

# Engineering Report

## Old Schoolhouse Brewery

Twisp, Washington

### Industrial Strength Process Water Treatment POTW Permit #WA0023370

Submitted to  
**Brewery Wastewater Design**  
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No approval or construction can be issued until final, detailed plans and specifications have been submitted and approved by the appropriate reviewing authority.

## **Executive Summary**

The Old Schoolhouse Brewery (OSB) is located Twisp, in Washington State. The Brewery's current operational plan estimates an average of 467 gallons per day (gpd) of process water to be produced during their first 1000 barrel year. 3 employees will be staffed to run the facility with an estimated average daily domestic wastewater generation of 75 gpd. Domestic wastewater will be piped by gravity directly to the municipal connection. Process water will undergo pH adjustment prior to discharging to the municipal service line.

Future growth is expected, with increased domestic and process water. The process water treatment process has been sized to handle the expected expansion for the first 5 years. Ongoing annual monitoring of flows and effluent quality are required to verify flow expectations and the need for increased treatment capacity.

This document is a review of the conceptual design provided by Brewery Wastewater Design. Construction documentation may still be necessary in order to approve and permit this installation. MAP Engineering Inc does not take liability for the performance of the process or the proper installation of the systems.

## Introduction

The Old Schoolhouse Brewery is a new brewery located in Twisp, Washington State. The owners of the brewery are expecting to produce roughly 1000 barrels (31,000 gallons) of malt beverage during the first year of operation. The expected process water produced during brewing is estimated to average 467 gallons per day during the first year. Three employees will run the day to day brewing operations and produce a domestic waste of 75 gallons per day. Both domestic and process wastewater will be transferred to the town of Twisp municipal treatment facility. The process water will undergo pH adjustment in a small external tank prior to being pumped to the municipal connection.

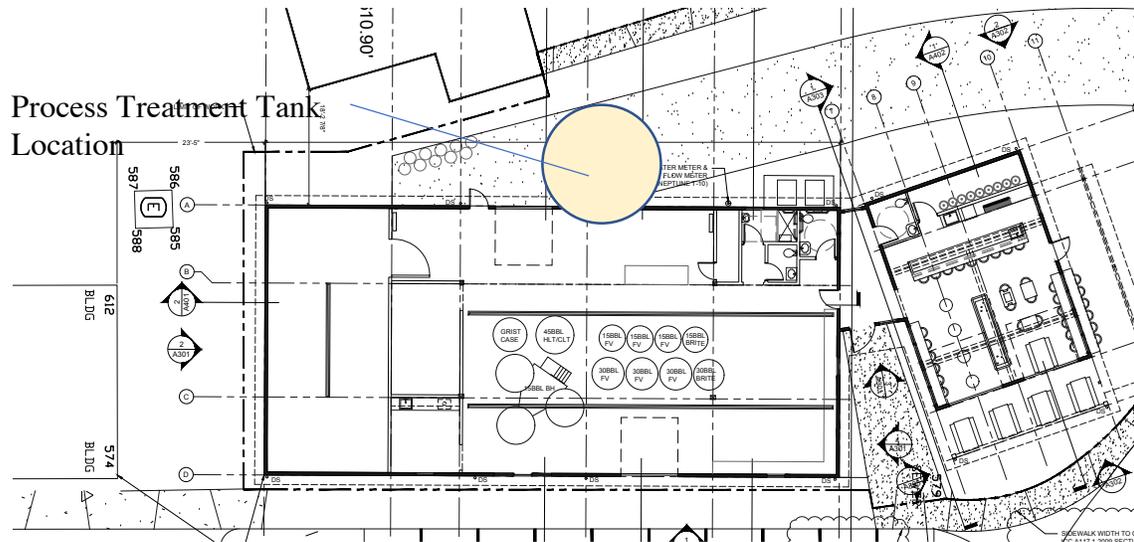
## Goal

Brewery Wastewater Designs goal was to provide an affordable system that protects the public health and the quality of water resources and the environment through the development and maintenance of appropriate and cost effective technologies for wastewater collection.

## Vicinity Map



## Development Map



## Wastewater Characterization

The Old Schoolhouse Brewery is expected to produce industrial strength waste and can be treated with traditional methods. The below data is based on existing breweries of similar size. Based on data provided in [Brewers Associations Wastewater Management Guidance Manual](#).

Influent Characteristics			
Constituent	Average	Weekly Peak	Rarely Exceed
BOD <sub>5</sub>	3550 mg/L	4900 mg/L	6420 mg/L
TSS	280 mg/L	540 mg/L	1430 mg/L
pH	4-6	3-5 mg/L	2-4 mg/L

Anticipated discharge from process treatment tank:

Effluent Characteristics			
Constituent	Average	Weekly Peak	Rarely Exceed
BOD <sub>5</sub>	3550 mg/L	4900 mg/L	6420 mg/L
TSS	280 mg/L	540 mg/L	1430 mg/L
pH	6-9	6-9	6-9

## System Sizing and Recommendations

### *Hydraulic Loading – Process System*

Year 1 - 1000 Barrels	467 gpd
Year 5 – Future Growth Potential	1,325 gpd

**Hydraulic Loading – Domestic System**

Year 1 – 3 employees	75 gpd
Year 5 – Future Growth Potential (9 employees - estimate)	225 gpd

Heat Exchanger water will be collected and reused within the facility.

Process water to be used or lost through evaporation, water retained in product, water retained in materials that are hauled from the facility, and daily consumption throughout the facility is expected to be roughly 213 gpd.

**Hydraulic Loading – Process Treatment**

One primary tank of 3,500 gallons will be utilized, with an operating volume of 1,500 gallons to treat and collect process wastewater from brewery. This will provide for sufficient retention time and surge capacity. The process tank is sufficiently sized with many hours of retention time for pH balancing. When properly designed and operated, pH of discharged process water should be within the desired limits.

**Organic Loading – Process Treatment**

Based on similar facilities the organic loading to the municipality should fall within the below estimates

$$3,550 \text{ mg/L BOD} \times 8.34 \times 467 \text{ gpd} / 1,000,000 = 13.83 \text{ lbs.}$$

$$280 \text{ mg/L TSS} \times 8.34 \times 467 \text{ gpd} / 1,000,000 = 1.09 \text{ lbs.}$$

**Solids**

Large solids will be removed from the process stream within the facility and disposed of with acceptable methods. Biosolids production from the process treatment tank should be minimal. Any solids remaining within the process treatment tank will be transferred to the municipality. It is expected that the tank will be pumped at least annually and hauled to an appropriate septage handling facility.

**Provisions**

Provisions including a calamity tank, manual shut-off, and automated controls for bypass are specified. Automated pH monitoring will only allow discharge to the municipal system if within appropriate ranges. Emergency storage is sufficient to provide adequate time for evaluation and adjustment. Automated chemical feed

systems with adjustable parameters will automatically monitor and chemically adjust pH as necessary.

### **Review of Recommendations**

Based on discussions Brewery Wastewater Design had with the town of Twisp public works director the municipal receiving facility has the hydraulic capacity to handle up to 10,000 gallons of flow from this facility. Additionally, the mass capacity of the existing facility for this specific client is 35 lbs BOD, 50 lbs TSS, with pH range between 6-9.

A new process wastewater tanks with duplex pumping system and appropriate NaOH caustic and H<sub>2</sub>SO<sub>4</sub> Acid injection should be appropriate to adjust the pH to an acceptable level. Actual volume of chemical used daily will be dependent on the variables within the system. Storage volumes of 110 gallons of NaOH and 30 gallons of H<sub>2</sub>SO<sub>4</sub> will be held at the facility. The system should be carefully monitored at all times and precautions have been included to account for upsets and emergency storage. Daily flow, pH levels, and chemical feed volumes should be recorded daily and provided to the regulatory body and municipality based on the permit requirements.

## **Conceptual Plans**

### **Plans and Specifications**

The plans and specifications provided by Brewery Wastewater Design are conceptual and should be sufficient for understanding of component configuration and design concept. Additional details may be necessary for construction and permitting.

Specification of componentry is clear and appropriate for equipment supply.

The operation and maintenance manual is clear and details are adequate for proper operation. Due to the complexity of chemical adjustment of wastewater I suggest Old Schoolhouse Brewery contract with Brewery Wastewater Design for the first year of operation.

## **Similar System Performance Example**

### **Example of Similar System – Provided by Brewery Wastewater Design**

#### **Brewery in Bigfork, MT**

- pH adjustment tank size = 2,500 gals
- Average flow: 757 gals/day
- Avg pH at discharge: 6.11

Based on the information provided the above system has never been out of compliance.

## Installer Qualifications

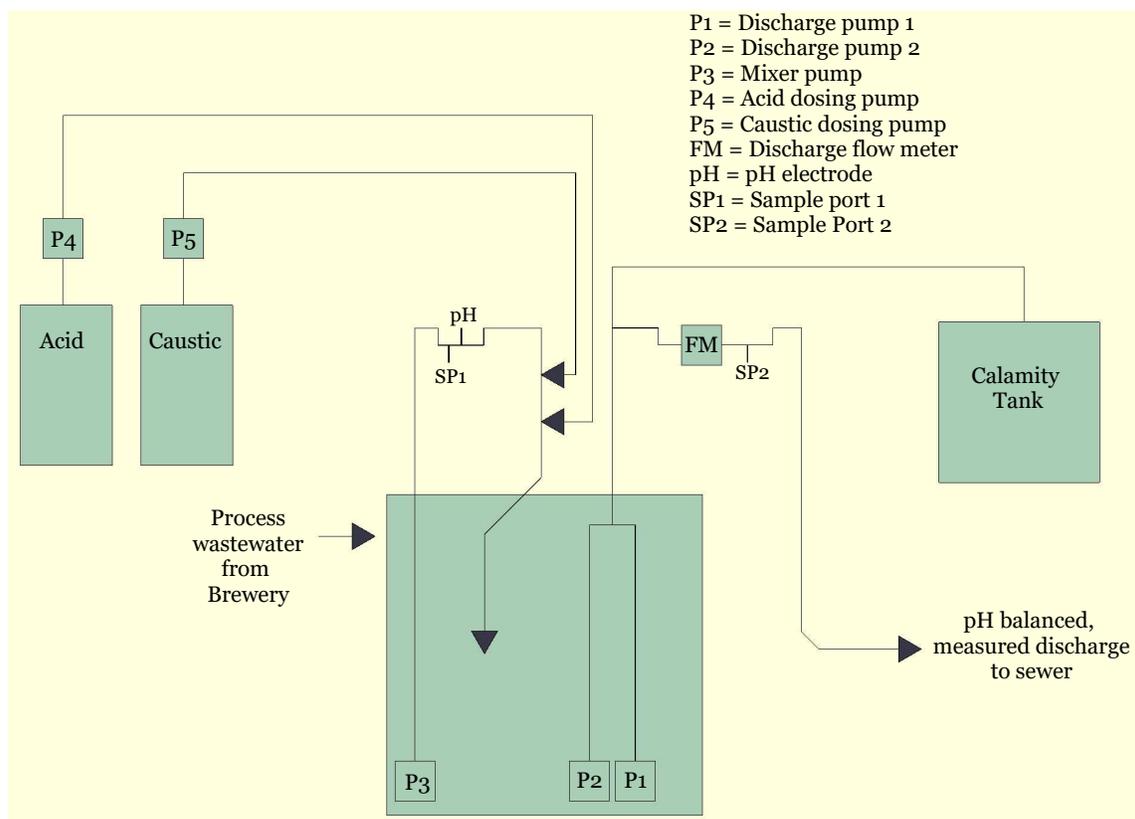
### Qualifications and Responsibilities

The installer must meet all WAC 246-272B-05000 requirements.

### Process Description (Brewery Wastewater Design Description):

“Process wastewater from Old Schoolhouse Brewing (OSB) gravity flows to an underground lift station outside the brewery. As the water falls out of the pipe and into the tank, it passes through a simple coarse screen to catch large chunks like pallet wood, shrink wrap, keg caps, etc. The lift station has a mixer system installed to mix the tank, test the pH, and automatically add chemicals to bring the pH within discharge range. Once the pH is in range and the tank is 40% full or more, the discharge pumps will kick on and begin to discharge wastewater to sewer through a flow meter.”

### System Layout:

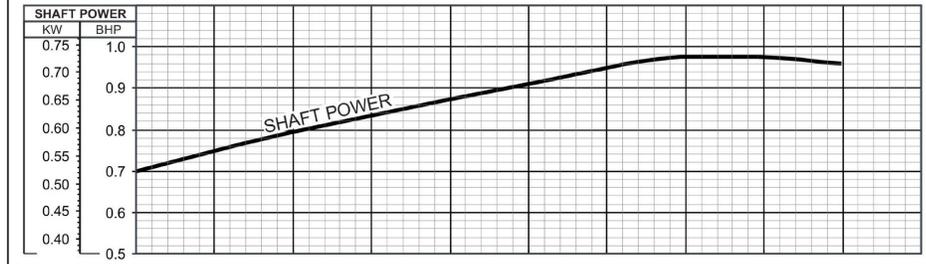
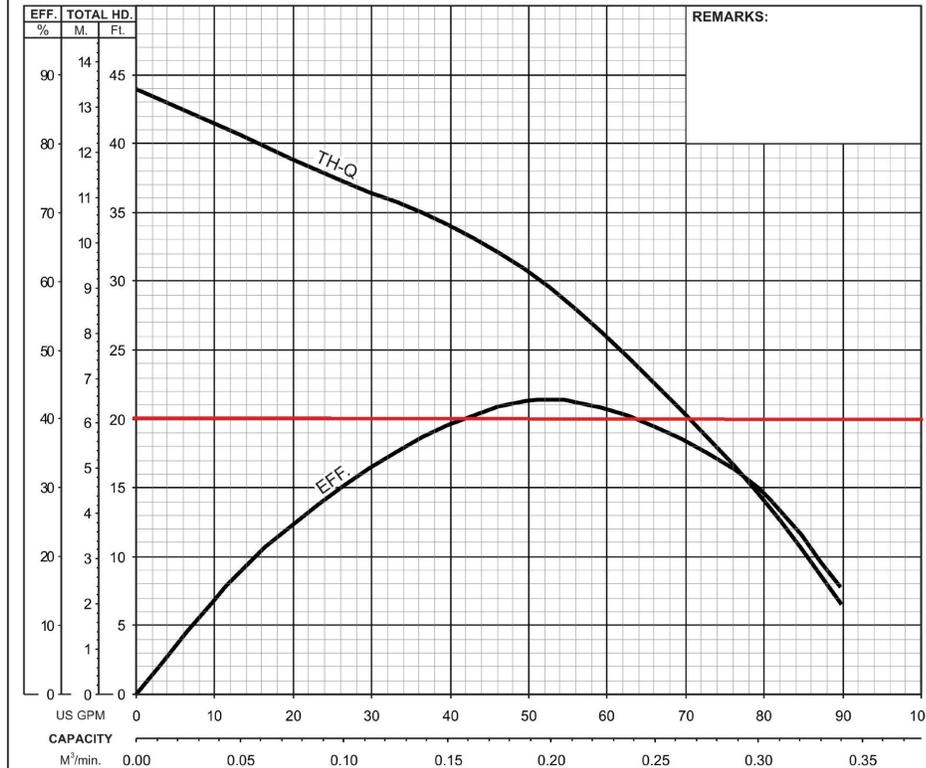


# Pump Curve

Oct. 12

60-PC-PU-08

 <b>TSURUMI PUMP</b>		<b>VANCS - SERIES - PU</b> (FRP) SEMI-VORTEX - SEWAGE & WASTEWATER PUMPS					<b>PERFORMANCE CURVE</b>			
<b>MODEL</b>	<b>BORE</b>	<b>HP</b>	<b>KW</b>	<b>RPM</b>	<b>SOLIDS DIA</b>	<b>LIQUID</b>	<b>SG.</b>	<b>VISCOSITY</b>	<b>TEMP.</b>	
50PU(AW)2.75 -63	2" / 50mm	1	0.75	3375	1.38" / 35mm	Water	1.0	1.123 cSt.	60°F	
<b>PUMP TYPE</b>	<b>PHASE</b>	<b>VOLTAGE</b>		<b>AMPERAGE</b>		<b>HZ</b>	<b>STARTING METHOD</b>		<b>INS. CLASS</b>	
Semi-Vortex - Sewage & Wastewater	3	208-220/460		3.2-3.2 / 1.5		60	Direct On Line		E	
<b>CURVE No.</b>	<b>DATE</b>	<b>PHASE</b>	<b>VOLTAGE</b>	<b>AMPERAGE</b>	<b>HZ</b>	<b>STARTING METHOD</b>		<b>INS. CLASS</b>		
-	-	-	-	-	-	-		-		



## **Management Plan**

A licensed and bonded contractor shall be hired at the time of approval to construct the facility. Brewery Wastewater Design will continue to provide operation and maintenance oversight under their system warranty. All known parties and contact information is provided below.

Owner  
Old Schoolhouse Brewery  
Twispworks  
Twisp, WA 98556

Wastewater Consultant  
John Mercer  
Brewery Wastewater Design  
1875 Locust Rd.  
Montrose, CO 81401  
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(541) 350-4261

Review Engineer  
Tristian Bounds, P.E.  
MAP Engineering Inc.  
1501 W 13<sup>th</sup> St  
Boise, ID 83702  
(541) 580-2980

Management Entity  
Old Schoolhouse Brewery  
Twispworks  
Twisp, WA 98556  
The LOSS system is owned by a single owner.

The management entity will be responsible for the monitoring of the system, all inspections, operations, maintenance, sampling, lab analysis, billing, and reporting to the state.

If the situation arises in which a transition to an alternative management entity the owner will accept interim responsibility for all activities as stated above.

The management entity will maintain full records of all inspections, repairs, sampling, pumping, improvements and performance. A copy of all records will be provided to the municipality for secondary record keeping.

## **Operation and Maintenance Plan**

The process tank will be equipped with a duplex pumping system, chemical feed system, recirculation pump, and control panel. The tank will be connected to the existing municipal system. The existing system is not to be modified without the approval of the municipality and regulatory agency.

The owner and operators responsibilities can be found under the management section.

All of the design specifics can be found in Brewery Wastewater Designs technical document.

Normal operation and maintenance should be completed in accordance with the manufacturers recommendations and all WAC requirements.

All troubleshooting guides, operation procedures, repairs, component maintenance, testing methods and schedules, record keeping requirements, and safety procedures can be found in the WAC code and manufacturers instructions.

Wiring diagrams, pump manuals, and manufacturers cut sheets should be provided with the equipment upon delivery.

Follow all original O&M manual documents.

Initial component testing will be conducted as specified in the design report by Brewery Wastewater Design.

## **Monitoring and Reporting Plan**

A monitoring plan should be provided with the permit and is anticipated to include regular monitoring of BOD<sub>5</sub>, TSS, and pH. Additional characteristics may be necessary or required.

Field test methods for process control constituents are appropriate.

Real time automated monitoring and flow reports should be logged daily, either via control panel logging capabilities or manual tracking.

If abnormal results occur the management entity should perform additional testing to verify performance. If performance continues to result in constituents outside of the expected levels the management entity shall develop a correction plan and provide to the municipality and Department of Ecology.

All results shall be provided to the Department of Ecology as required by the industrial permit and WAC code requirements. All monitoring and sampling results shall be maintained for future analysis and assistance with troubleshooting.

## Conclusion

Based on my experience with similar facilities the consulting work provided by Brewery Wastewater Design is sound and with proper operation and maintenance should provide the desired results of its intent.

The documentation included within this review as well as the information provided by Brewery Wastewater Design in their drawing packet, technical document and operation and maintenance manual appear to be sufficient to meet the requirements of WAC 173-240-130 & WAC 173-240-140.

If additional documentation is necessary MAP Engineering Inc can provide upon request.

Sincerely,

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