



City and Borough of Sitka

100 Lincoln Street • Sitka, Alaska 99835

Coast Guard City, USA

City and Borough of Sitka: Blue Lake Penstock System Infrastructure Fact Sheet

The City and Borough of Sitka (CBS) community obtains 100% of its drinking water and 60% of its electricity from Blue Lake. The Blue Lake Dam is one of the most essential pieces of infrastructure within the community and it is crucial that we maintain the dam penstock system infrastructure and the water conveyance system. In order to provide water when the Blue Lake penstock system is being maintained or Blue Lake water quality does not meet the standards of the CBS filtration avoidance waiver, CBS is proposing to install a new secondary drinking water source. The proposed project would draw water from Sawmill Creek and treat it in a new filter plant located adjacent to the existing Ultraviolet Radiation (UV) Water Treatment Plant.

CBS has received many questions regarding the need for a secondary water source, and wants to make sure citizens have accurate information about the proposed project. The questions below are answered in the subsequent pages. A schematic of the penstock system, current water treatment system and proposed water treatment system is provided at the end of this document. A project summary focused on the needs of penstock system maintenance can be found on the [Electric Department website](#).

This fact sheet provides the public with the details it needs to make informed decisions about the project. For additional questions, contact the Public Works Department at 747-1804, or at publicworks@cityofsitka.org.

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1. **What is the “penstock system”?** The Blue Lake penstock system is the infrastructure that delivers water from Blue Lake to the Blue Lake Hydroelectric Plant, the UV Treatment Plant, and to other water users in the Gary Paxton Industrial Park (GPIP). The system includes an intake and bulkhead gate, over a mile of rock tunnels and steel pipe (7-10 feet in diameter), over twenty root valves, a surge chamber, and related equipment. The most important safety feature of the penstock system is the dam intake gate, which allows flow to be shut off in an emergency or for planned maintenance.
2. **Are planned maintenance and inspections of the penstock system required?** The Blue Lake Hydroelectric Infrastructure is licensed and regulated by the Federal Energy Regulatory Commission (FERC), including the penstock system. FERC requires that CBS operates and maintains the infrastructure, using established industry practices to ensure public safety, including maintenance and inspections of the penstock system. See attached exhibit titled Blue Lake Dam Maintenance and Safety.
3. **Why does the penstock system need to be drained?** The penstock system needs to be drained every five years so it can be inspected and to perform routine maintenance such as testing the intake gate, cleaning rock strainers, and to ensure pipe and tunnel integrity. The penstock intake gate, located at the dam, is very important safety feature and needs to be operated at least once every year. The inspection will also determine if there is any major maintenance that needs to be performed.
4. **What will happen NOW if the Blue Lake penstock system has an unplanned outage or failure?** A failure of this infrastructure would be catastrophic. Potential consequences include prolonged (potentially months) inability to provide treated water, prolonged need to rely on diesel generation for electricity, and flash flooding of the Blue Lake power house and GPIP. Without an EPA-compliant back-up water system, domestic water will not meet EPA standards. In Sitka, non-EPA-compliant water would impact hospitals, fish processing, food processing, restaurants, schools, and other businesses.
5. **Why is a secondary water supply needed?** CBS has no way to provide potable water to the public during penstock system outages or during water quality events in Blue Lake. The lack of potable water will have significant health and economic impacts on the community.
6. **Why can't we use Indian River as a backup water source?** We can use Indian River as a secondary water source, but because of the water quality, drinking water regulations would require construction of a filtration plant to treat the water before delivering it to the public. If a filtration plant is not constructed, a community-wide boil water notice would be required.

- 7. I drank Indian River water for years, and never got sick. Why not use Indian River again?** The Indian River Water Treatment Plant was built in the 1960s. It no longer meets drinking water regulations, and would require an expensive project to make it functional. An April 2018 study estimated the cost of building a filter plant at Indian River at \$22.6 million, more than \$4 million above the estimated cost of a filter plant located adjacent to the UV treatment plant at GPIIP.
- 8. Didn't we just spend millions of dollars on an Indian River treatment plant during the Blue Lake Dam Hydroelectric Expansion Project?** Yes, during the Expansion Project \$4 million was spent on a temporary Indian River filtration plant that was used for two months. Additional short-term water operations staff were hired for the project, and the total cost to operate the plant was significantly greater than a similar period using the Blue Lake supply. The filter units were rentals, and could be rented again if needed. However, this is not a permanent solution. CBS would have to rent filtration units every time the penstock system required planned maintenance, and there would not be potable water provided during an unplanned outage or failure.
- 9. Isn't this just another unfunded mandate from the federal government? How can they expect a small town like Sitka to pay for another new water treatment plant?** CBS is not mandated to install a secondary water supply. CBS is proposing to install a new secondary drinking water source in order to provide water treatment when the Blue Lake penstock system is out of service or Blue Lake water quality does not meet standards. This secondary system will help ensure reliable drinking water for the community during emergencies and periods of infrastructure maintenance.
- 10. Why don't we simply issue a boil-water notice during a penstock system inspection?** Planned maintenance and inspection of the Blue Lake penstock system requires a minimum of 5 days and the water division would need a minimum of an additional week to flush, sanitize, and sample the system before the boil-water notice could be rescinded. Unplanned delays during the inspection could result in an extended time without potable water. During this time all water used in the community would need to be boiled before use. In addition to in-home use, much of the community's economy and service based industry would be impacted, including daycares, schools, seafood processing plants, restaurants, and hospitals.
- 11. Can we get a waiver from EPA/ADEC to serve untreated Indian River water during a penstock system inspection?** No. EPA/ADEC requires all communities to provide treatment for potable water. The type of treatment required is based on the water source used, and there are no waivers from providing treatment to water drawn from Indian River or Sawmill Creek. Furthermore, serving untreated water puts the entire community at risk of illness or death caused by water-borne pathogens such as *giardia* and *cryptosporidium*.
- 12. Don't we already have a treatment waiver?** CBS has a filtration avoidance waiver for the water drawn from Blue Lake. The waiver is written into the EPA Surface Water Treatment Rule for waters with exceptional purity, like Blue Lake. Indian River water does not meet the strict criteria needed for this waiver. In fact, there are only 70 systems nationwide that qualify for this waiver.
- 13. How long is the waiver good for?** There is no expiration date on the filtration avoidance waiver. However, if the source water quality parameters are exceeded, the waiver will be rescinded. Due to multiple recent instances of high turbidity (cloudy water) events detected in the Blue Lake water, CBS may be in jeopardy of losing this waiver. This would mean that CBS would have to start filtering its drinking water, instead of simply disinfecting it with UV treatment. The proposed filtration plant would meet the needs of CBS in the event that we lose the filtration avoidance waiver.

- 14. How many turbidity events can we have before the waiver is rescinded?** The waiver does not allow more than two events in the previous 12 months or more than five events in the previous 120 months. Sitka has had four events in the past four years. So CBS cannot suffer two more events over the next eight years, or three over any one-year period and retain the waiver.
- 15. What is the difference between UV treatment and filtration?** UV treatment uses ultraviolet radiation to inactivate most pathogens. Filtration is a mechanical process that filters pathogens out of raw water. It is a more labor and chemical intensive process than UV treatment, and therefore costs much more on a per-gallon basis.

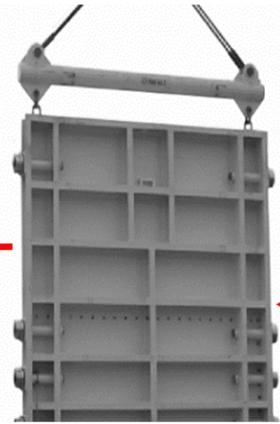
ANNUAL O&M COSTS

treatment system	annual operating cost	increases relative to UV Facility	
		annual cost	utility rate
Existing UV Facility	\$275,000	NA	NA
Filtration Facility with Penstock Supply	\$531,000	+ \$256,000	8%

- 16. Why is the secondary water source project so expensive?** The secondary water source project requires building a new intake, pump station, pipelines, and a building with treatment equipment, chemical storage, wash water handling, and finished water pumping. The project cost includes the costs for design, permitting, and construction, as well as contingency. The cost is similar to the costs identified in the 2008 UV Feasibility study. The EPA provided cost data for several surface-water water treatment plants built since 2007 that shows \$18 million as the average cost for those projects.
- 17. How would construction of this project affect my utility bill?** The Assembly increased the monthly residential water rate from \$40.53 to \$49.45, in June 2018, in anticipation of this project. That rate increase would fund the repayment of the approximately \$18 million loan that CBS has applied.
- 18. What efforts have been made to get a variance from the regulations?** Turbidity is an indicator for microbial organisms, which require application of a “treatment technique” prior to serving the water to the public. A variance is not allowed for raw water requiring a treatment technique due to microbial contamination. Per Safe Drinking Water Act 1415(e)(6)(B)-Ineligibility for Variance: *A variance shall not be available under this section for... (B) a national primary drinking water regulation for a microbial contaminant (including bacterium, virus, or other organism) or an indicator or treatment technique for a microbial contaminant.*
- 19. What is a Compliance Order by Consent (COBC)?** A COBC is an enforceable agreement that lists terms and conditions negotiated between ADEC and CBS. ADEC has proposed the CBS enter into a COBC to design and construct a secondary water treatment plant, during which time ADEC would suspend action on turbidity exceedances, which would allow us to maintain our filtration avoidance waiver.
- 20. Has CBS pursued outside funding?** Yes. Staff has submitted State Legislative Requests for a secondary potable water source every year from 2012 through 2018; submitted State Municipal Matching Grant questionnaires to ADEC in 2012 and 2013 (prior to the program being discontinued), and has applied for a loan from the ADEC State Revolving Loan Program. ADEC notified CBS on November 26, 2018, that they are ready to draft the loan offer for this project, but will hold off until the CBS Assembly commits to completing the project first.

- 21. Has staff put in an effort to identify alternative solutions?** Yes. In the past decade, Public Works has completed the following investigations:
- CBS Water Master Plan (May 2009): The study recommended construction of a dedicated water line from Blue Lake for use during penstock maintenance.
 - Indian River and Starrigavan Test Well Drilling Program (October 2012): The program established the viability of a groundwater source at Starrigavan, but was unable to locate an adequate aquifer near Indian River. Cost of treating and transmitting Starrigavan groundwater to town was estimated at \$50 million.
 - Dedicated Water Supply Report (January 2018): The report evaluated numerous secondary water supply options, including a dedicated supply line from Blue Lake.
 - Filtration Evaluation for Critical Secondary Water Source (April 2018): The report provided an in-depth evaluation of water filtration options for secondary water source.
- 22. What is the impact of a boil water notice?** Boil water notices could have a significant impact on businesses. A few of the impacts include: Restaurants, cafeterias, and coffee shops would need to close or prove to ADEC that they could either make their water safe for consumption prior to using for cooking or cleaning or develop alternate methods such as bagged (prewashed) produce, paper plates, etc. Seafood processors would need to chlorinate and sample their water before making ice. For more information on how you would be impacted by a boil water notice go to: <http://dec.alaska.gov/eh/fss/boil-water-notice-guidelines> or call 1-877-233-3663
- 23. What is the configuration of the preferred solution?** The preferred solution is depicted on the attached exhibit titled System Overview & Operating Costs. It would construct an intake in Sawmill Creek that would pump into the raw water supply line on the uplands side of Sawmill Creek Road. That supply line is currently connected to the UV Treatment Facility, on the water side of SMC Road. This project would install a TEE upstream of the UV Plant that would deliver raw water to the proposed filter plant when needed. Filtered water would be sent back through the UV Plant, where water would be chlorinated and sent to the CBS distribution system.
- 24. When will a decision be made?** CBS is scheduled to solicit a response from the Assembly at the December 11, 2018, meeting. See attached exhibit titled Assembly Agenda Decision Matrix.

Blue Lake Dam Maintenance & Safety



THE INTAKE GATE:

- A 26,000 lb intake gate
- 110 ft deep

THE PENSTOCK-TUNNEL

THE GATE PROTECTS:

- Over a mile of tunnel/pipe
- 7ft – 10ft diameter
- Over 20 Root Valves
- BL Powerhouse & GPIP

PROVIDES:

- Our City Drinking Water
- Fire Water
- NSRAA Water
- Electric Power

WITHOUT A BACKUP WATER SYSTEM:

- No drinking water during an outage of the penstock & tunnel
- Boiled Water Notice and impacts
- Affects: Hospitals, Food Service, Fish Processing & more
- Financial Impacts to the Community
- Length of outages 2 week minimum to ?????

ANNUAL TESTING ENSURES:

- Public Safety
- FERC compliance
- Maintenance
- Operability in an Emergency

BLUE LAKE POWERHOUSE



BLUE LAKE AFTERBAY



Assembly Agenda Decision Matrix

Decision-1: December 11, 2018

Enter into a Compliance Order by Consent with ADEC and authorize project spending

NO

NO on Decision-1 Outcomes:

1. CBS will likely lose filtration avoidance waiver and have to develop a new secondary source
2. Cost inflation for filter plant about \$1M per year
3. Operating cost increase for 24/7 filtration is \$256K per year relative to UV treatment
4. Boil Water required for any emergency penstock shutdown beyond 10-hours

YES

Decision-2: January 2019

Electric Department requests approval to do required waterway testing/inspections in 2019

YES

YES on Decision-1 Outcomes:

1. Design and construct secondary water plant by 2020
2. Retain filtration avoidance waiver saving \$256k annual over fulltime filtration.
3. Dam waterway inspections in 2020 without interruption to drinking water
4. \$18M project cost without additional rate increase
5. Able to maintain potable water during any emergency penstock shutdown

YES on Decision-2 Outcomes:

1. Shutdown dam to comply with FERC maintenance/testing requirements
2. 2020 Construct intake to pump river water into water distribution system without benefit of ADEC loan
 - a. Indian River = up to \$1.2M
 - b. Sawmill Creek = \$4.0M
3. 2-Week Planned Boil Water Notice
 - a. Dam repairs could extend Boil Water Notice for several months
 - b. Economic impacts (HIGH)
 - c. Risk to public health

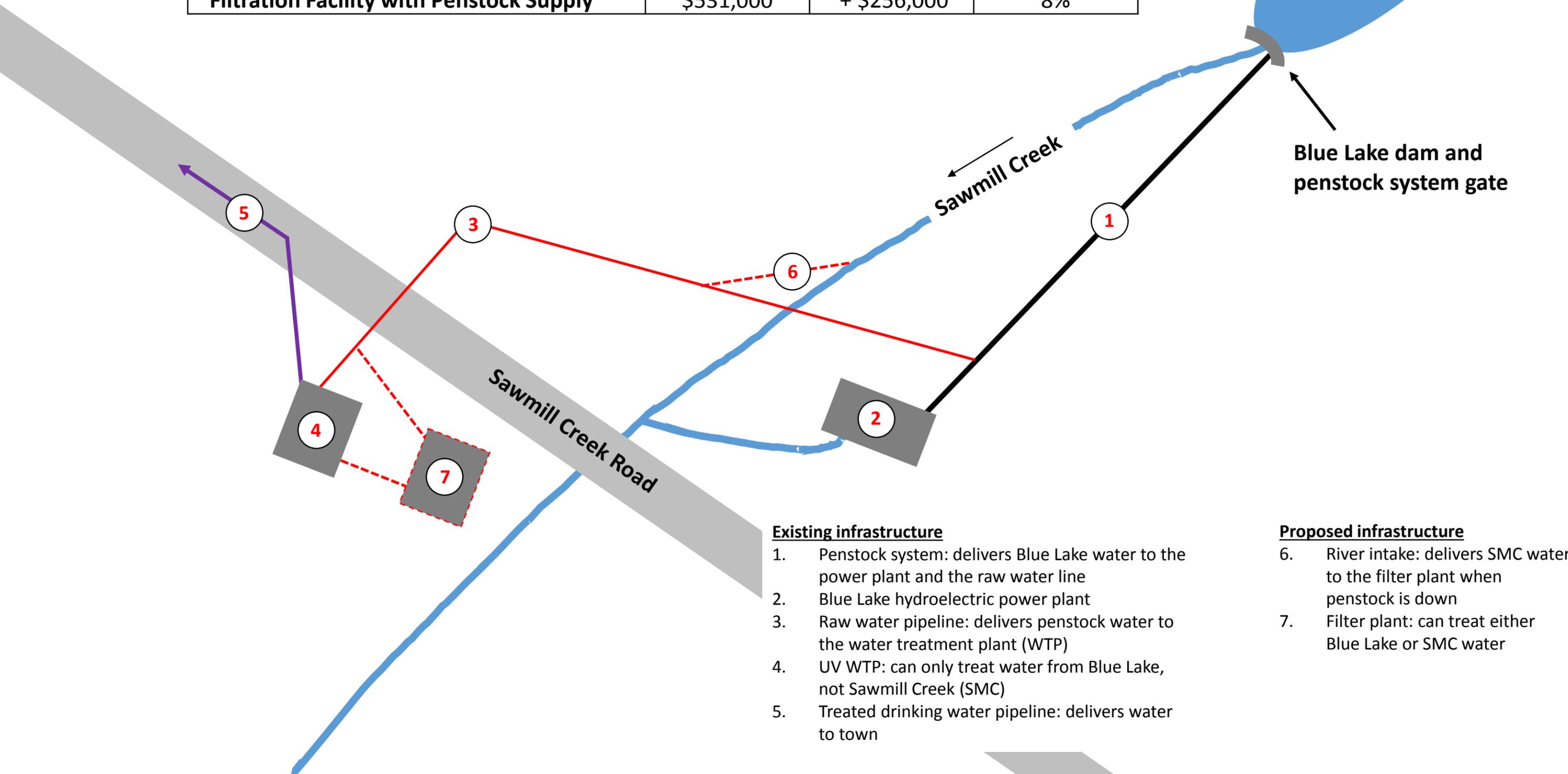
NO

NO on Decision-2 Outcomes:

1. Do not satisfy FERC requirements; face FERC enforcement measures
2. Do not comply with best industry standards; run increased risk of dam infrastructure failure
3. Water treatment maintained without issuance of boil water notice

System Overview & Operating Costs

ANNUAL O&M COSTS			
treatment system	annual operating cost	increases relative to UV Facility	
		annual cost	utility rate
Existing UV Facility	\$275,000	NA	NA
Filtration Facility with Penstock Supply	\$531,000	+ \$256,000	8%



Existing infrastructure

- 1. Penstock system: delivers Blue Lake water to the power plant and the raw water line
- 2. Blue Lake hydroelectric power plant
- 3. Raw water pipeline: delivers penstock water to the water treatment plant (WTP)
- 4. UV WTP: can only treat water from Blue Lake, not Sawmill Creek (SMC)
- 5. Treated drinking water pipeline: delivers water to town

Proposed infrastructure

- 6. River intake: delivers SMC water to the filter plant when penstock is down
- 7. Filter plant: can treat either Blue Lake or SMC water