



Floodplain Development Hydraulics and Hydrology Report

PREPARED FOR:

Panattoni Development Company
1821 Dock Street, Suite 100
Tacoma, WA 98402

PROJECT:

Skookumchuck Commerce Center
Centralia, Washington
AHBL Project No. 2210649.10

PREPARED BY:

Tyler Watkins, PE
Senior Project Engineer

REVIEWED BY:

Bart Brynestad, PE
Associate Principal

DATE

September 2023

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I hereby state that this **Floodplain Development Hydraulics and Hydrology Report** for the **Skookumchuck Commerce Center** project has been prepared by me or under my supervision and meets the standard of care and expertise that is usual and customary in this community for professional engineers. I understand that **City of Centralia** does not and will not assume liability for the sufficiency, suitability, or performance of drainage



09/26/2023

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Geotechnical Report

1.0 Project Overview

This memo accompanies the Floodplain Development Permit for the Skookumchuck Commerce Center project and explains how the proposed project complies with the City of Centralia floodplain development requirements.

The Skookumchuck Commerce Center project is located at West Reynolds Avenue, Centralia, Washington (Parcel Nos. 021041000000, 021037000000, 021059000000, 021039000000, 021060000000, 021037000000, 021059000000, 021045000000, 021044002000, 021044003000, 021044004000, 021043002000, 021043003000, 021043001000, and 021041001000). The project parcels are approximately 56.77 acres.

1.1 Proposed Project Description

This project proposes two buildings, one 483,276-square foot building and a second 295,356-square foot building, with associated parking and drive aisles. The project will be accessed from West Reynolds Avenue. Other site improvements will include stormwater management facilities, water, sewer, and dry utilities.

2.0 Summary of Requirements

Centralia Municipal Code (CMC) Section 16.21 contains the requirements for development within the floodplain.

Development within this area of the floodplain is allowed if in compliance with the General Standards of CMC 16.21.170. The General Standards cover anchoring, construction materials and methods, utilities, review of building permits, and compensatory mitigation for fill within the floodplain.

For non-commercial structures, the code requires that the building be elevated to at least 1 foot above the Base Flood Elevation (BFE).

For fill within the floodplain, the code requires that all floodplain fill be mitigated with compensatory storage at a one-to-one ratio.

3.0 Existing Site Conditions

The project is located directly adjacent to the Skookumchuck River and Coffee Creek. The site is currently mapped as Zones AE and X (shaded and unshaded), per the effective FEMA Map 5301020043C dated July 17, 2006. Portions of the floodway are also within the parcel boundary, but those floodways are located outside the limits of the proposed development. The project is not located within any of the City's Zero Rise Floodplain Overlay areas.

The BFEs for the site are shown in the FEMA map. The FEMA map uses the NGVD29 datum for elevations. Lewis County has converted these to the NAVD 88 Datum. BFEs on NAVD 88 are available on the Lewis County GIS website. This project and all the below elevations will be on the NAVD88 datum for consistency. The conversion from NGVD29 to NAVD88 is approximately +3.42 feet at the site location.

Because of the size of the site, the BFE varies across the property. The BFE for the property ranges from approximately 184.0 to 186.0. To determine the existing flood volume within the site, a 3D CAD model was used to calculate the flood volume below the varied BFE across the site. The existing site contains 171,170 cubic yards (CY) of flood storage within the project boundary.

3.1 Soils Reports

The entire site is mapped by the Natural Resources Conservation Service (NRCS) as "Maytown-Chehalis-Rennie." This soil is a Hydrologic Soil Group C soil. Erosion potential is low and infiltration is low for this soil type.

A Geotechnical Report prepared by Terra Associates, Inc., dated September 7, 2023, identifies onsite soils as medium dense, dry to moist, alluvial silt, fine sandy silt, and silty fine sand overlaying glacial outwash deposits comprised predominantly of medium dense to very dense, silty gravel with sand to silty sand with gravel, and sand and gravel with varying proportions of silt. Moderate to heavy groundwater was observed in several test pits located in the northern and southeastern portions of the site. Refer to the Geotechnical Report attached as Appendix B.

3.2 Analysis of Previous Flood Event Hydrology

The closest river gaging site to the project is the Skookumchuck River at Centralia (USGS 12026600) located at the Pearl Street Bridge approximately 0.73 mile upstream from the closest part of the project. NOAA maintains a list of the historic crests for this gage, available below.

Historic Crests:

- (1) 191.03 ft on 02/08/1996
- (2) 190.86 ft on 01/10/1990
- (3) 190.34 ft on 01/08/2009
- (4) 190.18 ft on 01/07/2022 (P)
- (5) 187.57 ft on 01/06/2015 (P)

(P): Preliminary values subject to further review.

Flood Categories (in feet):

Major Flood Stage:	191
Moderate Flood Stage:	190
Flood Stage:	189
Action Stage:	187

3.2.1 January 7, 2022, Flood Event

The most recent flooding event was on January 7, 2022, when the river crested at an elevation of 190.18 at the gage. This was the fourth largest flood event for the history of this gage site. This equates to a Moderate Flood Stage per the NOAA Flood Categories for this gage. Below is the NOAA description of flood impacts at that stage.

At Stage 190:

The Skookumchuck River will cause moderate flooding in Centralia and the surrounding area. The river will flood many roads and residential areas and cover much of the farmland in the Skookumchuck River valley. This stage corresponds roughly to a Phase 2 flood in the Lewis County flood warning system.

While there is no reliable data for high water marks on the project date during the January 7, 2022, flood, there are some aerial photos available that show the extent of the flood. Appendix A-7 shows two undated photos provided by the City. While we cannot confirm that this photo was taken at exactly when the river stage was at a maximum, it is the best available data for the flooding on the project site for that event. Based on the channel visible in the photo that connects Coffee Creek to the rail crossing trestle on the west side of the site, we can approximate the flood elevation to be 182.0 near the middle of the site by comparing the photo to the topographic survey of the project. This is approximately 3 feet below the 100-year BFE of 185.0 near the middle of the site.

The Flood Insurance Study for Lewis County, Washington, contains a flood profile for the Skookumchuck River near the site location. A blue line was drawn on the flood profile to indicate the elevation of the January 7, 2022, flood event (182.00 feet in NAVD88 approximated based on aerial photos and topography maps; see above paragraph). The elevation of the January 7, 2022, flood event, which is the fourth largest flood event for the history of this gage site, was measured on the flood profile to be approximately 3.83 feet below the 100-year BFE at the site location. Therefore, it is conservative to use the 100-year BFE to set the finished floors of the proposed buildings. Refer to Appendix A-8 for the Skookumchuck River Flood Profile.

4.0 Proposed Condition

4.1 Proposed Flood Volumes

The project proposes to fill some areas of the floodplain to support the development. The fill is required to establish the finished floor of the buildings at least 1.5 feet above the BFE and to elevate the areas of the site adjacent to the building.

Because the BFE varies across the site, the BFE for each building will be the highest mapped BFE within the building footprint. The BFE for Building A is 185.64 and the BFE for Building B is 185.29. Both buildings will have a finished floor elevation of 187.14. Therefore, both buildings are elevated at least 1.5 feet above the BFE.

To compensate for all areas of fill, the project will provide compensatory storage, as required in CMC 16.21.170.F. All compensatory storage will be provided at an equivalent elevation to the elevations being displaced; all proposed storage will be available at or below the elevation of the existing storage. To determine the amount of proposed flood storage on the site, a 3D CAD model was used to calculate the flood volume below the varied BFE across the site. The proposed condition includes 204,490 CY of compensatory flood storage, which is greater than the required/existing flood volume of 171,170 CY. Therefore, the provided volumes sufficiently compensate for the volumes being displaced by fill.

The project proposes a cut of 126,400 CY below the BFE, a fill of 93,080 CY below the BFE, and a net cut of 33,320 CY below the BFE. Therefore, the project has a net cut below the BFE and will provide more flood storage than the existing condition.

Including the volumes above the BFE, the project proposes a cut of 158,000 CY, a fill of 153,000 CY, and a net cut of 5,000 CY. This is the overall project earthwork volume. These numbers are different than the volumes below the BFE because any additional cut or fill above the BFE does not count as fill within the floodplain.

4.2 Proposed Floodplain Areas and Flow Path Hydraulics

Areas of the developed site available for flood storage include access aisles, parking areas, storm ponds, and habitat areas near the Skookumchuck River and Coffee Creek.

The proposed storm ponds are designed as stormwater treatment wetlands. They are intended to provide enhanced treatment for all runoff from the site, but they do not provide any detention because the project is exempt from flow control requirements. The stormwater treatment wetlands are designed to remain full of water at all times below the elevation of 176.50. Therefore, the proposed flood volume excludes volume in the stormwater treatment wetlands below this elevation. The storm ponds are all connected with large diameter pipes that can flow in either direction. The storm pond outlet pipe will have an invert elevation placed at 176.50 and will allow flood waters to flow freely in either direction, but will not impact the ability to provide stormwater treatment.

Flood storage is also provided within shoreline and stream buffers at the south and east edges of the project. These areas are being enhanced for habitat restoration and will also provide additional flood storage for the project. These areas are directly connected to the river by a natural low point along the river.

All onsite flood storage areas will be hydraulically connected. As flood water levels rise within the river, the shoreline and buffer restoration areas will be flooded and water will flow through the pipes back into the storm ponds. Once water levels reach the pavement elevations on the site, flood waters will flow over the surface to all flood storage areas on the site.

As flood waters recede, the opposite will occur. Flood water will flow back to the river over the surface until water levels are at the pavement elevations. After this, all flood waters will flow through the ponds, pipes, and shoreline and buffer restoration areas before being discharged back to the river.

The existing rail line to the southwest of the project has a drainage structure/bridge that will allow some surface waters to enter and exit the site. This drainage path will be maintained by the project. The new rail spur adjacent will also include a culvert, so that is an area that can still be used to provide a surface flow route for flood waters.

Also of note, the City owns and maintains a flood control structure on the second rail line southwest of the project. The City has noted that this structure is to remain closed and is consistent with the FEMA flood map. The project does not propose any changes to this structure.

The geotechnical engineer is monitoring groundwater throughout the 2023 winter season. Once their results are available for the full season, we will provide an updated analysis of how the groundwater will be mitigated by the project. Preliminary results show that groundwater elevations will be near the water surface elevation of 176.50 in the stormwater treatment wetlands. Mitigation will include interceptor trenches around the storm ponds to ensure that groundwater does not impact the proposed flood storage volume.

The project does not propose any grading within the floodway, so the hydraulic capacity of the Skookumchuck River will be unaffected by the development. The project proposes to grade the building finished floors and adjacent areas above the BFE to avoid impacts from flood events. However, other areas within the site will be graded much lower than the existing grades, which will provide more flood storage volume at lower elevations than the existing conditions. The project also proposes more flood storage closer to the Skookumchuck River within the habitat restoration areas, which will increase the conveyance capacity of flood waters flowing onto the site during flood events.

Flood Storage:

Existing Flood Volume = 171.170 CY
Proposed Flood Volume = 204.490 CY*

**The proposed flood volume excludes volume in the stormwater treatment wetlands below elevation 176.50.*

Earthwork Quantities:

Overall Earthwork Quantities

Cut = 158.000 CY
Fill = 153.000 CY
Net = 5.000 CY (export)

Earthwork Quantities Below BFE

Cut = 126.400 CY
Fill = 93.080 CY
Net = 33.320 CY (export)

Notes:

The above quantities are estimates only intended for the permitting process. Do not use for bid purposes. The quantities do not have stripping, compaction, or cut and fill adjustment factors applied to them, nor do they account for pavement, sidewalk, or building sections.

4.3 Phasing

The project will be constructed in two main phases, with the first phase broken into two sub-phases. Please refer to the separate phasing memo for a detailed description of the work proposed for each phase.

Phase 1 will be broken into two sub-phases to account for the timing of the possible delayed permitting for the work within the Shoreline Zone and Stream Buffer. The work in those areas will affect the available compensatory storage volumes and pond discharge pipes. Therefore, the initial phase, Phase 1A, will ensure that all compensatory storage requirements are met during each phase of the project.

Phase 1A generally includes the grading for both building pads and stormwater ponds. Phase 1B generally includes Building A, most of the site improvements, and the habitat restoration work within the Shoreline Zone and Stream Buffer.

Phase 2 generally includes Building B and the remaining site improvements. The compensatory storage and earthwork volumes described in this memo reflect the final improvements. A separate memo will be written during each phase of the project to demonstrate how the required compensatory storage is provided.

5.0 Conclusion

The proposed Skookumchuck Commerce Center project proposes to construct a 483,276-square foot and a 295,356-square foot warehouse/distribution facility. Site improvements include parking areas for passenger cars and trailers, truck docks, maneuvering areas, concrete aprons, storm drainage improvements, water and sewer connections, and landscaping. Per the above information, this project complies with all applicable flood control regulations of Centralia Municipal Code Section 16.21.

This analysis is based on data and records either supplied to or obtained by AHBL. These documents are referenced within the text of the analysis. The analysis has been prepared using procedures and practices within the standard accepted practices of the industry. We conclude that this project, as proposed, will not create any new problems within the existing downstream drainage system. This project will not noticeably aggravate any existing downstream problems due to either water quality or quantity.

AHBL, Inc.



Tyler Watkins, PE
Senior Project Engineer

TDW/lsk

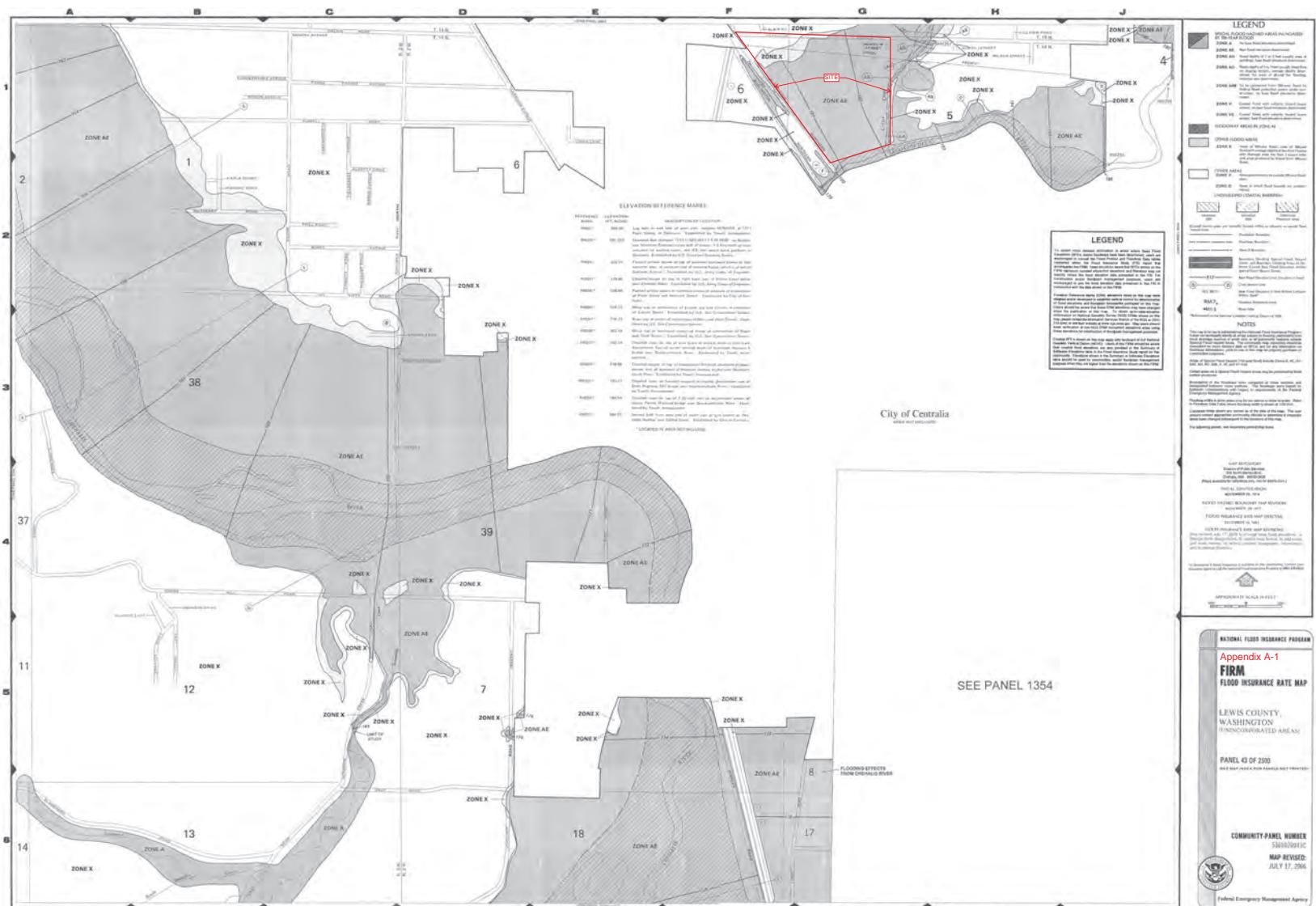
September 2023

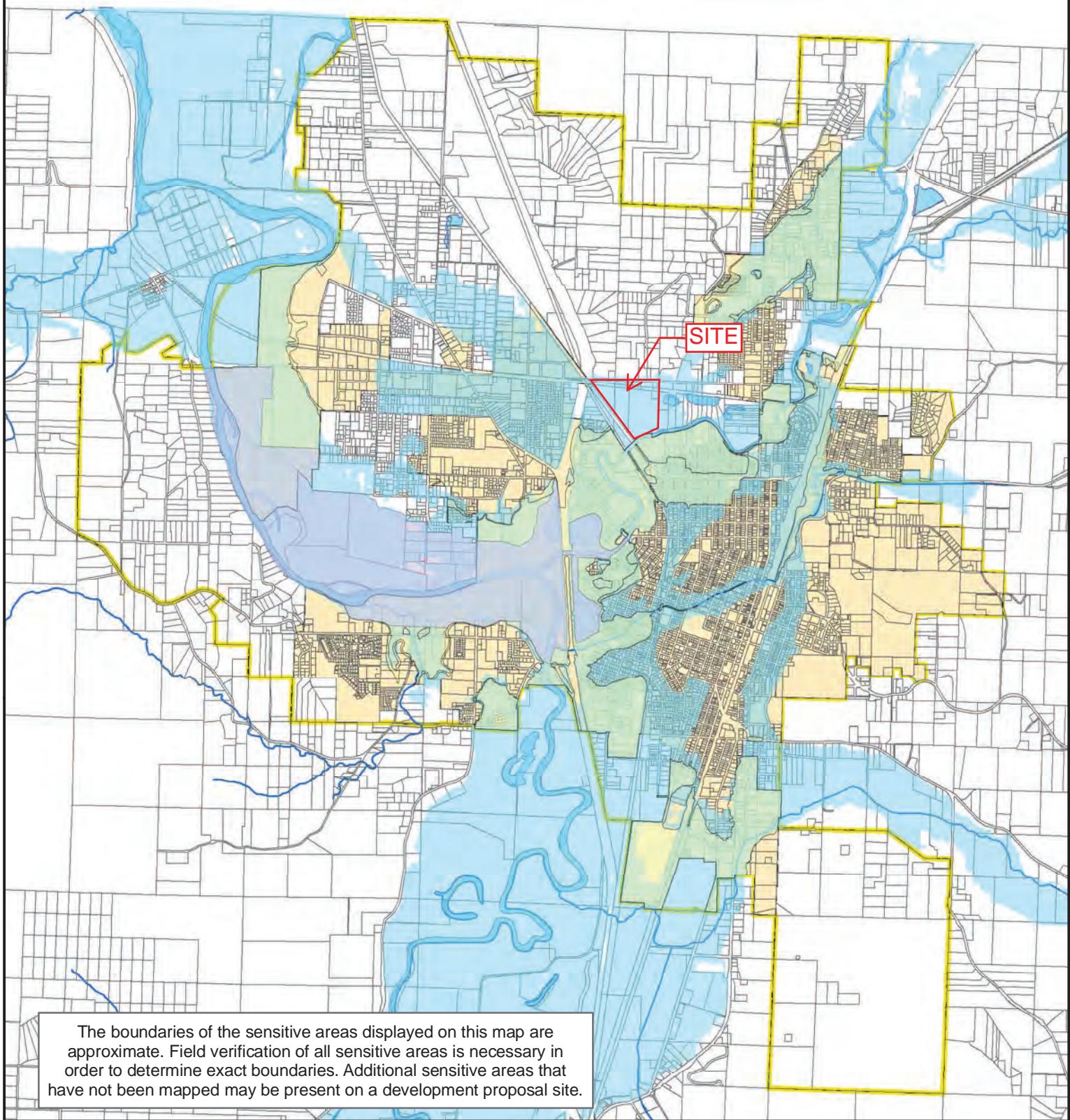
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Appendix A

Exhibits

- A-1FEMA FIRM Map 5301020043C
- A-2City Zero Rise Floodplain Overlay Map
- A-3County GIS Floodplain Map with NAVD88 Base Flood Elevations
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- A-7Flood Photos
- A-8Skookumchuck River Flood Profile





Appendix A-2

City of Centralia Zero Rise Floodplain Overlay Map



0 0.2 0.4 0.8 1.2 Miles

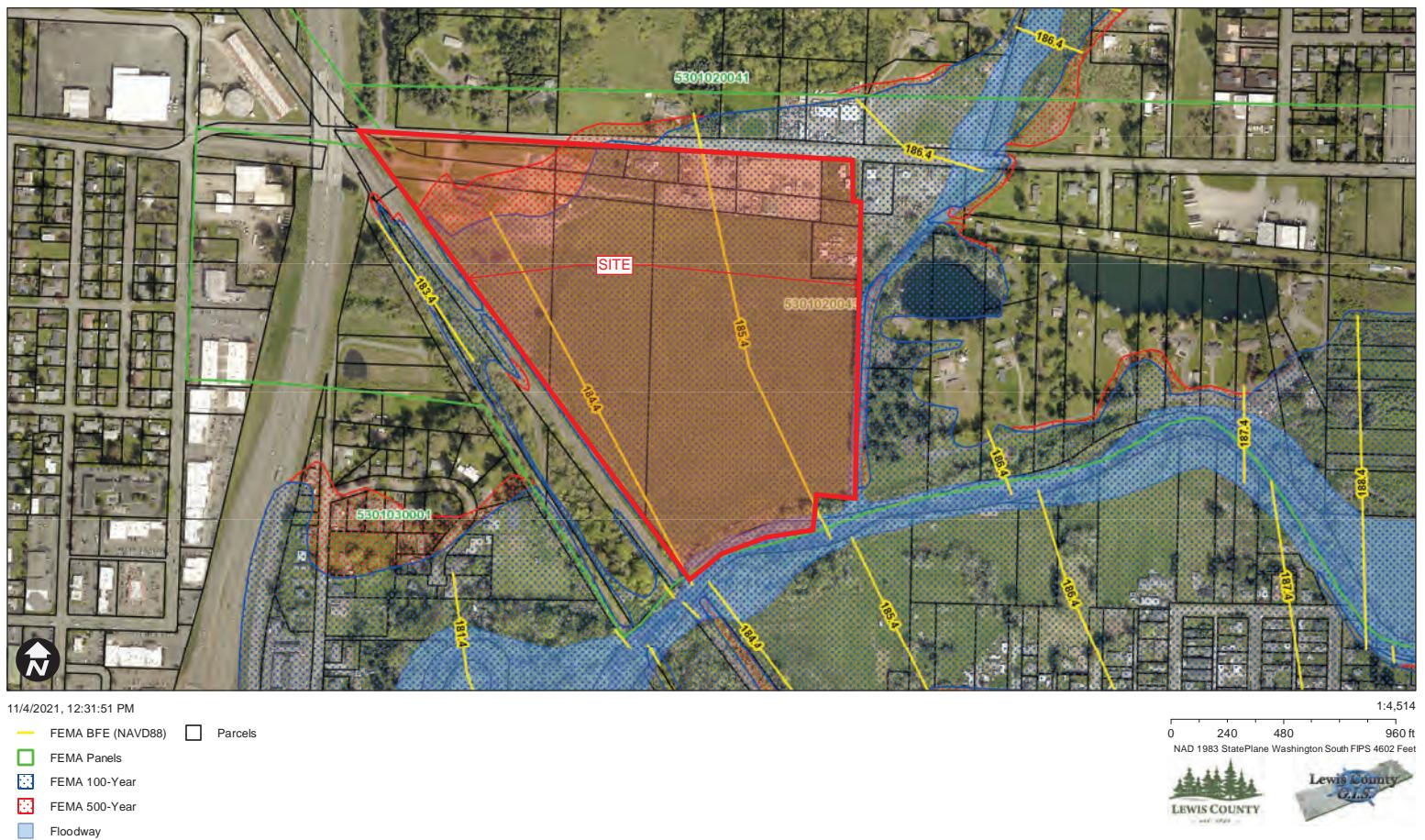


- Zero Rise Floodplain Overlay
- 1982 FEMA Floodplain
- 100 year Flood Plain
- Lakes and Rivers
- City Limits
- UGA Boundary

Created on January 14, 2009

Appendix A-3

Lewis County GIS Web Map



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— FEMA BFE (NAVD88) □ Parcels
■ FEMA Panels
■ FEMA 100-Year
■ FEMA 500-Year
■ Floodway

0 240 480 960 ft
 NAD 1983 StatePlane Washington South FIPS 4602 Feet

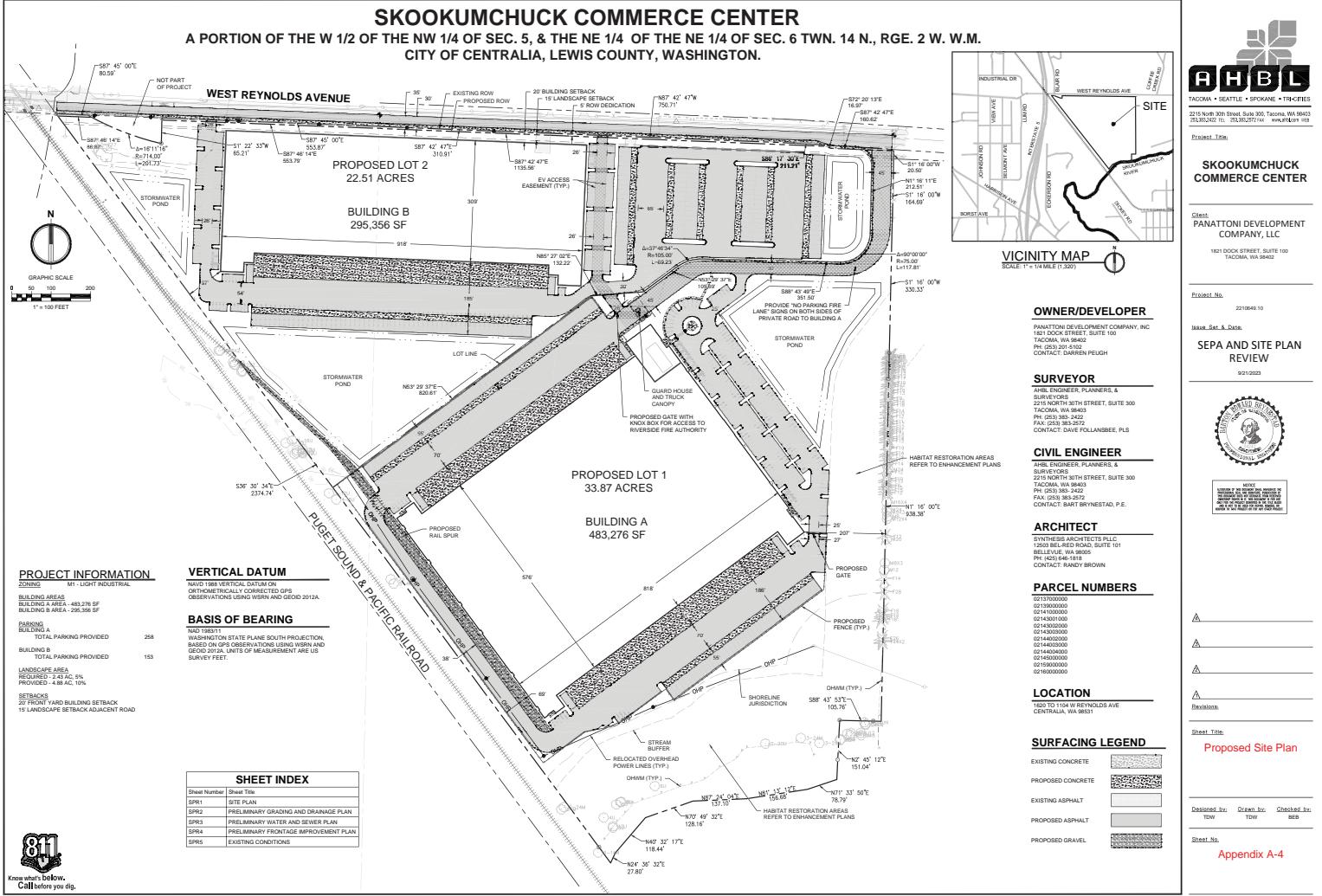


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SKOOKUMCHUCK COMMERCE CENTER

A PORTION OF THE W 1/2 OF THE NW 1/4 OF SEC. 5, & THE NE 1/4 OF THE NE 1/4 OF SEC. 6 TWP. 14 N., RGE. 2 W. W.M.
CITY OF CENTRALIA, LEWIS COUNTY, WASHINGTON.



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