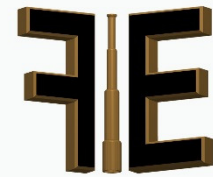


FORESIGHT ENGINEERING P.C.

10 Fleming Street
Lincoln, ME 04457 (207) 794-2775



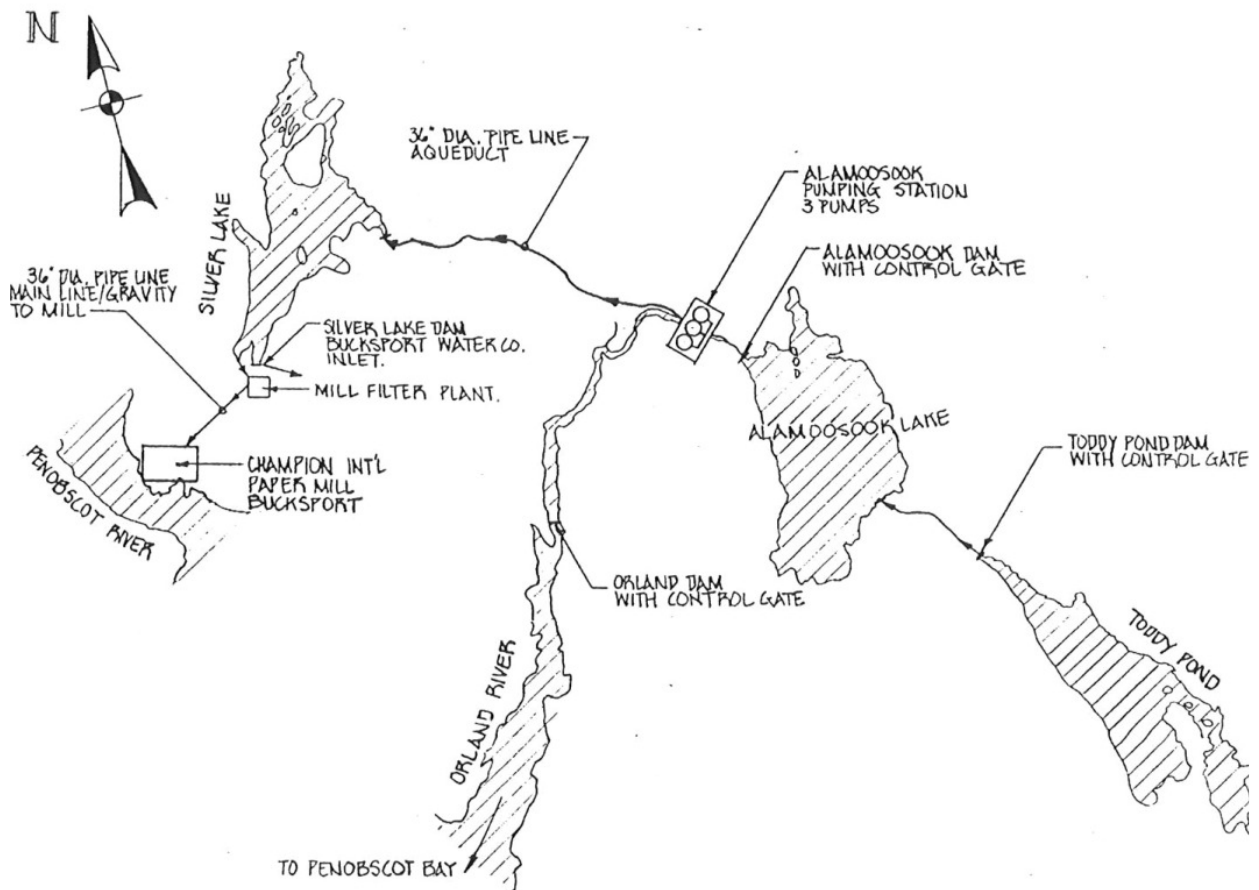
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Upstream Engineering Assessment of Bucksport Mill Water System Alamoosook Pump House to Silver Lake (Project # 19023Ra)

5-12-2019

1.0 Purpose of Report:

1.1 The purpose of this report is to provide an engineering assessment of the general condition of the Bucksport Mill's Water System. The following maps show an overview of the entire lake water system. This report will evaluate from the Alamoosook Pump House to Silver Lake. The report also includes: Design capacity, life expectancy, spare parts, and operational / maintenance budgets.

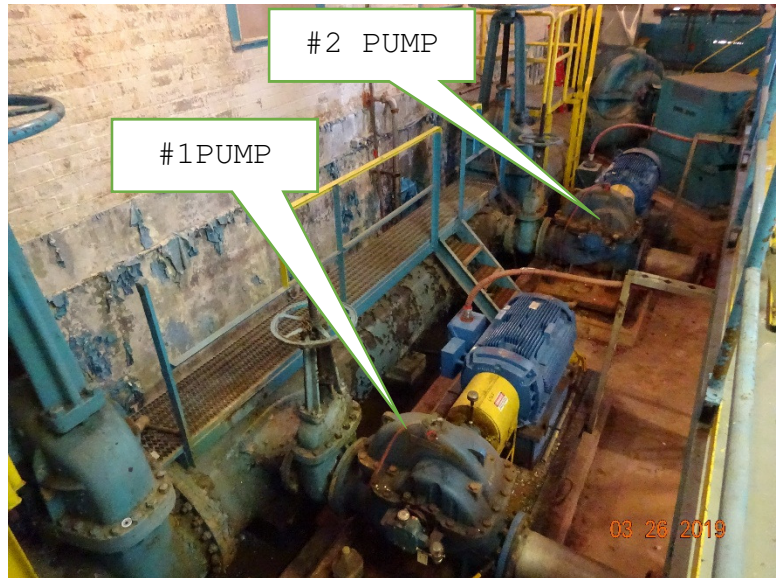


2.0 Pumping Capacity

2.1 The following picture shows the 3 pumps in the pump house. The #3 pump is not usable. The #1 & #2 pumps are operational.

2.2 The pumps are only run seasonally when Silver Lake level is low (See Atch 2: Water System Block Diagram).

2.3 The equipment file shows that pumps #1 & #2 are Goulds 3410 Size 10x12x17L with a 14.5" bronze impellor. The pumps are a premium brand which was installed in mid-2001.



2.4 Per the original pump curve (see atch 2), one pump could pump 4,200 gpm. Using the amp meters on the MCC, we back calculated that one existing pump is pumping around 4,055 gpm or 5.8 MGD. By using both pump #1 & #2, the flow rate will be around 8,000 gpm or 11.5 MGD. The flow rate is nearly double due to most of the head is caused by the static head component.

2.5 We did witness both pumps running. They ran with no excessive vibration and typical packing leakage.

3.0 Piping System to Silver Lake

3.1 The discharge piping is 36" diameter carbon steel piping with an exterior tar based coating. This piping is about 12,000 feet long which travels above and below the ground.

3.2 During the pump tests, we found several pipe leaks as seen in the photo. A close look shows the pipe has been patched in the past.



3.3 This next picture shows outlet which flows to Silver Lake. We measured the wall thickness of this pipe to be:

- At 12:00 X.xx Inches
- At 3:00 X.xx Inches
- At 6:00 X.xx Inches
- At 9:00 X.xx Inches

3.4 The original pipe thickness is 0.375". Therefore the pipe has only lost XX % due to corrosion. Most of the leaks are occurring that the welds which is typical and will continue.

3.5 The concrete under the end of the pipe is undermining and will eventually need a repair.



4.0 Pump House Structure

4.1 The 1930s pump house is a typical brick mill building. The structure shows no cracked bricks. The wall does show efflorescent which means water is leaking thru the wall.



5.0 Expected Life Expectancy

5.1 The Gould Pumps have an average pump bearing life of 10 continuous years.

5.2 The pump were installed in 2001 and the mill closed in 2015. Using an average run time of 3 months per year, the pumps are about 35% used or 65% life remaining. This means the drive or power end will be to be rebuild in around 20 years due to the low usage with proper lubrication. Yearly vibration analysis will determine the life to rebuild. The original pump's life was 60 years.

5.3 As for the 12,200 feet of carbon steel 36" diameter piping, you should expect annual leak patching.

6.0 Spare Parts

6.1 Attachment 3 is the recommended spare parts list for the Goulds 3410L pump. The list shows startup and recommended spare parts. It is typical for the mill to have purchased the parts or have a complete power end in stores. Currently the Mill **does or does not** have the parts in Mill stores.

6.2 Since the pipeline has routine leaks, a couple sheet of A36 rolled steel plate should be on site.

7.0 Operational Budget:

7.1 At \$120 /MWH, the cost to run 1 HP for one year is around \$1,088. To run one pump at the Alamoosook Pump Station will cost about \$657/day per pump.

8.0 Maintenance Budget:

8.1 Since this system is only expect to be used seasonally during droughts, the maintenance for this system is low. The following is the recommended maintenance:

- Beginning of the pumping season, rotate the pump shaft by hand. It should turn easily. Budget: \$700
- Replace the lubricants annually. Budget \$800
- Measure vibration once per year. Budget \$1,000
- Patch the piping once per year. Budget \$6,000
- Megger the motors during drought years Budget 1,500
- The yearly maintenance budget is \$10,000

8.2 A motor will need to be replaced about every 10 to 15 years. The motor for the pumps is a 250 HP 1800 RPM 2300 volt 449T frame TEFC 1.15 SF. The price for this motor is around \$18,000. During the 2001 project, they put in Reliance motors. Presently one motor is still a Reliance.

8.3 Another capital job will be reface the concrete outfall of the piping system. The budget price for this project is \$30,000. This is expected within 5 years.

9.0 Conclusion:

9.1 The pumping system from Alamoosook Lake to Silver Lake is in adequate condition to provide the backup water during low levels at Silver Lake. As any mechanical system, it will need yearly maintenance to remain a reliable pumping system.

9.2 This study is being conducted to understand if the current water supply will be adequate for the future Salmon Farm on the Bucksport Mill Site. The projected Salmon Water usage is:

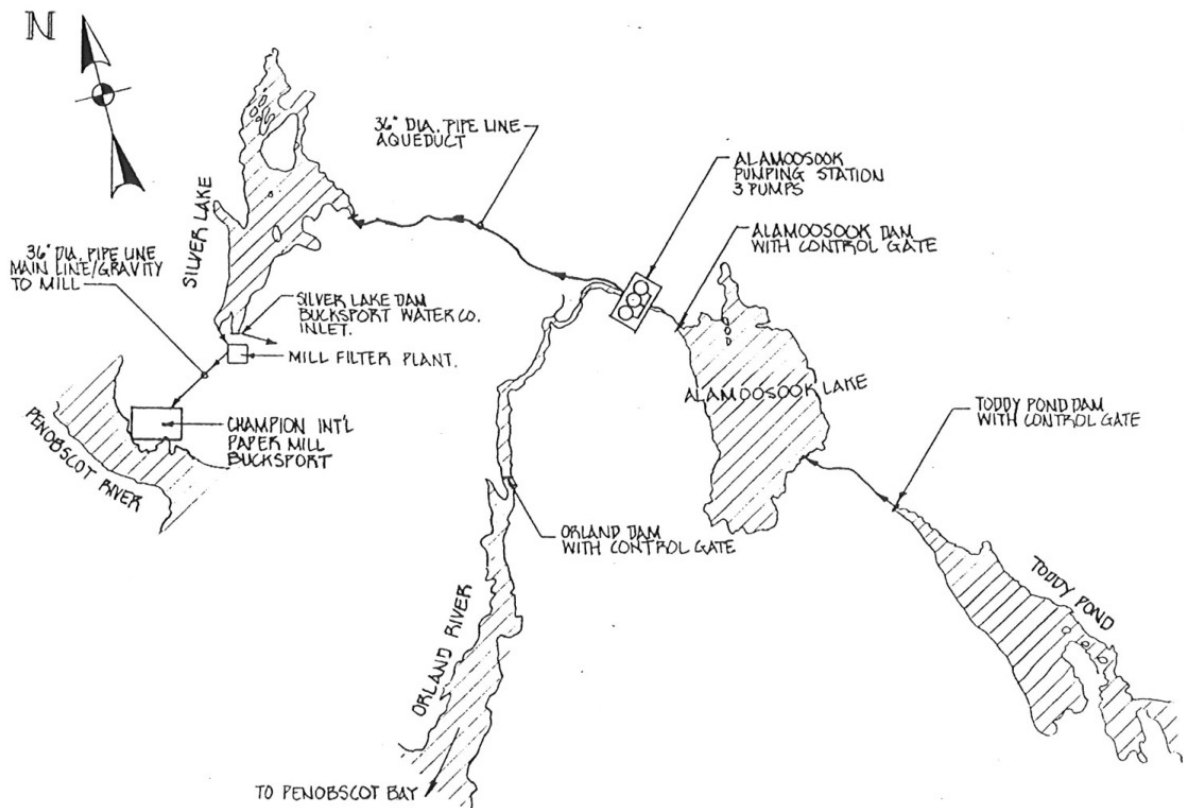
- Year 1: 1 MGD
- Year 5: 3 MGD
- Year 10: 5 MGD

9.3 The pumping system is able to provide 5.8 to 11.5 MGD.

9.4 A 1967 Process Water Study by Dr Kleinschmidt P.E. provided an estimate that Alamoosook Lake has an estimate useful drawdown of 6 feet with a storage of 1,900 MG. At 5 MGD per day plus 0.3 MDG for the Town of Bucksport, water is available for 358 days.

9.5 Therefore, It is a rare opportunity that this high quality lake water system is available for high demand use with its abundant water storage. The pumping system is just money. The Lake Water System is a gift of nature.

9.6 In conclusion, we believe this part of the Lake Water System, will easily supply a sustainable quality and quantity of water as required by the future Salmon Farm.



Jed Ocana P.E.

Theodore E. Ocana, P.E.
Registered Professional Engineer

Attachment:

- 1) Water System Block Diagram
- 2) Pump Curve / Pump Pricing in 2000
- 3) Pump Recommended Spare Parts