

TECHNICAL MEMORANDUM

Project: Sumner 32

From: Justin Jones, PE

RE: Site Development Flood Mitigation
Approach

Date: February 28, 2024

Introduction

The intent of this document is to provide technical analysis of the development impacts of the Sumner 32 development to the 100-year floodplain of the White River. This document outlines the code requirements the project is subject to including City of Sumner municipal code, review of FEMA Flood Plain Maps & 2017 Flood Insurance Study for Pierce County, and analysis of the existing and proposed flood characteristics of the site.

This document's focus is on defining the portions of the site that are above the 100-year floodplain due to the permitted preload that was added to the site prior to 2015. This includes the stormwater pond in the southeast corner of the site that was part of the previous preload and is hydraulically disconnected from floodplain. A portion of the site that is not proposed to be developed is below the 100-year floodplain. This area includes the drainage ditch to the southwest and the eastern portion of the site.

Project Background

The Sumner 32 Development Project lies within the 100-year floodplain of the White River as shown in the FEMA FIRM Map, which is located approximately 300-feet east of the proposed project site.

Determination of the 100-year Flood Plain Elevation

City of Sumner municipal code section 15.52.070 states the following:

“The areas of special flood hazard are identified by the Federal Insurance Administration in a scientific and engineering report entitled “The Flood Insurance Study for Pierce County including the City of Sumner, Community Number 530147,” dated March 7, 2017, which, with accompanying Flood Insurance Rate Maps (FIRM) and any revisions thereto, are adopted by reference and declared to be a part of this chapter.”

The 2017 FEMA Pierce County Flood Insurance Study, along with 2017 FEMA FIRM Map panels provide analyses of the historical flooding characteristics of the proposed project site. The 2017 Flood Insurance Study’s primary focus in Sumner is on the recorded flooding events along the White River, existing flood mitigation measures that are currently in place, and determination of peak discharges during flooding events; the FEMA FIRM panels provide mapping of the 100-year flood events, and establish the Base Flood Elevation in the vicinity of the project.

2017 FEMA Pierce County Flood Insurance Study

The 2017 FEMA Pierce County Flood Insurance Study describes the flooding characteristics of the White River, stating: “The highest recorded flow on the Puyallup and White Rivers occurred in December 1933, prior to the construction of Mud Mountain Dam”. The report goes on to mention that flooding of the White River also occurred in 1977 near its mouth, and is often influenced by the flooding & backwater of the Puyallup River. Page 45 of the study states:

“There are no dams or reservoirs to regulate flood discharges on the Puyallup River upstream of the confluence with the White River. However, Mud Mountain Dam, which is located on the White River 30 miles upstream of Sumner, had a usable storage capacity of 106,000 acre-feet. This storage helps to decrease the discharge downstream of the confluence by controlling the discharge on the White River, thus serving as a flood protection device for the city. The dam regulates flood flows to within bank flows, allowing a maximum of 15,500 cfs in the White River in the Sumner area, and 43,500 cfs in the Puyallup River downstream of Sumner.”

In "Table 2. Summary of Discharges", the 1-Percent Annual Chance Flood (i.e. 100-year flood) is stated to occur at 15,500 cfs, which corresponds to the maximum discharge of the White River, controlled from Mud Mountain Dam during flooding events.

Table 2. Summary of Discharges

Flooding Source and Location	Drainage Area (square miles)	Peak Discharges (cubic feet per second)			
		10- Percent- Annual-Chance	2-Percent- Annual-Chance	1-Percent- Annual-Chance	0.2-Percent- Annual-Chance
WHITE RIVER					
At Mouth	494	14,000	15,300	15,500	19,000
At State Highway 410 in the City of Buckley	427	13,800	14,800	15,500	17,200
At Confluence with Greenwater River	294	18,600	25,800	28,900	36,700
Upstream of Confluence with Greenwater River	217	13,500	18,700	20,900	26,400
Upstream of Confluence with West Fork White River	145	8,940	12,200	13,600	17,000

Table 7 of the report also describes the 1-Percent-Annual-Chance Flood Water Surface Elevation of the White River:

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY ² (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
WHITE RIVER								
A	668	210	3,569	4.3	51.0	51.0	51.0	0.0
B	1,151	183	3,410	4.5	51.1	51.1	51.1	0.0
C	1,285	183	3,418	4.5	51.1	51.1	51.2	0.1
D	1,835	196	3,313	4.7	51.3	51.3	51.4	0.1
E	3,326	126	2,576	6.0	51.9	51.9	52.0	0.1
F	3,589	167	3,633	4.3	52.3	52.3	52.5	0.2
G	3,675	167	3,630	4.3	52.3	52.3	52.5	0.2
H	3,898	242	3,836	4.0	52.4	52.4	52.6	0.2
I	5,281	186	3,206	4.8	52.8	52.8	53.0	0.2
J	5,732	187	2,864	5.4	53.0	53.0	53.2	0.2
K	5,764	187	2,875	5.4	53.0	53.0	53.2	0.2
L	6,835	324	3,418	5.5	53.7	53.7	53.8	0.1
M	7,250	217	3,102	5.0	53.9	53.9	54.1	0.2
N	7,356	217	3,122	5.0	53.9	53.9	54.2	0.2
O	8,555	320	3,545	4.9	54.3	54.3	54.7	0.4
P	9,335	249	3,005	5.2	54.7	54.7	55.0	0.3
Q	10,825	227	3,016	5.4	55.3	55.3	55.6	0.3
R	11,890	553	3,882	4.9	55.6	55.6	56.2	0.6
S	13,135	582	3,785	5.3	56.0	56.0	56.7	0.7
T	13,860	1,207	6,900	4.0	56.4	56.4*	57.2	0.8
U	15,586	702	3,625	4.3	56.4	56.4*	57.4	1.0
V	16,939	1,070	4,224	3.7	57.4	57.4	58.4	1.0
W	18,058	1,520	5,617	2.8	58.3	58.3	59.3	1.0
X	18,598	1,420	6,034	2.6	58.7	58.7	59.6	0.9
Y	19,327	600	4,400	3.5	58.9	58.9	59.8	0.9
Z	20,277	590	3,003	5.2	59.4	59.4	60.3	0.9

¹Stream Distance in Feet From Confluence with Puyallup River
²Elevations Computed Assuming Puyallup River Elevation of 50.74 ft NAVD

TABLE 7	FEDERAL EMERGENCY MANAGEMENT AGENCY	FLOODWAY DATA
	PIERCE COUNTY, WA	WHITE RIVER
	AND INCORPORATED AREAS	

*FEMA VERTICAL DATUM: NAVD88. SURVEY VERTICAL DATUM: NGVD29. CONVERSION: NAVD88 - 3.9 = NGVD29. SURVEY 100 YEAR FLOODWAY ELEVATION IS CALCULATED TO BE EL = 52.5'

The cross section of the river closest to the project site is cross section “U” AND “T” (as shown on the FEMA FRIM panels below). The regulatory and without floodway 1 Percent Annual Chance Flood is indicated to occur at an elevation of 56.5’ (NAVD), with an elevation of 57.4’ within the floodway. Since the project site is located outside of the floodway, the 1 Percent Annual Chance flood can be assumed to be at an elevation of 56.4’ per Table 7.

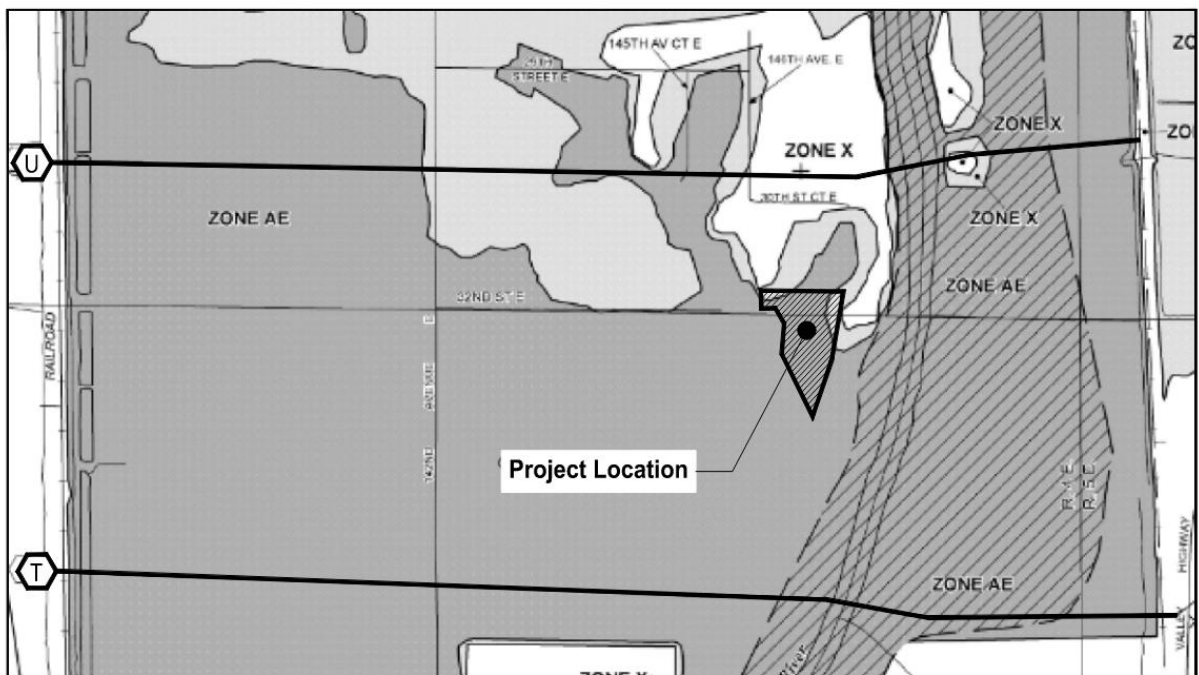
Table 7 utilizes the NAVD 88 datum while the project site survey utilizes NGVD 29, so a conversion between the vertical datums is required. NAVD 88 is approximately 3.9-feet higher than NGVD 29 (per Table 6. Conversion Factors of the 2017 FEMA Pierce County Flood Insurance Study), see conversion below:

$$56.4' - 3.9' = 52.5'$$

The highest anticipated 1 Percent Annual Chance Flood after conversion to NGVD 29 would occur at an elevation of 52.5’.

FEMA FIRM Panels

FEMA FIRM maps were also utilized to determine the extent of the White River floodplain as it relates to the project site, as well as confirm the flood elevations of the 100-year flood event. See figure below:



Per the 2017 FEMA FIRM Panel (also included in Appendix A), the project site lies within zone AE, which delineates the extent of the 100-year floodplain where base flood elevations have been determined.

Impacts of Development on the 100-year Floodplain

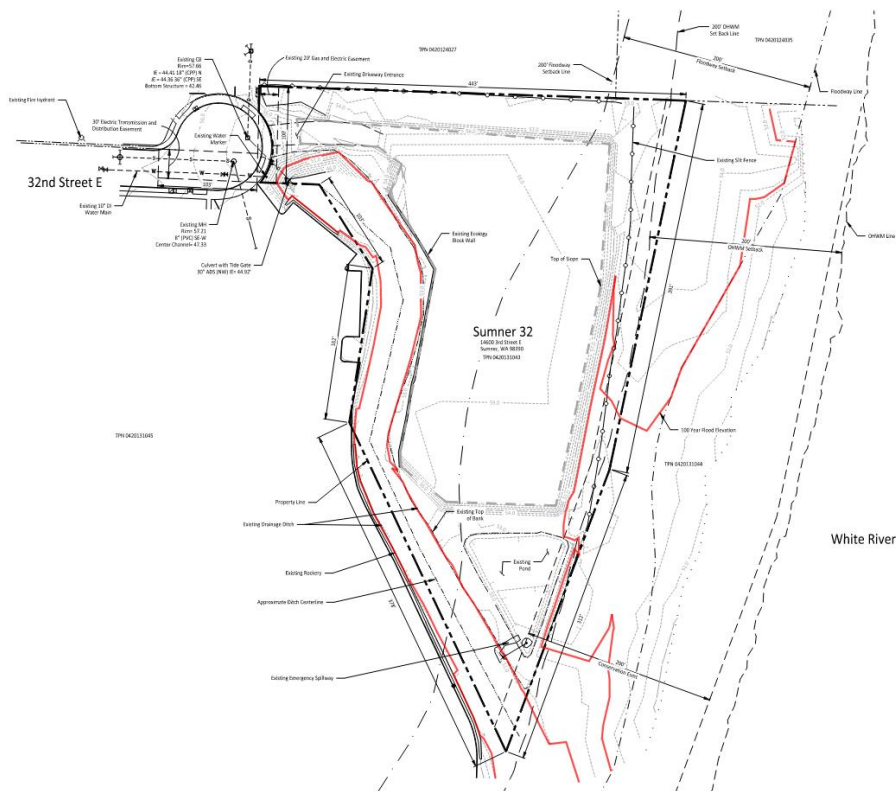
Existing Conditions

The existing site is comprised of a preloaded undeveloped land that fronts on the cul-de-sac of 32nd St E.

Portions of the site that are above the 100-year floodplain are due to the permitted preload that was added to the site prior to 2015. This includes the stormwater pond in the southeast corner of the site that was part of the previous preload. A portion of the site that is not proposed to be developed is below the 100-year floodplain. This area includes the drainage ditch to the southwest and the eastern portion of the site.

On-site elevations vary from 50-feet to 59-feet. A swale exists along the west property line of the project which is within the flood plain. A stormwater pond exists onsite from the previous preload, with the bottom of the swale at approximately 50.0' and the top of pond at approximately 53' which results in the pond being hydraulically disconnected from the 100-year floodplain. The elevations of the previously placed preload range from 53.0' to 59.0' which is above the 100-year flood elevation.

The existing site plan shows existing site elevations and contours, plan sheet below:



Proposed Conditions

The Sumner 32 site will be developed on the pre-load area that is above the 100-year floodplain and will have a vertical separation of approximately 7.5-feet when assuming a 100-year flood elevation of 52.5'. The proposed conditions will be completely above the 100-year floodplain elevation.



As a result of the development site being above the 100-year floodplain of the White River, import fill associated with the development of the project site will not displace storage area of the 100-year floodplain, and therefore construction of flood mitigation infrastructure would not be applicable to the project.