Groundwater Monitoring Network
State Waste Discharge Permit Number ST0501319
Terramar Brewery, Edison, WA

For:

For: Terramar Brewery
P.O. Box 3000 Bow
WA 98232

By:

PO Box 2546
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(360) 714-9409

March 14, 2023

STRATUM GROUP
P.O. Box 2546, Bellingham, WA 98227

March 14, 2023

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

Re: Groundwater Monitoring Network Completion Report
State Waste Discharge Permit Number ST0501319, Terramar Brewery, Edison, WA

The groundwater monitoring wells for the State Waste Discharge Permit Number ST0501319 have been installed consistent with the scope of work for the groundwater monitoring network dated October 16, 2020. The 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.

The groundwater monitoring network provided a determination/confirmation of site-specific geology and groundwater conditions relative to the wastewater discharge area. The results are summarized in this report. The groundwater network of four wells as opposed to the three in the permit and will allow for the monitoring of potential impacts to the groundwater quality associated with wastewater discharge area.

Initial groundwater elevations have been collected and water quality samples have been collected. We are waiting laboratory results and will report the initial results when the laboratory has completed the analyses.

It is our understanding that this report will be submitted to Washington State Department of Ecology. 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 in Skagit County. The brewery, tasting room and pizza kitchen and a gravel covered parking area are located on the south part of the site. The wastewater land application area 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). A flood control dike is located between the slough and the property along the length of the slough along on the property. A drainage ditch is located landward of the dike on the property. The ditch drains from the southwest area of the property and wraps around the perimeter of the property to a discharge point into the slough on the southeast of the property.

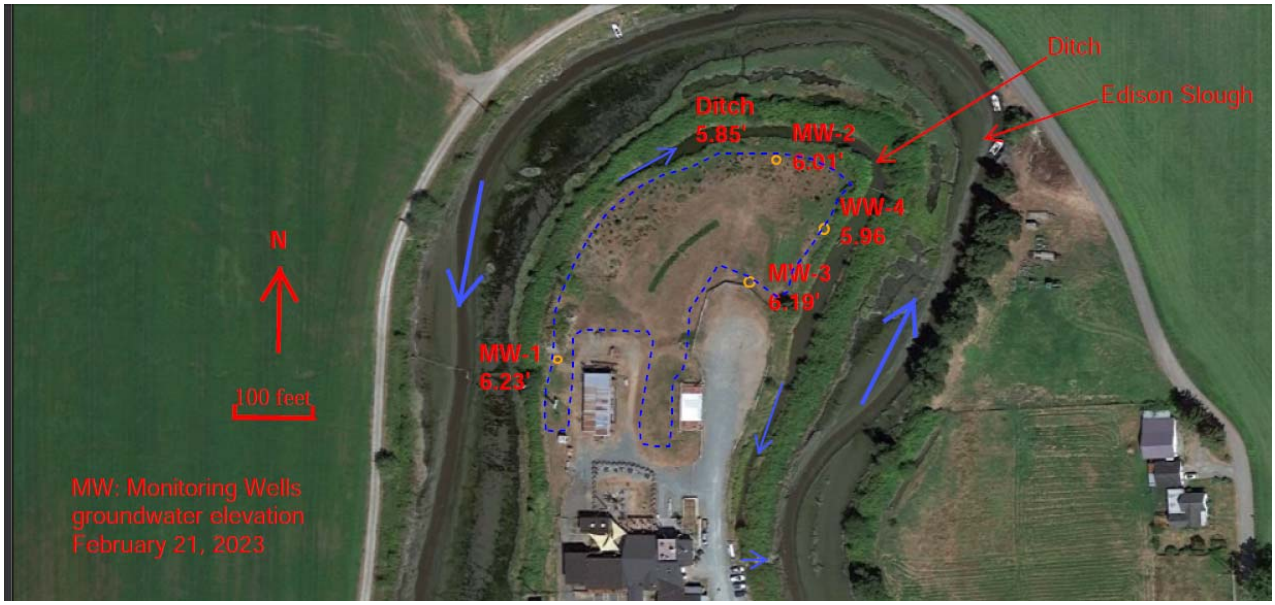

Figure 1. Site with well locations and pertinent features. Larger blue lines indicate the general flow of Edison Slough. Note the flow direction reverses during incoming tides. Smaller blue lines indicate the flow direction of the ditch. Dashed blue line encompasses the waste water application area.

GEOLOGY

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 and Edison Slough. The site is on the distal portion of the delta and sediments are predominantly fine grained and organic rich due to buried organic matter.

The upper soils on the site have been disturbed by past human occupation. Soil spoils form 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.

Gravel and rocks were spread on the surface during the site's use as a slaughter house facility and used wood facility. Recent grading took place after brewery began use of the site with clearing and smoothing of the northern portion of the property and the planting of trees and brush around the perimeter of the northern portion of the site as part of a wetland/shoreline mitigation requirement.

GROUNDWATER WELL NETWORK AND GROUNDWATER

Four groundwater monitoring wells were installed on the site consistent with the scope of work for the monitoring well network. The four wells were installed in September 2022 by Holocene Drilling using a 4-inch hollow stem drilling rig. All wells were installed consistent with Chapter 173-160 WAC, the Minimum Standards for Construction and Maintenance of Wells. The four wells are located as indicated in Figure 1.

The process of installation of the monitoring wells provided additional information regarding site geology and soils in which groundwater is present. The geology and soils information was acquired by collecting soil samples with a split spoon sampler driven ahead of the boring auger during well installation work as well as observations of the auger drilling cuttings brought to the surface.

All four wells encountered the same conditions. Gravel and rocks mixed with top soil and organic material was encountered from the surface to a depth of 1 to 1.5 feet. Below that upper soil level silty fine sand (SP) with lenses of medium sand with trace gravel (SP) were encountered to the depth of the borings at 12 feet below the surface. The soils encountered are consistent with distal river delta deposits that have undergone some reworking by tidal currents. Saturated soils were encountered at approximately 5 feet at all four borings.

Each of the 2-inch wells was installed with a screened interval from 3 feet below the surface to the bottom of the well at approximately 10 feet below the surface. The shallow upper screen level installation was in anticipation of shallow elevated groundwater during periods of extended wet weather.

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 were approximately 2 feet above the ground surface and enclosed with steel monuments with a caps. This approach eliminated the risk of surface water flow into the well and degradation of the well seal cap. The use of steel riser monuments also minimizes the risk of damage from mowing and other equipment on the site as the wells are easily observed.

Top of well casings were surveyed post well installation. A ground elevation of 10 feet derived from lidar elevations available through Skagit County GIS was used for the Well 4 location and all elevations surveyed are based on that elevation. Elevations including initial water elevations from February 21, 2023 are presented in Table 1.

Table 1.
Water elevations from February 21, 2023

Monitoring Well	Ecology Well Number	Top of casing elevation (feet)	Latitude	Longitude	Depth to water (feet)	Water elevation (feet)
MW-1	BPP 501	10.82	48.564247	122.443981	4.59	6.23
MW-2	BPP 502	11.82	48.564914	122.442839	5.81	6.01
MW-3	BPP 503	12.10	48.564534	122.443053	5.91	6.19
WW-4	BPP 504	11.78	48.564979	122.442678	5.80	5.96
Bottom of ditch west of MW-4		7.54 (bottom of ditch)				
Water level in ditch north of MW-2						5.85

The Permit Fact Sheet notes that the groundwater at the facility is shallow. This was confirmed during the installation of the groundwater monitoring network as shallow water was encountered at all four well sites. This is also evident from the presence of water in the ditch around the land application site. The northern and eastern portions of the ditch contain water year round. The Fact Sheet notes that during the winter months the water table is less than five feet below the ground surface. This was confirmed during water level measurements on February 21, 2023 with water levels below the ground surface ranging from 2.29 feet to 4.04 feet. Groundwater levels in late summer when the wells were installed were on the order of 5 feet as well.

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. We observed that ditch water levels on the northern and eastern sides of the site do not appear to change very much during the year as well. The ditch on the west side is shallower and the upper southwest end of the ditch was dry in the summer. Water was flowing through this section of ditch on February 21, 2023 following a few days of heavy rain. This indicates that groundwater levels within the land application area are only minimally impacted by tide levels and seasonal variation is not likely very pronounced. However, ongoing measurements during future sampling events of the ditch level will provide further data on seasonal water levels in the ditch as well as well as groundwater levels.