



CIVIL ENGINEERING ♦ SURVEYING ♦ LAND PLANNING

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October 4th, 2016

**5 Rivers
Floodplain Hydrologic Analysis**

To whom it may concern,

Contour Engineering LLC has been retained by Shiad Investments LLC to provide a hydrologic analysis of the proposed developments effects on the floodplain associated with the project site. The site consists of a single 3.03 acre parcel located within the local jurisdiction of the City of Sumner. The property is zoned light manufacturing district (M-1) and is proposed to be utilized for temporary truck storage. The site is the only remaining undeveloped property in the area. The proposed project will fill portions of the site to be at grade with the adjacent properties and to allow stormwater to be conveyed offsite by gravity. A portion of these areas proposed to be filled lie within a mapped 100-year flood plain

The site is located at 3113 142nd Ave E, Sumner, WA 98390 in the southwest ¼ of the southeast ¼ of section 12, Township 20 North, Range 04 East, W.M. The site is contained within a single Pierce County parcel, 0420124031, within the City of Sumner, Washington.

Native Soils

The United States Department of Agriculture Natural Resource Conservation Service (NRCS) for Pierce County maps the site as being underlain by Puget Sound silty clay loam (30A) and minor amounts of Snohomish silty clay loam (39A). Both of these soils are classified within the Hydrologic Soil Group (HSG) 'D'. HSG D soils generally are very limited in their capacity to infiltrate stormwater runoff.

On November 3, 2015, The project Geologist monitored the excavation of several test pits across the site to observe the subsurface conditions at select locations and returned to the site on December 29, 2015 to install (2) two 2-inch diameter Piezometers to monitor groundwater elevations over the winter.

The test pits encountered slightly variable subsurface conditions across the site that generally confirm the mapped stratigraphy. The test pits generally encountered 6 inches of topsoil over 0.5 to 3 feet of loose, moist, brown silty sand overlying 2 to 5 feet of loose to medium dense, moist, brown to grey silty sand to sandy silt. A 1 to 3 foot thick layer of loose, moist to wet peat was encountered in all test pits at a depth of 4.5 to 6 feet below the existing grade. This was underlain by dark grey silt and sand to the full depth explored. They interpret the soils encountered in the test pits to be alluvium deposits.

Groundwater seepage was encountered in all of the test pits at 4.5 to 6 feet, generally above or in the top portions of the peat deposit. The geologist interpreted this zone to be indicative of a perched groundwater table. The geologist returned to the site on December 29, 2015 to install 2 Piezometers. At the time of installation of the Piezometers, groundwater levels were observed at 2 to 2.5 feet below existing grades. We returned again on January 25, 2016 and observed groundwater levels to be at the ground surface to within one foot of the ground surface.

The high groundwater and poor soils indicate the site has a limited capacity to manage stormwater runoff onsite. Significant storm event likely will overcome the hydraulic conductivity the soil and will sheet flow offsite.

Hydrology

The entire site is currently cleared, with the majority of the site covered in gravel/compacted earth surfacing and the remaining surfaced with grass and other non-native invasive vegetation. Historically, it appears offsite stormwater flowed onsite from properties to the north and east; however, in development of these properties, fill has been placed to raise these areas above the 100-year base flood elevation which has blocked flood waters and offsite flows from reaching the site. Given the soils and high groundwater identified by the geologist, it is unlikely that the site can manage significant storm events onsite. Larger storm events likely sheet flow offsite toward 32nd Street East and 142nd Avenue East and are collected by the public storm sewer system and conveyed to the white river.

Since the project site is located within the local jurisdiction of the City of Sumner, stormwater runoff is required to be treated and detained according to their standards. The project triggers requirements to provide not only basic stormwater treatment but also oil control facilities as well. Stormwater will also be required to be detained to limit peak flow discharges offsite from the post-project 25-year, 24 hour duration design storm events to the existing site condition 2-year, 24 hour duration storm event.

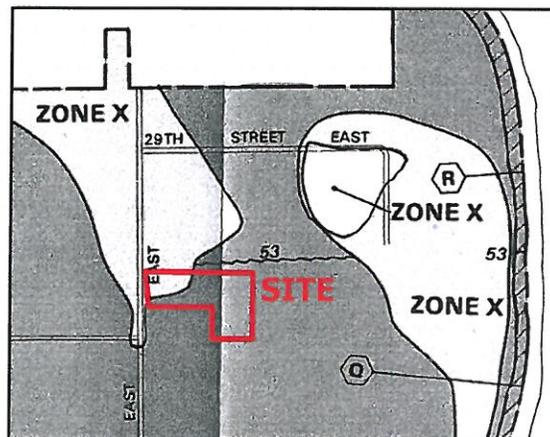
A preliminary detention system was sized to meet this standard for the developed site. A summary of the existing and developed peak flows from the site have been provided in the table below.

	Existing (CFS)	Developed (CFS)
2 Year	0.4409	0.1612
5 Year	0.6437	0.2429
10 Year	0.8010	0.3162
25 Year	1.0279	0.4359
50 Year	1.2185	0.5485
100 Year	1.4288	0.6851

By meeting the stormwater flow control standards of the City of Sumner the project will limit peak flows discharged offsite to at least 50% of the existing site conditions. Since no increase in stormwater runoff is proposed there will be no net increase in the base flood elevation due to the proposed development.

Floodplain

The effective flood map for the site is FEMA panel 5301470005D dated 06/18/1987. The project site is located within a Special Flood Hazard Area, zone AE, inundated by a 100-year flood of the White River. The site is located over 1,500-feet from the White River and is not mapped within any identified floodway. The floodplain associated with the project site is gradient ranging from an elevation of approximately 52.9' to 52.8' (NGVD 29) across the site. See FEMA map excerpt below:



Map Effective 1987

Based upon the effective flood map, it appears the source of floodwater to the site is from the northeast. Since the effective date of the flood map, 1987, there has been significant development in the areas surrounding the project site. Many of the identified floodplain areas have been filled and developed. This development appears

to have blocked floodwater from reaching the site. Currently, the only path for floodwaters to reach the site is to backwater up gradient from 142nd Avenue East which unlikely to occur without significant downstream flooding over the base flood elevation.

It is our opinion that the proposed site is no longer a part of the 100-year floodplain of the White River due to the actions of the surrounding developments; However, in lieu of acquiring a Letter of Map Amendment (LOMA) from FEMA at this time, the owner has elected to provide compensatory flood storage and habitat mitigation in accordance with a Habitat Management Plan prepared for the project reviewed and accepted by the City of Sumner.

If you have any questions or need any additional information, please feel free to contact us.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Kyle M. Mauren', with a long horizontal flourish extending to the right.

Kyle M. Mauren, E.I.T.
Design Engineer

A handwritten signature in blue ink, appearing to read 'Brett M. Allen', with a long horizontal flourish extending to the right.

Brett M. Allen, P.E.
Principal