment:** Under extreme loading conditions, particulate matter may bypass effective treatment altogether, entering the distribution system and posing a direct risk to public health and regulatory compliance.
- **Increased Cleaning and Maintenance Requirements:** Elevated turbidity will necessitate significantly more frequent scraping and cleaning of filter beds. In severe cases, cleaning may require deeper sand removal, partial media replacement, or full bed reconstruction—actions that are labor, time, and cost intensive and may result in prolonged, possibly months of system downtime.
- **Total Inoperability of the SSF System:** Should turbidity exceed manageable thresholds for a few to serval days, the entire filtration system may become inoperable. The City would then have no functional potable water supply for public consumption, fire suppression, or sanitary disposal, including flushing and sewer conveyance.

These risks are considered critical. Without alternative treatment capacity or raw water pretreatment, Stayton's ability to meet basic public health, safety, and sanitation needs would be severely compromised in a matter of hours to days under extreme turbidity conditions and would remain compromised for potentially months until turbidity was within normal ranges and beds could be brought back on-line.

## Risk Treatment

**Options for Turbidity Risk: Avoidance, Minimization, and Mitigation:** To address the serious risks posed by elevated turbidity during the Detroit Dam drawdown, the City of Stayton is evaluating and implementing a combination of **Avoidance**, **Minimization**, and **Mitigation** strategies, each designed to protect the integrity and operability of the City's potable water system:

## Avoidance

Avoidance focuses on eliminating the exposure to high turbidity events altogether by:

- **Securing Alternative Water Sources**: Exploring emergency interties with neighboring systems or temporary/permanent surface or groundwater supplies that are not affected by the drawdown.
- **Pre-Drawdown Operational Adjustment**: Maximizing treated water storage in reservoirs ahead of the turbidity event to reduce reliance on the raw water intake during peak disturbance.
- **Coordination with USACE and Regulators**: Advocating for drawdown timing, duration, or sediment management practices that avoid or minimize peak turbidity coinciding with critical periods of demand or vulnerability.
- **Exploration of Legal Avenues:** The City is actively monitoring and evaluating potential legal pathways to ensure that the impacts of the drawdown on municipal water supply are fully considered in environmental permitting, agency decision-making, and mitigation planning processes. This includes engagement in public comment periods, review of NEPA and ESA compliance, and potential pursuit of administrative or legal remedies if adverse impacts are not adequately addressed.

## Minimization

Minimization involves operational and physical strategies to reduce the severity of turbidity impacts, including:

- **Temporary/permanent Pretreatment or Bypass Structures**: Investigating installation of temporary/permanent sedimentation, screening, or chemical pre-treatment systems upstream of the SSF to remove heavier loads before they reach the filters.
- **Flow Modulation**: Adjusting intake timing to draw water during periods of lower turbidity, if diurnal or flow-based fluctuations allow for it.
- **Operational Readiness**: Enhancing staffing, training, and availability of equipment and materials for rapid filter maintenance or media handling during high-load conditions.

## Mitigation

Mitigation measures aim to respond to and recover from turbidity impacts that cannot be fully avoided or minimized:

- **Accelerated Filter Maintenance**: Increasing the frequency and depth of SSF scraping, with contingency plans for rapid sand/media replacement or full bed reconstruction if needed.

- **Emergency Treatment Alternatives**: Preparing for temporary/permanent mobile treatment units (e.g., packaged membrane or pressure filtration systems) to be deployed if SSF capacity is lost.
- **Public Communication and Demand Management**: Engaging the public and institutional users with clear communication on potential supply limitations, promoting conservation, and prioritizing essential use during emergency periods.
- **Exploration of Emergency Declaration**: The City is actively assessing the potential need to **declare a local emergency** if water treatment capacity becomes critically compromised. This includes evaluating what such a declaration would entail operationally, legally, and administratively—particularly in relation to **unlocking access to state or federal funding, mutual aid resources, or expedited permitting** for emergency infrastructure modifications.

Each of these treatment pathways requires careful coordination with regional partners, regulatory agencies, and internal operations teams to ensure readiness and continuity of service in the face of a potential raw water quality crisis.

## Potential Technical Options

**Alternative Water Supply and Treatment Investments:** In response to the identified risk of raw water turbidity overwhelming the City's existing slow sand filtration system during the Detroit Dam drawdown, the City of Stayton is evaluating several long-term and supplemental treatment solutions to ensure the reliability and resilience of its potable water system.

### Regional Partnership with the City of Salem

One of the most immediate and scalable alternatives is to secure enhanced **intertie access to the City of Salem's treated water supply** assuming they have surplus potable water from Geren Island[1]. This would involve further development of the existing purchase agreement for potable water. To support the sustainability of this option, Stayton would investigate the potential of **contributing to Salem's proposed expansion of groundwater capacity** on Geren Island. The Salem project suggests the development of additional wellfields to bolster Salem's turbidity resilience, from which Stayton could draw under established mutual aid or emergency supply agreements.

### Local Groundwater Development and ASR

Independently, the City of Stayton is also considering **accelerating the development of its own groundwater sources**, including deep wells capable of supplying a significant portion of the

[1] Geren Island is a small island located about 27 miles downstream from Detroit Dam on the North Santiam River, near Stayton, Oregon. It is the location of Salem's primary water treatment facility

City's average daily demand. In parallel, Stayton is exploring the feasibility of implementing an **Aquifer Storage and Recovery (ASR) system**, which would allow the city to store treated water in the aquifer during periods of low demand and recover it during emergencies or high turbidity events, thereby reducing reliance on the river during critical periods.

### Pretreatment Enhancements to the SSF System

To improve the resilience of the existing SSF infrastructure, the city is evaluating **pretreatment options such as Dissolved Air Flotation (DAF)**. DAF technology would remove suspended solids and organic matter before water enters the filter beds, significantly reducing turbidity loads and extending filter runtimes. Integration of such pretreatment could allow the SSF to remain functional even under moderately elevated turbidity conditions, providing a cost-effective and scalable buffer against system failure.

These investments, taken individually or in combination, represent a strategic shift toward a multi-source, risk-diversified water supply portfolio capable of withstanding the operational and environmental pressures anticipated during and after the Detroit Dam drawdown.

The costs associated with each option are being developed for further analysis and consideration. The pretreatment option is likely the most expensive but also provides the city with the most self-sufficiency for several water quality issues. The high-level cost estimate for this option is $12M-$15M but it could be double dependent on the associated ancillary requirements.

## Risk Treatment and Technical Solutions Analysis - Timeline

**Phase 1 – Initiation and Preliminary Assessment (Ongoing)**

- Define project scope and objectives
- Assemble internal team and assign responsibilities
- Identify regulatory requirements and agency coordination needs
- Review existing system performance data and raw water quality trends
- Initiate legal and emergency management consultations

**Phase 2 – Risk Characterization and Scenario Development (Ongoing)**

- Model turbidity loading scenarios during and after Detroit Dam drawdown
- Define system failure thresholds (e.g., NTU[2] limits, flow disruptions, filter overload)
- Assess vulnerability and potential consequence levels

[2] **Nephelometric Turbidity unit**, i.e. the unit used to measure the turbidity of a fluid or the presence of suspended particles in water. The higher the concentration of suspended solids in the water is, the dirtier it looks and the higher the turbidity is.

- Identify critical operational windows and seasonal constraints

**Phase 3 – Technical Options Analysis (2–4 months)**

- Evaluate pretreatment technologies (e.g., DAF, sedimentation, screening)
- Develop conceptual designs for alternative solutions (groundwater wells, ASR, intertie)
- Conduct high-level cost estimation both capital and operational (CAPEX and OPEX)
- Determine site constraints, permitting needs, and constructability
- Rank options based on effectiveness, feasibility, and timeline

**Phase 4 – Risk Treatment Planning (4–5 months)**

- Align treatment strategies under Avoidance, Minimization, and Mitigation categories
- Identify short-term emergency response measures vs. long-term capital projects
- Define roles, responsibilities, and decision-making triggers (e.g., emergency declaration)
- Refine cost estimates and identify funding strategies (state/federal grants, ARPA, SRF, etc.)

**Phase 5 – Stakeholder Engagement and Preliminary Approvals (5–6 months) (Engagement is currently underway and will be ongoing**

- Present findings and recommendations to City leadership and Council
- Engage with regional partners (City of Salem, Santiam Water Control District, etc.)
- Coordinate with regulatory and permitting agencies
- Begin funding applications and legislative briefings, if applicable

**Phase 6 – Implementation Roadmap and Project Sequencing (6–7 months)**

- Prioritize actionable items based on risk profile and resource availability
- Develop preliminary project schedules and milestones
- Prepare scopes of work and initiate design/engineering procurements
- Begin permitting and pre-construction assessments where applicable


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STAYTON