

Scope of Work for Groundwater Monitoring Network
State Waste Discharge Permit Number ST0501319
Terramar Brewery, Edison, WA

For:

Terramar Brewery
P.O. Box 3000
Bow, WA 98232

By:



PO Box 2546
Bellingham, WA 98227
(360) 714-9409

October 16, 2020

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PO Box 2546, Bellingham, Washington 98227
Phone: (360) 714-9409

October 16, 2020

Chris Barker
Terramar Brewery
P.O. Box 3000
Bow, WA 98232

Re: Scope of Work for Groundwater Monitoring Network
State Waste Discharge Permit Number ST0501319
Terramar Brewery, Edison, WA

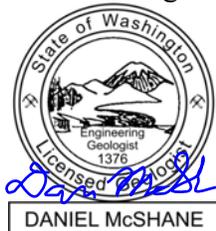
Dear Mr. Barker:

Per the State Waste Discharge Permit Number ST0501319 a groundwater monitoring scope of work is required to evaluate the site groundwater monitoring network for evaluation of the wastewater application site in accordance with WAC 173-200-080. This groundwater monitoring network plan will allow for the determination/confirmation of site-specific geology and groundwater conditions relative to the wastewater discharge area and allow for the monitoring of potential impacts to the groundwater quality associated with wastewater discharge area. It is our understanding that this scope of work will be submitted to Washington State Department of Ecology for approval.

Should you have any questions concerning the Groundwater Monitoring Network, please do not hesitate to contact us at (360) 714-9409.

Sincerely,
Stratum Group

Dan McShane, M.Sc., L.E.G.
Licensed Engineering Geologist



WASTEWATER OVERVIEW

The project background is provided in *Fact Sheet for State Waste Discharge Permit ST0501319*. The Terramar Brewery facility generates wastewater from cleaning and sanitizing brewery vessel interiors and exteriors, floor cleaning, packaging, and other processes directly related to brewing and distilling. Terramar Brewery submitted a five-year build-out plan with their waste permit. This plan has a projected average wastewater flow of approximately 467 gallons per day (gpd) in year one growing to an average of 1,325 gpd by year five.

This wastewater is directed to a tank where it is pH adjusted to between 6 and 9. From there it is pumped to a 30,000-gallon storage tank. Water is pumped from the tank to a sprinkler system with 23 zones covering 2.5 acres. The wastewater will irrigate grass for grass growth and land treatment.

LOCATION AND SITE SETTING

The Brewery facility is located in the unincorporated town of Edison. The brewery, tasting room and pizza kitchen and a gravel covered parking area are located on the south part of the site. The location of the wastewater land application is on the north portion of the site. The property is within a meander bend of Edison Slough such that the slough is located east, north and west of the land application area (Figures 1 and 2). Edison Slough is a tidal water body. Flow is generally from east to west through the meander, but the flow reverses during incoming high tides. In addition to Edison Slough, a drainage ditch wraps around the site parallel to the slough.

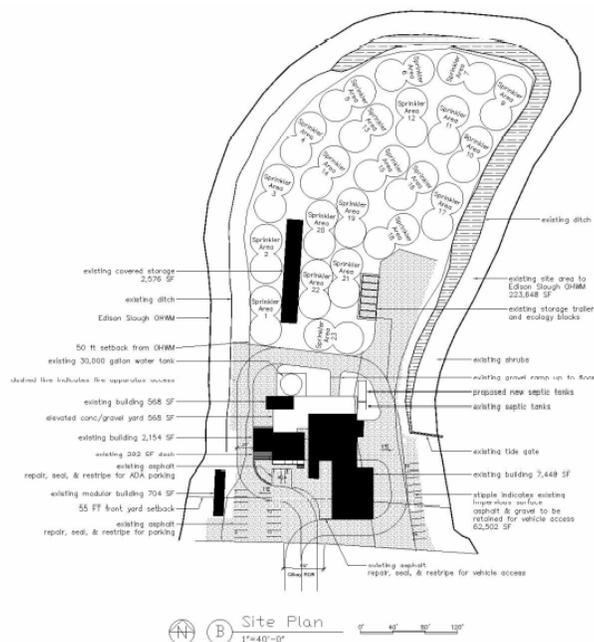


Figure 1. Site plan from permit fact sheet



Figure 2. Aerial view of the site (Skagit iMap, 2019 aerial view). Much of the site is now grass covered.

GEOLOGY AND GROUNDWATER

The Permit Fact Sheet notes that the groundwater at the facility is shallow. This is evident from the presence of water in the ditch around the land application site. This ditch contains water year round. The fact Sheet notes that during the winter months the water table is less than five feet below the ground surface, and based on ditch water levels as well as the elevation difference between the tidal slough and the property, groundwater is shallow year round.

The Fact Sheet as well as our own observations at the site notes that the ditch level does not fluctuate with the tide levels in the slough. This indicates that groundwater levels within the land application area are only minimally impacted by tide levels.

The subject property is underlain by alluvial deposits associated with the overlapping deltas of the Skagit River (the dominant sediment source) and small sediment sources from streams flowing across this delta area such as the Samish River. The site is on the distal portion of the delta and sediments are predominantly fine grained and fairly organic rich due to buried organic matter.

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The upper soils on the site have been disturbed by past human occupation. Soil spoils from past excavations in the slough, the excavation of the drainage ditch, past operations on the site when the buildings were in use for meat processing and used lumber storage as well as earlier use as a pasture/grass land. Septic drainfields were and are located in the land application area or adjacent to the application area.

PROPOSED GROUNDWATER MONITORING NETWORK

Based on the information available as provided in the Fact Sheet, the wetland assessment prepared for the site by Edison Engineering and our own site observations and understating of the underlying geology and past land use, we concur with the recommendation within the Permit Special Condition S10 that 3 permanent groundwater monitoring wells be installed at the site with one monitoring well located within the land treatment area and the other two monitoring wells located between the land treatment area and Edison Slough. However, we recommend the installation of 4 wells in order to better assess the potential range of subsurface conditions, and, post installation, water elevations in the wells. Water levels in 4 wells combined with water elevation in the ditch will better inform the most likely direction of water flow from the land application area.

The process installation of these monitoring wells will provide additional information regarding site geology and soils in which groundwater is present. The geology and soils information will be acquired by collecting soil samples with a split spoon sampler driven ahead of the boring auger during well installation work.

All wells will be installed consistent with Chapter 173-160 WAC, the Minimum Standards for Construction and Maintenance of Wells. The 4 wells will be located approximately as indicated in Figures 3 and 4.

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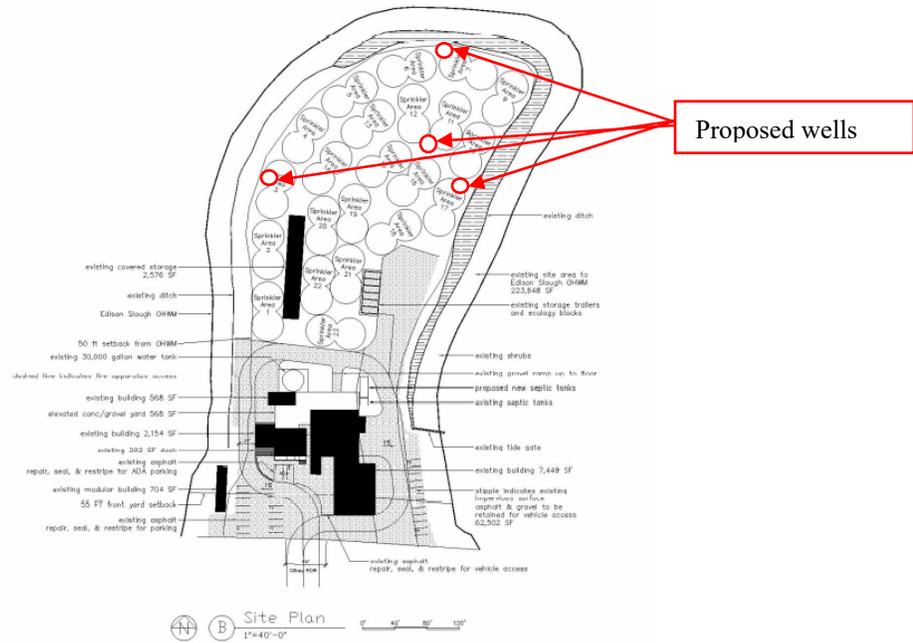


Figure 3. Site plan from permit fact sheet with approximate proposed well installations.

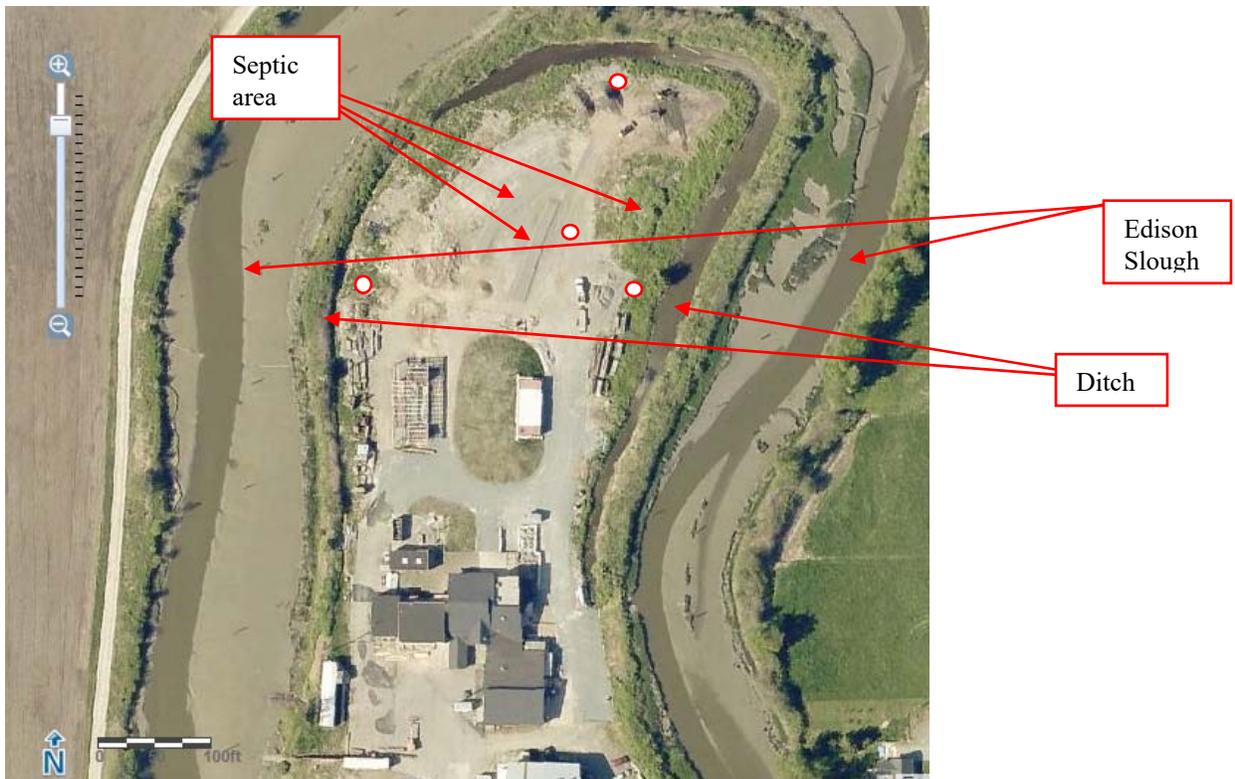


Figure 4. Aerial view of the site (Skagit iMap, 2019 aerial view, note site has been altered since) with approximate proposed well locations.

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We propose using 4-inch hollow-stem auger drilling to install the wells. Based on previous assessment as outlined in the Permit Fact Sheet and our own observations that groundwater at the site is shallow, it is anticipated that the wells will be on the order of 10 feet deep. The well screen interval will be between 3 feet and 10 feet. Some adjustments to the well depths and screen interval may take place based on soil and groundwater conditions encountered while completing the well the well borings. Wells will be 2-inch diameter PVC wells.

Because areas of perched surface water may develop on site, water puddles have been periodically observed on site and wells will be located in and in close proximity to the land application area, the tops of the wells will be 2 to 3 feet above the ground surface and enclosed with steel monuments with a locked cap. This will minimize the risk of surface water flow into the well and degradation of the upper well seal cap. The use of steel riser monuments will also minimize the risk of damage from mowing and other equipment on the site.

Once wells are installed, well casing elevations will be surveyed. A permanent stake will also be installed at the drainage ditch and surveyed so that water levels in the ditch can be measured as well. Other land features relevant to the land application area will be included in the survey.

Post well installation, wells will require development. Fine sediment is anticipated to be the primary issue. Development of the wells will be accomplished by a combination of bailing, surging and over pumping completed in that general order until low turbidity water can be obtained from the wells. Once wells are developed, the wells will be allowed to 'rest' for at least three days. Water levels will be measured in each well and the ditch to determine water levels and groundwater flow.

Upon completion of the monitoring wells, a report on the findings of the groundwater well network will be prepared and submitted to Ecology and groundwater monitoring in accordance to Special Condition S2.C of the Permit will commence.