Date	August 23, 2024
To	BERK Consulting
From	KPFF Consulting Engineers
Subject	Vulnerability & Risk Assessment – DRAFT MEMO

Vulnerability & Risk Assessment

The Appendix A: Sea Level Rise Vulnerability Assessments[1] of the Interim Climate Resilience Planning Guidance for Shoreline Master Programs published by the Washington State Department of Ecology[2] helps local governments address the shoreline impacts of climate change. It advises conducting vulnerability assessments that consider exposure, sensitivity, and adaptive capacity and stresses clear objectives, priority hazards, and public and Tribal engagement. The guidance also emphasizes incorporating findings into Shoreline Master Programs (SMPs) with locally tailored adaptation actions, leveraging existing data, and ensuring equitable community involvement for effective long-term resilience.

The table below summarizes the overall vulnerability of coastal resources and infrastructure in the Town of Friday Harbor. Vulnerability is categorized into four levels—low (L), medium (M), high (H), and severe (S)—based on the anticipated frequency and severity of climate hazard impacts.

			RSLR Scenario FEMA Zone AE Base Flood Elevation: 13ft				
Resource	**Base Elevation**	**RSLR-Related Hazards**	**+1ft**	**+2ft**	**+3ft**	**+4ft**	**+5ft**
Utility Infrastructure							
Stormwater: Pump 1	15 ft	Loss of function due to higher tide elevations	L	M	H	S	S
Stormwater: Pump 2	15 ft	Loss of function due to higher tide elevations	L	M	H	S	S
Transportation Infrastructure							
Ferry Terminal	15 ft	Coastal/fluvial flooding	L	M	H	S	S
Marina Fixed Piers	20 ft	Coastal/fluvial flooding	L	L	L	L	L
Coastal Development/Resources							
Shipyard Cove	7 to 10 ft	Coastal/fluvial flooding	S	S	S	S	S
San Juan Yacht Club	20 ft		L	L	L	L	L

[1] Washington State Department of Ecology, Interim Climate Resilience Planning Guidance for SMPs, Appendix A: Sea Level Rise Vulnerability Assessments, April 2024, https://apps.ecology.wa.gov/publications/parts/2406004part2.pdf

[2] Washington State Department of Ecology, Interim Climate Resilience Planning Guidance for Shoreline Master Programs, April 2024, https://apps.ecology.wa.gov/publications/documents/2406004.pdf

The table shows that vulnerability varies across different resource types within the study area but is generally classified as low to moderate.

I. Review and Summarize Shoreline Vulnerabilities

A detailed review and site observations have been conducted. Appendix A: Sea Level Rise Vulnerability Assessments informed these efforts, and the review identified several critical vulnerabilities to the Town of Friday Harbor's shoreline infrastructure.

- Critical Infrastructure Vulnerability: The Town's two main sanitary sewer pump stations, on East Street behind the Cannery Landing building and at the end of McDonald Avenue, are most susceptible to sea level rise (SLR) and potential flooding.

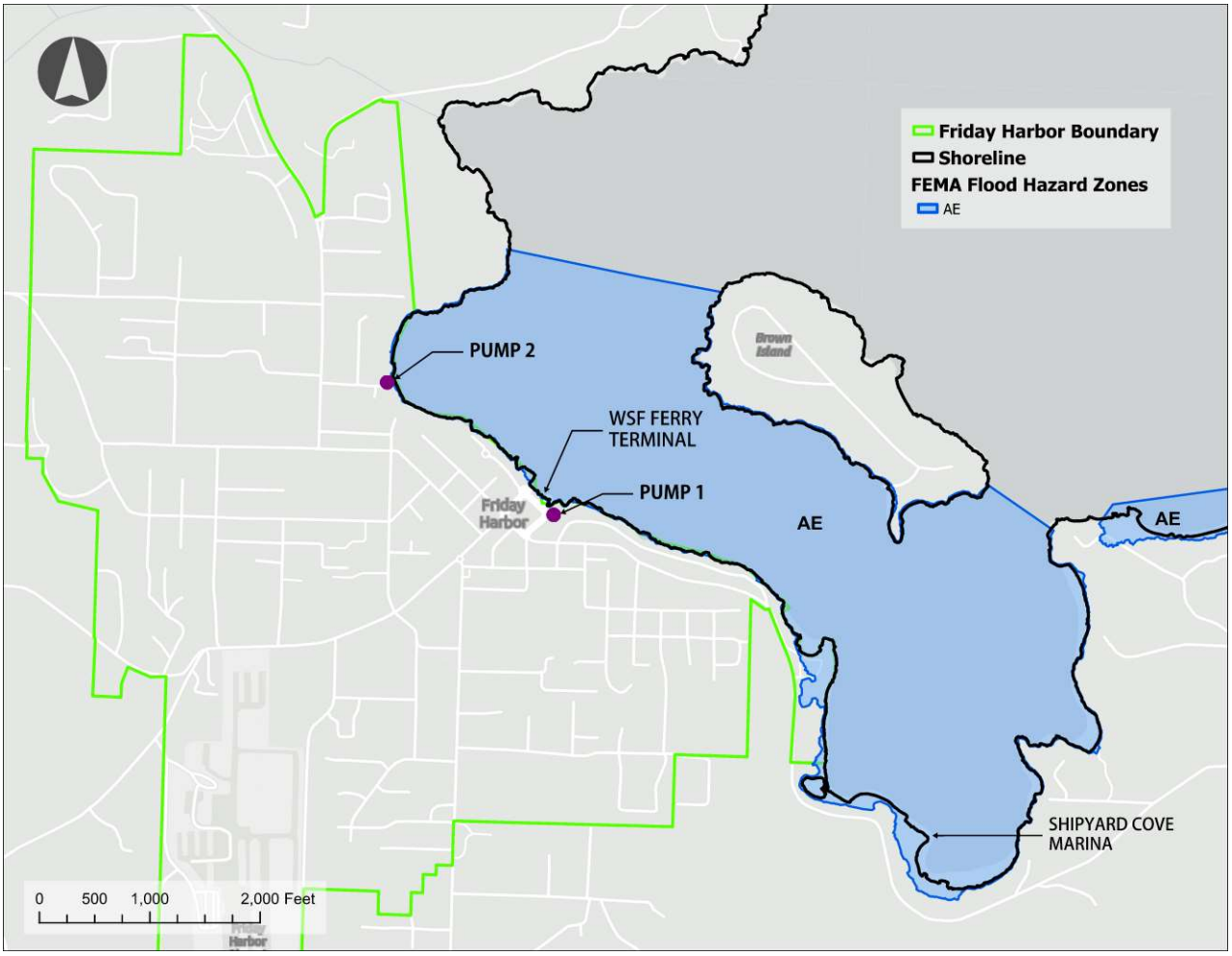

Figure 1 Map of the FEMA Flood Hazard Zones within the vicinity of the Town of Friday Harbor[3]

[3] In FEMA's floodplain management terminology, "Zone AE" is used for areas with a 1% annual chance of flooding (often referred to as the 100-year floodplain). It denotes regions that are expected to experience significant flood risk, and the flood elevation levels are typically determined by detailed hydraulic and hydrologic analyses.

These pump stations are integral to Friday Harbor's sewage systems, serving waterfront communities north and south of downtown. To mitigate potential vulnerabilities, upgrades to the pump stations could include protecting upstream sewer mains and side sewer connections to prevent damage that could allow seawater intrusion into the sewage treatment system and raising critical components above predicted king tide and storm surge levels, as applicable. Continued maintenance and monitoring programming should also include checking for signs of corrosion or damage due to saltwater exposure. Lastly, an emergency response plan that includes procedures for managing backflow events and ensuring the continued operation of the pump stations should be developed.

- Stormwater Management: The Town's stormwater outfalls are designed to manage high tides and prevent backflow, a significant resilience factor. However, continuous monitoring and upgrades may be necessary to ensure these systems remain effective as sea levels rise.
- General Shoreline Infrastructure: The Town of Friday Harbor's buildings and infrastructure are not immediately at risk from sea level rise. However, the lowest area of the Town is a private estate that could be susceptible to rising sea levels. The Town of Friday Harbor should continue to engage with the local communities and stakeholders to ensure that their concerns and values are effectively integrated into resilience planning efforts.

By developing strategies for the identified vulnerabilities, the Town of Friday Harbor can better prepare, plan for, and mitigate the impacts of sea level rise, ensuring the long-term resilience of its critical infrastructure and shoreline.

II. Potential Goals and Policies to Limit Vulnerabilities

To mitigate the risk associated with SLR, the Town of Friday Harbor may consider developing draft goals and policies that aim to limit vulnerabilities due to SLR. Appendix A: Sea Level Rise Vulnerability Assessments, supporting the Interim Climate Resilience Planning Guidance for SMPs, provides valuable insights that inform these strategies. Potential goals and policies may include the following.

- Integrate Climate Resilience into Infrastructure Planning: Incorporate climate resilience into all shoreline infrastructure planning and development aspects. This includes designing and retrofitting new infrastructure to withstand future sea level rise scenarios. Using vulnerability assessments, as recommended in the guidance, will ensure that all plans consider exposure, sensitivity, and adaptive capacity.
- Community Engagement and Education: Engage the local community to raise awareness about rising sea level risks and the importance of climate resilience. Educational programs can help residents and businesses understand how to protect their properties and contribute to broader resilience efforts. Appendix A reinforces this strategy by highlighting the importance of public engagement to ensure community priorities are reflected in resilience planning.
- Coordination with Multiple Stakeholders: Since the Town does not own overwater infrastructure, which is instead owned by entities like WSDOT, the Port of Friday Harbor, and private owners, coordinating resilience planning efforts with these stakeholders is crucial. Given the guidance highlights the importance of partnerships, including collaboration with Tribes and other local entities, collaborative efforts can ensure a unified approach to managing and protecting shoreline infrastructure.

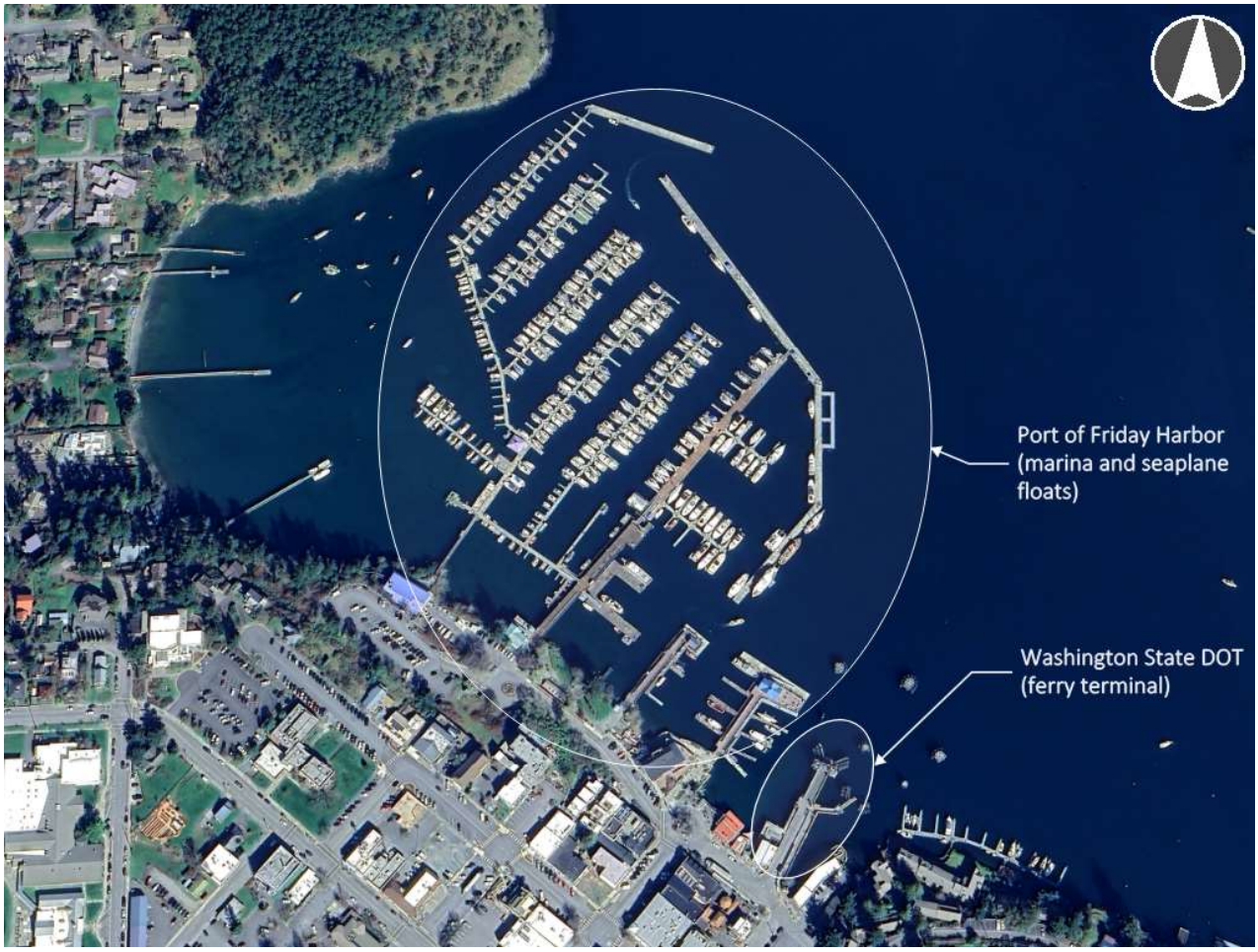

Figure 2 Other Waterfront Infrastructure Ownership (Google Earth)

- Leverage Updated Data and Technology: Use the latest data and technology, such as GIS and Lidar, to enhance infrastructure planning and risk assessment. A robust GIS system will enable precise mapping of vulnerable areas and help better decision-making.
- Adopt Best Practices from Other Coastal Communities: The Departments of Commerce and Ecology are developing guidance related to climate resilience and sea level rise adaptation. This process includes engagement opportunities for affected communities and will be based on experience elsewhere. Following and participating in this process will give the Town of Friday Harbor staff the opportunity to learn from other coastal communities facing similar challenges.
  One suggested approach to improving coastal resiliency is using green infrastructure, such as living shorelines, to reduce erosion and provide natural buffers against storm surges and sea level rise. Other approaches that could be considered include integrating public access and coastal protection and minimizing the use of hard floodwalls to provide protection.
- Pursue Funding Opportunities: The Town of Friday can identify and pursue funding opportunities to support the implementation of resilience measures. These can include federal and state grants, partnerships with private sector entities, and non-profit organizations. The guiding documentation suggests utilizing resources like the Coastal Hazards Resilience Network and Washington Sea Grant for support and funding opportunities.

By adopting these strategies, the Town of Friday Harbor can proactively address its' vulnerabilities to SLR and enhance the resilience of its shoreline and infrastructure.

III. Conclusion

Proactive measures are essential to address the vulnerabilities described, particularly regarding the two critical pump stations. Upgrading these facilities and improving overall resiliency will help mitigate the long-term impacts of sea level rise on the Town's infrastructure. Developing a comprehensive GIS system, coordinating with the various entities owning overwater infrastructure, and tracking the development of new guidelines will enhance the Town's preparedness. Additionally, addressing the risk of seawater intrusion into the Town's sewage treatment system is crucial for supporting the integrity of the Town's infrastructure and protecting the local ecosystem.

By integrating climate resiliency into local planning, engaging the community, and adopting best practices, as detailed in Appendix A of the Interim Climate Resilience Planning Guidance for Shoreline Master Programs, the Town of Friday Harbor can effectively mitigate the impacts of sea level rise. These strategies will ensure the long-term sustainability of its critical stormwater infrastructure and safeguard the well-being of its residents and environment. By following the recommendations outlined in the guidance, the Town of Friday Harbor can build a robust framework for future resilience against climate change impacts.