

Olympic Gravity Water System Assets White Paper

June 7, 2021

Preface

The City of Port Townsend and the Port Townsend Paper Mill have a historical partnership of supplying water to the Quimper Peninsula, City of Port Townsend, and the Port Townsend Paper Mill dating back to 1928. The City and Port Townsend Paper Company are in the process of developing a new partnership agreement that will address water supply looking forward to the next 100 years.

Like the development of the Olympic Gravity Water System in the late 1920's, the development of an agreement between the City of Port Townsend (City) and Port Townsend Paper Company (PTPC) is a significant undertaking with the stakes being high for both parties. As such, the negotiation of a mutually beneficial agreement warrants thoughtful collaboration based on the best data possible.

As a way to ensure good factual data is available for the negotiation, eight technical white papers break down information into manageable segments. In the following specific white paper categories, the City and PTPC have worked together to develop these white papers to provide information for consideration during the negotiation of the agreement.

1. Assets: Understanding each entities assets and capacities that support investment decisions.
2. Stakeholders: The public as well as many governmental organizations may be potentially interested stakeholders.
3. Planning and Environmental Considerations: Future water supply needs, climate change and water supply availability are important factors to include in planning for the future.
4. Operations: Operational requirements, efficiencies, cost, and as well as distinguishing between capital and ordinary maintenance is a major part of any public private partnership agreement.
5. Capital Investments: Capital needs are extensive and should be informed by a value engineering study for system reliability and to reduce costs.
6. Funding and Resources: In order to address operational and capital needs, a plan is necessary to fund system needs ensuring that sustainability is achieved.
7. Legal considerations impact the form of the agreement depending on negotiation outcomes. Surety and performance are two key legal discussion points.

The intent of developing these white papers is to provide a resource to inform negotiations and as background for the public and decision makers. All of the white papers will be assembled into a comprehensive technical report in support of the development of a comprehensive recommendation for the City of Port Townsend City Council and the Port Townsend Paper Mill Board of Directors.

The following white paper focuses on the assets of the system, including those held individually by the City and the Port Townsend Paper Mill, which may be relevant to development of the partnership.

Introduction

The OGWS originating from Snow Creek, which began operation in 1905, was decaying and having difficulty supporting the water needs of the community by the mid-1920s. The Port Townsend community actively competed to be the site of the new Crown Zellerbach kraft paper mill to help revive the city's economic fortunes and renovate the water system. As part of the process the City acquired water rights on the Big and Little Quilcene Rivers and the voters approved issuing municipal bonds to pay for the construction of a dam and pipeline from the Big Quilcene River. Port Townsend has maintained ownership the OGWS facilities and water rights but leased the operation and maintenance of the source water collection and transmission system to the National Paper Products Company. In addition to lease payments, the mill and its various owners have continued to assume responsibility for the operation of the OGWS since its completion. Sections of wood stave pipeline installed in 1928 were replaced between the 1950s and 1972 with welded steel pipe. Construction of the Little Quilcene diversion and Lords Lake reservoir in 1955/1956 added a new source of supply and 500 million gallons of storage to the water system.

Since 1928, the City and Port Townsend Paper Company have been engaged in a public private partnership which included agreements for the development and construction of the system, operations, and upgrades as described above. The history of the Port Townsend Paper Mill and City of Port Townsend relationship is provided via two presentation provided through Jefferson County Historical Society and Port Townsend Public Library Speaker Series.

<https://ptpubliclibrary.org/library/page/port-townsend-paper-mill-%E2%80%93-past-present-and-future>.

The Port Townsend Paper Mill – Past, Present, and Future

The Jefferson County Historical Society and the Port Townsend Public Library are teaming up with the City of Port Townsend, the Port Townsend Paper Mill, KPTZ 91.9, the Swan School, and other partners to present a suite of programming this winter all about the Mill – its history, economic and workforce impact, recycling practices, and of course its product – paper!

See below for details on individual events.



Looking forward to the next 100 years the City and Port Townsend Paper Corporation will be continuing a cooperative relationship in some form. Public Private Partnerships have changed over the years and have different legal requirements; however, many principles are similar.

A fundamental tenon to effective public private partnerships is utilizing each partner's strength within their purpose of operation and the legal constraints for which they work within. The intent of this white paper is to determine those key areas of strength each party provides. As such, this whitepaper outlines the assets each entity brings to the partnership. Additionally, this white paper looks specifically at the asset of the system itself and poses the hypothetical situation of how the system might change if one of the parties were to end the partnership.

System Assets

The system itself has inherent characteristics which result from the type of system developed in 1928 and expanded in subsequent years. Some of the system assets are provided below

- High water quality – The source water has little in the way of natural or human caused contaminants and is generally very low in total suspended solids (TSS). Low TSS is a result of an undeveloped watershed within the Olympic National Forest and two reservoirs that provide for high residence times and settling of suspended solids. The purity of the water minimizes treatment costs for both the City and Mill.
- Water quality for paper production – Water as provided through the OGWS is sufficiently clean that it does not require additional filtration for most of the mill uses. Since the elimination of the Port Townsend’s City Lake chlorination system, the mill treats its process water with a low chlorine dose as a biocide.
- The OGWS is a 100% gravity transmission system with sufficient pressure to deliver raw water to the City and Mill without pumping. The absence of pumping results in substantial energy saving. Thus, the system has a very low carbon footprint in terms of daily operations. Once delivered to the Mill, process water is pumped through the various processes as it is recycled several times. Most of the City’s service area is gravity fed based on the OGWS head pressure to deliver water through the filter plant into treated water storage reservoirs. There is one exception for a small pressure zone on Morgan Hill where pumping of water is required.
- Given the duration of this successful public private partnership, the system is still in good operating order nearly 100 years later.
- Forest Service Permit – The necessary permissions to operate the water system on Federal property are valid until 2029. This permit is the result of a significant negotiations in past years and cooperation with the National Forest Service.
- The fact that the watershed is managed and owned by the Federal government, reduces the risk of human caused disruption to the watershed in terms of water quality impacts caused by agriculture, industry, and other development. Maintaining high quality water for domestic use is Olympic National Forest Service’s stated primary resource management objective for the Port Townsend municipal watershed. Water quality can still be impacted by natural disasters, logging, and other forest management practices but the lack of development provides a fundamental layer of protection.

Port Townsend Paper Corporation Assets

The Port Townsend Paper Corporation has a large workforce with industrial capabilities that have assisted in operating the water supply and transmission system including:

- Providing three FTEs, which include fulltime caretaker duties at City Lake and the Big Quilcene Diversion.
- Waterline crew with pipe welder, construction, and general contracting experience.

- Flexible labor in terms of caretakers living on site for quick response (15 minutes) to operating issues at City Lake or the Big Quilcene Diversion, dealing with landslides, screen cleaning, control adjustments, etc.
- Ability to respond with additional mill resources. During pipe failure or operating upsets emergency repair speed is directly tied to lost opportunity cost of paper production. The Mill can provide pipe fitters/welders as necessary for pipeline repairs. Electricians, instrument technicians, and millwrights routinely provide maintenance service for the water system including rebuilding components such as the rotating screen at the Big Quilcene Diversion.
- Long term relationship with qualified contractors for emergency or unusual work. This includes local contractors and specialty integrated mechanical and piping contractors for live leak repair.
- Experienced purchasing group for procurement and expediting of required materials.
- PTPC engineering, machine and instrumentation shops providing design services, specialty tools for construction and fabrication, and warehousing of spare parts
- Nonpublic agency with employee pay closely following prevailing wages.
- Corporate entity has the ability to raise private capital.
- Economic Impact
 - 300 employees, \$33,000,000 in wages and benefits.
 - Local Investment: \$146,000,000 (2016)
 - \$2,500,000/yr. local & state taxes plus income taxes

City of Port Townsend Assets

The City of Port Townsend has a number of assets related to being a municipality and water purveyor.

- Ownership of existing water system infrastructure
- Water rights are owned by the City of Port Townsend. In Washington State, the Courts have held that Municipal Water Rights are generally protected against relinquishment for non-use. This is not the case for private enterprise which follows the “Use it or lose it” doctrine.
- Variety of heavy equipment such as backhoes and dump trucks as well as parts and tools for maintaining a water system.
- Land including timber assets

Name	Acres	Comments
Lords Lake	471.83	275 acres of commercial timberland
City Lake	167.17	73.42 acres of commercial timberland
Four Corners	19.72	Commercial timberland

Forest Land near Jacob Miller Rd	81.53	Commercial timberland
Various pipeline parcels		Usually 30 feet wide

- Utility strip easements and some fee simple rights of way.
- Public works crews with equipment operation and water system maintenance experience.
- WARN access for statewide support from other utility providers.
- Government bonding ability with access to low interest rates and government loans.
- Municipal operations are dedicated to longevity and stability of infrastructure.
- Community has a growing customer base.
- Public works and engineering staff with project management expertise.
- Financial and administrative expertise.
- SCADA and GIS systems enhance system operational performance.
- Ability to access grants – i.e. FEMA emergency preparedness grants.

Dissolution of Public Private Partnership – The what if hypothetical

Given the assets as currently provided in above sections of this whitepaper are generally founded on the principle that the partnership will continue, an analysis of hypothetical dissolution of the partnership is warranted. This analysis may be useful in assigning roles and responsibilities, developing investment strategies, and addressing surety in the negotiation of a new public private partnership agreement.

City Leaves Partnership:

What if the City were to leave the partnership? This hypothetical case could result from the City pursuing an alternative water source such as desalination in lieu of investing in the reconstruction of the OGWS transmission line. This case analyzes how the Mill could continue to operate and invest in the system. The following points are important to consider:

- Water quality – Water turbidity limits would only change slightly otherwise; source water quality or treatment requirements would not be impacted.
- Pipeline reliability – Mill would invest to maintain current reliability. Since the Mill is more sensitive to upsets than the city, Mill use is the driver for maintaining 24/7 reliability. With the City’s 6 million gallons of storage, it can rely upon this to maintain service for approximately 3 days during a transmission outage, whereas the Mill must shut down with any pipeline interruption. Shutdown results in a minimum restart period of 24 hours resulting in loss of production.
- Mill may have to manage the USFS Permit renewal if the City abandoned its ownership position of the water rights and property assets.

- Capital investments would be made as required to provide high level of reliability within the business viability operating window. Some investments include:
 - Potentially expanding Lords Lake storage.
 - Seismic improvements will be required for Lords Lake East Dam per WSDOE Dam Safety
 - Eventual replacement of transmission pipeline and diversion facilities.
- Ownership- Possible lease or transfer of system assets from City to PTPC.
- Water rights -Possible lease or transfer ownership to PTPC.
- The Mill would assume of system liability.
- The Mill could expect higher maintenance workload as the system ages.

PTPC Leaves Partnership:

What if the PTPC were to leave the partnership? This hypothetical question would be based on PTPC ceasing operations. A reliable and cost-effective water supply is a fundamental requirement for the operation of the Mill as the water is core to the process and thus operating the Mill with an alternative water source is highly unlikely. As described below, various options are considered which result in the answer of how the City could continue to operate and invest in the system OGWS should the PTPC leave the partnership. The following preface points are important to consider:

- Asset sizing – The City would only require capacity of 3-4 MGD in the near term and 5-7 MGD in the long term unless another water intensive business were to become a customer of the City. If the pipeline was replaced with a smaller pipe, the relatively small cost savings in a smaller transmission line would potentially inhibit future industrial, commercial and wholesale developments and could limit the chances of redevelopment of the PTPC site.
- Pursuit of rate base expansion - If the system were to be maintained, additional customers are likely to be necessary to support system operation and capital investments, which may include a partnership with the Jefferson County PUD to serve the Tri-area with wholesale water.
- Significantly reduced water consumption may lead to stagnation and water quality issues in the lake reservoirs.
- The need for system reliability between watershed and City Lake is reduced as storage capacity in City Lake is sufficient for several months of City only operation.
- System reliability between City Lake and the Water Treatment Facility remains critical as this link is the sole source of supply for the City. Treated water storage in town requires that the transmission line outage be limited to only a few days otherwise customers will be out of water.
- Water rights preservation – Municipal water rights are retained even though they may not be fully exercised. This leaves open the opportunity to attract other business development and would possibly support the redevelopment of the Paper Mill site should it become unviable as a mill.
- Prioritize of investments would become different raising the following questions:
 - Does the City need Lords Lake?
 - Does the City need both diversions?
 - Could 9 miles of pipeline and Big Quilcene Diversion be abandoned in favor of the Little Quilcene Diversion and City Lake operational Storage?
 - Would slip lining be a viable option on some pipeline sections?
 - Would investments be warranted to automate operations and eliminate on-site residences at City lake and the Big Quilcene diversion given City employment structures?

- Would it be appropriate to focus on prevention of catastrophic failures which the City could not afford to fix or would be beyond the City's capacity to raise sufficient capital for repairs or replacement?
- How could the City focus on upgrading section of pipeline between City Lake and Water Treatment Facility?
- Would the City be able to secure grant assistance without the benefit of supporting a large employment base such as the Mill?
- Are there alternative water sources that would sustain the City at a more affordable rate?

Options Considered:

Jacobs Engineering was hired to assist the City and the PTPC in various technical analyses. The following four options were explored for the what if scenario of the PTPC leaving the partnership. These options also reflect information provided in the Planning and Environmental White Paper in terms of system growth needs.

Scaled Back OGWS

Municipal water demand could be met by the utilization of a scaled back Olympic Gravity Water System consisting of the Little Quilcene diversion combined with Lords Lake and/or City Lake reservoirs. With a water right for 6.179 mgd, which is available most of the year, and combined reservoir storage of 640 million gallons the system would be capable of supplying a fully built out community minus the large industrial demand. This reduced system would eliminate maintenance requirements for about a third of the transmission pipeline and one diversion. In this option, the City could temporarily shut down the Big Quilcene Diversion and the pipeline between the diversion and Lords Lake. This temporary shutdown would reduce O&M costs and the City would forego replacement of the pipeline. This would offer significant cost reductions until increased demand resumed. It would be recommended to put the system into a temporary hold pattern and continue to maintain permits. A key consideration is that one of the benefits of the industrial demand is the rapid turnover of the water stored in the lake reservoirs. Stagnant water from increasing the reservoir detention time can result in water quality problems. Additional pipeline modifications may have to be made to allow Little Quilcene diversions to bypass Lords Lake. Lords Lake may experience limited use in this scenario.

Wells

Groundwater recharge in the Port Townsend vicinity is limited by available precipitation (1981-2010 average 19.03 in/yr). Recharge within the Port Townsend area is derived entirely from rainfall, which was estimated by Pacific Groundwater Group at around 7 in/yr. this recharge rate amounts to an average annual groundwater input of 4.5 cfs (2,020 gpm). Capturing the theoretical recharge rate is not possible and because groundwater elevations are close to MSL, over pumping would lead to saltwater intrusion into the aquifer. Any groundwater system would likely consist of numerous well fields but would only be able to supply a portion of the municipal demand and would likely require treatment for iron, manganese and other potential contaminants. The best opportunity for use of wells is to augment the supply for irrigation purposes as is the case with the development of the Golf Course Well. The cost to complete one well for the golf course irrigation will be in \$100,000-200,000 range and only produce a maximum of 150 gpm. Ultimately, use of groundwater is not a viable option to supply water demands for the City of Port Townsend's water service area, even without the industrial demand of the PTPC.

Reverse Osmosis

Treating seawater using a reverse-osmosis (RO) desalination process is the currently the only technically feasible alternative to the City's gravity water system. Jacobs Engineering provided a conceptual level estimated capital cost for a 2.5 mgd desalination water treatment facility is \$113,000,000. This estimate could potentially be reduced by siting the facility closer to the coastline; however, the difference in cost would not be substantially different. Estimated annual operating and maintenance costs for a desalination water treatment facility are typically very high, primarily due to the power requirements along with significant chemical cleaning and maintenance costs. The estimated annual O&M cost for this desalination facility is approximately \$4.8 million in 2021 dollars. Combining the capital costs and these maintenance costs, desalination is not a viable option for water supply from a financial standpoint.

Water Reuse

Water reclamation is one way to improve water use efficiency by utilizing treated wastewater for some water supply needs. Reclaimed water is effluent derived in any part from sewage from a wastewater treatment system that has been adequately and reliably treated, so that as a result of that treatment, it is suitable for a beneficial use. The 2019 Water System Plan estimated the cost to produce reclaimed water for non-direct use such as irrigation at \$0.04 per gallon. Whereas the current utility billing rate for residential water use is \$0.003 per gallon. Treating water to a direct potable reuse standard is substantially higher. A municipal water system is not a closed loop system and, even if the City was utilizing reclaimed water, there would have to be an alternate supply of water to make up for that portion not captured in the reclamation process. The use of reclaimed water is almost certainly a method of water use efficiency that will be more widely deployed in the future as cost parity is reached. The beneficial use of reclaimed water is numerous as described in the Planning and Environmental white paper. However, not all of these uses do not result in the ability to use a different water source for the City of Port Townsend. These uses likely would be for irrigation and other/or environmental benefits.

The following table provides a relative comparison of the various supply options in the case of a system that is not needed to provide high volumes of industrial water. The following table illustrates the challenge of an alternative system.

Summary of Supply Alternatives for City of Port Townsend if No Longer Serving PTPC							
Supply Alternatives	Permitting Certainty	System Complexity	Risk of Insufficient Supply	Capital Cost	Can Capital Costs be Phased?	O&M Cost	Potential for Fatal Flaw
Stand-Alone Supply Alternatives							
Continued use of OGWS	Good	Medium	Low	High	Yes	Medium	Low
Modified Use of OGWS ¹	Good	Medium	Low	High	Yes	Medium	Medium
Desalination of Seawater	Poor	High	Low	Highest	No	Highest	Medium
Development of Groundwater	Poor	Medium	High	Medium	No	Medium	High
Supply Alternatives Plus Reuse of WWTP Effluent							
Continued use of OGWS plus WWTP Reuse	Medium	High	Low	High	Yes	High	Low
Modified Use of OGWS plus WWTP Reuse	Medium	High	Low	High	Yes	High	Medium
Desalination of Seawater plus WWTP Reuse	Poor	Highest	Low	Highest	No	Highest	Medium
Development of Groundwater plus WWTP Reuse	Poor	High	High	High	No	High	High
¹ Modified use of the OGWS would include expansion of the customer base by supplying the Jefferson PUD Quimper Water System and removal of some of the OGWS facilities from continued use. The OGWS facilities that could be removed (pending further analysis), include: Lords Lake and the Big Quilcene intake and pipeline. This could reduce the total cost of the project.							

Conclusion

The information provided in this white paper illustrates the importance of a partnership. The history of the development of the OGWS was founded on the struggles of the City to maintain and develop a reliable and adequate water supply. This fundamental problem resulted in the development of the 1928 OGWS. The outcome of this analysis provides the backing for the confidence of the City to continue to invest in the OGWS despite the any possibility of the loss of the PTPC as a partner. This white paper also lays the groundwork for placing each entity in their position of core competency to facilitate an effective partnership for the short and long term.

References

WARN Agreement

WAWARN Operational Plan

2021 Jacob's Engineering Analysis of Reverse Osmosis

Port Townsend Paper Mill Past, Present, and Future Speaker Series Provided by the Jefferson County Historical Society and Port Townsend Public Library

- January 28, 2021, *Port Townsend Paper Mill Past, Present, and Future* Presentation by General Manager, Kevin Scott
- February 25, 2021, *Port Townsend Paper Mill Past, Present, and Future* Presentation by Water Operations Manager, Ian Jablonski