Appendix A: SEIS SCOPING NOTICE AND COMMENTS

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CITY OF SUMNER
1104 Maple Street, Suite 250
Sumner, Washington 98390-1423
253.299.5530 • Fax: 253.299.5509

Community Development Department
Paul Rogerson, AICP, Director

Determination of Significance and Request for Comments on Scope of Supplemental EIS

City of Sumner 2013 Comprehensive Plan Annual Amendments

Description of Proposal

The City is proposing amendments to its adopted Comprehensive Plan (2012) to comply with the State of Washington Growth Management Act. Alternatives to be addressed in the Supplemental EIS include the *No Action Alternative*, i.e. the existing plan (continuation of the City's current GMA Comprehensive Plan to year 2030), and the *Action Alternatives* to include: *2013 Comprehensive Plan Amendment Docket* as follows:

Amendment No. / Applicant	Location	Description
MA-1: Amendments Related to Surplus City Property	Generally City owned property south of Stewart Road (8th Street) bounded on the east by the BNSF railroad tracks and on the west by the White (Stuck) River and on the south by 24th Street East.	1) Redesignate approximately 120 acres from Public-Private Utilities and Facilities to M-1, Light Manufacturing; 2) Redesignate approximately 34 acres from Urban Village to M-1, Light Manufacturing; and 3) Amend the Zoning Map to be consistent with the M-1, Light Manufacturing land use designation on the Comprehensive Plan Map by rezoning approximately 28 acres from General Commercial (GC) to M-1. The Urban Village designation may change on surrounding properties as well based on a land use and zoning analysis in the Supplemental EIS.
TA-1: Amend the Land Use Element, Public Private Facilities and Utilities description.	No location	Amend the Land Use Element, Public Private Facilities and Utilities description to remove an inconsistency between the description of the land use designation on page 48 with the description on page 50.

Amendment No. / Applicant	Location	Description
TA-2: Amendments related to the Sumner Meadows Golf Course	No location	Amend Parks and Open Space Element (Policies 2.7, 2.10 and Figure 14); Vision Statement; Commuter/Rail Regional Transit Sub-element (Policy 1.6); and Transportation Element (Figures 16 and 17).
Note: Zoning Code Text Amendments ZA-1 and ZA-2 approved as part of the 2013 Comprehensive Plan Amendment Docket are proceeding under a separate timeline and environmental review. The Zoning Code text amendments are substantively unrelated to the Comprehensive Plan Amendments.		

Proponent
City of Sumner

Location of Proposal
Generally, property south of Stewart Road (8th Street) bounded on the east by the BNSF railroad tracks and on the west by the White (Stuck) River and on the south by 24th Street East. Adjacent properties may also be reviewed in the Supplemental EIS.

Lead Agency
City of Sumner

EIS Required
The lead agency has determined this proposal is likely to have a significant adverse impact on the environment. An environmental impact statement (EIS) is required under RCW 43.21C.030 (2)(c) and will be prepared. The document is anticipated to be a Supplemental EIS per WAC 197-11-600 and -620. The lead agency has identified the following areas for discussion in the EIS: Earth, Water Resources, Plants and Animals, Land Use, Plans and Policies, Population/Housing/Employment, Transportation, and Public Services and Utilities.

The Supplemental EIS for the 2013 annual amendments would supplement the Final EIS for the City of Sumner Comprehensive Plan Update and Amendments issued on November 24, 2010.

Scoping
Agencies, affected tribes, and members of the public are invited to comment on the scope of the Supplemental EIS. You may comment on alternatives, mitigation measures, probable significant adverse impacts, and licenses or other approvals that may be required. The method and deadline for giving us your written comments is **5 p.m., Monday, November 25, 2013**.

Responsible official
Paul Rogerson
Community Development Director
Phone 253-299-5521; Fax 253-299-5509
paulr@ci.sumner.wa.us

City of Sumner
1104 Maple Street
Sumner, WA 98390-1423

Date: 10/31/13 Signature: Paul Rogerson

CITY OF AUBURN WASHINGTON

Peter B. Lewis, Mayor

25 West Main Street * Auburn WA 98001-4998 * www.auburnwa.gov * 253-931-3000

November 25, 2013

SENT VIA EMAIL AND US MAIL

Mr. Paul Rogerson
Community Development Director
City of Sumner
1104 Maple Street
Sumner, WA 98390

RE: Comments on the Supplemental Environmental Impact Statement for the City of Sumner's 2013 Comprehensive Plan Annual Amendments

Dear Mr. Rogerson:

Thank you for the opportunity to comment on the City of Sumner's issued Determination of Significance on the Supplemental Environmental Impact Statement (EIS) for the 2013 Comprehensive Plan Annual Amendments. The City of Auburn appreciates the opportunity to already be working with the City of Sumner on the amendment related to Surplus City Property and we look forward to that continuing. We offer the following comments for the Supplemental EIS scoping and draft Traffic Impact Analysis for the Sumner Meadows Golf Course Redevelopment that has already been provided to Auburn:

1. The following comments relate to the proposed North Access Road:
   - Most recent discussions between City of Auburn and City of Sumner staff have identified the potential to signalize the site access intersection at Stewart Road SE using a "flying-T" intersection design. The location of the intersection has yet to be finalized and may involve the relocation of the Sumner/Auburn City limits. As part of the analysis and intersection design the following elements need to be considered:
     - Providing access to the City of Auburn storm detention pond,
     - Development of a trailhead facility, including parking and restrooms,
     - Incorporating a public trail connection as part of the proposed development,
     - Providing access to/from the east, or relocating to provide access to/from the east, of the City of Auburn stockpiles located to the north of Stewart Road.

2. The following comments relate to the analysis and findings presented in the Sumner Meadows Golf Course Redevelopment TIA:
   - The analysis presented in the TIA should reflect the ultimate site access configuration along Stewart Road currently being determined between City of Auburn, City of Sumner staff, and the project applicant.
   - Based on the trip generation and distribution presented in the TIA, several additional intersections should have been evaluated as part of the analysis including – Stewart Road/W Valley Hwy, Stewart Road/140th Ave, E Valley Hwy/Terrace View Dr, and E Valley Hwy/E Valley Access Rd.
   - The trip generation for the project should have been calculated using the ITE Industrial Park land-use (#130), not the individual land-uses presented in the TIA. It is not possible to guess the mix of land-uses which will occupy the development, or manage the mix of tenants to match the assumed land-use mix. The industrial park use would seem to be a better fit for the project and provide additional flexibility (ITE Definition: Industrial parks contain a number of industrial and related facilities. They are characterized by a mix of manufacturing, service,

and warehouse facilities with a wide variation in the proportion of each type of use from one location to another. Many industrial parks contain highly diversified facilities – some with a large number of small businesses and others with one or two dominant industries). In addition ITE states that caution should be used with the High-Cube Warehouse/Distribution Center land-use due to wide variations in trip generation based on the types of uses. Using the industrial park land-use would, however, result in significantly higher trip generation, with approximately 2,500 peak hour trips compared with fewer than 700 peak hour trips identified in the TIA. If they move forward with the land-use mix in the TIA we will need assurance that the actual development will be consistent with the land-use mix identified and should monitor the trip generation as the project develops to make sure they do not significantly exceed what has been documented in the TIA.

- It is anticipated that a significant proportion of trips generated by the proposed project will be large trucks. To account for the driving characteristics of trucks relative to passenger vehicles, the trip generation should be adjusted using a passenger car equivalence (PCE) factor to provide a more representative analysis of traffic operations, especially at the site driveways.
- Please identify all the pipeline projects included in the analysis
- The TIA does not include any discussion of impacts to safety, non-motorized facilities, parking, or queuing.
- The right-turn warrant is only evaluated during the weekday PM peak hour. Given the level of truck trip generation anticipated with the proposed development (truck trip generation will be much higher during the off-peak hours), left- and right-turn lanes should be provided at all site access locations. The use of a PCE factor should also be considered as part of this analysis.

3. The proposal site is located with a known flood hazard area associated with the White River. The SEIS should evaluate the potential risks to life, property and environmental resources associated with the proposal; as well as any other potential adverse effects (effects on emergency preparedness resources, etc), and the consistency of the proposal with land use plans, policies, and local, state and federal floodplain regulations. Best available science and data regarding floodplain area, hydraulics, and hydrology, should be used to perform this evaluation.

Thank you again for the chance to comment on the Supplemental EIS scoping and if there are any questions on the above comments please contact me at echamberlain@auburnwa.gov or 253-931-3092.

Sincerely,

Elizabeth F. Chamberlain

Elizabeth F. Chamberlain, AICP
Planning Services Manager
Planning and Development Department

COR13-490

cc: Chris Andersen, Environmental Services Manager
James Webb, Traffic Engineer

Ryan Windish

From: Karen Walter <KWalter@muckleshoot.nsn.us>
Sent: Friday, November 15, 2013 10:20 AM
To: Ryan Windish
Subject: Sumner's 2013 Comprehensive Plan Amendments , Determination of Significance and Notice of Application PLN-2013-0517
Attachments: FIRM Maps for Sumner area near 8th Street E.pdf

Ryan,
We have reviewed the Scoping Notice and Notice of Application for the City's proposed 2013 Comprehensive Land Amendments and offer the following comments to protect and restore the Tribe's treaty-protected fisheries resources:

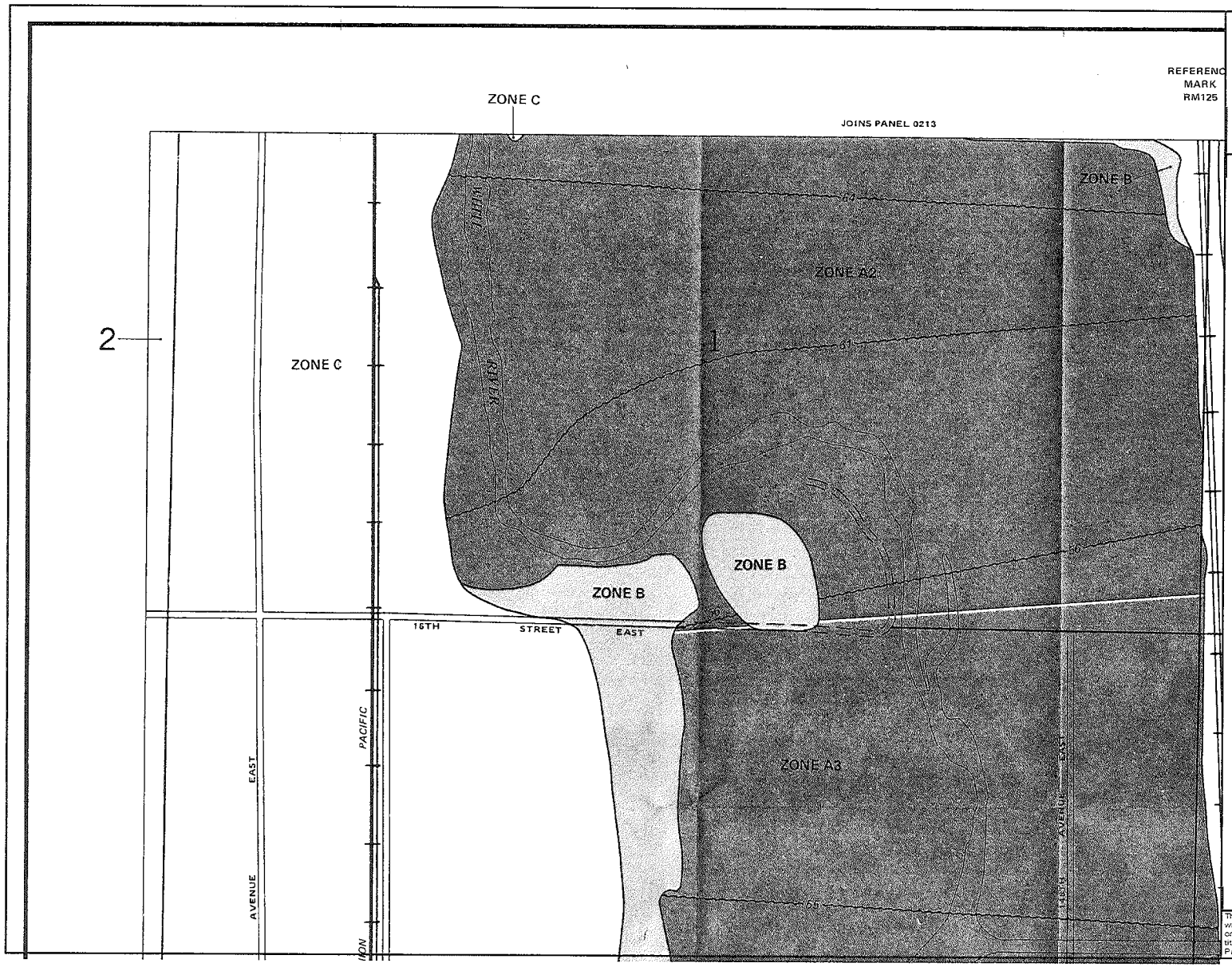
1.The SDEIS needs to fully evaluate the proposed amendments and associated zoning for all potential impacts to the White River, its floodplain and channel migration zone, the riparian area and any wetlands. FEMA identifies several areas within the action area to be within the 100 year floodplain (see attached). Further, the City's levee setback feasibility study (Parametrix June 2011) contemplated several options needed provide flood control and/or habitat benefits to the White River near 24th Street East. All of the options from this feasibility study should be analyzed in this SDEIS as the proposed amendments and associated zoning will likely preclude the implementation of some options and may limit flood plain protection and fish habitat restoration opportunities.

2. As we noted in our comments to the Collin Keck proposed trail project, we have been discussing potential river and stream habitat restoration ideas, including levee setbacks and other potential projects with City staff in the course of conversations regarding the City's proposed water right changes/additions and other topics. While the trail project is set back from the White River, it seems that the location of the trail may preclude future levee setback opportunities. We have yet to resolve these concerns and these Comprehensive Plan amendments may further limit mitigation options for the City's proposed water right changes necessary to resolve the water rights issues.

In summary, we suggest that we meet with City staff to discuss these important issues prior the City taking further action on these lands that may limit options and actions necessary to protect and restore fish habitat in this portion of the White River. Please call me to set up such a meeting. We appreciate the opportunity to review this proposal and look forward to the City's responses.

Thank you,
Karen Walter
Watersheds and Land Use Team Leader

Muckleshoot Indian Tribe Fisheries Division
Habitat Program
39015 172nd Ave SE
Auburn, WA 98092
253-876-3116



APPROXIMATE SCALE

500 0 500 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

PIERCE COUNTY, WASHINGTON

(UNINCORPORATED AREAS)

PANEL 351 OF 1375

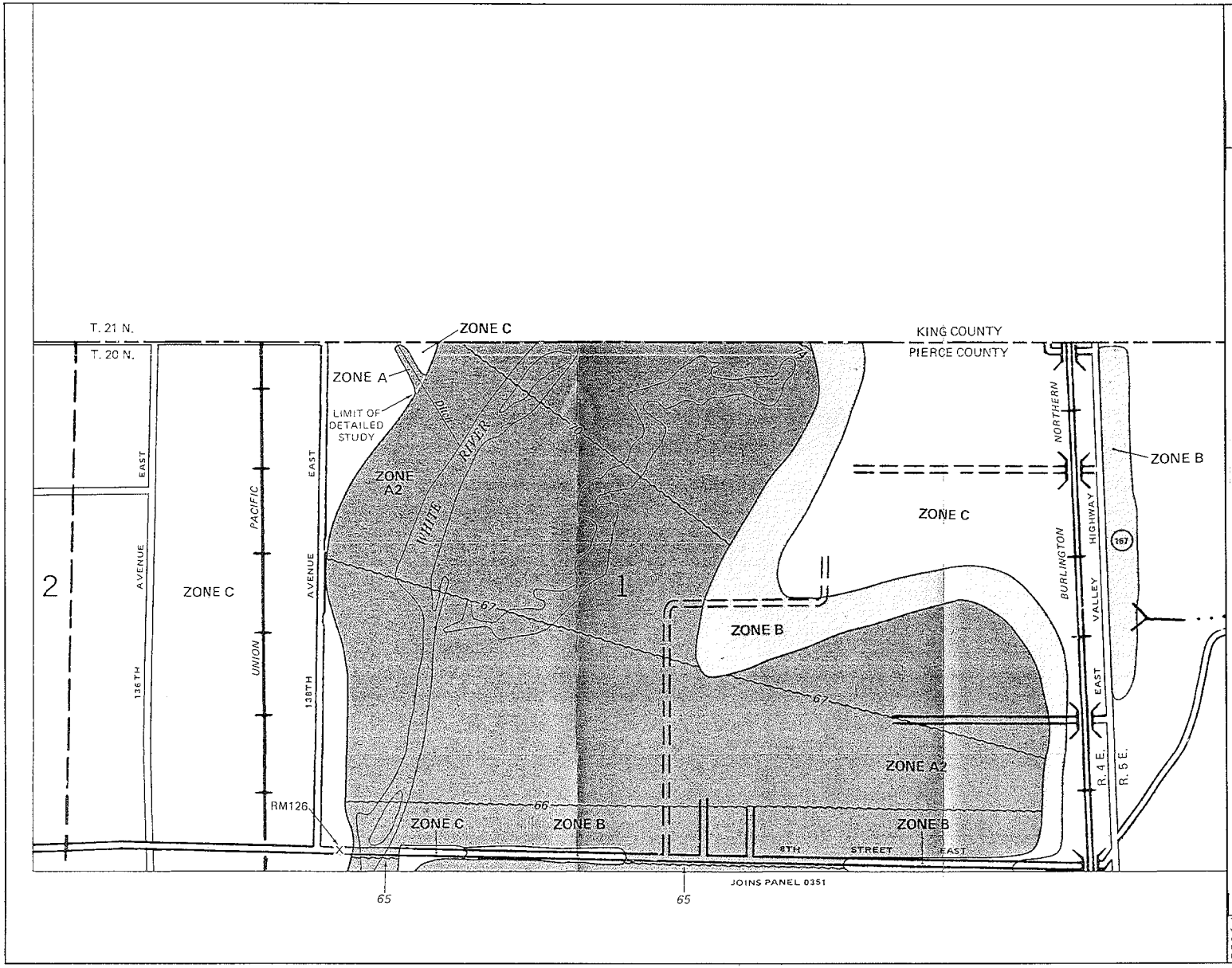
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
530138 0351 C

EFFECTIVE DATE:
AUGUST 19, 1987

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



APPROXIMATE SCALE

500 0 500 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

PIERCE COUNTY, WASHINGTON

(UNINCORPORATED AREAS)

PANEL 213 OF 1375

(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER

530138 0213 C

EFFECTIVE DATE:

AUGUST 19, 1987

Federal Emergency Management Agency

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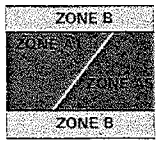
ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION (FT. NGVD)	DESCRIPTION OF LOCATION
RM126	74.69	Brass disk at the southwest corner of 8th Street East bridge over the White River, 100 feet east of 139th Avenue East. Established by Western Aerial Surveys, Inc.

KEY TO MAP

500-Year Flood Boundary
100-Year Flood Boundary
Zone Designations
100-Year Flood Boundary
500-Year Flood Boundary



Base Flood Elevation Line With Elevation In Feet** — 513

Base Flood Elevation in Feet Where Uniform Within Zone** — (EL 987)

Elevation Reference Mark — RM7×

Zone D Boundary

River Mile — •M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside special flood hazard areas.

Coastal base flood elevations apply only landward of the shoreline shown on this map.

For adjoining map panels, see separately printed Index To Map Panels.

APPROXIMATE SCALE

500 0 500 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

PIERCE COUNTY, WASHINGTON
(UNINCORPORATED AREAS)

PANEL 213 OF 1375
(SEE MAP INDEX FOR PANELS NOT PRINTED)

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TARRAGON
An Investco Company

November 25, 2013

Mr. Ryan Windish
City of Sumner
1104 Maple Street
Sumner, WA 98390

RE: Commenting on the Scope of the EIS and comprehensive plan map amendment and the Notice of Application for the Comprehensive Plan Amendment Application. Project number PLN-2013-057.

Dear Ryan,

Find below our comments concerning the Comprehensive Plan Map Amendment (CPA) and EIS scope per the Scoping Notice and Notice of Application dated October 31, 2013 and November 11, 2013, respectively. Please include these comments as responsive to both notices. We have responded to specific portions of the proposed CPA listed in italics below with our comments and requests indented in bold thereafter.

Amendment No. - MA-1:

1.) *Re-designate approximately 120 acres from Public-Private Utilities and Facilities to M-1, Light Manufacturing.*

We have commented on this portion of the proposal in prior correspondence and remain concerned that this redesignation of the Sumner Meadows Golf Course eliminates required City open space and creates inconsistencies with other comprehensive planning policies. We appreciate that this supplemental SEPA review and Comprehensive Plan amendment process is providing the forum for fully evaluating the issues we have raised previously. We expect the City to continue to consider the comments we have provided previously on this proposal, and will offer additional comments, if necessary, after we review the City's draft supplemental EIS analysis.

2.) *Redesignate approximately 24 acres from Urban Village to M-1, Light Manufacturing.*

Possible Area Expansion: As we have stated previously, now that the City has initiated the reversal of the 2008 Comprehensive Plan Amendment that originally established the Urban Village Overlay in this part of the City, we believe that the City's SEPA EIS review and the comprehensive plan amendment proposal should also evaluate elimination of the entire Urban Village overlay designation in this area, since removing the golf course portion undermines the original intent of that designation and we believe, potentially jeopardizes the viability of the remainder. This would specifically include evaluation of removing the UV Overlay designation on parcels 0420014062, 0420014061, and 0420014060. We suggest the impacts of this change should be considered as an alternative to the City's proposed action and further suggest that the

supplemental EIS evaluate the environmental impacts of a change to M-1 zoning and the removal of the Urban Village Overlay. Currently the three parcels referenced are zoned largely HDR with an Urban Village overlay. We ask that the supplemental EIS explores both the option of 1) reviewing these parcels as HDR zoning with and Urban Village Overlay and 2) also changing the zoning to M-1 without an urban village overlay. With information from both of those options in the supplemental EIS we feel that we and the City can make a better decision on whether these parcels be included in the redesignation of the golf course to M-1 zoning.

3.) *Amend the Zoning Map to be consistent with the M-1, Light Manufacturing land use designation on the Comprehensive Plan Map by rezoning approximately 28 acres from General Commercial (GC) to M-1. The Urban Village designation may change on surrounding properties as well based on a land use and zoning analysis in the Supplemental EIS.*

Area Expansion: Please include parcels 0420011027, 0420011031, 0420011015 and 0420011017 in the Supplemental EIS scope and the Comprehensive Plan Amendment and map amendment. We do not believe that GC zoning works on these parcels, especially with the removal of the GC zoning from the golf course, and agree that if the City proceeds with the proposed changes to the golf course property, then the M-1 designation on these parcels would add more consistency.

Area Expansion: Please include parcels 0420014061, and 0420014060 in the Supplemental EIS scope and Comprehensive Plan Amendment and map amendment for rezoning the General Commercial (GC) zoning to be consistent with the majority zoning designation for parcel 0420014062. We understand that the base zoning may, or may not, change based on the Supplemental EIS analysis for our site also being reviewed in the comprehensive map amendment update. As such, we believe this change should be evaluated as two alternatives: all HDR or all M-1.

We appreciate that you are looking at the affect that changing the zoning designation on the Golf Course will have on neighboring properties that share the same existing zoning. Please let me know if you have any questions. Additionally, if you could send me an anticipated timeline for these comprehensive plan amendments, the timeline for the final publication to the EIS, and when we will have additional time to comment on the EIS it would be greatly appreciated.

Sincerely,

Dennis L. Rattie
President
Tarragon L.L.C.

Appendix B: SEIS LAND CAPACITY ESTIMATES

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Land Capacity by Sumner Meadows Alternative

The land capacity estimates below are based on the Sumner 2010 Final Environmental Impact Statement Appendix A methods and results.

Sumner Planning Area: Capacity and Targets excluding Orton Junction UGA

	Base Year: 2008			Targets		
Demographic	City [1]	PC-UGA [2]	Total	City 2030 [1]	PC-UGA 2030 [2]	Total 2030
Population Gross	9,060	1,344	10,404	11,970	2,484	14,454
Population Net				2,910	1,140	4,050
Housing Units Gross	3,973	512	4,485	5,743	1,042	6,785
Housing Units Net				1,770	530	2,300
Employment Gross	10,828	418	11,246	20,135	597	20,732
Employment Net				9,307	179	9,486

Notes:

[1] Excludes mobile and work at home jobs.

[2] UGA Employment calculated based on land use and 19.37 employee per acre.

[3] With HDR at 12 du/ac. Assumes Fleischmann Property as industrial Use rather than mixed use.

[4] Excludes Orton Junction UGA expansion, Retains Eastern UGA.

Sumner Planning Area: Capacity and Targets with Orton Junction UGA Included

	Base Year: 2008			Targets		
Demographic	City [1]	PC-UGA [2]	Total	City 2030 [1]	PC-UGA 2030 [2]	Total 2030
Population Gross	9,060	1,344	10,404	11,970	2,484	14,454
Population Net				2,910	1,140	4,050
Housing Units Gross	3,973	512	4,485	5,743	1,042	6,785
Housing Units Net				1,770	530	2,300
Employment Gross	10,828	418	11,246	20,135	597	20,732
Employment Net				9,307	179	9,486

Notes:

[1] Excludes mobile and work at home jobs.

[2] UGA Employment calculated based on land use and 19.37 employee per acre.

[3] With HDR at 12 du/ac. Assumes Fleischmann Property as mixed use.

[4] Includes Orton Junction UGA expansion, and Eastern UGA retraction.

Prepared February 2014

Sources: City of Sumner GIS 2010; BERK Consulting 2014

	No Action Alternative 5 with Original UGA					
Demographic	City [3]	PC-UGA [4]	Total	Diff 2030 City	Diff 2030 PC-UGA	Diff 2030 Total
Population Gross	11,879	3,558	15,437	(91)	1,074	983
Population Net	2,819	2,214	5,033	(91)	1,074	983
Housing Units Gross	5,281	1,518	6,799	(462)	476	14
Housing Units Net	1,308	1,006	2,314	(462)	476	14
Employment Gross	19,958	597	20,555	(177)	0	(177)
Employment Net	9,130	179	9,309	(177)	0	(177)

	No Action Alternative 5 with prior approved UGA					
Demographic	City [3]	PC-UGA [4]	Total	Diff 2030 City	Diff 2030 PC-UGA	Diff 2030 Total
Population Gross	12,035	2,964	14,999	65	480	545
Population Net	2,975	1,620	4,595	65	480	545
Housing Units Gross	5,352	1,371	6,723	(391)	329	(62)
Housing Units Net	1,379	859	2,238	(391)	329	(62)
Employment Gross	19,990	2,750	22,740	(145)	2,153	2,008
Employment Net	9,162	2,332	11,494	(145)	2,153	2,008

Demographic	Alt 1 Diff 2030 City	Alt 2 Diff 2030 City	Alt 3 Diff 2030 City	Alt 4 Diff 2030 City
Population Gross	(91)	(177)	813	(91)
Population Net	(91)	(177)	813	(91)
Housing Units Gross	(462)	(501)	(51)	(462)
Housing Units Net	(462)	(501)	(51)	(462)
Employment Gross	3,187	3,080	2,979	125
Employment Net	3,187	3,080	2,979	125

Demographic	Alt 1 Diff 2030 City	Alt 2 Diff 2030 City	Alt 3 Diff 2030 City	Alt 4 Diff 2030 City
Population Gross	65	(21)	969	65
Population Net	65	(21)	969	65
Housing Units Gross	(391)	(430)	20	(391)
Housing Units Net	(391)	(430)	20	(391)
Employment Gross	3,219	3,112	3,011	157
Employment Net	3,219	3,112	3,011	157

Demographic	Alt 1 Diff 2030 Total	Alt 2 Diff 2030 Total	Alt 3 Diff 2030 Total	Alt 4 Diff 2030 Total
Population Gross	983	897	1,887	983
Population Net	983	897	1,973	983
Housing Units Gross	14	(25)	425	14
Housing Units Net	14	(25)	425	14
Employment Gross	3,187	3,080	2,979	125
Employment Net	3,187	3,080	2,979	125

Demographic	Alt 1 Diff 2030 Total	Alt 2 Diff 2030 Total	Alt 3 Diff 2030 Total	Alt 4 Diff 2030 Total
Population Gross	545	459	1,449	545
Population Net	545	459	1,535	545
Housing Units Gross	(62)	(101)	349	(62)
Housing Units Net	(62)	(101)	349	(62)
Employment Gross	5,371	5,265	5,164	2,310
Employment Net	5,371	3,112	5,164	2,310

Appendix C: OFFSITE ALTERNATIVE SITE EVALUATION

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BERK

PHONE 206.324.8760
2025 First Avenue, Suite 800
Seattle, WA 98121
www.berkconsulting.com

MEMORANDUM

DATE: February 24, 2014

TO: Ryan Windish, Planning Manager, AICP, City of Sumner Community Development Department

FROM: Alex Cohen, AICP, Senior Associate and Lisa Grueter, AICP, Manager, BERK Consulting

RE: Offsite Alternative Site Evaluation

Purpose and Proposal

The City of Sumner is considering map and text docket applications to amend its Comprehensive Plan and development regulations related to the anticipated surplus of the Sumner Meadows Golf Course for private development. The proposal would amend the Comprehensive Plan Land Use Map to redesignate the golf course from Public-Private Utilities and Facilities to Light Industrial. Light Industrial is applied as the predominant underlying zoning, but there is an area along Stewart Road zoned as General Commercial that would be rezoned to Light Industrial. Other related Comprehensive Plan text amendments would be made to the Land Use Element, Commuter/Rail Regional Transit Sub-element, and Parks and Open Space Element.

Consistent with its State Environmental Policy Act (SEPA) responsibilities, the City has authorized the preparation of a Supplemental Environmental Impact Statement (SEIS) that analyzes the potential environmental impacts associated with adoption of the proposed Comprehensive Plan Amendments. The SEIS addresses the proposed actions and a range of onsite alternatives, some of which would include adjacent properties. SEPA rules require consideration of an off-site alternative for legislative actions and private rezones in some situations.[1] To comply with SEPA rules, the City is considering an off-site alternative to the Comprehensive Plan changes as well.

In an effort to identify a reasonable[2] off-site alternative location, an analysis of potential sites that would meet the objectives of the proposal and be consistent with SEPA was conducted. The purpose of this memorandum is to document the methods and results of that analysis and to identify the off-site alternative selected for inclusion in the City's SEIS.

This memorandum includes a description of the proposal's goals and onsite alternatives. It describes the criteria used to identify potential off-site alternatives that may meet the proposal's objectives. The memo describes the analysis of each off-site alternative and the criteria used to determine if the alternative would be viable. Lastly, the memo identifies the off-site alternative selected and provides a rationale for its selection.

---

[1] See WAC 197-11-440 (5)(d), as well as Central Puget Sound Growth Management Hearings Board Case, *Davidson Serles v. City of Kirkland* (October 5, 2009), Case No. 09-3-0007c.

[2] Reasonable alternatives are described in WAC 197-11-440(5): (b) Reasonable alternatives shall include actions that could feasibly attain or approximate a proposal's objectives, but at a lower environmental cost or decreased level of environmental degradation. (i) The word "reasonable" is intended to limit the number and range of alternatives, as well as the amount of detailed analysis for each alternative.

Proposed Comprehensive Plan Amendment and Alternatives

The City of Sumner is considering map and text docket applications to amend its Comprehensive Plan and development regulations related to the anticipated surplus of the Sumner Meadows Golf Course for private development of light industrial uses. The proposed docket amendments include the following elements, considered together as **Alternative 1 Sumner Meadows Docket Application**:

1. *MA-1: Amendments Related to Surplus City Property:* 1) Redesignate approximately 122 acres from Public-Private Utilities and Facilities to M-1, Light Manufacturing; 2) Redesignate approximately 32 acres from Urban Village to M-1, Light Manufacturing; and 3) Amend the Zoning Map to be consistent with the M -1, Light Manufacturing land use designation on the Comprehensive Plan Map by rezoning approximately 28 acres from General Commercial (GC) to M-1.
2. TA-1: Amend the Land Use Element, Public Private Facilities and Utilities description: Amend the Land Use Element, Public Private Facilities and Utilities description to remove an inconsistency between the description of the land use designation on page 48 with the description on page 50.
3. *TA-2: Amendments related to the Sumner Meadows Golf Course:* Amend Parks and Open Space Element (Policies 2.7, 2.10 and Figure 14); Vision Statement; Commuter/Rail Regional Transit Sub-element (Policy 1.6); and Transportation Element (Figures 16 and 17).

Three alternatives to the Proposal are also under evaluation, with onsite and offsite components, including the following:

- **Areawide Industrial Alternative:** This alternative is an extension of docket application MA-1 beyond Sumner Meadows Golf Course to include an areawide redesignation of private vacant lands north and south of Stewart Road east of the White (Stuck) River. Alternative 2 would amend the Comprehensive Plan land use map to apply Light Industrial in place of General Commercial, Urban Village, and Public-Private Utilities and Facilities. Implementing zoning would be Light Industrial M-1. Other text amendments TA-1 and TA-2 would be implemented similar to Alternative 1.
- **Areawide Industrial and Residential Alternative:** This areawide alternative would reclassify private properties north of Stewart Road and east of the White (Stuck) River and the Sumner Meadows Golf Course as Light Industrial. Implementing zoning would be Light Industrial (M-1). Property west of Sumner Meadows Golf Course owned by Six Kilns Apartments LLC would be designated as Urban Village and zoned as High Density Residential (HDR). This would recognize a development agreement executed between Six Kilns Apartments LLC and City in 2009. Other text amendments TA-1 and TA-2 would be implemented similar to Alternative 1.
- **No Action Alternative:** This alternative is the continuation of the City's current Growth Management Act (GMA) Comprehensive Plan that includes a planning period extending to the year 2030. The No Action Alternative is a SEPA-required alternative. With the No Action Alternative, General Commercial, Urban Village, and Public-Private Utilities and Facilities land use map designations would be retained in the Comprehensive Plan. Corresponding General Commercial (GC), Light Industrial (M-1), and High Density Residential (HDR) zoning districts would be retained. No Comprehensive Plan text amendments would be made.

Objectives of the Proposal

For any proposal for which a local government has issued a threshold decision of significance, SEPA requires that an EIS evaluate the proposal along with reasonable alternatives that meet the proposal's objectives at a lower environmental cost (WAC 197-11-440).

As part of describing a proposed action and alternatives, SEPA requires the description of proposal objectives and features. Agencies are encouraged to describe a proposal in terms of objectives, particularly for agency actions to allow for consideration of a wider range of alternatives and measurement of the alternatives alongside the objectives. Any potential off-site alternative would have to "feasibly attain or approximate" (WAC 197-11-440(5)) the stated proposal's objectives which are as follows:

- Determine the long-term land use for the Sumner Meadows Golf Course property declared surplus to the City's needs (35.94.040 RCW) on March 25, 2013.
- Reinforce Sumner's role as a manufacturing and industrial center serving south King County and east Pierce County including the City's goal of 20,000 employees in the Manufacturing/Industrial Center.
- Allow for a consistent and compatible land use pattern along Stewart Road and the White (Stuck) River.
- Accommodate the City's fair share of population and employment forecasts to meet GMA requirements and the City vision.
- Protect critical areas and allow for appropriate water quality treatment and stormwater management and reduce or minimize floodplain or flooding impacts.
- Consider docket requests consistent with the annual comprehensive plan review cycle.

The degree to which each alternative accomplishes the objectives will be specifically addressed in the SEIS. This analysis seeks simply to identify an off-site alternative that has the potential to meet the objectives.

Potential Off-site Alternative selection

The process to select an off-site alternative was iterative. A series of evaluations was undertaken starting with a broad screening and getting progressively more detailed. The first step in identifying an off-site alternative was developing a set of criteria that would allow identification of sites that have the potential to meet the objectives of the proposal. These criteria are meant to "cast a wide net" and identify areas that may be used as off-site alternatives. More specific analysis of the potential off-site alternatives was included in a second screening. Based on the objectives stated above, the following criteria were developed:

- **Adequate Size.** The proposed amendment would designate an additional 154 acres of land for light industrial use. Based on a conceptual plan developed by the City an estimated 3,523,490 square feet of commercial space would be possible (adequate space to support approximately 3,500 new jobs). While an alternative's site would not have to be the same size, compliance with the proposal's objectives related to Sumner's role as a manufacturing and industrial center would require a comparably sized area.
- **Non-industrial.** The proposed amendments would change the Comprehensive Plan's designation of the golf course from Public-Private Utilities and Facilities to Light Industrial. The proposal would add employment capacity to the City, meeting the objectives of the proposal. Any comparable alternative would need to represent a change in employment capacity consistent with those objectives. Use of an off-site alternative that is currently designated for industrial or light industrial use would not represent a change in City land use policy and would therefore not be consistent with the proposal and other alternatives.

The City was scanned based on these criteria and four areas were identified as potential off-site alternative locations. The four sites are described below and shown on Exhibit 1.

Site 1. **AG Property.** This site is a City-owned property immediately south of the Sumner Meadows Golf Course. It is 95 acres along the White River and currently zoned Agriculture (AG) and designated Public-Private utilities and Facilities. The site is currently undeveloped and used for leased farming and portions of the site, within the buffer of the White River, have been planted with vegetation for mitigation.

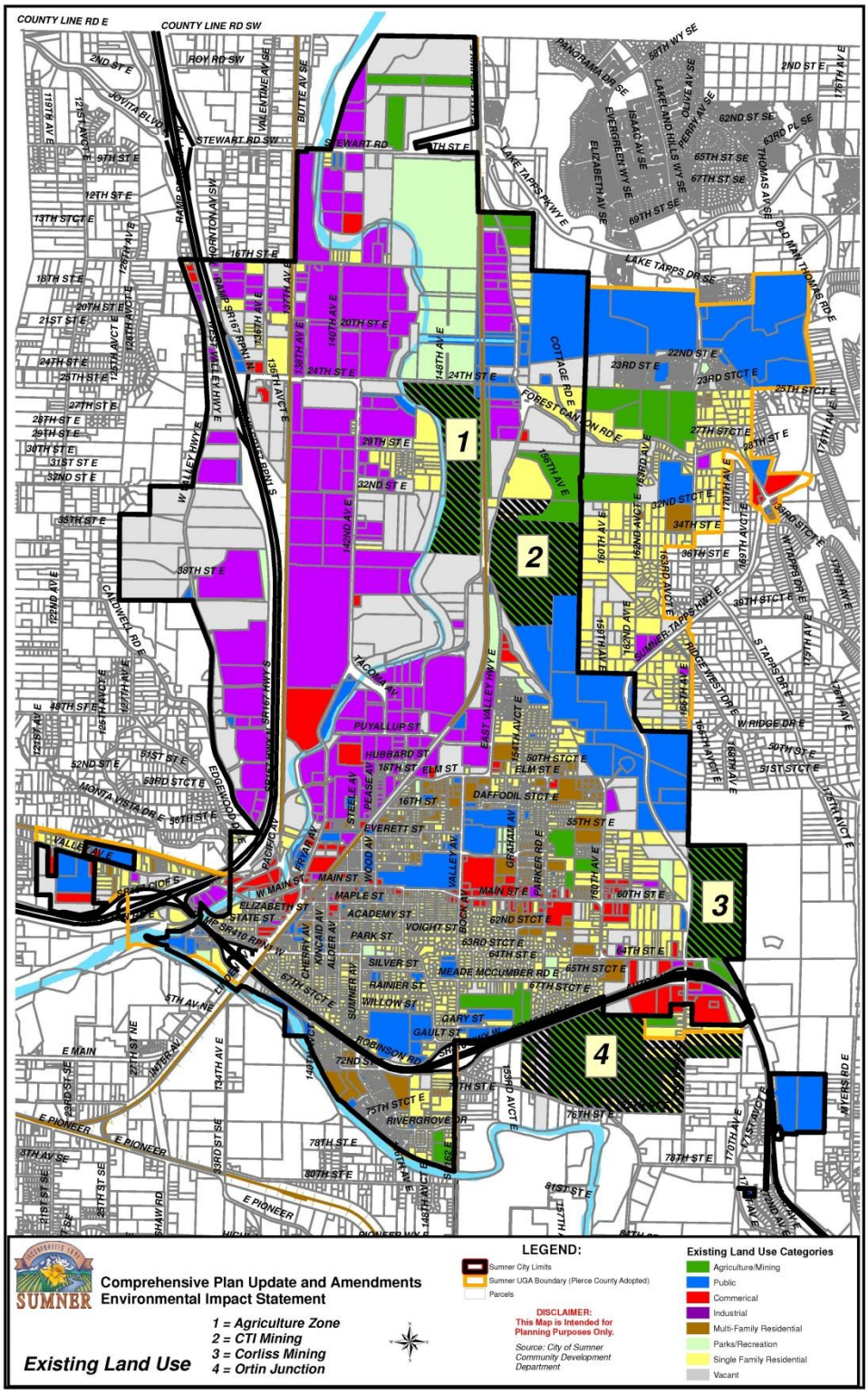
Site 2. **CTI Mine.** This site is approximately 110 acres and located immediately east of East Valley Highway. It is comprised of six parcels than are currently zoned Low Density Residential (LDR 8.5 and 12) and designated Low Density Residential. The site is currently an operational gravel mine.

Site 3. **Corliss Mine.** This site is an approximately 78-acre parcel located immediately east of Sumner-Tapps Highway East north of SR 410. The site is zoned Low Density Residential (LDR-12) and a small amount is zoned General Commercial (GC). The site is designated Low Density residential, residential Protection and Urban Village. The site is currently used as a cement and aggregate facility and gravel mine.

Site 4. **Orton Junction.** This site includes 41 parcels totaling approximately 160 acres. It is located south of SR 410 outside of City limits, but within the City's UGA approved by Pierce County in 2010; it was denied by the Growth Management Hearings Board and under appeal in the court system. The City is considering withdrawing its appeal of this area, and Pierce County would likely rescind the UGA expansion in that case. The site is currently designated for Low and High Density Residential categories, General Commercial, and Interchange Commercial with an intent to apply a future zone of Planned Mixed Use Development if the area annexes. The site is primarily used for agriculture, but has some low density residential development. Two car dealerships and a large grocery store lie adjacent to the north.

No other sites were identified that were of sufficient size and had the potential for redesignation to an industrial use.

Exhibit 1 Potential Off-site Alternative Location



FEASIBILITY OF POTENTIAL OFF-SITE ALTERNATIVES

As noted above, analyzing potential off-site alternatives was an iterative process. Each of the potential off-site alternatives identified above were screened against a second set of criteria to determine if they would be a reasonable alternative that could meet the objectives of the proposal. Of primary concern was whether the alternative site could reasonably be used as an employment center and whether redesignation would be consistent with the City's population and employment growth assumptions. Based on these factors, the following evaluation criteria were developed:

- **Viability as Industrial Site – Environmental and Transportation Conditions.** The off-site alternative should represent a viable industrial or light industrial site within the planning horizon of the Comprehensive Plan (through 2030). As a viable industrial site, the site should be located adjacent to other similarly zoned lands. It should be located in a topographically appropriate setting (i.e. relative flat with relatively flat ingress and egress). It should also be within reasonable proximity to high capacity transportation corridors (i.e. highways and rail lines). Environmental conditions, e.g. critical areas, should be limited and able to be avoided or mitigated to allow for industrial development.
- **Consistent with the City's Growth Targets.** As per the proposal's objectives, the off-site alternative should be consistent with accommodating the City's fair share of population and employment allocation for meeting GMA requirements. Within the City, the City's estimated 2010 housing capacity currently falls about 391 dwelling units short of the 2030 target and the City's estimated 2010 employment capacity falls 145 jobs short of the 2030 target. If Orton Junction is included, the City and UGA's housing capacity exceeds the 2030 target by 329 units and employment capacity exceeds the City's target by 2,008 jobs. The SEIS will address growth capacity as Pierce County has been conducting analysis towards the 2014 Buildable Lands Report and this will be compared to the City's 2010 estimates.

Each of the four potential off-site alternatives sites was screened against those criteria. Exhibit 2 summarizes the result of the comparison:

Exhibit 2
Alternative Site Screening Comparison

Off-site Alternative	Viable for Industrial Use	Consistent Growth Targets	Conclusions
Site 1. AG Property.	The Ag property south of the Sumner Meadows golf course is located on flat land and is surrounded by light industrial development and light industrial zoned lands. A BNSF rail line is located to its immediate east and SR 167 is located less than a mile to the west. The site contains floodway and floodplains.	Redesignation and rezoning of this site to light industrial would not change the City's residential capacity. Conversion would increase the City's employment capacity.	▪ Broad qualities for a viable industrial site exist. ▪ Topography and adjacent uses are appropriate. ▪ Multiple transportation options are nearby. ▪ Conversion would be consistent with proposal's employment objectives. ▪ Additional programmatic and site specific studies would be needed to determine the ability to meet critical area regulations and create a cohesive development plan.

Off-site Alternative	Viable for Industrial Use	Consistent Growth Targets	Conclusions
Site 2. CTI Mine	The CTI Mine lies partially on the valley floor and mostly on the slopes above the White River valley. It is topographically higher above the City's industrial center. Current access to the site is via sloped connectors to E Valley Hwy. The site is currently surrounded by undeveloped land and residential developments.	This site is currently zoned for Low Density Residential development. A change in designation would not decrease City's residential capacity currently since that the City's land capacity analysis assumes mining will continue through the City's Comprehensive Planning horizon. However, it would limit the City's future residential capacity potential if changed to employment uses.	▪ Conditions for a light industrial site are limited. ▪ The site is located on a hillside with access to road options and in proximity to rail but not adjacent. ▪ Mining is planned to continue for the foreseeable future.
Site 3. Corliss Mine.	The Corliss Mine site is located primarily along a hillside with steep access to the plateau above. A small portion along 116th Street is flat. It is not within close proximity to rail access. SR 410 is located nearby to the south. The site is not within close proximity of other industrial uses.	The site is currently zoned primarily for residential development (and some commercial). Removal of the residential capacity on this site would lower the City's overall growth capacity.	▪ Conditions for viable light industrial are limited. ▪ Nearby transportation options consist of roads not rail. ▪ Loss of residential capacity is not consistent with the City's growth assumptions.
Site 3. Orton Junction.	This site is located outside of City limits. It is located on flat land along SR 410. Rail access is not in close proximity. Adjacent land uses are residential development and agriculture with some commercial uses.	The site is currently planned for mixed uses, which has a residential component. Removal of the residential capacity on this site would lower the City's future growth capacity. However, it is likely that the UGA expansion will be rescinded, in which case it would not have urban growth capacity.	▪ Conditions for viable light industrial exist. ▪ Nearby transportation options are limited to SR 410, and not railroad. ▪ Loss of UGA status would limit the location's ability to support any kind of urban use, residential, commercial, or industrial.

CONCLUSION

Based on the analysis of potential sites and the site screening in Exhibit 2, the Ag site south of the Sumner Meadows Golf Course appears to be the most viable off-site alternative that would approximate the proposal's objectives and be consistent with SEPA requirements.

The site is large enough to provide some employment capacity and help reinforce Sumner's role as a job center. It could be converted to light industrial uses because of its flat topography location within the City's light industrial corridor and access to both railroad and highway/arterial transportation options. Its conversion to light industrial would create additional employment capacity in the City and would not remove any residential capacity.

The Ag property can be evaluated in the EIS in terms of potential natural and built environment impacts.

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Appendix D: SUMNER MEADOWS GEOTECHNICAL EVALUATION

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PanGEO
INCORPORATED
Geotechnical & Earthquake
Engineering Consultants

February 4, 2013
Project No. 11-050.100

Mr. Ryan Windish, AICP
Planning Manager
City of Sumner Community Development Department
1104 – Maple Street, Suite 250
Sumner, WA 98390

Subject: Sumner Meadows Geotechnical Evaluation
Sumner, Washington

Dear Mr. Windish:

As requested, PanGEO has completed a geotechnical engineering study for the Sumner Meadows Golf Course property in Sumner, Washington. We understand that the City is considering selling the property for future industrial or warehouse developments. The intent of this report is to provide a preliminary geotechnical evaluation of the property for potential buyers to conduct a pre-purchase feasibility study of the property. Because our evaluation was completed based on review of existing data, and final design of future developments are not available at this time, this report should be considered preliminary in nature. Additional geotechnical studies including a site- and development-specific subsurface exploration program should be completed for the final design and permitting of future developments.

We trust that the attached report meets your needs at this time. Please call if you have any questions or comments.

Sincerely,

Siew L. Tan, P.E.
Principal Geotechnical Engineer

3213 Eastlake Avenue East, Suite B
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ATTACHMENTS:

Figure 1 Vicinity Map
Figure 2 Site and Exploration Plan
Appendix A: Summary Boring Logs (CH2M Hill, 1998)
Appendix B: Summary Boring Logs and Laboratory Test Results (Landau Associates, 2011)

SUMNER MEADOWS
GEOTECHNICAL EVALUATION
SUMNER, WASHINGTON

1.0 GENERAL

This report summarizes the available geological and geotechnical subsurface data in the vicinity of the Sumner Meadows Golf Course in Sumner, Washington, and presents preliminary geotechnical recommendations for use by potential buyers to conduct a feasibility study for their industrial or warehouse developments. Our work was performed in accordance with our proposal dated January 16, 2013, and we received the notice to proceed on January 23, 2013. The results of our study and our recommendations are summarized below.

2.0 SITE AND PROJECT DESCRIPTION

The area being considered for future development consists of the existing Sumner Meadows Golf Course in Sumner, Washington. The location and boundary of the site are shown in the attached Figures 1 and 2. The site borders Stewart Road to the north, East Valley Highway East to the east, Tailrace to the south, and the White River to the west. Excluding the shoreline setback from the White River, we understand that the site has a buildable area of about 132 acres.

As currently envisioned, the property will be re-purposed for warehouse or light industrial use. Design of future developments are not available at this time, but we understand that they are likely to consist of single-level, high bay concrete buildings similar to nearby warehouses.

3.0 SUBSURFACE CONDITIONS

Subsurface conditions at the site were inferred from published geology maps and existing subsurface explorations that were completed near the subject site. No subsurface explorations were completed as part of the current study.

3.1 GEOLOGY

The project site is located in a broad, low-lying, relatively flat valley situated between glacial uplands to the east and west. At the end of the glacial ages, the valley was a marine embayment that in the project area extended to 300 feet below present sea level

(Dragovich and others, 1994). Both the White and Green Rivers had eroded the glacial materials from the eastern uplands and re-deposited the material as deltaic and alluvial beds. By 5,700 years ago the alluvium had backfilled the valley by Auburn to an elevation of approximately –120 feet, and the valley was inundated by the Osceola mudflow from Mt. Rainier. This mudflow came down the White River valley, buried the glacial upland areas, and left an approximately 20-foot thick bed of debris beneath the project site (Dragovich and others, 1994). The Osceola left large amounts of material available for erosion by the White and other Rivers. The rivers quickly re-incised their valleys, leading to accelerated deposition rates in the valley. In the 5,700 years following the mudflow, the Kent–Auburn–Puyallup valley have been filled to its present level. At the project site the elevation is approximately 60 feet, so there is about 150 to 200 feet of silt, sand and gravel alluvium beneath the project area.

3.2 SOILS

Based on the soil conditions encountered in the nearby subsurface explorations (see Figure 2 for approximate locations of previous test borings), the subsurface conditions at the site are anticipated to be consistent with the mapped geology, and generally consist of a sequence of loose to medium dense sand and soft to medium stiff silt and clay. In two of the test borings (B-1 and B-2) completed by Landau Associates (2011) for the White River pedestrian crossing project, an approximately 7-foot thick layer of peat was also encountered between a depth of about 19 and 26 feet below grade. Peat layers of variable thicknesses were also encountered in the test borings completed by CH2M Hill (1998) for the Lake Tapp Parkway project, at various depths. Please refer to the summary borings included in Appendices A and B of this report for additional details.

Because peat deposits are prone to secondary compression, future subsurface exploration programs should be completed to address the specific needs of planned developments.

3.3 GROUNDWATER

Shallow groundwater should be anticipated at the site. The nearby test borings indicate a groundwater level of approximately 5 to 8 feet at the time of drilling. The depth of the groundwater table is expected to be influenced by seasonal precipitation and the water level in the adjacent White River. During periods of heavy precipitation in the winter and spring months, groundwater may be present near the ground surface.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 COMPRESSIBLE SOILS AND PRE-LOAD

The alluvium and peat (where present) deposits in the project area are anticipated to settle under the weight of the new buildings and site fill. Placement of pre-load fill prior to building construction to induce the settlement of the compressible soils is an economical approach to improve the performance of the site soils, and is commonly done for warehouse developments in the area. The height of preload fill should be determined by the actual design loads and finished grade. However, in general, placement of 4 to 6 feet of preload fill is quite common.

Based on our previous experience in the valley, a 4- to 10-week pre-load period should be anticipated. The actual duration of pre-load will depend on the actual subsurface conditions in the areas of pre-load, and the height of the preload fill. We also anticipate up to about 6 inches of settlement could occur under 6 feet of preload fill.

4.2 SEISMIC CONSIDERATIONS

4.2.1 IBC Site Class

We anticipate that the seismic design for the future developments at the site will be in conformance with the 2009 or 2012 International Building Code (IBC), which specifies a design earthquake having a 2% probability of occurrence in 50 years (return interval of 2,475 years). Based on the site soil conditions, it is our opinion that Site Class E is appropriate for the site. Assuming that the proposed structures will have a natural period of less than 0.5 second, site-specific ground response analysis will not be needed.

4.2.2 Liquefaction

According to the mapping completed by Dragovich and Pringle (1995), the risk of earthquake-induced liquefaction at the site is considered high. Based on the presence of loose, slightly silty to silty sand and a shallow water table beneath the site, we concur that the liquefaction potential is high during a seismic event consistent with the 2009 or 2012 IBC.

Liquefaction of site soils is likely to result in settlement of footings. In general, based on our experience with other projects in the valley, we believe that 3 to 6 inches of total settlement could occur. The differential settlement is likely to be less than half of the

total settlement due to the relatively uniform soil conditions. Such differential settlements are unlikely to result in major damage or collapse of typical warehouse buildings, but may cause some cracking of the floor slabs and walls, and possible distress to underground utilities leading into the buildings. To improve the seismic performance of footings, the footings may be tied together with concrete grade beams to increase the stiffness of the foundation system, and to reduce the impacts of differential settlement. In addition, it may also be advisable to include flexible couplings in the utilities leading into the buildings.

Soil liquefaction could also lead to the potential of lateral movements of sloping ground surfaces, such as along the banks of the adjacent White River. A recent geotechnical study (Landau, 2011) completed for a nearby pedestrian bridge crossing the White River indicates that the risk of the lateral spreading is low. In general, as long as the future proposed developments will be located beyond the shoreline setback of the White River, the potential impacts of lateral spreading will be low and, in our opinion, does not need to be considered in the design of future developments.

4.3 FOOTING DESIGN PARAMETERS

Conventional spread footings and thickened floor slabs may be used to support the proposed warehouses. All footings should be underlain by at least 2 feet of compacted structural fill. All footings constructed over compacted structural fill may be designed for an allowable bearing pressure of 3 ksf. The typical one-third increase for the maximum allowable bearing pressure is not permitted for seismic loads due to liquefaction risks.

All footings should be founded a minimum distance of 18 inches below the finish grade. All footing excavations should be trimmed neat and footing subgrades should be carefully prepared. Any loose or softened soil should be removed from the footing excavation. Footing excavations should be observed by the Geotechnical Engineer of Record to confirm that the exposed footing subgrade is consistent with the expected conditions and adequate to support the proposed building.

Lateral forces from wind or seismic loading may be resisted by the combination of passive earth pressures acting against the embedded portions of the foundations and by friction acting on the base of the foundations. Passive resistance values may be determined using an equivalent fluid weight of 350 pounds per cubic foot (pcf). This value includes a factor of safety of at least 2 assuming that the properly compacted

structural fill will be placed adjacent to the sides of the footings. A coefficient of friction of 0.4 may be used to determine the frictional resistance at the base of the footings. This coefficient includes a factor of safety of approximate 1.5.

4.4 SLAB-ON-GRADE

In areas where moisture could be detrimental to equipment or floor coverings, interior slab-on-grade floors should be provided with an adequate moisture break. The capillary break material should consist of a minimum of 4 inches of free-draining, crushed rock or well-graded sand and gravel compacted to at least 95 percent of the maximum dry density, per ASTM D1557. The capillary break material should have a maximum particle size of ¾ inch, with no more than 80 percent passing the U.S. No. 4 sieve and less than 5 percent fines (material passing the U.S. No. 200 sieve). In addition, a minimum 10-mil polyethylene vapor barrier should be placed over the capillary break material.

Where concrete slabs are designed as beams on an elastic foundation, the compacted subgrade should be assumed to have a modulus of subgrade reaction of 100 pounds per cubic inch. We also recommend placement of joints at periodic intervals to control the cracking of the slab.

4.5 PAVEMENT

In general, for planning purposes, pavement sections should consist of at least 3 inches of asphalt overlying 4 inches of crushed surfacing base course (CSBC) overlying 12 inches of compacted structural fill. Depending on the subgrade soil conditions, the use of geotextile or geogrid may also be needed to stabilize the subgrade to allow proper placement and compaction of structural fill.

5.0 CONSTRUCTION CONSIDERATIONS

5.1 RE-USE OF ON-SITE SOILS

Native soils in the Valley generally contain a high percentage of fine-grained material and are very moisture sensitive, and these materials are not suitable for use as structural fill. For planning purposes, structural fill should consist of imported granular soils. On-site soils may be used for preload fills, landscaping mounds or berms planned in non-structural areas.

5.2 STRUCTURAL FILL AND COMPACTION

Imported structural fill, where needed, should consist of granular soils. In general, such fill materials should be less than 1¼ inches in maximum dimension, with less than 7 percent passing the U.S. Standard No. 200 sieve (WSDOT 9-03.14). The fine-grained portion of structural fill soils should consist of non-plastic material. Maximum particle size greater than 1¼ inches may be acceptable, but should be approved by the Geotechnical Engineer of Record prior to use.

5.3 PRELOAD

5.3.1 Placement of Preload Fill

Any necessary remedial grading or placement and compaction of structural fill should be performed prior to placement of the preload fill. Preload fill may consist of structural fill, on-site native soils, or materials that are readily available locally. Density testing is not required for the preload fill, however, a reasonable compaction effort should be made by track-walking or wheel rolling with equipment. The preload surface should be crowned slightly to promote surface water drainage. Preload fill slopes should be constructed no steeper than 1H:1V. If the building lines of the proposed warehouse are adjacent to private properties, a temporary retaining wall such a concrete ecology blocks may be needed along the preload fill boundaries.

Upon removal of the preload fills, the underlying structural fill should be proof rolled. Any soft or disturbed areas identified during proof rolling should be removed and replaced with properly compacted structural fill. Proof rolling and any remedial grading should be performed under the observation of the Geotechnical Engineer of Record.

5.3.2 Settlement Monitoring

Settlement of the preload fill should be monitored during and after fill placement. Settlement monitoring should be performed using settlement plates. The location, type, and frequency of reading the settlement plates should be determined by the Geotechnical Engineer of Record prior to grading. The settlement monitoring results should be evaluated by the Geotechnical Engineer of Record to determine the timing of preload fill removal.

5.5 UNDERGROUND UTILITIES

5.5.1 Pipe Support and Bedding

All utilities should be installed only after any preloading has been completed. Utility excavations will likely encounter soft sandy silt and a water table within a few feet of the ground surface. Particularly soft or weak soils may require two feet of over excavation and replacement with quarry spalls or granular soil to provide a firm working surface and medium for accomplishing dewatering in the utility trench.

Underground utilities should be placed, bedded, and backfilled in accordance with WSDOT *Standard Specification* 7-04 (storm sewers), 7-10 (water mains) and 7-17 (sanitary sewers), or other applicable specifications. In general, pipe bedding materials should be placed in loose lifts not exceeding 6 inches in thickness, and compacted to a firm condition. Bedding materials and thicknesses should be in accordance with any applicable manufacturers' recommendations.

5.5.2 Trench Backfill

Utilities constructed within building footprints or beneath paved areas should be backfilled with select granular material meeting the requirements for structural fill. Trench backfill should be placed in 8- to 12-inch, loose lifts and compacted to at least 90 percent maximum dry density, per ASTM D1557. In structural or paved areas, the upper 2 feet of the backfill should be compacted to at least 95 percent maximum dry density. In areas where some backfill settlement can be tolerated, such as landscape areas, the backfill may be placed in loose lifts not exceeding 2 feet with each lift compacted to at least 85 percent maximum dry density, with the upper 2 feet compacted to at least 90 percent maximum dry density.

Underground utilities should be designed to accommodate significant total and differential settlement and flexible connections should be used for utilities at entry points to the building.

5.6 WET SEASON GRADING

If possible, preparation of areas to receive fill and fill placement should be performed during dry weather conditions. Compaction should take place immediately after subgrade preparation, and the newly prepared areas should be protected against saturation from precipitation. If protective measures are not provided, and the subgrade soils become

saturated and spongy due to rain and/or construction traffic, the required relative compaction may not be achieved. General recommendations relative to earthwork performed in wet conditions are presented below:

- Site stripping, excavation and subgrade preparation should be followed promptly by the placement and compaction of clean structural fill, capillary break material or base course material.
- Footing subgrades must be protected from softening from rainfall.
- The size and type of construction equipment used may have to be limited to prevent soil disturbance.
- During wet weather, the allowable fines content (material by weight passing the #200 sieve) of the structural fill should be reduced to no more than 5 percent, based on the portion passing ¾-inch sieve. The fines should be non-plastic.
- The ground surface within the construction area should be graded to promote run-off of surface water and to prevent the ponding of water.
- Bales of straw and/or geotextile silt fences should be strategically located to control erosion and the movement of soil.

6.0 UNCERTAINTY AND LIMITATIONS

We have prepared this report for use by the City of Sumner and the project team. Recommendations contained in this report are based on a review of pertinent subsurface information, and our understanding of the intended use of this report. The study was performed using a mutually agreed-upon scope of work.

Variations in soil conditions are likely to exist between the locations of the explorations and the actual conditions underlying the site. The nature and extent of soil variations may not be evident until construction occurs.

The scope of our work does not include services related to construction safety precautions. Our recommendations are not intended to direct the contractors' methods, techniques, sequences or procedures, except as specifically described in our report for consideration in design. Additionally, the scope of our work specifically excludes the

assessment of environmental characteristics, particularly those involving hazardous substances. We are not mold consultants nor are our recommendations to be interpreted as being preventative of mold development. A mold specialist should be consulted for all mold-related issues.

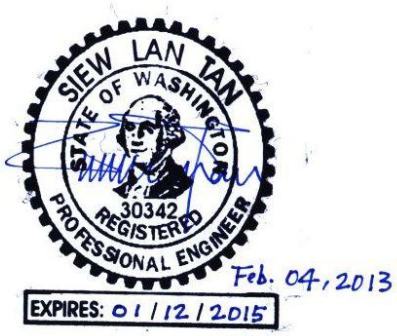
This report may be used only by the client and for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both off and on-site), or other factors including advances in our understanding of applied science, may change over time and could materially affect our findings. Therefore, this report should not be relied upon after 24 months from its issuance. PanGEO should be notified if the project is delayed by more than 24 months from the date of this report so that we may review the applicability of our conclusions considering the time lapse.

It is the client's responsibility to see that all parties to this project, including the designer, contractor, subcontractors, etc., are made aware of this report in its entirety. The use of information contained in this report for bidding purposes should be done at the contractor's option and risk. Any party other than the client who wishes to use this report shall notify PanGEO of such intended use and for permission to copy this report. Based on the intended use of the report, PanGEO may require that additional work be performed and that an updated report be reissued. Noncompliance with any of these requirements will release PanGEO from any liability resulting from the use this report.

Within the limitation of scope, schedule and budget, PanGEO engages in the practice of geotechnical engineering and endeavors to perform its services in accordance with generally accepted professional principles and practices at the time the Report or its contents were prepared. No warranty, express or implied, is made.

We appreciate the opportunity to be of service to you on this project. Please feel free to contact our office with any questions you have regarding our study, this report, or any geotechnical engineering related project issues.

Sincerely,



Siew L. Tan, P.E.
Principal Geotechnical Engineer

7.0 REFERENCES

CH2M Hill, 1998, Summary boring logs for Lake Tapp Parkway East, Phase 4

Dragovich, J.D., Pringle, P.T. and Walsh, T.J., 1994, *Extent and geometry of the Mid-Holocene Osceola mudflow in the Puget lowland – implications for Holocene sedimentation and paleogeography*: Washington Geology, vol. 22, No. 3, September, 1994, pp. 3 – 26.

Dragovich, J.D. and Pringle, P.T., 1995, *Liquefaction Susceptibility for the Sumner 7.5-minute Quadrangle, Washington*, Washington Division of Geology and Earth Resources, Geology Map GM-44.

Landau Associates, 2011, *Geotechnical Report, White River Pedestrian Bridge, Sumner, Washington*, consultant report prepared for Parametrix, Inc. and City of Sumner, dated January 26, 2011.

PanGEO INCORPORATED	Sumner Meadows Geotechnical Evaluation Sumner, Washington	VICINITY MAP	
		Project No. 11-050.100	Figure No. 1

12-182 Site Plan Fig 2.grf 2/2/13 (5:56) JC

Legend:

B-1 Approximate Boring Location (Landau Associates, 2011)

B-1 Approximate Boring Location (CH2M Hill, 1998)

North

Note: Base map obtained from Bing.com

PanGEO INCORPORATED

Sumner Meadows Geotechnical Evaluation Sumner, WA

BORING LOCATION MAP

Project No.	Figure No.
11-050.100	2

file.grf w/ file.dat 2/2/13 (6:06) TEA2

See City of Sumner Community Development Department for technical supporting materials.

1104 Maple Street, Sumner WA 98390 | 253-863-8300

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Appendix E: AIR QUALITY AND GHG ASSUMPTOINS AND METHODS

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Sumner Meadows SEIS
Regional GHG Emission Summary

GHG Emission Estimates	Average Annual GHG Emissions During 60-Year Project Lifetime (metric tons CO2-equivalent per year)				
	Alt 1 Golf Course	Alt 2 Areawide M-1	Alt 3 Areawide M-1 and HDR	Alt 4 Offsite	Alt 5 No Action
Existing Emissions	160,050				
GHG Emission Increases					
Increase Above Existing (Buildings)	148,420	147,612	150,370	118,101	118,336
Increase Above Existing (Soil Carbon)*	780	780	780	695	695
Total Increase Above Existing	149,200	148,392	151,150	118,796	119,031
Increase above 2010 No Action	30,169	29,361	32,118	-235	--
Percent GHG emissions reduced below the un-mitigated increase	12.4%	12.6%	11.6%	108.0%	--
Actual reduction due to mitigation	4277	4246	4220	3182	--

*Values are approximate

Note: All values listed above do not include "soil carbon" GHG emissions.

Development Mitigation Levels for Action Alternatives
Sumner Meadows SEIS

Description	Maximum Achievable Reduction to Energy Use or Vehicle Trips	Considerations for Assigning Mitigation Values for Proposed Action	Assigned Reduction to Energy Use or Vehicle Trips	Applicability Percentage	Overall Reduction Percentage and Category		Combined Electricity Reduction Percentage	Notes
LEED Certification - Reductions in building energy use for industrial/commercial buildings	39% (Electricity and Natural Gas)	Action alternatives would result in approximately 15% of new industrial and commercial building construction as LEED silver or better.	25%	15%	3.8%	Building Energy Use Only (Natural Gas and Electricity)	5.0%	(1)(4)
Puget Sound Energy Green Power Program - Renewable energy purchase offset program for industrial/commercial businesses	100% (Electricity)	Action alternatives would result in approximately 1% of new industrial and commercial buildings participating in PSE's Green Power Program.	50%	1%	0.50%	Electricity Use Only		(2)(4)(5)
Energy Efficient Outdoor Lighting - Commercial and industrial businesses would utilize energy efficient outdoor lighting fixtures and bulbs.	40% (Electricity - Outdoor Lighting)	Action alternatives would result in commercial and industrial facilities using energy efficient outdoor lighting. Calculations assume outdoor lighting comprises 5% of total building energy use.	16%	5%	0.80%	Electricity Use Only		(3)(4)
End of Trip Bicycle Facilities - Commercial and industrial facilities would provide showers, changing spaces, and secure bicycle lockers for employees.	0.63% (Vehicle Trips)	Action alternatives would result in approximately 10% of commercial and industrial employers providing end of trip bicycle facilities.	0.63%	5%	0.03%	Employee Commute Trips Only	--	(3)

Notes:
(1) LEED building energy reduction estimates obtained from: Institute for Research in Construction. *Do LEED-certified buildings save energy? Yes, but…* Publication No. NRCC-51142. August 2009
LEED participation estimates obtained from USGBC website. Green Building Facts webpage. Available at http://www.usgbc.org/articles/green-building-facts
(2) Puget Sound Energy (PSE) Green Power Program.
https://pse.com/savingsandenergycenter/GreenPower/Pages/default.aspx
(3) California Air Pollution Control Officers Association (CAPCOA), *Quantifying Greenhouse Gas Mitigation Measures.* August 2010
(4) The combined reduction percentage for electricity usage as a result of all mitigation measures was calculated using the method described in *Quantifying Greenhouse Gas Mitigation Measures* (CAPCOA 2010) to avoid double-counting of reduction strategies.
(5) The amount of electricity as a percent of overall energy use by commercial/industrial facilities (66%)was calculated based on PSE-specific carbon intensity data (Puget Sound Energy 2011 Greenhouse Gas Inventory, 2012) and national average data on distribution of natural gas (Buildings Energy Data Book, Table 3.1.7, 2005).

Existing GHG Emissions Inside City and UGA

Business Natural Gas Use Reduction	0%	Bussiness Electricity Reduction	0%	Business Employee Commute Trip Reduction	0%

Section I: Buildings

Type (Residential) or Principal Activity (Commercial)	# Units	Square Feet (in thousands of square feet)	Emissions Per Unit or Per Thousand Square Feet (MTCO2e) Embodied	Energy	2007 Transportation	Un-Mitig BAU Lifespan Emissions (MTCO2e)	Mitigated Lifespan Emissions (MTCO2e)	Un-Mitig BAU Annualized (MTCO2e)	Mitigated Annualized (MTCO2e)
Single-Family Home	2787		98	672	792	4,352,846	4,352,846	75,186	75,186
Multi-Family Unit in Large Building	714		33	357	766	825,166	825,166	10,245	10,245
Multi-Family Unit in Small Building	683		54	681	766	1,024,621	1,024,621	12,721	12,721
Mobile Home	305		41	475	709	373,864	373,864	6,458	6,458
Education		198	39	646	361	207,005	207,005	3,310	3,310
Food Sales		0	39	1,541	282	0	0	0	0
Food Service		0	39	1,994	561	0	0	0	0
Health Care Inpatient		0	39	1,938	582	0	0	0	0
Health Care Outpatient		0	39	737	571	0	0	0	0
Lodging		0	39	777	117	0	0	0	0
Retail (Other Than Mall)		613	39	577	247	528,869	528,869	8,456	8,456
Office		34	39	723	588	45,878	45,878	733	733
Public Assembly		0	39	733	150	0	0	0	0
Public Order and Safety		0	39	899	374	0	0	0	0
Religious Worship		0	39	339	129	0	0	0	0
Service		502	39	599	266	453,842	453,842	7,256	7,256
Warehouse and Storage		1909	39	352	181	1,091,465	1,091,465	17,450	17,450
Other		718.00	39	1,278	257	1,130,258	1,130,258	18,071	18,071
Vacant		0	39	162	47	0	0	0	0
		3,974.0							

Section II: Pavement

Pavement		198.70				9,935	9,935	166	166
	Total Project Emissions:					10,043,748	10,043,748	160,050	160,050

Alt 1 Sumner Meadows Docket Application GHG Increases Inside City and UGA

					Business Natural Gas Use Reduction	4%	Bussiness Electricity Reduction	5%	Business Employee Commute Trip Reduction	0.03%
Section I: Buildings (Includes CAFÉ Adjustment)			Emissions Per Unit or Per Thousand Square Feet (MTCO2e)							
Type (Residential) or Principal Activity (Commercial)	# Units	Square Feet (in thousands of square feet)	Embodied	Energy	Future CAFÉ Transportation	**Un-Mitig BAU Lifespan Emissions (MTCO2e)**	Mitigated Lifespan Emissions (MTCO2e)	**Un-Mitig BAU Annualized (MTCO2e)**	Mitigated Annualized (MTCO2e)	
Single-Family Home	1664		98	672	287	**1,758,771**	**1,758,771**	**30,379**	**30,379**	
Multi-Family Unit in Large Building	544		33	357	277	**363,151**	**363,151**	**4,509**	**4,509**	
Multi-Family Unit in Small Building	106		54	681	277	**107,276**	**107,276**	**1,332**	**1,332**	
Mobile Home	0		41	475	257	**0**	**0**	**0**	**0**	
Education		0	39	646	131	**0**	**0**	**0**	**0**	
Food Sales		0	39	1,541	102	**0**	**0**	**0**	**0**	
Food Service		0	39	1,994	203	**0**	**0**	**0**	**0**	
Health Care Inpatient		0	39	1,938	211	**0**	**0**	**0**	**0**	
Health Care Outpatient		0	39	737	207	**0**	**0**	**0**	**0**	
Lodging		0	39	777	42	**0**	**0**	**0**	**0**	
Retail (Other Than Mall)		833	39	577	89	**587,598**	**565,576**	**9,395**	**9,042**	
Office		0	39	723	213	**0**	**0**	**0**	**0**	
Public Assembly		0	39	733	55	**0**	**0**	**0**	**0**	
Public Order and Safety		0	39	899	136	**0**	**0**	**0**	**0**	
Religious Worship		0	39	339	47	**0**	**0**	**0**	**0**	
Service		833	39	599	96	**611,841**	**588,973**	**9,782**	**9,417**	
Warehouse and Storage		8364	39	352	66	**3,814,354**	**3,679,653**	**60,984**	**58,830**	
Other		1593.00	39	1,278	93	**2,246,549**	**2,153,334**	**35,918**	**34,428**	
Vacant		0	39	162	17	**0**	**0**	**0**	**0**	
		11,623.0								
Section II: Pavement										
Pavement		581.15				**29,058**	**29,058**	**484**	**484**	
	Total Project Emissions:					**9,518,598**	**9,245,791**	**152,782**	**148,420**	

Alt 2 Areawide M-1 GHG Increases Inside City and UGA

Business Natural Gas Use Reduction	4%	Bussiness Electricity Reduction	5%	Business Employee Commute Trip Reduction	0.03%

Section I: Buildings (Includes CAFÉ Adjustment)

Type (Residential) or Principal Activity (Commercial)	# Units	Square Feet (in thousands of square feet)	Emissions Per Unit or Per Thousand Square Feet (MTCO2e) Embodied	Energy	Future CAFÉ Transportation	Un-Mitig BAU Lifespan Emissions (MTCO2e)	Mitigated Lifespan Emissions (MTCO2e)	Un-Mitig BAU Annualized (MTCO2e)	Mitigated Annualized (MTCO2e)
Single-Family Home	1664		98	672	287	1,758,771	1,758,771	30,379	30,379
Multi-Family Unit in Large Building	544		33	357	277	363,151	363,151	4,509	4,509
Multi-Family Unit in Small Building	106		54	681	277	107,276	107,276	1,332	1,332
Mobile Home	0		41	475	257	0	0	0	0
Education		0	39	646	131	0	0	0	0
Food Sales		0	39	1,541	102	0	0	0	0
Food Service		0	39	1,994	203	0	0	0	0
Health Care Inpatient		0	39	1,938	211	0	0	0	0
Health Care Outpatient		0	39	737	207	0	0	0	0
Lodging		0	39	777	42	0	0	0	0
Retail (Other Than Mall)		714	39	577	89	503,655	484,779	8,052	7,751
Office		0	39	723	213	0	0	0	0
Public Assembly		0	39	733	55	0	0	0	0
Public Order and Safety		0	39	899	136	0	0	0	0
Religious Worship		0	39	339	47	0	0	0	0
Service		714	39	599	96	524,436	504,834	8,385	8,071
Warehouse and Storage		8529	39	352	66	3,889,601	3,752,243	62,187	59,991
Other		1624	39	1,278	93	2,290,267	2,195,238	36,617	35,098
Vacant		0	39	162	17	0	0	0	0
		11,581.0							

Section II: Pavement

Pavement		579.05				28,953	28,953	483	483

Total Project Emissions: 9,466,110 | 9,195,245 | 151,943 | 147,612

Alt 3 Areawide M-1 and HDR GHG Increases Inside City and UGA

Business Natural Gas Use Reduction	4%	Bussiness Electricity Reduction	5%	Business Employee Commute Trip Reduction	0.03%

Section I: Buildings (Includes CAFÉ Adjustment)

Type (Residential) or Principal Activity (Commercial)	# Units	Square Feet (in thousands of square feet)	Emissions Per Unit or Per Thousand Square Feet (MTCO2e) Embodied	Energy	Future CAFÉ Transportation	Un-Mitig BAU Lifespan Emissions (MTCO2e)	Mitigated Lifespan Emissions (MTCO2e)	Un-Mitig BAU Annualized (MTCO2e)	Mitigated Annualized (MTCO2e)
Single-Family Home	1664		98	672	287	1,758,771	1,758,771	30,379	30,379
Multi-Family Unit in Large Building	955		33	357	277	637,517	637,517	7,915	7,915
Multi-Family Unit in Small Building	106		54	681	277	107,276	107,276	1,332	1,332
Mobile Home	0		41	475	257	0	0	0	0
Education		0	39	646	131	0	0	0	0
Food Sales		0	39	1,541	102	0	0	0	0
Food Service		0	39	1,994	203	0	0	0	0
Health Care Inpatient		0	39	1,938	211	0	0	0	0
Health Care Outpatient		0	39	737	207	0	0	0	0
Lodging		0	39	777	42	0	0	0	0
Retail (Other Than Mall)		714	39	577	89	503,655	484,779	8,052	7,751
Office		0	39	723	213	0	0	0	0
Public Assembly		0	39	733	55	0	0	0	0
Public Order and Safety		0	39	899	136	0	0	0	0
Religious Worship		0	39	339	47	0	0	0	0
Service		714	39	599	96	524,436	504,834	8,385	8,071
Warehouse and Storage		8471	39	352	66	3,863,151	3,726,727	61,764	59,583
Other		1613	39	1,278	93	2,274,754	2,180,369	36,369	34,860
Vacant		0	39	162	17	0	0	0	0
		11,512.0							

Section II: Pavement

Pavement		575.60				28,780	28,780	480	480

Total Project Emissions: 9,698,340 | 9,429,053 | 154,675 | 150,370

Alt 4 Offsite Increases Inside City and UGA

Business Natural Gas Use Reduction	4%	Bussiness Electricity Reduction	5%	Business Employee Commute Trip Reduction	0.03%

Section I: Buildings (Includes CAFÉ Adjustment)

Type (Residential) or Principal Activity (Commercial)	# Units	Square Feet (in thousands of square feet)	Emissions Per Unit or Per Thousand Square Feet (MTCO2e) Embodied	Energy	Future CAFÉ Transportation	Un-Mitig BAU Lifespan Emissions (MTCO2e)	Mitigated Lifespan Emissions (MTCO2e)	Un-Mitig BAU Annualized (MTCO2e)	Mitigated Annualized (MTCO2e)
Single-Family Home	1664		98	672	287	1,758,771	1,758,771	30,379	30,379
Multi-Family Unit in Large Building	544		33	357	277	363,151	363,151	4,509	4,509
Multi-Family Unit in Small Building	106		54	681	277	107,276	107,276	1,332	1,332
Mobile Home	0		41	475	257	0	0	0	0
Education		0	39	646	131	0	0	0	0
Food Sales		0	39	1,541	102	0	0	0	0
Food Service		0	39	1,994	203	0	0	0	0
Health Care Inpatient		0	39	1,938	211	0	0	0	0
Health Care Outpatient		0	39	737	207	0	0	0	0
Lodging		0	39	777	42	0	0	0	0
Retail (Other Than Mall)		833	39	577	89	587,598	565,576	9,395	9,042
Office		0	39	723	213	0	0	0	0
Public Assembly		0	39	733	55	0	0	0	0
Public Order and Safety		0	39	899	136	0	0	0	0
Religious Worship		0	39	339	47	0	0	0	0
Service		833	39	599	96	611,841	588,973	9,782	9,417
Warehouse and Storage		5658	39	352	66	2,580,298	2,489,177	41,254	39,797
Other		1077	39	1,278	93	1,518,853	1,455,832	24,283	23,276
Vacant		0	39	162	17	0	0	0	0
		8,401.0							

Section II: Pavement

Pavement		420.05				21,003	21,003	350	350

Total Project Emissions: 7,548,792 | 7,349,759 | 121,283 | 118,101

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2010 No Action Increases Inside City and UGA

Business Natural Gas Use Reduction	0%	Bussiness Electricity Reduction	0%	Business Employee Commute Trip Reduction	0%

Section I: Buildings (Includes CAFÉ Adjustment)

Type (Residential) or Principal Activity (Commercial)	# Units	Square Feet (in thousands of square feet)	Emissions Per Unit or Per Thousand Square Feet (MTCO2e) Embodied	Energy	Future CAFÉ Transportation	Un-Mitig BAU Lifespan Emissions (MTCO2e)	Mitigated Lifespan Emissions (MTCO2e)	Un-Mitig BAU Annualized (MTCO2e)	Mitigated Annualized (MTCO2e)
Single-Family Home	1664		98	672	287	1,758,771	1,758,771	30,379	30,379
Multi-Family Unit in Large Building	544		33	357	277	363,151	363,151	4,509	4,509
Multi-Family Unit in Small Building	106		54	681	277	107,276	107,276	1,332	1,332
Mobile Home	0		41	475	257	0	0	0	0
Education		0	39	646	131	0	0	0	0
Food Sales		0	39	1,541	102	0	0	0	0
Food Service		0	39	1,994	203	0	0	0	0
Health Care Inpatient		0	39	1,938	211	0	0	0	0
Health Care Outpatient		0	39	737	207	0	0	0	0
Lodging		0	39	777	42	0	0	0	0
Retail (Other Than Mall)		833	39	577	89	587,598	587,598	9,395	9,395
Office		0	39	723	213	0	0	0	0
Public Assembly		0	39	733	55	0	0	0	0
Public Order and Safety		0	39	899	136	0	0	0	0
Religious Worship		0	39	339	47	0	0	0	0
Service		833	39	599	96	611,841	611,841	9,782	9,782
Warehouse and Storage		5404	39	352	66	2,464,463	2,464,463	39,402	39,402
Other		1029	39	1,278	93	1,451,161	1,451,161	23,201	23,201
Vacant		0	39	162	17	0	0	0	0
		8,099.0							

Section II: Pavement

Pavement		404.95				20,248	20,248	337	337

Total Project Emissions: 7,364,509 | 7,364,509 | 118,336 | 118,336

Appendix F: HYDRAULIC INVESTIGATIONS OF THE LOWER WHITE RIVER

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MEMORANDUM

To: Mike Dahlem, City Engineer, Sumner

From: Dan Eggers, P.E. and Raymond Walton Ph.D., P.E., P.E., WEST Consultants, Inc.

Date: May 5, 2014

Subject: Hydraulic Investigations of the Lower White River

CONSULTANTS, INC.
12509 Bel-Red Road, Suite 100
Bellevue, WA 98005-2535
Phone: (425) 646-8806
Fax: (425) 646-0570
www.westconsultants.com

Introduction

The City of Sumner (City) had previously contracted WEST Consultants, Inc. (WEST) to develop a hydraulic model of the Lower White River. The City was interested in developing a model that reflects the current conditions in the Lower White River channel and its associated floodplain. This "existing conditions" model could then be used as a tool to analyze the anticipated impacts that would be associated with potential future activities within the White River or its associated floodplain.

This memorandum presents a hydraulics assessment performed by WEST for the Lower White River. The City has contracted WEST to provide hydraulic analyses in support of the Draft Supplemental Environmental Impact Statement (SEIS) for the "City of Sumner 2013 Comprehensive Plan Annual Amendments Sumner Meadows Docket." This memorandum discusses the expected impacts associated with potential projects and development adjacent to the Lower White River in the City of Sumner.

The City is interested in understanding the floodplain impacts associated with potential future development within the White River floodplain. These potential activities include the construction of the King County, Countyline Levee Setback project. This project is being assumed to be constructed in the future and constitutes Alternative 5 or the "No Action" Alternative within the SEIS. Additionally, the City is interested in understanding the floodplain impacts that would be caused by development (filling) of the Sumner Meadows Golf Course property from Stewart Road, south to 24th Street, along with the construction of the 24th Street Bridge and roadway corridor. This scenario represents Alternatives 1 through 3 in the SEIS. Lastly, the City is interested in understanding the impacts associated with building the 24th Street Bridge and roadway corridor along with the development (filling) of the agricultural land south of 24th Street. This represents Alternative 4 or the Offsite Alternative in the SEIS.

This memorandum discusses the development of the hydraulic model that was used to analyze the hydraulics of the White River in the area discussed within the SEIS. Alternatives 1 through 3 were found to have potential increases in 100-year water surface elevations compared to Alternative 5 (No Action) that are generally less than 1 foot downstream of 24th Street, 1 to 2 feet between 24th Street and the trail bridge, and less than 0.5 feet between the trail bridge and Stewart Road. The maximum increase is 1.84 feet and occurs at RS 19083

which is between 24th Street and the Lake Tapps tailrace. Alternative 4 was found to have potential increases in 100-year water surface elevations compared to Alternative 5 (No Action) that are generally less than 1 foot in the study area except along the reach of the White River adjacent to the Sumner Meadows Golf Course upstream of 24th Street where increases ranged from 1 to 2 feet.

Existing Conditions

In the lower White River, there are a number of existing hydraulic models:

- A 2005 HEC-RAS hydraulic model developed by Northwest Hydraulic Consultants (nhc) for Pierce County developed for a flood insurance study. The study and documentation were completed, but the study was never made effective by FEMA. We believe that the model used channel cross sections from about 2002.
- A 2012 HEC-RAS hydraulic model developed by STARR for FEMA. The model development is incomplete and was halted while FEMA develop their revised levee policy. The model uses channel cross sections from a 2012 survey, and from 2009 in the lower mile and a half of the river.
- A Corps of Engineers HEC-RAS hydraulic model of the Puyallup, White and Carbon Rivers developed for their General Investigation (GI) study. This model uses cross sections from 2009, but was developed as an unsteady-flow model and uses “storage areas” to model flows along the east overbank from upstream of Stewart Road to the golf course.
- A 2009 HEC-RAS hydraulic model developed by Northwest Hydraulic Consultants (nhc) for King County developed for a flood insurance study. The study and documentation were completed but the study has not yet been made effective by FEMA. We believe that the model used channel cross sections from 2009. The model was calibrated to high water makes from the January 2009 flood.
- A 2012 HEC-RAS hydraulic model developed by Northwest Hydraulic Consultants (nhc) for King County. We understand that the model is incomplete, but replaced the channel sections in the 2009 model with surveyed sections from 2012.
- A 2012 RiverFlow-2D model developed by Herrera Environmental Consultants to evaluate a proposed setback levee in lower King County, to reduce flood levels in the City of Pacific. This model was calibrated to high water marks from the January 2009 flood event.

The 2012 “STARR” model was used as the base model for development of an updated existing conditions hydraulic model. This model extends from the King/Pierce County line to the White River confluence with the Puyallup River; a reach of approximately 5.5 miles. To make the model suitable for analyzing potential activities in the lower White River, the model was supplemented with additional channel cross sections surveyed to provide more detail in areas with sparse coverage. Further, the model was extended upstream into King County to the BNRR bridge at approximate River Mile 6.4 using cross section data from

the 2012 King County HEC-RAS model. Figure 1 shows the cross section layout of the HEC-RAS model of the Lower White River. The various reaches in the 1D model are color coded for ease of reference. Finally, areas that are permitted to be filled were added to the topography.

The calibrated Mannings *n* roughness values from the Pierce County 2005 and King County 2009 HEC-RAS models were applied to the model. There are no known recorded high water marks after 2012 (the year that most of the channel survey data were collected). This makes calibration of the existing conditions model difficult. It was assumed that although channel bed elevations may have changed (especially upstream of Stewart Road), channel roughness has not changed considerably since the 2009 King County HEC-RAS model was calibrated and that the 2009 King County calibrated roughness values are still appropriate for current conditions. This assumption was made because some of the factors that influence channel roughness, such as, bed material size, bank vegetation, sinuosity, and debris potential has changed little from 2009 based on available data. The results of the model for the 1%-annual-chance-flood event (100-year flood) are shown in Table 1, and are color coded to match the cross sections shown in Figure 1.

To validate the existing conditions model, simulated 100-year water surface elevations were compared to the 100-year water surface from the King County RiverFlow-2D model. Figure 2 shows a comparison of HEC-RAS simulated water surface elevations along the White River with RiverFlow-2D results at the same locations for the existing condition. Negative numbers indicate HEC-RAS elevations that are lower than RiverFlow-2D elevations.

The HEC-RAS model results were also compared to the King County 2009 HEC-RAS model results. The King County 2009 model extends from just downstream of the Stewart Road Bridge (River Mile 5.0) to River Mile 10.6. In the City of Sumner reach upstream of Stewart Road, the thalweg elevations are approximately 1 – 2 feet higher than those in the 2009 King County model. Computed water surface elevations are generally 1.5 to 2 feet higher than the 2009 King County elevations.

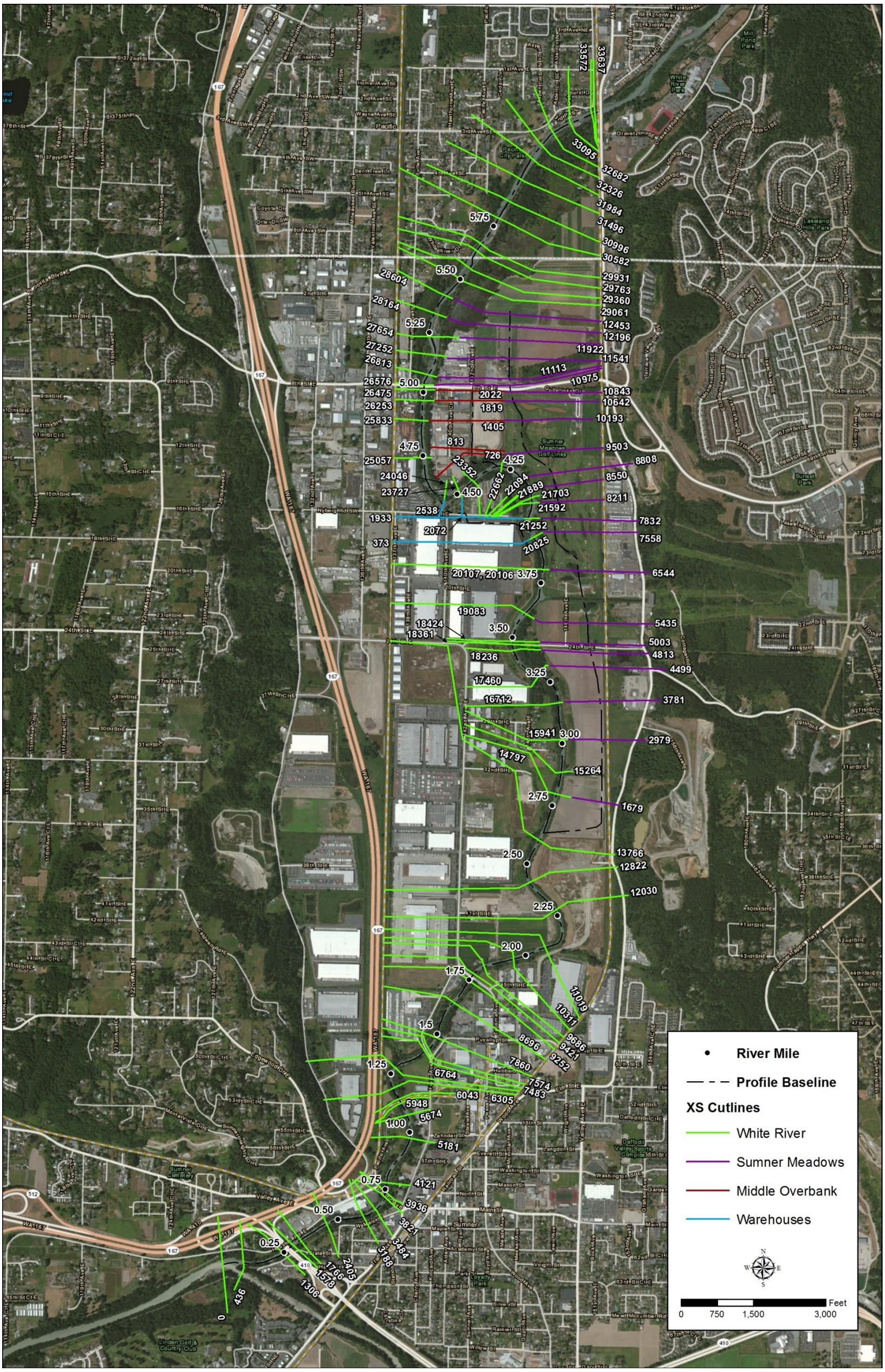

Figure 1. Lower White River Cross Section Layout

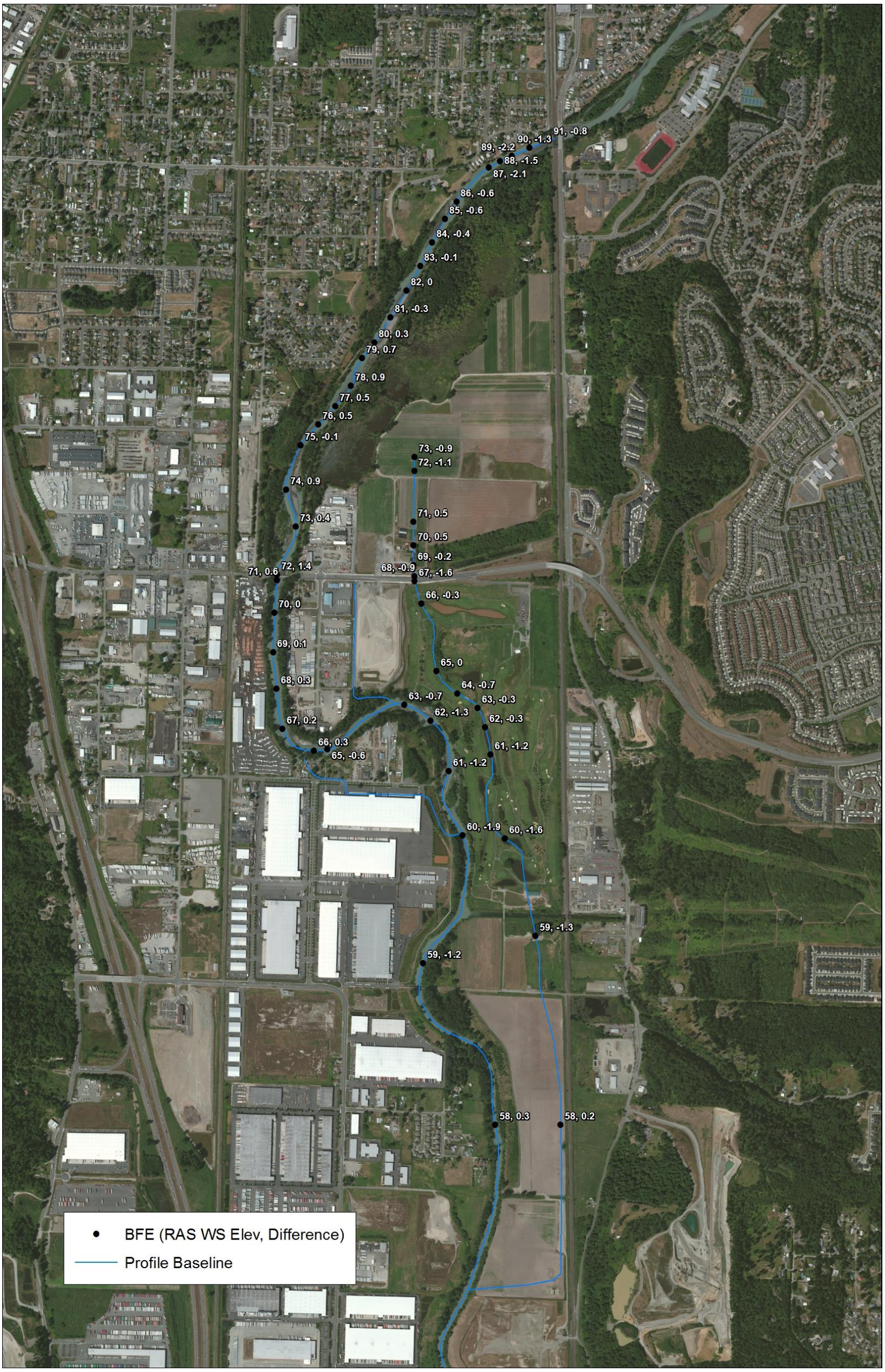

Figure 2. Comparison of HEC-RAS model results to RiverFlow2D results for the existing condition.

No Action Alternative (Alternative 5)

In the “No Action” alternative:

- The proposed King County levee setback project upstream of Stewart Road will have been built. The implications of this are that flood water will no longer overtop the banks upstream of Stewart Road and flow in a southerly direction across Stewart Road and be directed toward the Sumner Municipal Golf Course. Instead, all flow will be directed through the Stewart Road Bridge opening.
- A new crossing of White River along the alignment of 24th Street will be constructed. The implication of this would be to potentially cut off any overbank conveyance areas across the 24th Street alignment.

The results of the model for the 1%-annual-chance-flood event (100-year flood) are shown in Table 1, and are color coded to match the cross sections shown in Figure 1. To validate the “No Action” conditions model, simulated 100-year water surface elevations were compared to the 100-year water surface from the King County RiverFlow-2D model. Figure 3 shows a comparison of HEC-RAS simulated water surface elevations along the White River with RiverFlow-2D results at the same locations for the with King County levee setback project condition.

Alternatives 1, 2 and 3

SEIS Alternatives 1 through 3 include the construction of the 24th Street Bridge, roadway corridor construction, and fill within the Sumner Meadows Property. While there are planning differences, hydraulically they act in the same manner, and are therefore analyzed here collectively.

Alternatives 1-3 include:

- The proposed King County levee setback project upstream of Stewart Road will have been built. The implications of this are that flood water will no longer overtop the banks upstream of Stewart Road and flow in a southerly direction across Stewart Road and be directed toward the Sumner Municipal Golf Course. Instead, all flow will be directed through the Stewart Road Bridge opening.
- A new crossing of White River along the alignment of 24th Street will be constructed. The implication of this would be to potentially cut off any overbank conveyance areas across the 24th Street alignment.
- There will be significant fill placed in the floodway fringe on the left (east) overbank downstream of Stewart Road.

These potential future changes were incorporated in to the hydraulic model by modifying the cross sections to reflect modifications to the overbank ground elevations, by adding bridge structure geometry at the 24th Street crossing, and

by changing flow paths as appropriate to simulate overbank areas that would be cut off due to fill or other activities.

Under the Countyline Levee scenario, flow is prevented from entering the Sumner Meadows property from upstream of Stewart Road. Flow does begin to spill from the mainstem of the White River onto the Sumner Meadows property (left overbank) downstream of RS 9503 (Figure 1) and flows are conveyed through the Sumner Meadows property downstream. With the Sumner Meadows property filled, flow would not spill from the mainstem of the White River into the left overbank until downstream of the 24th Street corridor at approximately RS 4813 (Figure 1). This leaves more flow in the mainstem of the White River through this reach causing higher water surface elevations within the mainstem. The results of the model for the 1%-annual-chance-flood event (100-year flood) are shown in Table 1, and are color coded to match the cross sections shown in Figure 1.

Water surface elevations for the 100-year flow are higher in the mainstem from upstream where the flows would begin to spill from the mainstem under the Countyline Levee scenario (approximately RS 23727) to downstream of the 24th Street corridor (RS 17460). Increases in water surface elevations in the mainstem for the 100-year flood compared to the Countyline Levee scenario are generally less than 1 foot downstream of 24th Street, 1 to 2 feet between 24th Street and the trail bridge, and less than 0.5 feet between the trail bridge and Stewart Road. The maximum increase is 1.84 feet and occurs at RS 19083 which is between 24th Street and the Lake Tapps tailrace. This also means that the areas to the west of the main channel within this reach, which includes several warehouses, also would have higher 100-year water surface elevations of a similar magnitude.

Table 1 shows the expected increases in 100-year water surface elevations for the Sumner Meadows property fill and 24th Street Bridge compared to the Countyline Levee (No Action") Alternative.

The results show the differences in water surface elevations along the White River for the 100-year flow for the existing and Alternative 1-3 conditions. In general, the cumulative effects of the combination of potential future activities are increases in water surface elevations between 0.5 and 1.5 feet. The largest increases are simulated near constrictions (the future 24th Street crossing for example). When not created by the addition of a specific constriction such as the 24th Street crossing, the increases generally are caused by a reduction in the conveyance area of main channel cross sections due to the placement of fill in the cross section overbanks and cutting off of overflow pathways forcing higher peak flows back into the main channel.

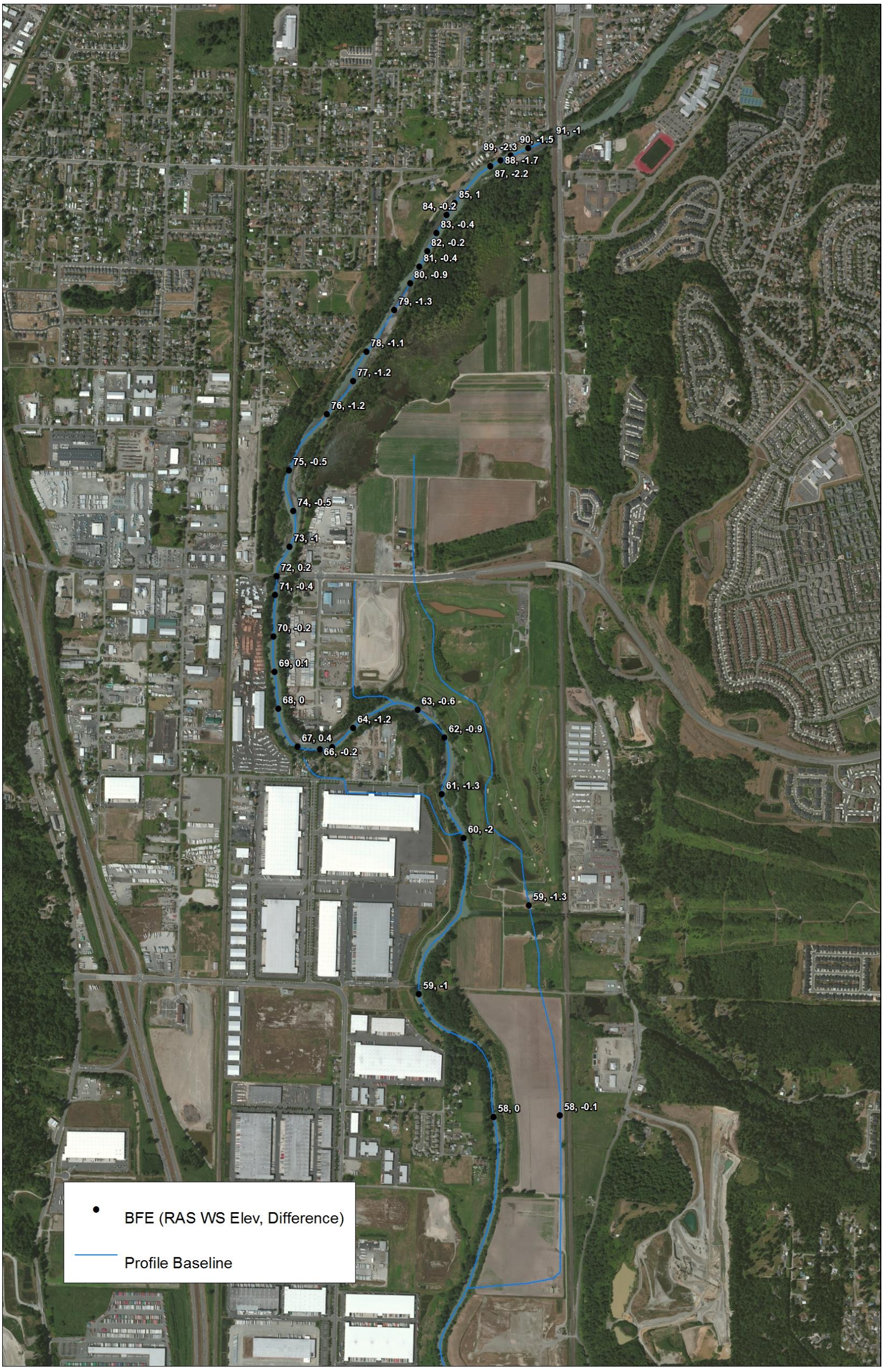

Figure 3. Comparison of HEC-RAS model results to RiverFlow2D results for the King County levee setback condition.

Alternative 4

This alternative assumes that the 24th Street Bridge will be constructed and the agricultural property to the south of 24th Street on the left (east) overbank has been filled to an elevation above the 100-year floodplain for future development. The Countyline Levee Project is also assumed to be in place. No additional fill is placed to the north of 24th Street. This analysis also assumes that no mitigation for increases in water surface elevations has been performed.

Under the Countyline Levee scenario, flow is prevented from entering the Sumner Meadows property from upstream of Stewart Road. Flow does begin to spill from the mainstem of the White River onto the Sumner Meadows property (left overbank) downstream of RS 9503 (Figure 1) and flows are conveyed through the Sumner Meadows property downstream. With the construction of the Countyline Levee Project, the 24th Street Bridge and roadway, and fill to the south of 24th Street, flow would spill from the mainstem of the White River at approximately the same location as the Countyline Levee scenario which is downstream of RS 9503 (Figure 1). However, under the scenario where the 24th Street Bridge and roadway are built, flow would no longer be conveyed in the left (east) overbank beyond 24th Street. Any flow that spilled into the left overbank from upstream would be forced back into the main channel. Additionally, the flow would not be allowed to reenter the left overbank downstream of 24th Street due to the fill that would be placed in the agricultural land to the south of the 24th Street corridor. This leaves more flow in the mainstem of the White River through this reach causing higher water surface elevations within the mainstem. Additionally, 24th Street Bridge Corridor creates a backwater that propagates upstream.

The results of the model for the 1%-annual-chance-flood event (100-year flood) are shown in Table 1, and are color coded to match the cross sections shown in Figure 1. They show the differences in water surface elevations along the White River for the 100-year flow for the existing and Alternative 1-3 conditions. Water surface elevations for the 100-year flow would be higher in the mainstem from approximately RS 24046 to RS 15941 (Figure 1) downstream of the 24th Street Corridor. Increases in water surface elevations in the mainstem for the 100-year flood compared to the Countyline Levee scenario are generally 0.5 feet or less, except for the 4,000 feet upstream of the 24th Street Corridor where they are generally over 1 foot and are 2 feet immediately upstream of the 24th Street Corridor. This also means that the areas to the west of the main channel within this reach, which includes several warehouses, also would have higher 100-year water surface elevations of a similar magnitude. Similarly, the 100-year water surface elevations within the Sumner Meadows property are higher. Table 1 shows the expected increases in 100-year water surface elevations for the 24th Street Bridge and roadway corridor along with the fill to the south of 24th Street compared to the Countyline Levee scenario.

Table 1. Comparison of water surface elevations during 100-year flood

Reach	Cross Section	Existing conditions (ft NAVD)	No Action alternative 5 (ft NAVD	Alternatives 1-3 (ft NAVD	Alternative 4 (ft NAVD
Upper Main	30996	82.39	79.78	80.15	79.78
Upper Main	30582	81.41	78.99	79.07	78.99
Upper Main	29931	79.72	78.13	78.13	78.13
Upper Main	29763	78.91	77.71	77.71	77.71
Upper Main	29360	77.95	76.79	76.79	76.79
Upper Main	29061	77.05	76.23	76.23	76.23
Upper Main	28604	75.67	75.65	75.65	75.65
Upper Main	28164	74.43	75.18	75.18	75.18
Upper Main	27654	73.87	74.50	74.50	74.50
Upper Main	27252	73.00	73.47	73.47	73.47
Upper Main	26813	72.43	72.78	72.78	72.78
Upper Main	26576	72.22	72.50	72.50	72.49
Upper Main	26475	70.76	71.38	71.38	71.38
Upper Main	26253	70.30	70.92	70.92	70.92
Upper Main	25833	69.61	70.20	70.20	70.20
Upper Main	25057	67.96	68.50	68.49	68.50
Upper Main	24046	66.26	66.73	66.71	66.74
Upper Main	23727	64.17	64.63	64.74	64.63
Upper Main	23352	63.58	63.99	64.13	64.01
Upper Mid Main	22662	63.11	63.46	63.75	63.5
Upper Mid Main	22094	61.65	62.54	62.99	62.62
Upper Mid Main	21869	60.92	62.23	62.4	62.29
Upper Mid Main	21703	61.09	62.29	62.46	62.35
Upper Mid Main	21592	61.06	62.25	62.42	62.31
Upper Mid Main	21252	60.89	62.17	62.31	62.23
Upper Mid Main	20825	60.31	61.94	61.93	61.97
Middle Main	20107	59.81	61.74	61.60	61.76
Middle Main	20106	59.81	61.74	61.60	61.76
Middle Main	19083	59.42	61.58	61.19	61.69
Middle Main	18424	58.94	60.92	60.45	60.96
Middle Main	18361	58.94	60.28	59.58	60.33
Middle Main	18236	58.80	59.64	58.64	59.69
Middle Main	17460	58.43	58.98	58.59	58.96
Middle Main	16712	58.12	58.49	58.19	58.35
Middle Main	15941	57.91	58.15	57.96	57.91
Middle Main	15264	57.74	57.98	57.54	57.67
Middle Main	14797	57.43	57.67	57.53	57.42
Lower Main	13766	56.87	57.11	56.87	56.87
Lower Main	12822	56.39	56.65	56.39	56.39

Lower Main	12030	56.16	56.43	56.16	56.16
Lower Main	11019	55.87	56.15	55.87	55.87
Lower Main	10311	55.57	55.83	55.57	55.57
Lower Main	9686	55.19	55.45	55.19	55.19
Lower Main	9421	55.06	55.32	55.07	55.07
Lower Main	9252	54.76	55.00	54.76	54.76
Lower Main	8696	54.65	54.88	54.65	54.65
Lower Main	7860	54.39	54.62	54.39	54.39
Lower Main	7574	54.26	54.49	54.26	54.26
Lower Main	7483	54.12	54.33	54.12	54.12
Lower Main	6764	53.79	54.00	53.79	53.79
Lower Main	6305	53.70	53.91	53.70	53.70
Lower Main	6043	53.51	53.71	53.51	53.51
Lower Main	5948	52.60	52.72	52.60	52.60
Lower Main	5674	52.44	52.55	52.44	52.44
Lower Main	5181	52.31	52.42	52.31	52.31
Lower Main	4121	51.89	51.97	51.89	51.89
Lower Main	3936	51.91	51.99	51.91	51.91
Lower Main	3821	51.91	51.99	51.91	51.91
Lower Main	3484	51.53	51.59	51.53	51.53
Lower Main	3188	51.37	51.41	51.37	51.37
Lower Main	2405	51.15	51.18	51.15	51.15
Lower Main	1766	50.98	51.00	50.98	50.98
Lower Main	1578	50.78	50.79	50.78	50.78
Lower Main	1306	50.78	50.78	50.78	50.78
Lower Main	436	50.76	50.76	50.76	50.76
Lower Main	0	50.74	50.74	50.74	50.74
Mid OB	2022	66.03	67.26	67.26	67.26
Mid OB	1819	65.97	67.20	67.19	67.20
Mid OB	1405	65.24	66.39	66.39	66.39
Mid OB	813	64.54	65.64	65.64	65.64
Mid OB	726	63.37	64.54	64.54	64.55
Warehouses	2538	64.04	64.55	64.62	64.57
Warehouses	2072	62.30	62.62	62.66	62.63
Warehouses	1933	60.40	62.08	62.15	62.12
Warehouses	373	60.37	61.99	62.00	62.02

Mitigation Concepts

Because the cumulative effects of potential future activities (Alternatives 1-5) are significant, concepts were developed to mitigate the anticipated increases in water surface elevations during high flow events. A series of mitigation concepts were analyzed such that when performed in conjunction with the potential future activities, the cumulative result would be that there would be no increase in water surface elevations during the 100-year flood event compared to existing conditions. We note that this evaluation is intended to serve as a "proof of concept", and not an analysis of a specific mitigation design. The mitigation concepts are:

- Mitigation Concept A: Excavation of material on the right (west) overbank near River Mile 2.1. This lowers water surface elevations downstream of the future 24th Street crossing. This mitigates for some of the increased water surface elevations caused by a new crossing of the White River along the 24th Street alignment.
- Mitigation Concept B: Excavation of material on the left (east) overbank from approximately River Mile 2 to River Mile 3.2. This lowers water surface elevations in the reach downstream of the future 24th Street crossing. This mitigates for some of the increased water surface elevations caused by a new crossing of the White River along the 24th Street alignment and for the increased flows in the main channel due to the placement of fill in the left overbank.
- Mitigation Concept C: Excavation of an overflow channel in the left overbank from approximately River Mile 3.2 to River Mile 3.6, under the future 24th Street crossing. The overflow channel in this location would have an approximate 200-foot top width and be excavated up to 10-feet deep in some locations. The channel would convey approximately 5,000 cfs at the 100-year flood. This mitigates for some of the increased water surface elevations caused by a new crossing of the White River along the 24th Street alignment and for the increased flows in the main channel due to the placement of fill in the left overbank.
- Mitigation Concept D: Excavation of material on the left (east) overbank from approximately River Mile 3.6 to River Mile 4.3. This lowers water surface elevations in the reach upstream of the future 24th Street crossing. This mitigates for some of the increased water surface elevations caused by a new crossing of the White River along the 24th Street alignment and for the increased flows in the main channel due to the placement of fill in the left overbank.
- Mitigation Concept F: Excavation of an overflow channel in the right overbank from approximately River Mile 4.0 to River Mile 4.5 *or* removal of the trail bridge adjacent to the golf course. Floodwaters that currently travel south through the golf course and downstream would potentially be forced back into the main channel upstream of the trail bridge at some point in the future. This would increase peak discharges at the location of the trail bridge. To mitigate for this increased discharge, there are two concepts that

mitigate for the resulting increases in water surface elevations. One would be to remove the existing trail bridge. Another would be to excavate an approximately 200-foot top width overflow channel that would be 8 feet deep in places. Excavation of an overflow channel may also involve modifications to the existing trail. Note that either concept would mitigate for increases in water surface elevations and would *not* need to be done in conjunction.

- Mitigation Concept G: Excavation of material on the left (east) overbank from approximately River Mile 5.0 to River Mile 4.6. This lowers water surface elevations in the reach downstream of the Stewart Road crossing. This mitigates for the increased flows in the main channel due to the King County levee setback project.
- Mitigation Concept H: A new crossing of White River along the alignment of Stewart Road will be constructed. This would convey increased peak flows that would be created by construction of the King County levee setback project.

Figure 4 shows the locations and lateral extents of the mitigation concepts.

Mitigation for "No Action" Alternative 5

Mitigation for the "No Action" Alternative (Alternative 5) was not simulated directly. As mitigation for Alternatives 1-3 is shown in the next section to lower water surface elevations to at or below "existing conditions", and as Alternatives 1-3 contain the "No Action" changes to existing conditions, we know that mitigation of the "No Action" alternative is possible.

Mitigation for Alternatives 1-3

To mitigate for the conditions that result from Alternatives 1-3, all of the above mitigation "concepts" were included in the hydraulic model in addition to the revisions made to develop the geometry for Alternatives 1-3. Table 2 shows the resulting differences in water surface elevations along the White River for the 100-year compared to existing conditions. All mitigated elevations are at of below existing condition elevations, with a few exceptions that are close enough to zero for a "proof of concept" analysis.

Mitigation for Alternative 4

The modeling of the mitigation for Alternatives 1-3 included a conservative assumption that the areas filled under Alternative 4 would lie in the "hydraulic shadow" of the areas filled in Alternatives 1-3. Therefore, the concept used to mitigate Alternatives 1-3 would also mitigate for Alternative 4. If Alternative 4 is selected a site-specific mitigation plan can be designed and simulated to confirm the above stated assessment.

Figure 4. Potential Conceptual Mitigation Sites.

Table 2. Existing 100-year Water Surface Elevations compared to Mitigated Alternatives 1-3 Conditions on White River

Cross Section	Existing Conditions (ft NAVD)	Alternatives 1-3 (ft NAVD)	Mitigated Conditions (ft NAVD)	Difference between existing and mitigation (ft)
28604	75.67	75.67	75.27	-0.40
28164	74.43	74.43	74.68	0.25
27654	73.88	73.87	73.84	-0.04
27252	73.00	73	72.69	-0.31
26813	72.44	72.43	71.74	-0.70
26576	72.22	72.22	71.39	-0.83
26475	70.76	70.76	70.76	0.00
26253	70.30	70.3	70.13	-0.17
25833	69.61	69.61	69.37	-0.24
25057	67.96	67.96	67.67	-0.29
24046	66.26	66.26	65.47	-0.79
23727	64.16	64.17	62.38	-1.78
23352	63.58	63.58	62.01	-1.57
22662	63.10	63.11	61.37	-1.73
22094	61.64	61.65	61.04	-0.60
21869	60.92	60.92	60.81	-0.11
21703	61.08	61.09	60.74	-0.34
21592	61.06	61.06	60.69	-0.37
21252	60.88	60.89	60.52	-0.36
20825	60.31	60.31	60.09	-0.22
20107	59.80	59.81	59.42	-0.38
20106	59.80	59.81	58.98	-0.82
19083	59.42	59.42	58.59	-0.83
18424	58.94	58.94	58.62	-0.32
18361	58.93	58.94	58.58	-0.35
18236	58.80	58.8	58.55	-0.25
17460	58.43	58.43	58.14	-0.29
16712	58.12	58.12	57.76	-0.36
15941	57.91	57.91	57.46	-0.45
15264	57.74	57.74	57.24	-0.50
14797	57.43	57.43	57.08	-0.35
13766	56.87	56.87	56.62	-0.25
12822	56.39	56.39	56.14	-0.25
12030	56.16	56.16	56.06	-0.10
11019	55.87	55.87	55.88	0.01
10311	55.57	55.57	55.61	0.04
9686	55.19	55.19	55.19	0.00
9421	55.06	55.06	55.07	0.01

Note: Negative differences indicate that Mitigated Conditions are lower than Existing Conditions

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Appendix G: SUMNER MEADOWS GOLF COURSE -WETLAND INVESTIGATION AND DELINEATION

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Widener & Associates TRANSPORTATION & ENVIRONMENTAL PLANNING

10108 32nd Ave W, Suite D, Everett, WA 98204 Tel (425) 348-3059 Fax (425) 348-3124

Memorandum

To: Mike Dahlem, City of Sumner, (253)299-5702
Date: January 31, 2014
Subject: Sumner Meadows Golf Course -Wetland Investigation and Delineation

Authorizing Agency / Reason for the Investigation

On behalf of the City of Sumner, Widener & Associates undertook a wetland investigation within the Sumner Meadows Golf Course to determine if there were any jurisdictional wetlands and/or drainages, as determined by the US Army Corps of Engineers (Corps) and City of Sumner Critical Areas Ordinance. Information is also included regarding other investigations of the property and conditions prior to the construction of the golf course.

Site Location

The proposed project is located in the City of Sumner in Pierce County, Washington. The project site is located within the legal geographic description of: Township 20 North; Range 4 East, Sections 1 and 12 as well as Range 5 East; Sections 6 and 7. Please refer to Figure 1 for a vicinity map of the project area.

Site Description

The area of wetland investigation is located within the Sumner Meadows Golf Links on Stewart Road. This study area also includes a vacant field adjacent to the golf course parking lot in the northeast corner of the property and the fields between the White River Tailrace and 24th Street. The area is bordered by the White River to the west, railroad tracks to the east, Stewart Road to the north and 24th Street to the south. The study area does not include the 200-foot buffer associated with the White River north of the tailrace.

Date of Visits

Widener & Associates conducted a site visits on August 6th, 11th and 15-17th, 2010 as well as January 15-17, 2013.

Methods

A routine determination with onsite inspection was used to determine if any wetlands were present within the project footprint[1]. Prior to the field investigation, soil surveys, wetland maps, and hydrology data was reviewed. Surface site conditions (vegetation and hydrology) were recorded throughout the site. Two wetlands were found within the study area, Wetland A (1.29 acres) and Wetland B (0.22 acres) which are both emergent wetlands. Several other locations meeting the wetland parameters were identified however, none meets the jurisdictional parameters for the Corps or the City of Sumner.

[1] Army Corps of Engineers 1987 Wetland Delineation Manual
Part 4, section D, subsection 2

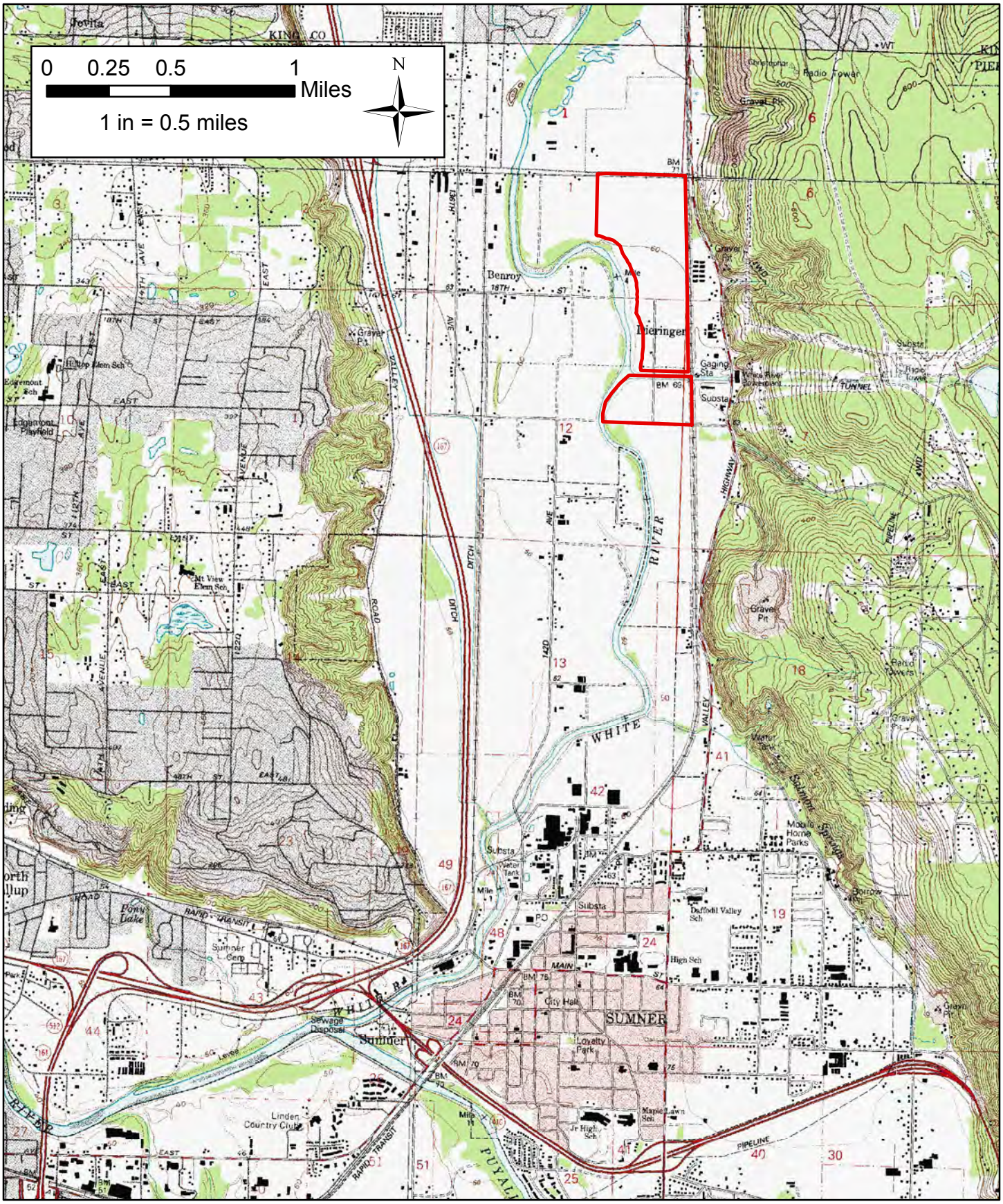

Figure 1: Vicinity Map

Sumner Meadows Golf Links

City of Sumner

July 15, 2013

Vegetative Communities

One of the three jurisdictional wetland parameters is vegetation. The study area is located within the *Tsuga heterophylla* major vegetation area (Franklin and Dyrness, 1973). The study area contains several distinct vegetative communities. The majority of the study area was planted lawn for the golf course and some planted rhubarb. As the vegetation in these areas is disturbed, it is not considered when assessing whether or not the area is a wetland. The vacant field was dominated by various grasses and herbs including reed canarygrass (*Phalaris arundinacea*)(FACW), bull thistle (*Cirsium vulgare*)(FACU), cutleaf blackberry (*Rubus laciniatus*)(FACU+), sweetclover (*Melilotus officinalis*)(FACU), and common mullein (*Verbascum thapsus*)(UPL). Only reed canarygrass is representative of a hydrophytic plant community.

Within wetland A, vegetation consists primarily of hedge false bindweed (*Calystegia sepium*) (FAC) growing over reed canarygrass (*Phalaris arundinacea*) (FACW) and quackgrass (*Elymus repens*)(FAC-). Wetland B is swale filled with reed canarygrass.

Vegetation within the constructed wetlands contains primarily emergent vegetation such as common cattail (*Typha latifolia*), soft rush (*Juncus effusus*)(FACW), sedge (*Carex spp.*)(OBL), however, some also contain willows (*Salix spp*)(FACW) and Douglas spirea (*Spiraea douglasii*)(FACW). All of the species dominating the wetland areas are representative of a hydrophytic plant community. See attached Photo Log.

Soils

Another wetland parameter is soil. According to the Pierce County Soils Survey[2], soils in the study area consist of several types of soil. Briscot loam, Shalcar Muck, Snohomish silty clay loam, Semiahmoo muck are listed as hydric on the national hydric soil list, while Puyallup fine sandy loam, Pilchuck fine sand, and Sultan silt loam are partially hydric. See attached soil survey map.

Areas within the wetland areas, soils were found to have a depleted matrix, redox dark surface, or depleted matrix under a dark surface. A test pit was dug in the vacant field on the northwest corner of the golf course and no indicators of wetland soil were present. See attached Wetland Determination Data Form.

Hydrology

The third and final jurisdictional wetland parameter is hydrology. The average annual precipitation is about 35-40 inches and the mean annual air temperature is about 50° F[2]. The growing season in Sumner, WA is approximately 234 days in length, from March 22nd to November 11 (using the 5 years in 10 criteria and 28°F)[3]. Therefore, the area must be inundated or saturated to the surface for a minimum of 12 consecutive days in order to have wetland hydrology 5 percent of the growing season (29 days to have wetland hydrology 12.5 percent of the growing season).

At the time of the site visit, no water or saturation was found within 24 inches of the surface, however within wetland A and B oxidized rhizospheres were found along living roots, a primary

---

[2] Pierce County Soil Survey
http://soildatamart.nrcs.usda.gov/Manuscripts/WA653/0/wa653_text.pdf

[3] Natural Resource Conservation Service. 2002. Climate Information for Pierce County in the State of Washington.
http://www.wcc.nrcs.usda.gov/ftpref/support/climate/wetlands/wa/53053.txt

indicator of wetland hydrology. Within the wetland B, an algal crust and matted vegetation were also observed. No ordinary high water mark was visible within wetland B.

At the time of the site visit within northwest field, no water or saturation was found within 19 inches of the surface and no other indicators of wetland hydrology were present.

Surface water and saturation are found in multiple locations within the golf course. The excavation of large depressions created locations that collect precipitation and are sometimes supplemented by water pumped from the White River. A linear water feature on the northern study area boundary also collects water from the loop driveway. There was no outlet to the White River and the features are not jurisdictional under the Corps Guidelines.

Significant areas of drainage ditch had flowing water during the site visit. The ditches would be considered a 'relatively permanent water'[4] and outlets to the tailrace from the north and south. They are therefore jurisdictional under Corps guidelines. Locations of portions of the ditch which flow north from 24th Street to the tailrace along the railroad tracks are approximated as large areas of blackberries and steep slopes made the area inaccessible. See Figure 2.

Historical Conditions and Additional Investigations Conducted

Prior to construction of the golf course, a wetland investigation was undertaken of the northeast corner of the property as cited in the attached City of Sumner Community Development Department Staff Report (section III (B)2. This staff report outlines the recommendation for approval of permits for the golf course development. While no copies of the wetland investigation have been located, it is the only report identified during approval of the Shoreline Substantial Development Permit and is assumed to identify the only wetland present. The wetland report prepared by PAC-TECH Engineering[5] determined that a Category III wetland existed in the northeast corner of the property.

As mentioned in previous sections, during the investigation of this northeast corner conducted by Widener and Associates, no indicators of wetland soils or hydrology were observed during the field visit. In addition, Soundview Consultants undertook an investigation of the golf course property on behalf of KG Investment Management[6] which inventoried all landscape features present on the property. No wetland was identified in the northeast corner. Through these investigations, it has been determined that this wetland no longer exists in the location delineated in 1993.

One indication that can be used to illustrate hydrology is visible saturation on aerial imagery. This can be used in conjunction with other evidence including differential crop management, topography, and hydric soils to determine if adequate wetland hydrology exists. Historical aerial photos were examined for evidence of saturation, which appear as darker patches, or differences in crop management. Prior to golf course construction in the 1990s, the project area was used for agriculture. During construction, the water features were excavated. No indication that wetland hydrology existed prior to this excavation are present in the historical aerial photos. See Photos 1-3.

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[4] Tributaries that typically flow year-round or have continuous flow at least seasonally (typically 3 months).

[5] This report was titled "Wetland Delineation for the NE corner of the NE ¼ of the SE ¼ of Section 1, Township 20 North, Range 4 East" and was dated October 1993.

[6] Soundview Consultants. 2013. Sumner Meadows Wetland Delineation and Fish and Wildlife Habitat Assessment. December.

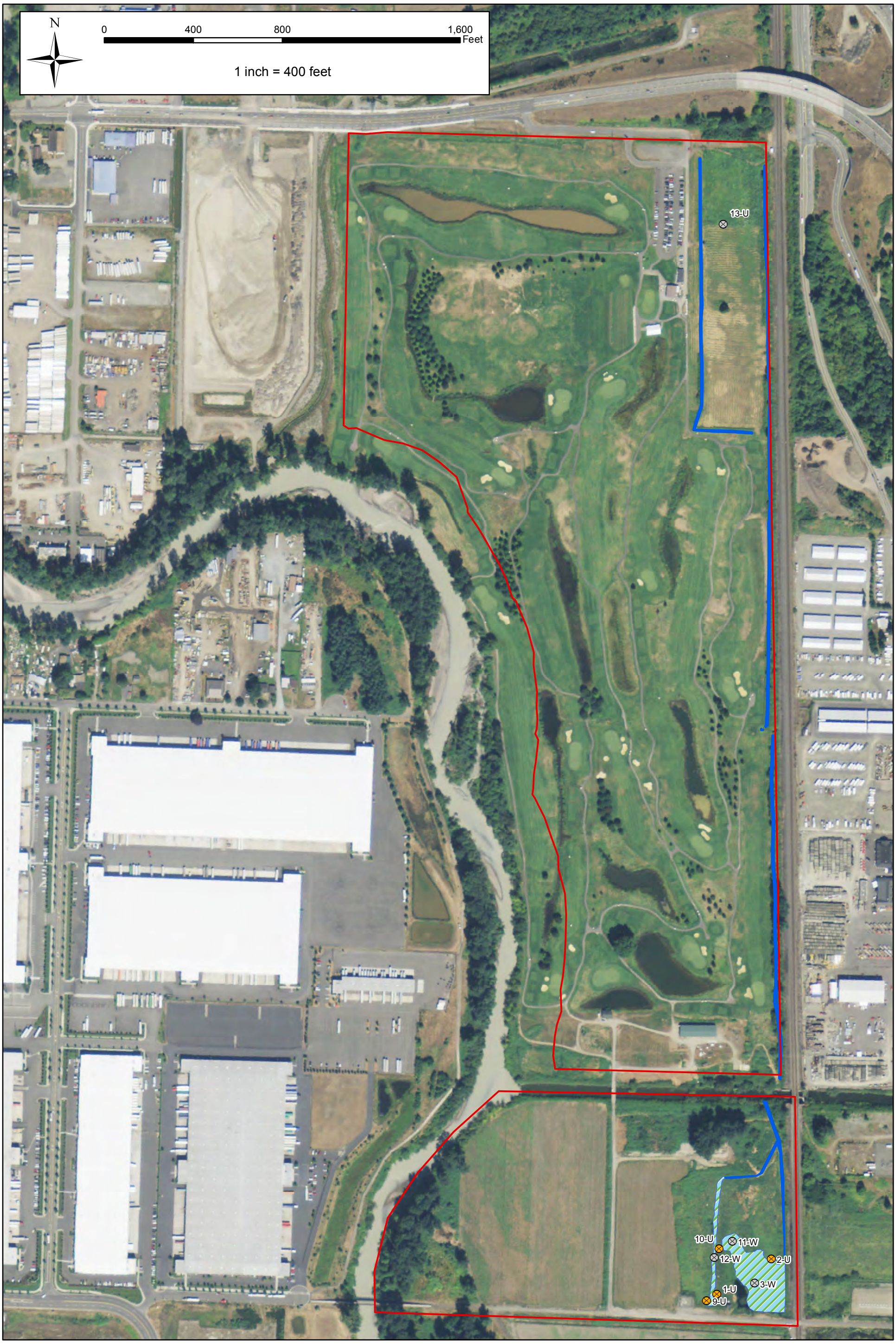

Figure 2: Project Area

Sumner Meadows Golf Links

City of Sumner

July 12, 2013

Photo 1: Aerial photo showing agricultural use of property (approx. 1940-1950)

Photo 2: Agricultural use of property continues in the 1960s. No indications of wetland hydrology visible.

Photo 3: Aerial photo (1994) taken during golf course construction, the water features had been excavated and inundation in these areas is visible.

City of Sumner
As defined by the City of Sumner Municipal Code 16.46.030, regulated wetlands include" those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

Regulated wetlands do not include "those artificial wetlands intentionally created from nonwetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities." As the ponds were constructed as landscape amenities for the golf course, they are not regulated by the City of Sumner. The drainage ditch would also not be jurisdictional by the City of Sumner under these regulations. Wetland B is a reed canarygrass lined swale, it is not regulated by the City of Sumner. Wetland A is not intentionally created and is therefore considered a regulated wetland by the City of Sumner.

Wetland Findings / Conclusion
The National Wetlands Inventory (NWI) map for the area was referenced for information on known wetlands in the project area. Multiple wetlands are shown within the study area, including the landscape ponds and wetlands within the golf course. A palustrine forested wetland is shown in the vacant field that occupies the northeast corner of the study area adjacent to the parking lot. A palustrine scrub shrub seasonally flooded (PSSC) and palustrine emergent seasonally flooded wetland (PEMC) are shown in the location of wetland A and B. See attached NWI map.

It was determined based on the above criteria, utilized by the Corps to determine jurisdictional wetlands that two jurisdictional wetlands, wetlands A and B, occur within the study area. Wetland A and B are connected to the White River via a jurisdictional drainage running parallel to the railroad tracks which outlets to the tailrace. The likely wetlands that occur within the golf course were constructed by excavating depressions to collect precipitation and supplemented by water pumped into them from the White River. These features were created for aesthetic purposes. No natural source of wetland hydrology to these wetland and open water features was identified. According to the *Draft Guidance on Identifying Waters Protected by the Clean Water Act*[7] prepared by the Corps and the Environmental Protection Agency, "Small ornamental waters created by excavating and/or diking dry land for primarily aesthetic reasons" are not regulated under the Clean Water Act. The Corps would also consider the wetlands to be non-jurisdictional as the wetlands have no surface water connection to the White River. This includes the small portion of linear water feature on the northern boundary which collects water from the driveway but does not have aesthetic value. No potential wetlands were identified within the vacant field in the northeast corner.

The drainage ditch adjacent to the railroad tracks was determined to be jurisdictional as it is a 'relatively permanent water' with a connection to the White River; approximately 6,700 linear feet occur within the study area.

[7] http://www.epa.gov/tp/pdf/wous_guidance_4-2011.pdf

Photo Log

Photo 1: Northwest facing view of wetland A

Photo 2: Southeast facing view of wetland B

See City of Sumner Community Development Department for technical supporting materials.

1104 Maple Street, Sumner WA 98390 | 253-863-8300

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Appendix H: CITY OF SUMNER – SUMNER MEADOWS CONCEPTUAL REDEVELOPMENT PLAN

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COVER SHEET

LEGAL DESCRIPTIONS

TAX LOT 042001-4-004
(PER CHICAGO TITLE COMPANY'S PLAT CERTIFICATE, THEIR ORDER NO. 4375901 DATED NOVEMBER 29, 2012 AT 8:30 AM.)

THE SOUTH 100 FEET OF THE NORTH 130 FEET OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER OF THE EAST HALF OF THE NORTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 1, TOWNSHIP 20 NORTH, RANGE 4 EAST OF THE WILLAMETTE MERIDIAN.

EXCEPT THAT PORTION THEREOF CONVEYED TO PIERCE COUNTY BY STATUTORY WARRANTY DEED RECORDED SEPTEMBER 3, 2003 UNDER RECORDING NUMBER 200309030136.

ALSO EXCEPT THAT PORTION THEREOF CONVEYED TO THE CITY OF SUMNER BY QUIT CLAIM DEED RECORDED JANUARY 27, 2010 UNDER RECORDING NUMBER 201001270207.

ALSO EXCEPT THAT PORTION THEREOF CONVEYED TO THE CITY OF SUMNER BY QUIT CLAIM DEED RECORDED NOVEMBER 2, 2011 UNDER RECORDING NUMBER 201111020295.

SITUATE IN THE CITY OF SUMNER, COUNTY OF PIERCE, STATE OF WASHINGTON.

TAX LOT 042001-4-058
(PER CHICAGO TITLE COMPANY'S PLAT CERTIFICATE, THEIR ORDER NO. 4375903 DATED NOVEMBER 29, 2012 AT 8:30 AM.)

REVISED PARCEL A OF BOUNDARY LINE ADJUSTMENT RECORDED UNDER RECORDING NUMBER 9908130864 AS CORRECTED BY AFFIDAVIT OF MINOR CORRECTION OF SURVEY RECORDED UNDER RECORDING NUMBER 200109120735, BEING A PORTION OF THE EAST 3/4TH OF THE SOUTHEAST QUARTER OF SECTION 1, TOWNSHIP 20 NORTH, RANGE 4 EAST OF THE W.M., AND A PORTION OF SECTION 6, TOWNSHIP 20 NORTH, RANGE 5 EAST OF THE W.M.

EXCEPT THAT PORTION CONVEYED TO PIERCE COUNTY IN DEED RECORDED UNDER AUDITOR'S FILE NUMBER 200309030136.

SITUATE IN THE CITY OF SUMNER, COUNTY OF PIERCE, STATE OF WASHINGTON.

TAX LOTS 042012-1-000, 042012-1-001 & 042012-1-020
(PER CHICAGO TITLE COMPANY'S PLAT CERTIFICATE, THEIR ORDER NO. 4375923 DATED DECEMBER 10, 2012 AT 8:30 AM.)

PARCEL A:
THAT PORTION OF THE NORTH HALF OF THE NORTHEAST QUARTER OF SECTION 12, TOWNSHIP 20 NORTH, RANGE 4 EAST OF THE WILLAMETTE MERIDIAN, DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHEAST CORNER OF SAID NORTHEAST QUARTER OF SAID SECTION 12;
THENCE SOUTHERLY ALONG THE EAST LINE OF THE NORTHEAST QUARTER OF SAID SECTION 12 TO THE SOUTH LINE OF THE NORTH HALF OF THE NORTHEAST QUARTER OF SAID SECTION 12;
THENCE NORTH 89°04'02" WEST ALONG SAID SOUTH LINE OF THE NORTH HALF OF THE NORTHEAST QUARTER OF SECTION 12 A DISTANCE OF 1393.03 FEET;
THENCE NORTH 10°56'00" EAST A DISTANCE OF 317.86 FEET;
THENCE NORTH 10°25'42" EAST A DISTANCE OF 20.0 FEET TO THE NORTHWEST CORNER OF THE SOUTH HALF OF THE SOUTH HALF OF THE NORTHEAST QUARTER OF THE NORTHEAST QUARTER OF SAID SECTION 12;
THENCE NORTH 330 FEET, MORE OR LESS, TO THE NORTHWEST CORNER OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF THE NORTHEAST QUARTER OF SAID SECTION;
THENCE EASTERLY ALONG THE NORTH LINE OF SAID SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF THE NORTHEAST QUARTER OF SAID SECTION TO THE HEREINAFTER DESCRIBED POINT "A";
THENCE NORTH 12°26'00" EAST A DISTANCE OF 111.75 FEET;
THENCE NORTH 12°26'12" EAST A DISTANCE OF 29.52 FEET;
THENCE NORTH 26°45'48" WEST A DISTANCE OF 599.18 FEET TO THE NORTH LINE OF SAID NORTHEAST QUARTER OF SECTION 12;
THENCE EASTERLY ALONG SAID NORTH LINE TO THE POINT OF BEGINNING;

EXCEPTING THEREFROM A SOUTH LINE 30.0 FEET IN WIDTH CONVEYED TO PIERCE COUNTY FOR ROAD BY DEED RECORDED JULY 7, 1922 UNDER RECORDING NUMBER 635357; [sic]

ALSO EXCEPT THAT PORTION THEREOF LYING WITHIN REVISED LOT A OF BOUNDARY LINE ADJUSTMENT RECORDED APRIL 27, 2009 UNDER RECORDING NUMBER 200904270391.

POINT "A" DESCRIPTION:

BEGINNING 576.16 FEET SOUTH OF THE NORTHEAST CORNER OF SECTION 12, TOWNSHIP 20 NORTH, RANGE 4 EAST OF THE WILLAMETTE MERIDIAN;
THENCE WEST A DISTANCE OF 1,206.38 FEET;
THENCE SOUTH 12°26'00" AND A DISTANCE OF 111.75 FEET TO THE SOUTH LINE OF THE NORTH HALF OF THE NORTHEAST QUARTER OF THE NORTHEAST QUARTER OF SAID SECTION TO SAID POINT "A";

SITUATE IN THE COUNTY OF PIERCE, STATE OF WASHINGTON.

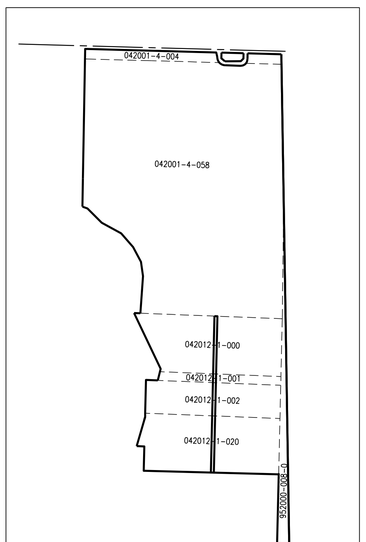
PARCEL B:
REVISED LOT A, BOUNDARY LINE ADJUSTMENT 200904270391, RECORDED APRIL 27, 2009, RECORDS OF PIERCE COUNTY AUDITOR.

SITUATE IN THE CITY OF SUMNER, COUNTY OF PIERCE, STATE OF WASHINGTON.

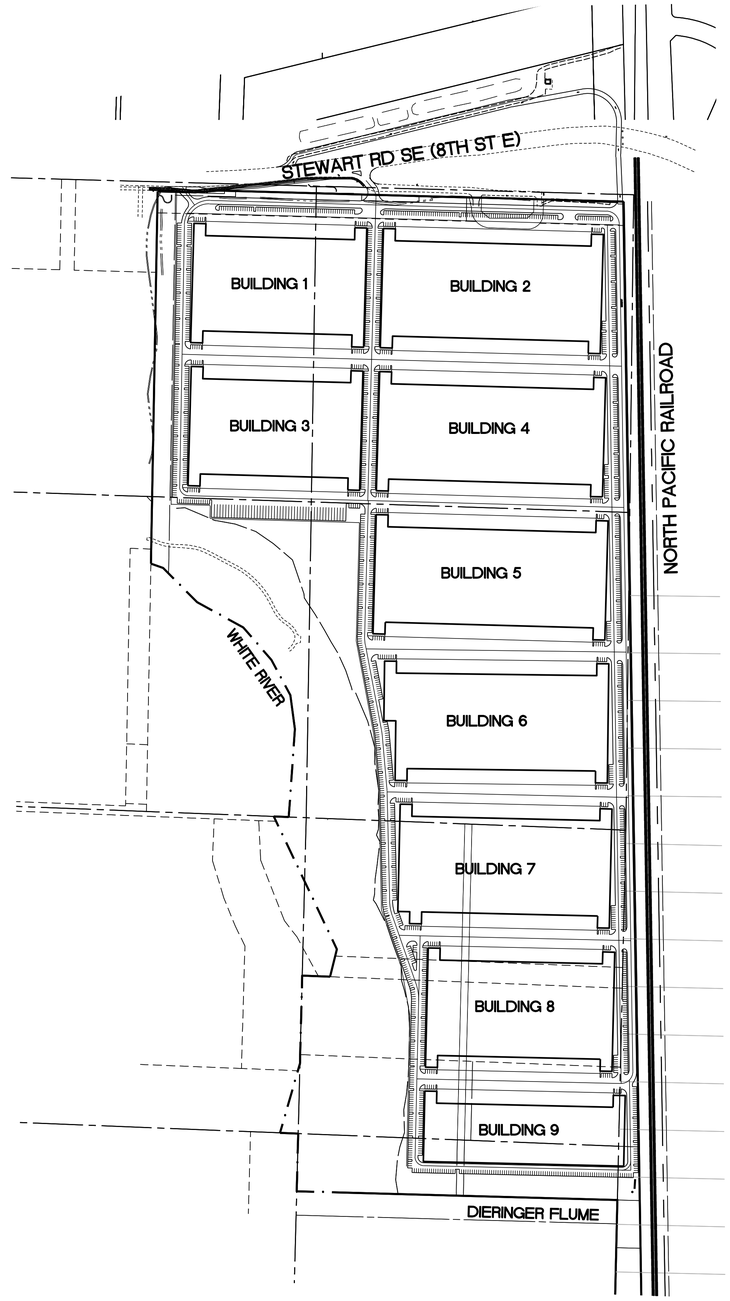
TAX LOT 952000-008-0
(PER CHICAGO TITLE COMPANY'S PLAT CERTIFICATE, THEIR ORDER NO. 4375903 DATED DECEMBER 6, 2012 AT 8:30 AM.)

ALL THAT PORTION OF LOTS 3 THROUGH 18, INCLUSIVE, WHITE RIVER GARDEN TRACTS, PIERCE COUNTY, WASHINGTON, ACCORDING TO THE PLAT THEREOF, RECORDED IN VOLUME 7 OF PLATS, PAGE 100, RECORDS OF PIERCE COUNTY AUDITOR, LYING WESTERLY OF A LINE DRAWN PARALLEL WITH AND DISTANT 50.0 FEET WESTERLY OF, AS MEASURED AT RIGHT ANGLES TO, BURLINGTON NORTHERN RAILROAD COMPANY'S
(FORMERLY NORTHERN PACIFIC RAILWAY COMPANY) SEATTLE LINE MAIN TRACK CENTERLINE.

SITUATE IN THE CITY OF SUMNER, COUNTY OF PIERCE, STATE OF WASHINGTON.



KEY TO TAX LOT NUMBERS



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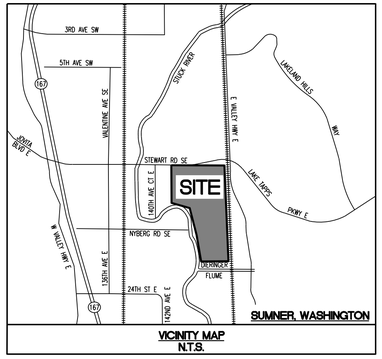


VICINITY MAP
N.T.S.

HORIZONTAL DATUM: NAD 83/91

BASIS OF BEARINGS FOR THIS SURVEY IS NAD 83/91, WGS POINT DESIGNATION NO. 2342 WAS HELD FOR POSITION AND A LINE BETWEEN SAID POINT NO. 2342 AND POINT DESIGNATION NO. 473 WAS HELD FOR ROTATION BEING, NORTH 43°41'35" WEST AS SHOWN.

VERTICAL DATUM: NGVD 29

BASIS OF ELEVATION FOR THIS SURVEY IS NGVD29. CITY OF SUMNER CONTROL POINT NO. 1 WAS HELD FOR ELEVATION, BEING 68.952'

DATES OF SURVEY:

FIELD SURVEY BY BARGHAUSEN CONSULTING ENGINEERS, INC. CONDUCTED IN DECEMBER, 2012.

SITE ADDRESS:

14802 GOLF LINKS DRIVE, SUMNER, WA 98390

GROSS CALCULATED LAND AREA:

6,913,401± SQUARE FEET (158.709± ACRES)

TAX ACCOUNT NUMBERS:

042001-4-058, 042012-1-000, 042012-1-001, 042012-1-002, 042012-1-020, 952000-008-0

INDEX TO SHEETS:

C1 OF 11	COVER SHEET
C2 OF 11	CONCEPTUAL SITE PLAN - NORTH
C3 OF 11	CONCEPTUAL SITE PLAN - SOUTH
C4 OF 11	CONCEPTUAL SITE PLAN - NORTH ACCESS ROAD DETAIL
C5 OF 11	CONCEPTUAL GRADING PLAN - NORTH
C6 OF 11	CONCEPTUAL GRADING PLAN - SOUTH
C7 OF 11	CONCEPTUAL STORM PLAN - NORTH
C8 OF 11	CONCEPTUAL STORM PLAN - SOUTH
C9 OF 11	CONCEPTUAL WATER AND SANITARY SEWER PLAN - NORTH
C10 OF 11	CONCEPTUAL WATER AND SANITARY SEWER PLAN - SOUTH
C10 OF 11	CONCEPTUAL WATER AND SANITARY SEWER PLAN - SOUTH TO 24TH ST

LEGEND:

PROPOSED TYPE II CATCH BASIN	EXISTING CONTOURS — 58 —
PROPOSED TYPE I CATCH BASIN	EXISTING WATERMAIN — W — W — W —
EXISTING TYPE II CATCH BASIN	PROPOSED WATERMAIN — W —
EXISTING TYPE I CATCH BASIN	PROPOSED SANITARY SEWER LINE — SS —
PROPOSED STORM DRAINAGE LINE	PROPOSED SANITARY SEWER MANHOLE
EXISTING STORM DRAINAGE LINE	
PROPOSED SPOT ELEVATIONS 59.0	

No.	Date	By	Ckd.	Appr.	Revision

Title: COVER SHEET

SUMNER MEADOWS GC DISPOSITION

For:

CITY OF SUMNER
1104 MAPLE STREET
SUMNER, WA 98390

Scale: Horizontal 1"=300' Vertical NA

Designed KEH
Drawn KEH
Checked JGH
Approved JGH
Date 2/5/13

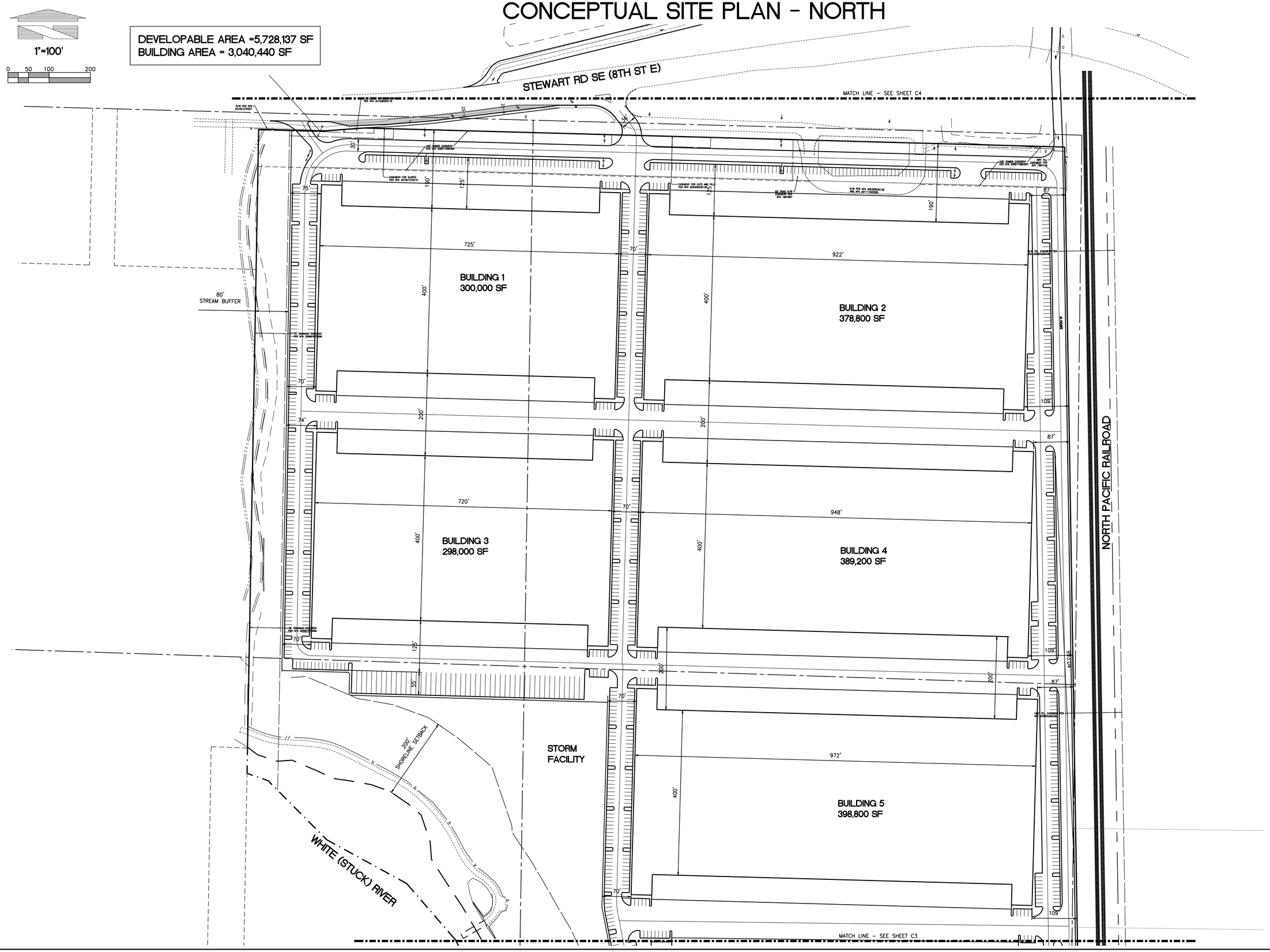
BARGHAUSEN CONSULTING ENGINEERS, INC.
18215 72ND AVENUE SOUTH
KENT, WA 98032
(425)251-6222
(425)251-8782 FAX
CIVIL ENGINEERING, LAND PLANNING, SURVEYING, ENVIRONMENTAL SERVICES

Job Number 16160

Sheet C1 of 11

File:P:\16000s\16160\preliminary\16160-po.dwg Date/Time:2/19/2013 4:39 PM Scale:0.386863 KHARRIS Xref: ----

CONCEPTUAL SITE PLAN - NORTH



No.	Date	By	Ckd.	Appr.	Revision

Title: CONCEPTUAL SITE PLAN NORTH

SUMNER MEADOWS GC DISPOSITION

For:

CITY OF SUMNER
1104 MAPLE STREET
SUMNER, WA 98390

Scale: Horizontal 1"=100' Vertical NA

Designed KEH
Drawn KEH
Checked JGH
Approved JGH
Date 1/7/13

BARGHAUSEN CONSULTING ENGINEERS, INC.
18215 72ND AVENUE SOUTH
KENT, WA 98032
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Job Number 16160

Sheet C2 of 11

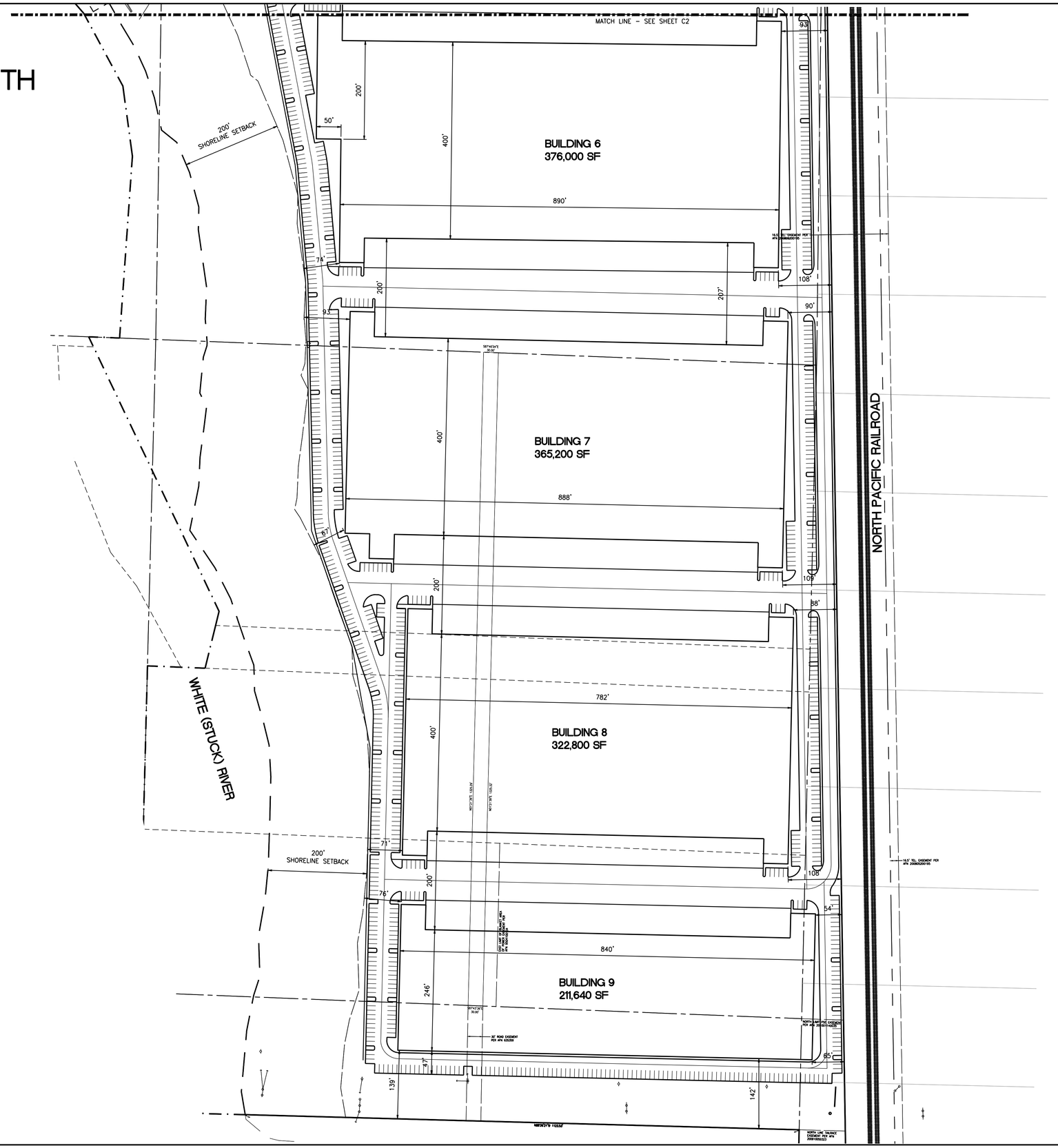
File:P:\16000s\16160\preliminary\16160-PA.dwg Date/Time:2/19/2013 11:39 AM Scale:0.386863 KHARRIS Xref: ----

CONCEPTUAL SITE PLAN - SOUTH

1"=100'

0 50 100 200

DEVELOPABLE AREA =5,728,137 SF
BUILDING AREA = 3,040,440 SF



No.	Date	By	Ckd.	Appr.	Revision

Title: CONCEPTUAL SITE PLAN SOUTH
SUMNER MEADOWS GC DISPOSITION

For: CITY OF SUMNER
1104 MAPLE STREET
SUMNER, WA 98390

Designed KEH
Drawn KEH
Checked JGH
Approved JGH
Date 1/7/13

Scale:
Horizontal 1"=100'
Vertical NA

BARGHAUSEN CONSULTING ENGINEERS, INC.
18215 72ND AVENUE SOUTH
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Job Number 16160

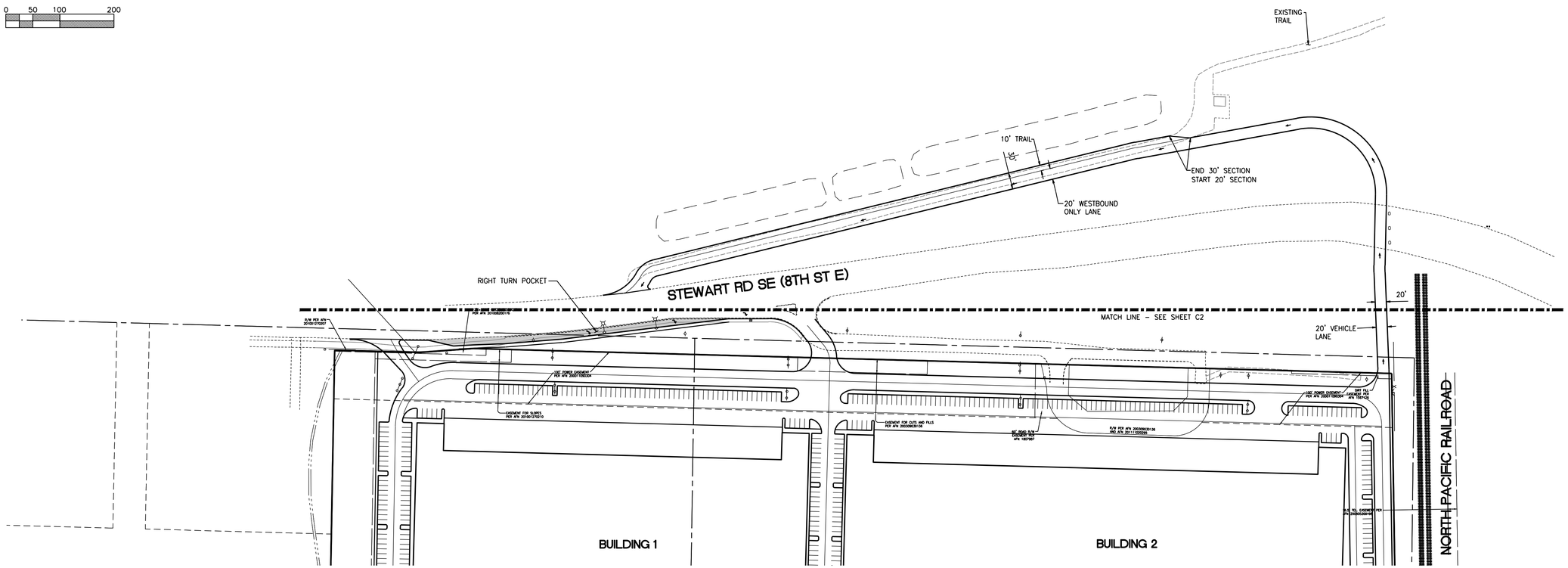
Sheet C3 of 11

File:P:\16000s\16160\preliminary\16160-PA.dwg Date/Time:2/19/2013 11:39 AM Scale:0.386863 KHARRIS Xref: ----

CONCEPTUAL SITE PLAN – NORTH ACCESS ROAD DETAIL

1"=100'

0 50 100 200



No.	Date	By	Ckd.	Appr.	Revision

Title: CONCEPTUAL SITE PLAN
NORTH ACCESS
ROAD DETAIL
SUMNER MEADOWS GC DISPOSITION

For: CITY OF SUMNER
1104 MAPLE STREET
SUMNER, WA 98390

Scale: Horizontal 1"=100'
Vertical NA

Designed KEH
Drawn KEH
Checked JGH
Approved JGH
Date 1/7/13

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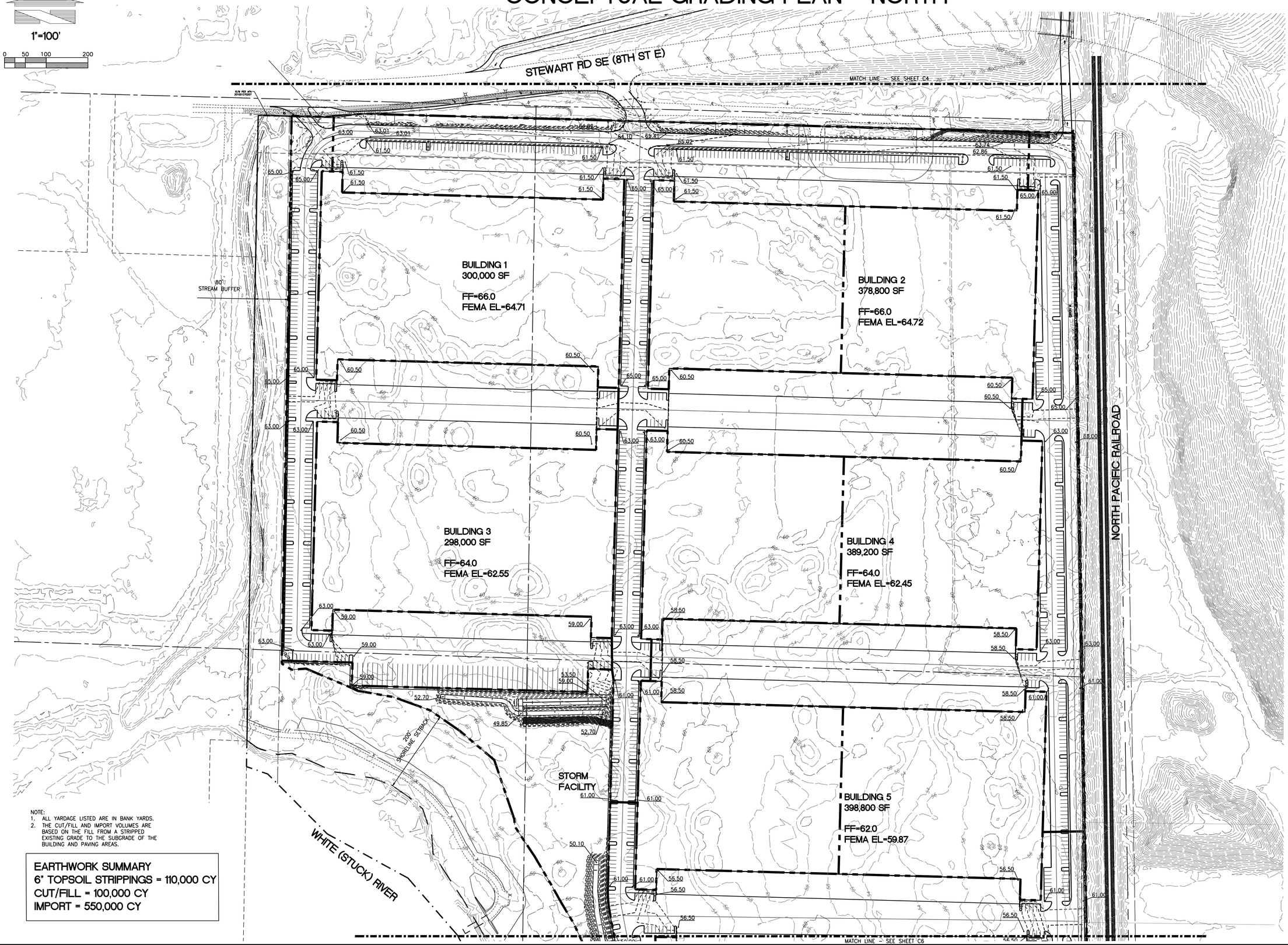
Job Number 16160

Sheet C4 of 11

File:P:\16000s\16160\preliminary\16160-PA.dwg Date/Time:2/19/2013 11:39 AM Scale:0.3868863 KHARRIS Xref: ----

CONCEPTUAL GRADING PLAN - NORTH



NOTE:
1. ALL YARDAGE LISTED ARE IN BANK YARDS.
2. THE CUT/FILL AND IMPORT VOLUMES ARE BASED ON THE FILL FROM A STRIPPED EXISTING GRADE TO THE SUBGRADE OF THE BUILDING AND PAVING AREAS.

EARTHWORK SUMMARY
6" TOPSOIL STRIPPINGS = 110,000 CY
CUT/FILL = 100,000 CY
IMPORT = 550,000 CY

No.	Date	By	Ckd.	Appr.	Revision

Title: CONCEPTUAL GRADING PLAN NORTH

SUMNER MEADOWS GC DISPOSITION

For:

CITY OF SUMNER
1104 MAPLE STREET
SUMNER, WA 98390

Scale: Horizontal 1"=100' Vertical NA

Designed KEH
Drawn KEH
Checked JGH
Approved JGH
Date 1/7/13

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KENT, WA 98032
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CIVIL ENGINEERING, LAND PLANNING, SURVEYING, ENVIRONMENTAL SERVICES

Job Number 16160

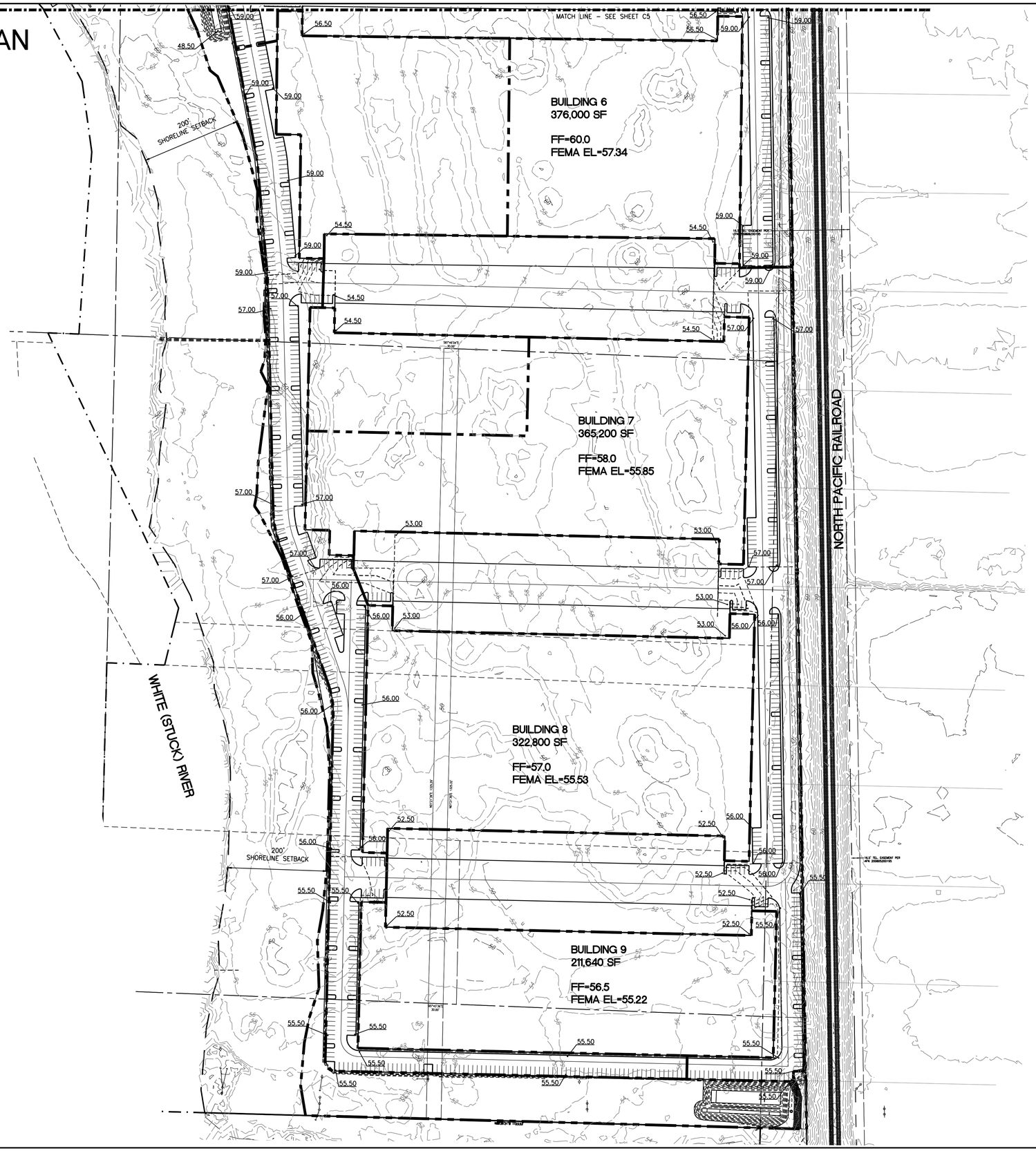
Sheet C5 of 11

File:P:\16000s\16160\preliminary\16160-pg.dwg Date/Time:2/19/2013 5:55 PM Scale:0.386863 KHARRIS Xref: ----

CONCEPTUAL GRADING PLAN – SOUTH

1"=100'

0 50 100 200



No.	Date	By	Ckd.	Appr.	Revision

Title: CONCEPTUAL GRADING PLAN SOUTH

SUMNER MEADOWS GC DISPOSITION

For: CITY OF SUMNER
1104 MAPLE STREET
SUMNER, WA 98390

Scale: Horizontal 1"=100' Vertical NA

Designed KEH
Drawn KEH
Checked JGH
Approved JGH
Date 1/7/13

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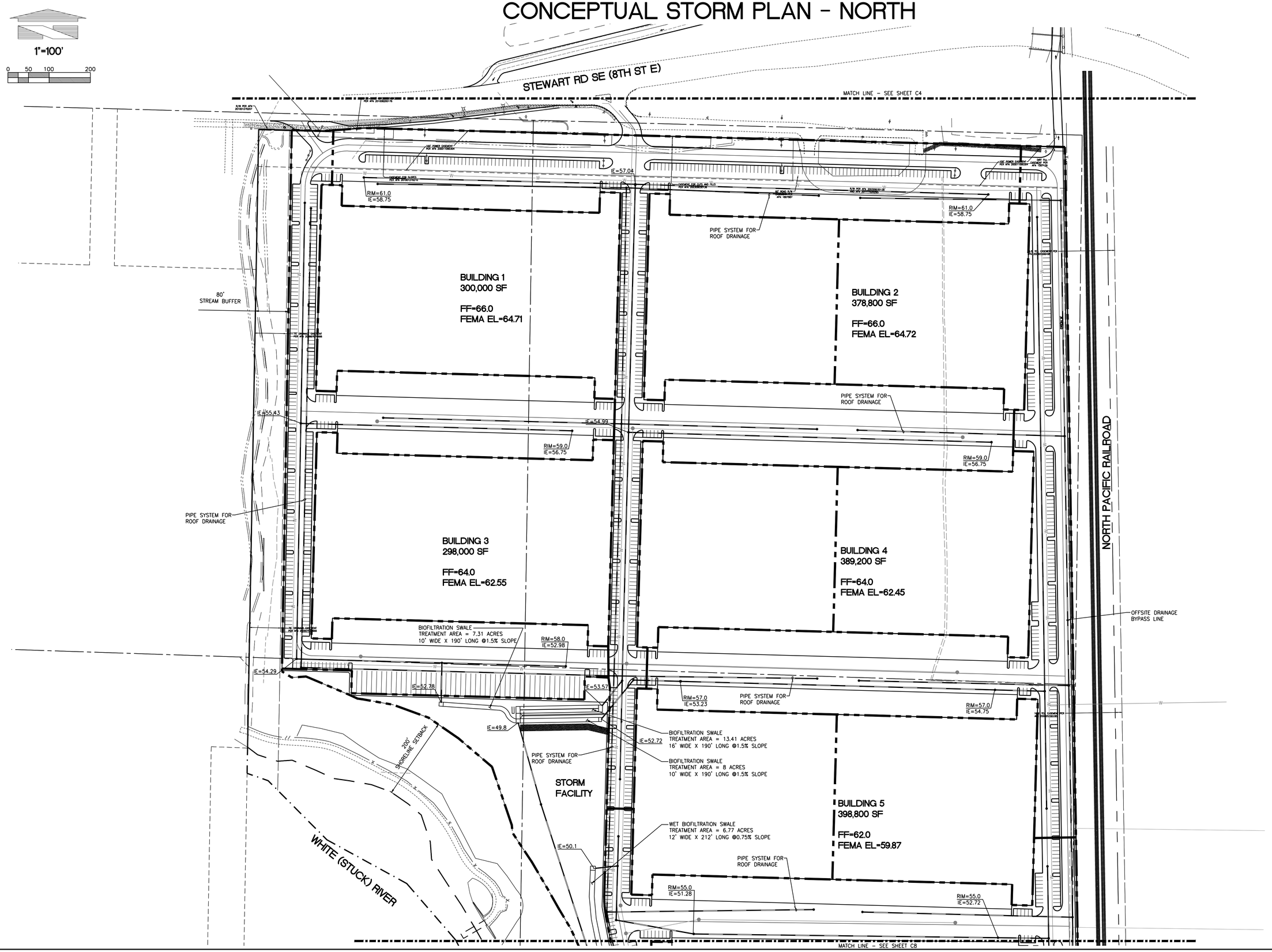
CIVIL ENGINEERING, LAND PLANNING, SURVEYING, ENVIRONMENTAL SERVICES

Job Number 16160

Sheet C6 of 11

File:P:\16000s\16160\preliminary\16160-pg.dwg Date/Time:2/19/2013 5:55 PM Scale:0.366863 KHARRIS Xref: ----

CONCEPTUAL STORM PLAN - NORTH



No.	Date	By	Ckd.	Appr.	Revision

Title: CONCEPTUAL STORM PLAN NORTH

SUMNER MEADOWS GC DISPOSITION

For:

CITY OF SUMNER
1104 MAPLE STREET
SUMNER, WA 98390

Scale: Horizontal 1"=100' Vertical NA

Designed KEH
Drawn KEH
Checked JGH
Approved JGH
Date 1/7/13

BARGHAUSEN CONSULTING ENGINEERS, INC.
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KENT, WA 98032
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CIVIL ENGINEERING, LAND PLANNING, SURVEYING, ENVIRONMENTAL SERVICES

Job Number 16160

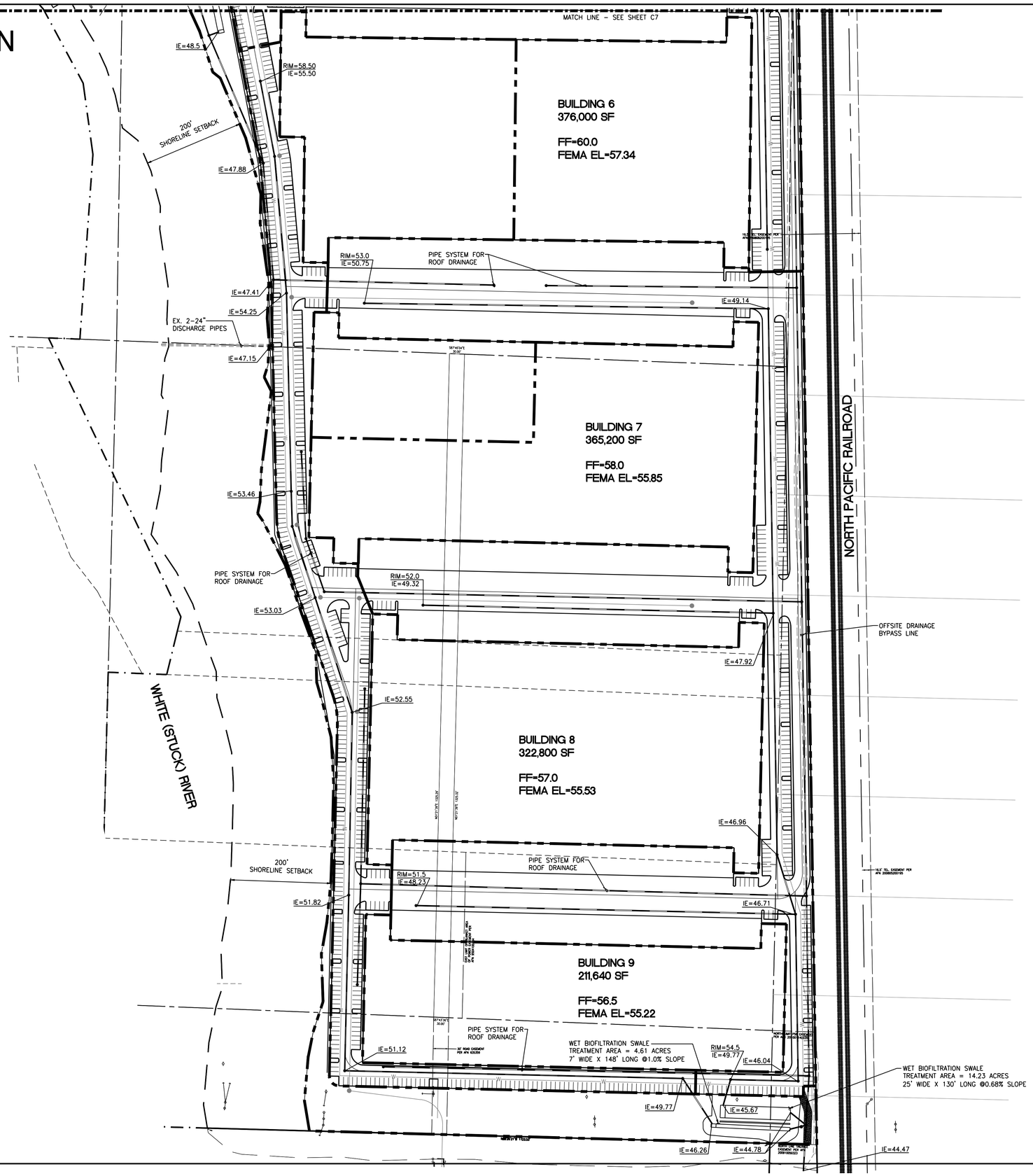
Sheet C7 of 11

File:P:\16000s\16160\preliminary\16160-pm.dwg Date/Time:2/19/2013 11:42 AM Scale:0.386863 KHARRIS Xref: ----

CONCEPTUAL STORM PLAN - SOUTH

1"=100'

0 50 100 200



No.	Date	By	Ckd.	Appr.	Revision

Title: CONCEPTUAL STORM PLAN SOUTH

SUMNER MEADOWS GC DISPOSITION

For:

CITY OF SUMNER
1104 MAPLE STREET
SUMNER, WA 98390

Scale: Horizontal 1"=100' Vertical NA

Designed KEH
Drawn KEH
Checked JGH
Approved JGH
Date 1/7/13

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18215 72ND AVENUE SOUTH
KENT, WA 98032
(425)251-6222
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Job Number 16160

Sheet C8 of 11

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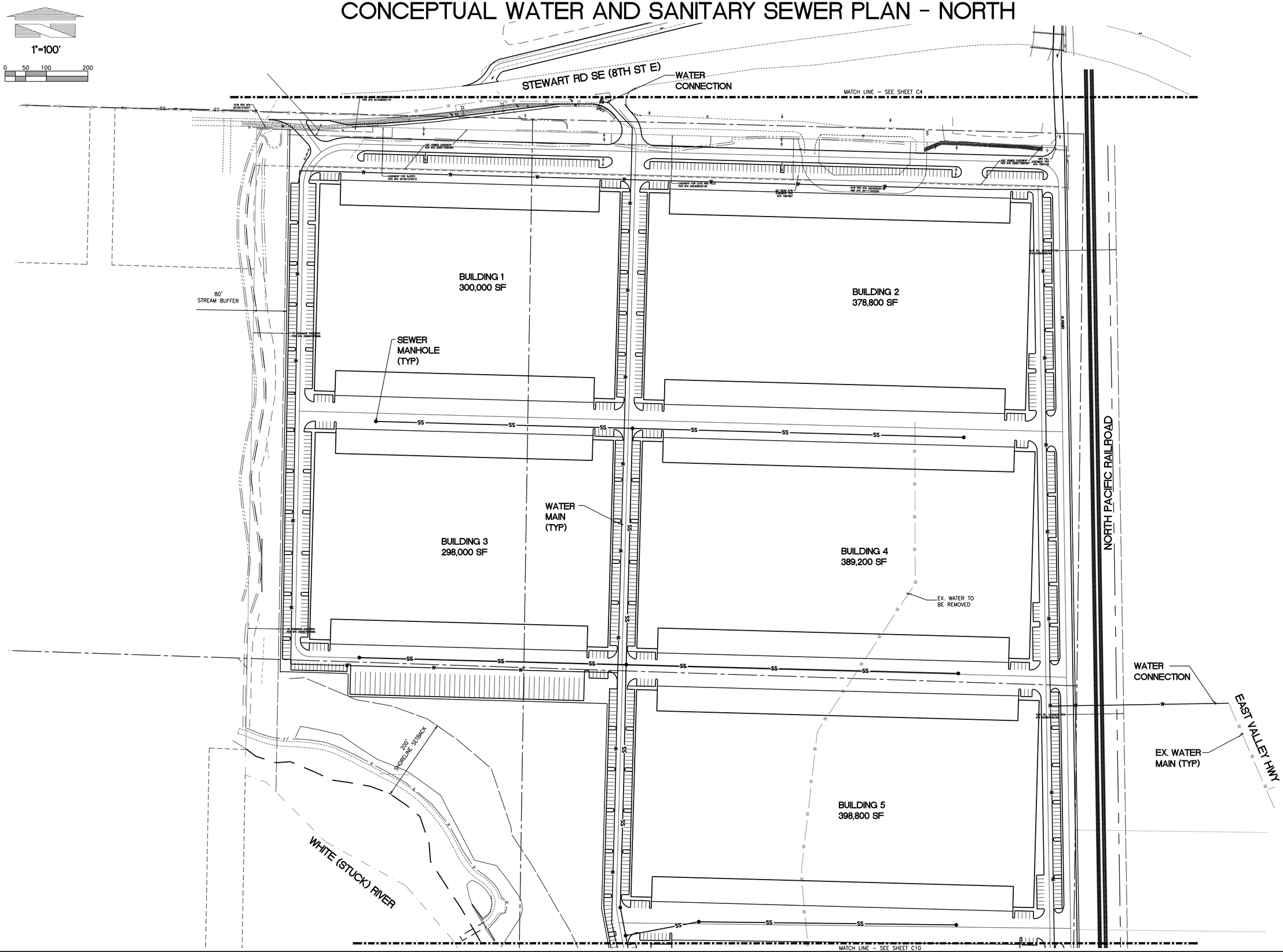
CONCEPTUAL WATER AND SANITARY SEWER PLAN - NORTH



No.	Date	By	Ckd.	Appr.	Revision

Title: CONCEPTUAL WATER AND SANITARY SEWER PLAN - NORTH

SUMNER MEADOWS GC DISPOSITION

For:

CITY OF SUMNER
1104 MAPLE STREET
SUMNER, WA 98390

Scale: Horizontal 1"=100' Vertical NA

Designed KEH
Drawn KEH
Checked JGH
Approved JGH
Date 1/7/13

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Sheet C9 of 11

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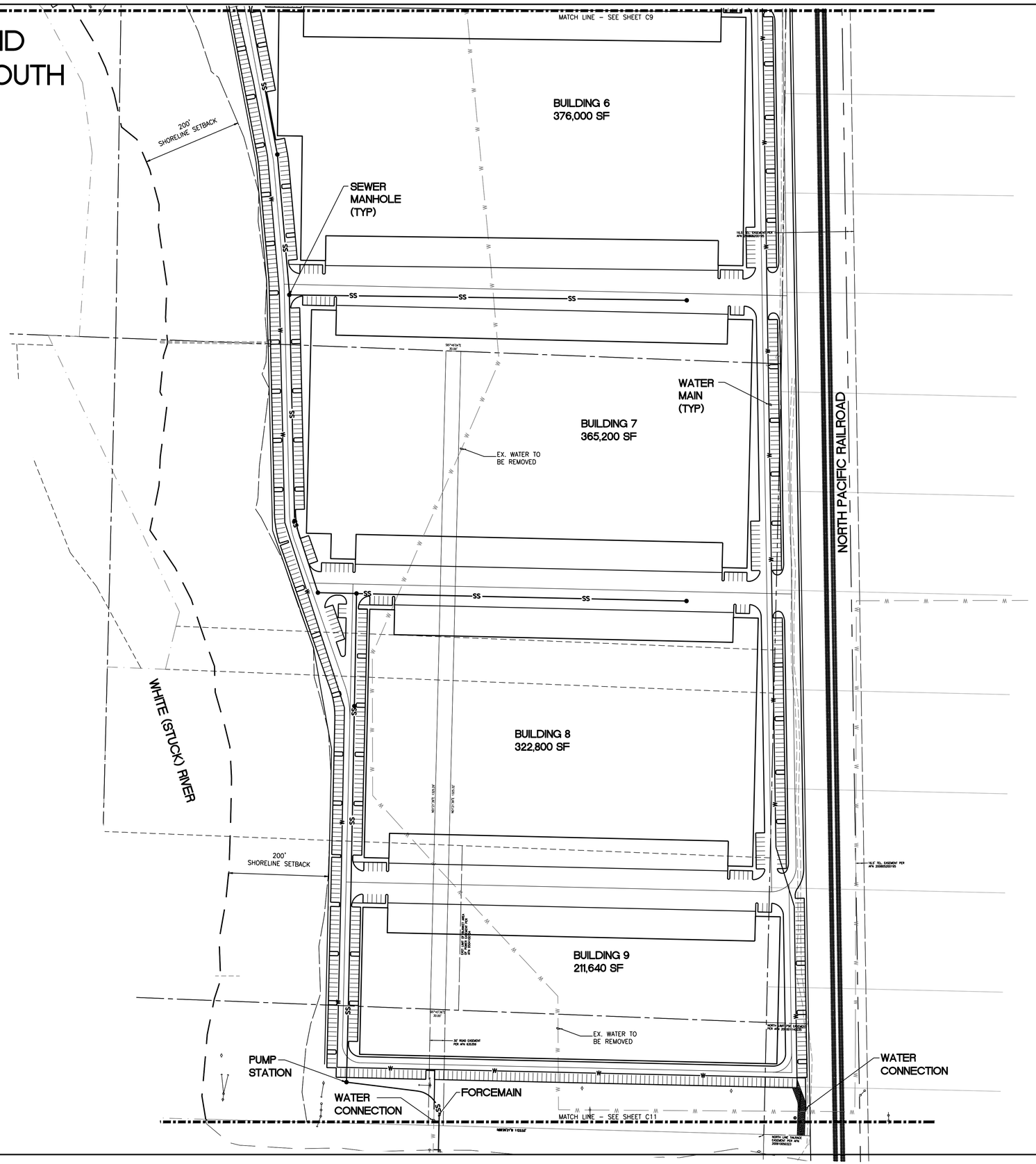
CONCEPTUAL WATER AND SANITARY SEWER PLAN - SOUTH

1"=100'

0 50 100 200



No.	Date	By	Ckd.	Appr.	Revision

Title: CONCEPTUAL WATER AND SANITARY SEWER PLAN - SOUTH

SUMNER MEADOWS GC DISPOSITION

For:

CITY OF SUMNER
1104 MAPLE STREET
SUMNER, WA 98390

Scale: Horizontal 1"=100' Vertical NA

Designed KEH
Drawn KEH
Checked JGH
Approved JGH
Date 1/7/13

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Job Number 16160

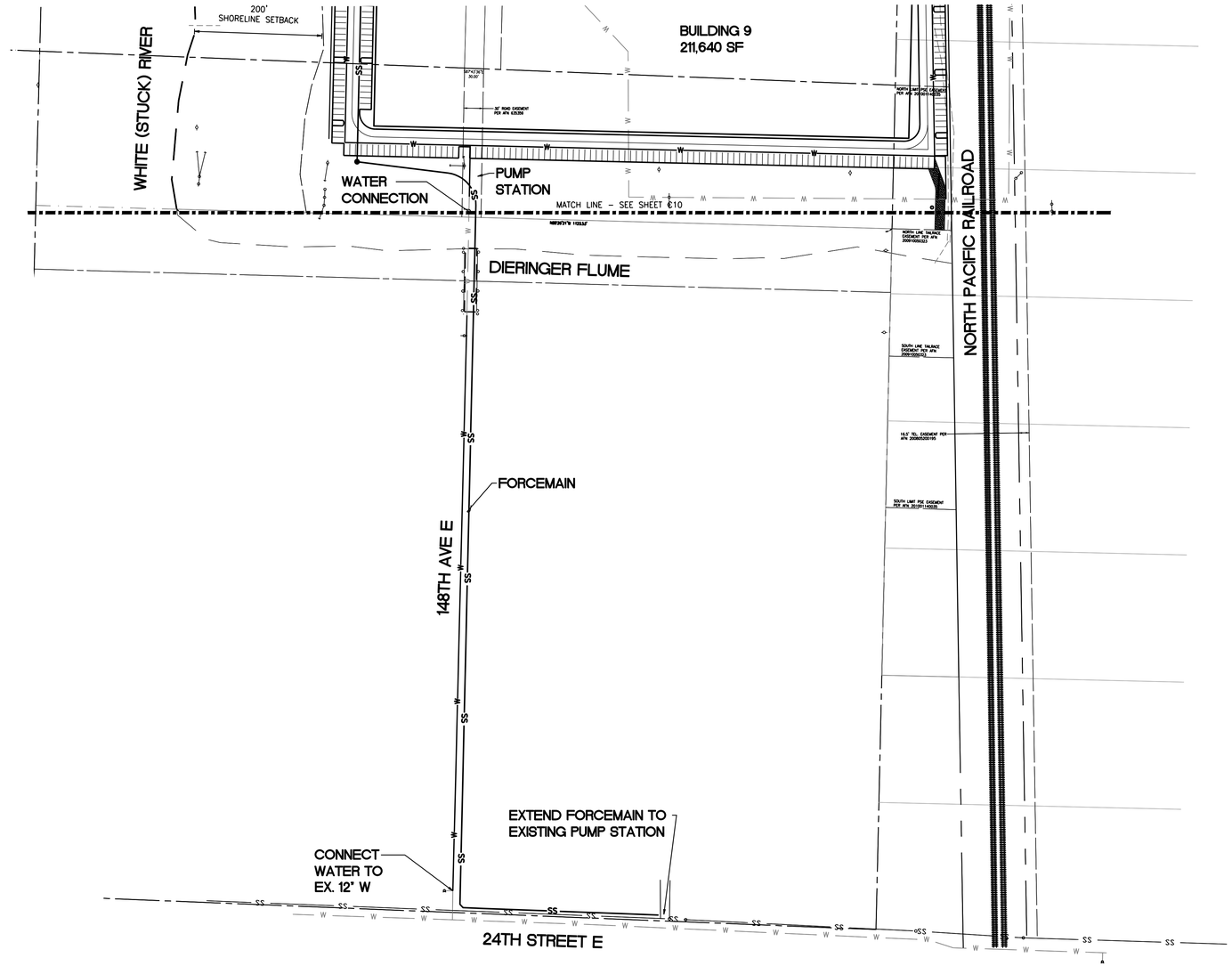
Sheet C10 of 11

File:P:\16000s\16160\preliminary\16160-pws.dwg Date/Time:2/19/2013 11:37 AM Scale:0.386863 KHARRIS Xref: ----

CONCEPTUAL WATER AND SANITARY SEWER PLAN - SOUTH TO 24TH STREET

1"=100'

0 50 100 200



No.	Date	By	Ckd.	Appr.	Revision

Title: CONCEPTUAL WATER AND SANITARY SEWER PLAN - SOUTH TO 24TH ST

SUMNER MEADOWS GC DISPOSITION

For: CITY OF SUMNER
1104 MAPLE STREET
SUMNER, WA 98390

Scale: Horizontal 1"=100'
Vertical NA

Designed KEH
Drawn KEH
Checked JGH
Approved JGH
Date 1/7/13

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Sheet C11 of 11

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Appendix I: GOLF COURSE PROPERTY SEWER AND POTABLE WATER INFRUSTRUCTURE ASSESMENT

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KPG

Technical Memorandum

To: Mike Dahlem, PE

From: Nathan Mozer, PE

Date: 2/1/2013

Re: Golf Course Property Sewer & Potable Water Infrastructure Assessment

Project No: 11114W2

NATHANIEL IAN MOZER
STATE OF WASHINGTON
38365
REGISTERED
PROFESSIONAL ENGINEER
2/12/13

BACKGROUND

Sumner is in the process of preparing to accept proposals for purchase of the current Sumner Meadows Golf Links property. The golf course property is made up of 5 separate parcels with a combined area of approximately 151 acres, of which approximately 131 acres are developable. The golf course property extents are shown on Figure 1. Sumner has requested that the existing sanitary sewer system be evaluated prior to sale to assess whether the existing infrastructure can support future development of the property. City has also requested that this memorandum discuss potable water improvements necessary to accommodate development of the golf course property.

EXISTING SANITARY SEWER INFRASTRUCTURE

There are two existing sanitary sewer pump stations close enough in proximity to provide service to the golf course property, Pump Station 14 and Pump Station 15. The locations of these stations can be viewed on Figure 2.

It is important to note that all of the below-referenced calculations assume the basin extents shown on Figure 1 and land use designations specified on the Sumner Comprehensive Plan Map. Further, the flow estimate calculations assume that Infiltration and Inflow (I/I) is a component of peak flow only for gravity systems. Thus, the peak flow estimates for the golf course property and the basin contributing flow to the force main on E Valley Hwy do not contain an I/I component. See below for further discussion regarding options for providing sewer service to the golf course property.

Pump Station 14

Pump Station 14 is located at approximately the 24th Street E / 148th Avenue E intersection and has a firm capacity of approximately 750 gpm at 22 feet Total Dynamic Head (TDH). Both the Technical Memorandum by Parametrix showing the TDH and the updated pump curve from ABS are attached for reference.

Pump Station 15

Pump Station 15 is located to the west of the golf course property and has a firm capacity of approximately 500 gpm at 60 feet TDH. Construction of this pump station was partially funded through LID 1105, which the golf course is not part of. Further, Pump Station 15 does not appear to have excess capacity at build-out of its contributing basin. For these reasons it was decided that sewer flows from development on the golf course property will not be conveyed to Pump Station 15.

Force Main on E Valley Hwy

There is an existing 8-inch diameter Septic Tank Effluent Pump (STEP) force main located in E Valley Hwy that could be utilized to convey flow from the golf course property. This force main terminates at approximately the City limits and discharges to existing gravity conveyance just north of the E Valley Highway / 24th Street E intersection. The gravity conveyance ultimately discharges into Pump Station 14.

GOLF COURSE PROPERTY SEWER FLOW ESTIMATE

It is assumed that the property will be developed as Light Industrial per the conceptual layout developed by Barghausen Consulting Engineers. Table 1 outlines the estimated sanitary sewer peak flow from the golf course property after build-out.

Table 1 Golf Course Property Peak Sewer Flow Estimate

Total Buildable[1] Area (Acres)	Total Developed Area[2] (Acres)	Avg. Flow Per Acre[3] (gpad)	Avg. Daily Flow (gpm)	Peaking Factor	Peak Flow[4] (gpm)
130.9	104.7	1,300	94.5	2.5	236.4

[1] "Buildable Area" implies total area minus critical areas, including the White River setback.
[2] "Developed Area" is Total Buildable Area minus 20% to account for roads, easements, etc.
[3] "Avg. Flow Per Acre" is taken from the Sumner Sanitary Sewer Comprehensive Plan Amendment (May 2000), Table 4-2 Wastewater Flow Estimates Based Upon Land Use.
[4] "Peak Flow" assumes no I/I component because the entire basin will be serviced by a pressure system (incl. laterals).

EXISTING SANITARY SEWER INFRASTRUCTURE EVALUATION

Force Main on E Valley Hwy

There is an existing 8-inch diameter force main on E Valley Hwy that could be used to convey flow from the golf course property. The current contributing basin to the force main on E Valley Hwy is outlined in Table 2, below. The extents of the force main contributing basin are shown on Figure 1.

Table 2 Existing Force Main Contributing Basin[3]

Land Use Designation[1]	Area (SF)	Area (Acre)
Medium Density Residential (MDR)	1,526,969	35.1
Public Utilities[2]	845,064	19.4
Light Industrial	1,555,092	35.7
Total	**3,927,125**	**90.2**

[1] Per the Sumner Comprehensive Plan Map.
[2] Public Utilities parcels were modeled as Light Industrial for peak flow estimate calculations.
[3] Represents entire basin, including both buildable and non-buildable land.

Peak flow from the current force main contributing basin was estimated using the land-use designation method as identified in Chapter 4 of the Sumner Sanitary Sewer Comprehensive Plan Amendment (May 2000). Table 3 provides a summary of the peak flow calculation for the current contributing basin of the E Valley Hwy force main.

Table 3 Existing Force Main Contributing Basin Peak Sewer Flow Estimate

	Light Industrial	Med. Dens. Residential[1]	Total
Total Buildable (SF)[1]	2,400,156	763,485	3,163,641
Total Buildable (Acres)	55.1	17.5	72.6
Total Developed Area[2] (Acres)	44.1	14.0	58.1
Avg. Flow Per Acre[3] (gpad)	1,300	2,300	-
Avg. Daily Flow (gpm)	39.8	22.4	62.2
Peaking Factor	2.5	3.5	-
Peak Flow[4] (gpm)	99.5	78.4	**177.9**

[1] "Total Buildable Area" for Med. Dens. Residential is approximately 50% of actual total to account for steep slopes.
[2] "Developed Area" Total Buildable Area minus 20% to account for roads, easements, etc.
[3] "Avg. Flow Per Acre" is taken from the Sumner Sanitary Sewer Comprehensive Plan Amendment (May 2000), Table 4-2 Wastewater Flow Estimates Based Upon Land Use.
[4] "Peak Flow" assumes no I/I component because entire basin will be serviced by a pressure system (incl. laterals).

Assuming a maximum flow velocity of 7.5 fps, the capacity of the existing 8-inch diameter force main is approximately 1,150 gpm.

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Pump Station 14

The current contributing basin to Pump Station 14 is outlined in Table 4, below. The extents of the current Pump Station 14 contributing basin are shown on Figure 1.

Table 4 Pump Station 14 Contributing Basin[1]

Land Use Designation[2]	Area (SF)	Area (Acre)
Public Utilities[3]	2,060,388	.47.3
Medium Density Residential (MDR)	1,526,969	35.1
Light Industrial	2,678,940	61.5
Low Density Residential	6,732,659	154.6
Neighborhood Commercial	154,503	3.5
Total	**13,153,459**	**302.0**

[1] Inclusive of the Force Main Contributing Basin. Represents entire basin, including both buildable and non-buildable land.
[2] Per the Sumner Comprehensive Plan Map.
[3] Public Utilities parcels were modeled as Light Industrial for peak flow estimate calculations.

Peak flow from the current Pump Station 14 contributing basin was estimated using the land-use designation method for Public Utilities, Medium Density Residential, Light Industrial, and Neighborhood Commercial as identified in Chapter 4 of the Sumner Sanitary Sewer Comprehensive Plan Amendment (May 2000). Peak flow from the Low Density Residential areas was estimated using the Service Area Population Method. Table 5 provides a summary of the peak flow calculation for the current Pump Station 14 contributing basin.

Table 5 Pump Station 14 Contributing Basin Peak Sewer Flow Estimate

	MDR	Light Industrial	Neighborhood Commercial	LDR (per DU)	Total
Dwelling Units (DU)	-	-	-	436	
Total Buildable (SF)[1]	763,485	4,024,944	112,686	-	4,901,115
Total Buildable (Acres)	17.5	92.4	2.6	-	112.5
Total Developed Area[2] (Acres)	14.0	73.9	2.1	-	90.0
Avg. Flow Per Acre[3] (gpad)	2,300	1,300	1,500	-	-
Avg. Flow per DU[4] (gpd)	-	-	-	214.2	-
Avg. Daily Flow (gpm)	22.4	66.7	2.2	64.9	156.1
Peaking Factor	3.5	2.5	2.5	3.5	-
I/I Flow[5] (gpm)	0.0	15.3	0.9	53.7	69.9
Peak Flow (gpm)	78.4	182.1	6.4	280.9	**547.8**

[1] "Total Buildable Area" for Med. Dens. Residential is approximately 50% of Total Buildable Area to account for steep slopes.
"Total Buildable Area" for Light Industrial assumes that approx. 12.9 acres are unbuildable due to wetlands.
"Total Buildable Area" for Neighborhood Commercial assumes that approx. 0.96 acres are unbuildable due to wetlands.
[2] "Developed Area" is Total Buildable Area minus 20% to account for roads, easements, etc.
[3] "Avg. Flow per Acre" is taken from the Sumner Sanitary Sewer Comprehensive Plan Amendment (May 2000), Table 4-2 Wastewater Flow Estimates Based Upon Land Use.
[4] Per Sumner Sanitary Sewer Comprehensive Plan Amendment, Chapter 4: Q(avg) = 85 gpcd.
Per Sumner Comprehensive Plan, 2.52 capita/DU. [(85 gal/capita-day)x2.52 capita/DU = 214.2 gal/DU-day.
[5] "Peak Flow" assumes I/I component at 500 gpad for gravity portion of systems only. I/I is assumed to be zero for pressure systems.

EXISTING POTABLE WATER INFRASTRUCTURE EVALUATION

There are four separate water mains that are located on or in the vicinity of the golf course property.

1. An 8-inch ductile iron main branches off the 12-inch diameter main in E Valley Hwy, is routed under the BNSF tracks and ultimately terminates at approximately where the existing club house sits.
2. A 12-inch ductile iron main terminates just off Stewart Road SE at the current golf course entrance.
3. A 12-inch ductile iron main terminates at approximately the City limits line on E Valley Hwy.
4. A 16-inch ductile iron main on 24th Street SE.

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The approximate locations of the above-mentioned water mains can be viewed on Figure 3, attached.

CONCLUSIONS AND RECOMMENDATIONS

SANITARY SEWER

There are two practical options available to provide sanitary sewer service to the golf course property using existing infrastructure:

1. Collecting sewage from the golf course property using a STEP system and conveying influent to the existing STEP force main on E Valley Hwy. This option will require constructing a STEP system on-site and installing a force main lateral to the existing force main in E Valley Hwy. The force main lateral would be installed under the BNSF tracks using jack and bore or other trenchless method.
2. Collecting and conveying sewage from the golf course property to an interim pump station, which would then discharge to Pump Station 14. The interim pump station is required to convey sewage across the Lake Tapps Tailrace Canal. If this option is pursued, the sewer flow estimate from the golf course property should be updated to include an I/I component for the gravity conveyance system upstream of the interim pump station.

It is important to remember that the golf course property sewer flow estimates outlined herein are based on an assumed land use. It is strongly recommended that the ultimate golf course property Developer be required to develop and submit their own sewer flow estimates based on the actual, proposed development type.

Force Main on E Valley Hwy

The existing force main has a capacity of approximately 1,150 gpm, assuming a maximum flow velocity of 7.5 fps. The combined peak flow of from the existing contributing basin and the golf course property is as estimated in Table 6, below.

Table 6 Estimated Peak Flow to Existing Force Main (Existing Basin + Golf Course Property)

Basin	Peak Flow (gpm)
Existing Contributing Basin	236.4
Golf Course Property	177.9
Total	**414.3**

It appears that the existing 8-inch diameter force main has sufficient capacity to convey the combined peak flow of approximately 414 gpm from its current contributing basin plus the golf course property.

This force main outfalls to a gravity system prior to discharging to Pump Station 14. Per information contained on the gravity system Record Drawings, it appears that the existing 12-inch diameter gravity main has sufficient capacity to convey the force main capacity without excessive surcharge.

The existing force main could be used to convey sewage from the golf course property to Pump Station 14. It is highly recommended, however, that the Developer be required to conduct a thorough hydraulic analysis of the force main prior to connection to verify force main conditions and location, to verify correct sizing and placement of air intake/vacuum relief valves, and to correctly size the on-site pump(s).

Pump Station 14

Per the pump curves provided by the ABS Pump vendor and the pump station evaluation Technical Memorandum developed by Parametrix, the existing station has a firm capacity of approximately 750 gpm at 22 feet TDH. The combined flow from the existing contributing basin plus the golf course property is estimated to be approximately 785 gpm.

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Pump Station 14 likely has sufficient capacity to accept flow from the golf course property even though the total basin peak flow estimate slightly exceeds the pump station firm capacity estimate. This is due to the fact that that the basin is made up of roughly half industrial and half residential. Research of sewer flow monitoring data indicates that land use significantly impacts and shapes the diurnal flow pattern, most notably, peak flows for residential, industrial, and commercial occur at different times during the day. Although we don't know exactly what type of industry will ultimately reside on the undeveloped parcels within the Pump Station 14 basin, it is reasonable to assume that the residential and light industrial water usage will follow historic patterns and peak at different times.

Sewer flow from development of the golf course property could be routed to Pump Station 14 via either the existing force main or a new force main constructed along the 148th Avenue E corridor. Regardless of the alignment used, it is highly recommended that the Developer be required to acquire the Pump Station 14 design report to verify the station firm capacity and TDH of the pump station and the associated force main capacity.

POTABLE WATER

The 2009 City of Sumner Water System Plan clearly identifies a project that connects three of the four water mains discussed above, thus looping the distribution system to increase flow and create redundancy. The Capital Improvement Project listed in the Water System Plan is Project D12 – 8th Street E and E Valley Hwy Loop. The specifics of D12 are that it will extend the existing 12-inch diameter main from Steward Road SE (8th St E) to the existing 8-inch diameter main located on-site. From there, the 12-inch diameter main will be extended under the BNSF tracks to the existing 12-inch diameter main on E Valley Hwy.

In addition to the CIP D12, a 12-inch diameter water main will be installed south along the 148th Avenue E alignment to connect to the existing 16-inch diameter water main on 24th Street. All of the above-mentioned water mains; the existing 8-inch from E Valley Hwy, the 12-inch diameter extension from 24th Street SE, the 12-inch diameter extension from Steward Road SE, and the 12-inch diameter extension from E Valley Hwy will be connected to an on-site, internal loop designed to provide fire flow to the developed site.

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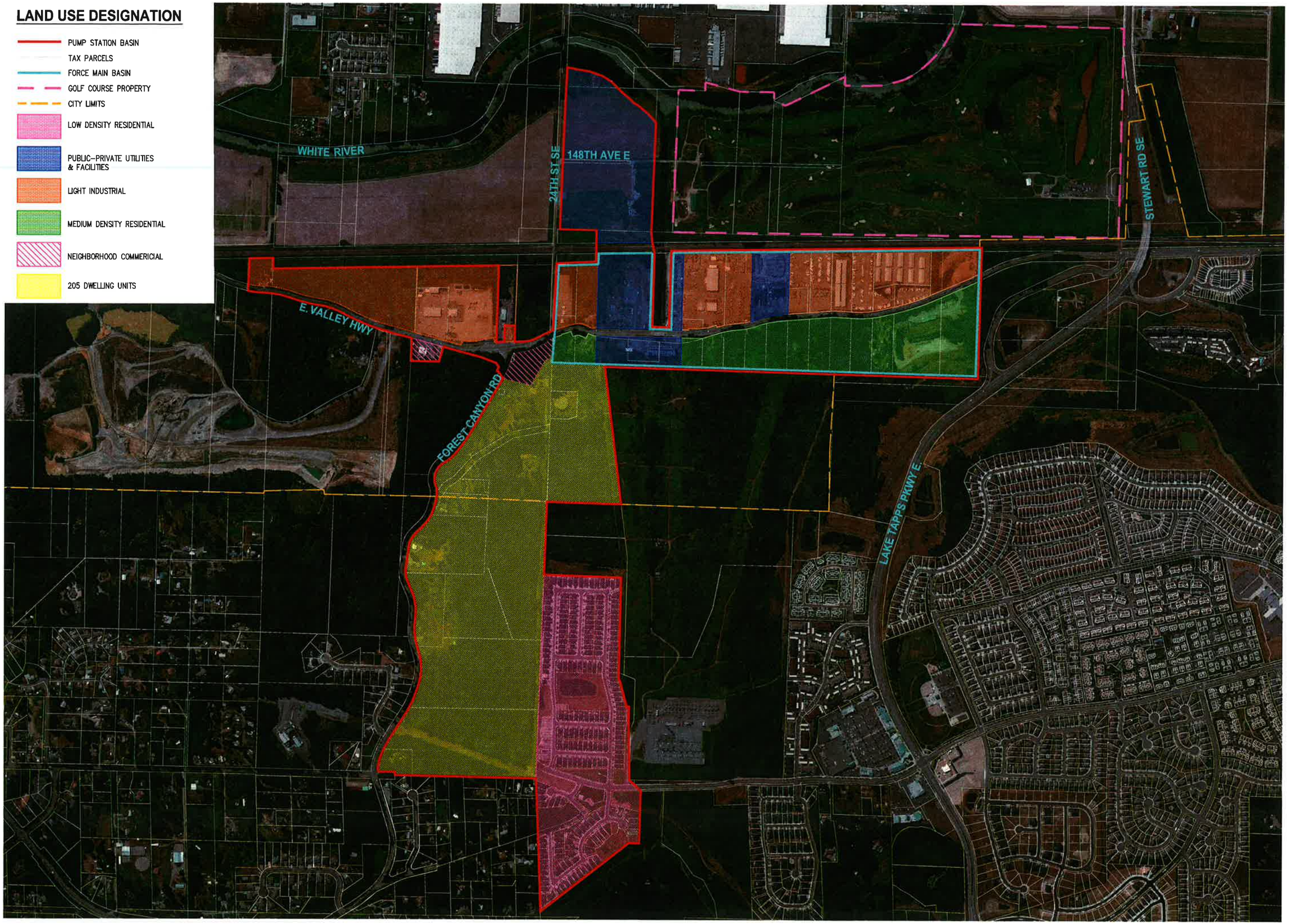

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SCALE IN FEET

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FIGURE 1: GOLF COURSE PROPERTY SANITARY SEWER FLOW ESTIMATE

SUMNER

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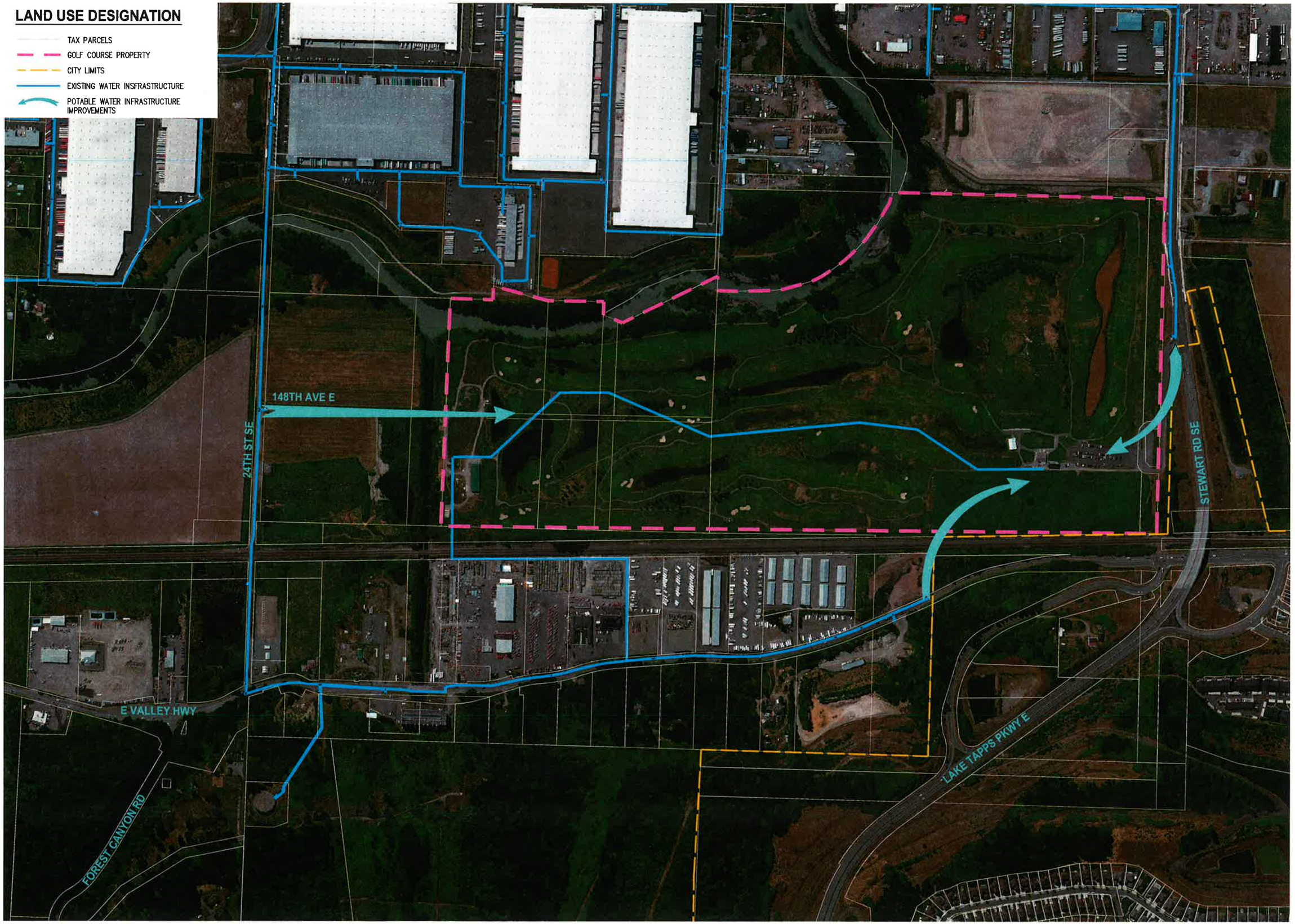
FIGURE 2: EXISTING SANITARY SEWER INFRASTRUCTURE



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SCALE IN FEET

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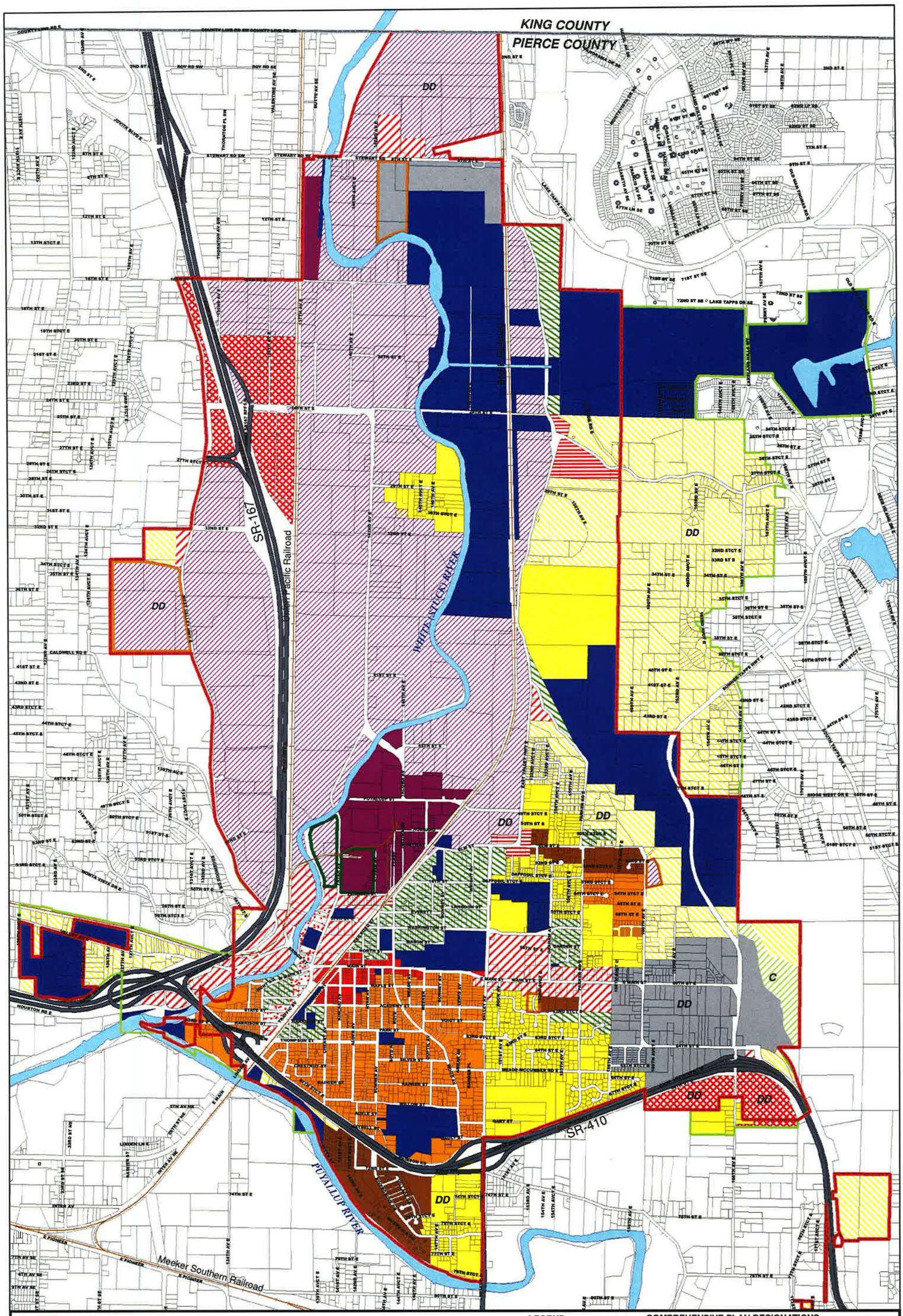
753 9th Ave N
Seattle, WA 98109
(206)285-1940
2502 Jefferson Ave
Tacoma, WA 98402
(253)627-0720

FIGURE 3: EXISTING POTABLE WATER DISTRIBUTION SYSTEM



City Of Sumner

Comprehensive Plan Map

SOURCE: City Of Sumner Coumminity Develpment Deparment, 2008

ADOPTED:12-01-2006
SUB-ORDINANCE NO: 2276
PLOTTED ON: 12-03-2008, JAM

N W E S

DISCLAIMER:
The City of Sumner does not make any warranties or representations with regard to the accuracy of this map. No reliance should be placed upon this map for the location of any easement, street, road, highway, or boundary line or other matter shown on this map, and no liability is assumed by the City of Sumner for the correctness thereof.

DD - Design District Overlay C - Cluster Overlay"

****Note: Additional Clustering Requirements apply in Designations Not included with a "C" Based on Critical Area Regulations***

*****Note: Refer to Cluster Overlay Provisions***

Scale: Not To Scale

LEGEND:

- Sumner City Limits
- Urban Growth Boundary
- Highways
- Railroads
- Tax Parcels
- Planned Mixed Use Development
- Special Restrictions & Agreement

COMPREHENSIVE PLAN DESIGNATIONS:

- Central Business District
- General Commercial
- Interchange Commercial
- Neighborhood Commercial
- Mixed Use Development
- Heavy Industrial
- Light Industrial
- High Density Residential
- Medium Density Residential
- Low Density Residential 3
- Low Density Residential 2
- Low Density Residential 1
- Residential Protection
- Urban Village
- Public-Private Utilities & Facilities

Parametrix ENGINEERING . PLANNING . ENVIRONMENTAL SCIENCES

TECHNICAL MEMORANDUM

Date:	September 19, 2006
To:	Mike Dahlem
From:	Daniel McNally and Rick Long, P.E. REL
Subject:	Forest Canyon Pump Station Evaluation
Project Number:	214-1527-051 (01/102)
Project Name:	Forest Canyon Highlands

INTRODUCTION

Parametrix was requested to analyze flow data for projected new developments in the Sumner, Washington area and provide a preliminary design for a pump station that could handle their estimated peak wastewater flows. This memo details the projected flow for the future developments, the general arrangement of the pump station, the hydraulics used for pump selection, the pump selection, and the wet well sizing for the pump station.

PEAK FLOW PROJECTION

The projected flow value that was used to determine the pump station firm capacity was determined using the Department of Ecology's *Criteria for Sewage Works Design*. From this method, it was determined that the peak flow for the pump station would be approximately 600 gpm. An acreage flow calculation and a City projected flow calculation were also completed, but they resulted in lower flows than the flow derived from the Department of Ecology calculation. The value obtained from the Department of Ecology's method was used for the pump station design since this flow was the highest of all methods and thus would estimate the largest possible flow. Table 1 shows the results for each method. (Detailed explanations for each method are available in Appendix A.)

Table 1. Peak Flow Projections

Method	Peak Flow (gpd)
DOE	853,560
Acreage Flow	583,625
City of Sumner Sewer Comprehensive Plan	785,004

GENERAL ARRANGEMENT

The major components for the pump station are the pumps, check valves, plug valves, a wet well, a valve vault, and piping. The proposed layout for the components has been sketched and is included in Appendix B. From the layout, it can be seen that the influent pipe is at elevation 50 feet due to current sewer plan and profile designed by Barghausen dated July 7, 2006. Also, it can be seen that the rim elevation of the wet well was estimated at Elevation [illegible] feet so that it would be 1' higher than the 100-year flood plain.

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HYDRAULICS

The proposed pump station and force main with all major corresponding parts and elevations were entered into the hydraulics modeling software Fathom. The simulation provided a system curve from which we determined the total dynamic head at 600 gpm is 21 feet. We then added a 5 percent safety factor to the TDH which produced a design point of 22 feet total dynamic head at 600 gpm. The Fathom visual report can be found in Appendix C, and the system curve that is derived from Fathom data can be found in Appendix D.

PUMP SELECTION

The developer is initially only responsible to provide part of the ultimate firm capacity for the pump station and has the option to install either a complete duplex system or a triplex system with two of three pumps. For this reason, the City requested that pumps be selected based on both a duplex and triplex approach to determine which method was most cost efficient.

For duplex pumping, an ABS Model AFP-1041 was selected, and for triplex pumping, an ABS Model AFP-0841 was selected. The price for a duplex system which includes two pumps, rails, and control panel is $15,500. The price for a triplex system which includes three pumps, rails, and a control panel is $20,000. The developer would only be responsible for two pumps in a triplex system though, so the cost would be approximately $16,000 since each pump costs approximately $4,000.

WET WELL SIZING

The wet well was sized based on the depth below the influent pipe required for pump submergence and working volume and the diameter needed to properly install the pumps. The approximate depth and diameter dimensions for a duplex and triplex system are shown in the table below. See Appendix B and Appendix G for explanation of sizing.

Table 1. Wet Well Size Data

System Type	Depth (feet)	Diameter (inches)
Duplex	12	72
Triplex	12	84

Based on a duplex system, the pumps will start at a maximum of seven times an hour each. See Appendix H for calculation. A triplex system would have slightly fewer starts per hour.

RECOMMENDATION

It is our recommendation that a duplex system be used for this project since the cost for the pumps will be essentially the same for a duplex or triplex system, and a duplex system will have a lower construction cost. The cost of construction for the duplex system will be lower since the wet well is smaller and the system will require less valves and piping than a triplex system would.

See City of Sumner Community Development Department for technical supporting materials.

1104 Maple Street, Sumner WA 98390 | 253-863-8300

Appendix J: SUMNER MEADOWS - PRELIMINARY STORMWATER SITE PLAN

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PRELIMINARY STORMWATER SITE PLAN

Sumner Meadows Golf Course Disposition

South of Stewart Road S.E., Between
the White River and the North Pacific Railroad
Sumner, Washington

Prepared for:
City of Sumner
1104 Maple Street
Sumner, WA 98390

February 20, 2013

Our Job No. 16160

DRAFT

BARGHAUSEN CONSULTING ENGINEERS, INC.

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- 4.2 Developed Site Hydrology
- 4.3 Performance Standards and Goals
- 4.4 Flow Control System
- 4.5 Water Quality System
- 4.6 Conveyance System Analysis and Design

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7.0 OTHER PERMITS

8.0 OPERATIONS AND MAINTENANCE MANUAL

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DRAFT

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EXHIBIT F – WATER QUALITY DESIGN

EXHIBIT G – CONVEYANCE ANALYSIS

EXHIBIT H – OPERATIONS AND MAINTENANCE MANUAL

EXHIBIT I – BOND QUANTITIES

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1.0 PROJECT OVERVIEW

The proposed Sumner Meadows GC Disposition project consists of approximately 158.7 acres of land located south of Stewart Road SE between the White River and East Valley Highway within the City of Sumner. The existing site is currently used as the Sumner Meadows Golf Course with buildings for the clubhouse, equipment and maintenance facilities. More particularly the site is described as portions of Section 12, Township 20 North, Range 4 East and Sections 6 and 7, Township 20 North, Range 5 East, Willamette Meridian, City of Sumner, Pierce County, Washington. Please see the vicinity map included as Exhibit A. This report provides site information and an analysis used to design the stormwater facilities that will provide the water quality, and conveyance for the 131.5 acres pursuant to development. The proposed project site was designed to meet the City of Sumner and the 2005 Department of Ecology (DOE) Stormwater Management Manual for Western Washington requirements.

The project site is bounded by the White River to the west, Stewart Road SE to the north, by Dieringer Slough to the south and by North Pacific Railroad to the east. The pre-developed site has been graded with many hills and valleys as is common in a golf course. There are numerous ponds and swales for drainage. The entire site eventually drains to the White/Stuck River, through existing pipes into the river or into the Dieringer Slough and then to the river.

The proposal for this project is to construct nine large warehouse type buildings on the property. The buildings would have truck loading areas to the north and south of the buildings as well as passenger car parking at the east and west ends of the buildings. An access road is proposed along the northern and eastern project perimeters to route traffic to the different buildings more easily. The site would also include utilities, landscaping, access driveways, and storm water facilities.

The developed has been divided into two major drainage basins. The north portion of the site will ultimately drain to two existing 24" pipes that flow to the White River. The southern portion of the site will drain to a new pipe discharging into the Dieringer Slough at the southeast corner of the site. The major basin that drains to the west is further divided into five smaller basins. The first four smaller basins consist of areas of asphalt pavement surrounding the proposed buildings. These areas will be collected in catch basins and underground piping and routed to a biofiltration swale for water quality treatment prior to being discharged from the site. The four bioswales will be constructed on the western portion of the site between the development and the 200 foot shoreline setback. The last of the smaller basins is the roof drainage. Roof drainage on this project will be collected in a separate system and directly discharged offsite because water quality treatment is not required. The southern portion of the site is divided into two basins directed to biofiltration swales and one basin of roof drainage. The southern biofiltration swales are located at the south end of the site under the existing power poles.

Biofiltration swales will be used to provide basic treatment for the pollution generating surfaces of the project. Because this site has direct discharge to the White/Stuck River, enhanced treatment and detention are not required. Runoff will be collected and conveyed to the water quality swales by an underground piping system from catch basins located in vehicular areas.

2.0 EXISTING CONDITIONS SUMMARY

The proposed project is located in the White River Basin, which is situated in northern Pierce County. A review of the topographic map and field observations confirm that runoff from the site flows into the numerous ponds onsite. These ponds eventually discharge west into the two existing pipes that flow into the White River or south into an existing pipe that discharges into the Dieringer Slough. The White River continues into the Puyallup River and ultimately towards Puget Sound.

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The existing soil conditions consist mainly of loam or muck. Soil types include Briscot loam, Pilchuck fine sand, Puyallup fine sandy loam, Semiahmoo muck, Shalcar muck, Snohomish silty clay loam and Sultan silt loam. Most of the site soils are type D soils but there are areas of type C and type B along the river buffer. Please see Exhibit B SCS soils map. Because detention is not required, the existing conditions were not used in modeling.

For developed conditions, the 15-minute water quality flow rate from Western Washington Hydrology Model (WWHM) was used in sizing the biofiltration swales. The developed conditions were modeled as 95% impervious and 5% till landscaping.

3.0 OFF-SITE ANALYSIS REPORT

There is a large upstream basin contributing runoff to this site. There is an existing ditch that flows south along the eastern boundary of the site to the Dieringer Slough. This runoff will be collected in a proposed pipe along the eastern property line. This storm system will convey offsite flows south as well as roof runoff from the proposed buildings. At the southeast corner of the property the pipe will discharge to the Dieringer Slough. There is also a ditch along the northern property line that flows west to an existing ditch west of the site and then south to the White River. Stewart Road to the north has its own drainage collection and conveyance system which will not be disturbed with this development. The White River forms the property line to the west.

The White River flows south approximately 21,000 feet where it joins the Puyallup River. The Puyallup River continues to Puget Sound.

4.0 PERMANENT STORMWATER CONTROL PLAN

4.1 Existing Site Hydrology

The project site is an existing municipal golf course with several buildings and a paved parking lot. The golf course has been graded to introduce hills and valleys consistent with a golf course. Several ponds and drainage swales have also been constructed on site as part of the golf course construction. Existing runoff is directed to the ponds. The ponds discharge generally south and west to the river. The site drains to two main outfalls. Along the western property boundary there are two 24-inch culverts that discharge directly to the White/Stuck River. At the southeast corner of the site is another 24-inch pipe that discharges into the Dieringer Slough which then flows west into the White/Stuck River.

4.2 Developed Site Hydrology

Under developed conditions, the entire site will be graded, raised with fill material, and then graded relatively flat with a slight slope to the south. The proposed project consists of nine large warehouse type buildings. The areas around the buildings will be paved for truck maneuvering and vehicle parking areas. The drainage calculations were done using the WWHM, using the ratio of pervious/impervious surface under developed conditions to be 95 percent impervious with 5 percent used for landscaping. This area is included in the water quality calculations. Runoff from the pollution generating areas will be routed to bioswales to the west or south for water quality treatment prior to being discharged from the site. Temporary erosion and sedimentation ponds will be designed and constructed onsite for temporary use during construction. The storm drainage proposal conforms to the requirements of the City of Sumner requirements.

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4.3 Performance Standards and Goals

The proposed project site discharges to the White River at the existing discharge points. Therefore it is exempt from providing flow control or enhanced water quality treatment. This site will provide basic water quality treatment for the pollution generating surfaces of the site. Roof runoff, considered clean runoff, will be directly discharged.

4.4 Flow Control System

No flow control is proposed for this development as it directly discharges into the White/Stuck River through a manmade conveyance system.

4.5 Water Quality System

Because this site directly discharges to the White River, only basic water quality is required. To provide basic water quality, runoff from the pollution generating areas of the site will be collected in catch basins and routed through underground pipes to biofiltration swales for treatment. Some of the swales are standard biofiltration swlaes and some have been designed as wet biofiltration swales. Wet biofiltration swales will have a flow splitter prior to the swale with flows larger than the water quality flow rate being discharged downstream. The calculations to size the swales can be found in Exhibit F Water Quality Design.

4.6 Conveyance System Analysis and Design

The conveyance system capacity will be designed during the final engineering phase.

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5.0 CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN

A construction stormwater pollution prevention plan will be incorporated into the design when construction, grading and erosion control plans are developed.

6.0 SPECIAL REPORTS AND STUDIES

No additional special reports or studies are included at this time. It is anticipated that a geotechnical engineering report, a wetland determination report and a habitat management plan will be developed for this site.

7.0 OTHER PERMITS

No other permits are being applied for at this time. It is anticipated that during the course of this project numerous permits will be necessary, including:

- SEPA determination
- City of Sumner Grade and Fill permit
- City of Sumner right-of-way use permit
- City of Sumner permits for utility extensions
- City of Sumner commercial building permit

- City of Sumner design review
- Department of Ecology NPDES permit

8.0 OPERATIONS AND MAINTENANCE MANUAL

See Exhibit H. The Operations and Maintenance Manual will be developed with the final engineering plans.

9.0 BOND QUANTITIES

See Exhibit I. The bond quantities will be prepared during the final engineering plans after review by the City of Sumner.

10.0 CONCLUSION

This proposal meets all the requirements of the City of Sumner and the design standards of the 2005 Department of Ecology Stormwater Management Manual for Western Washington. Therefore, preliminary project approval for this development should be granted.

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Exhibit A
Vicinity Map

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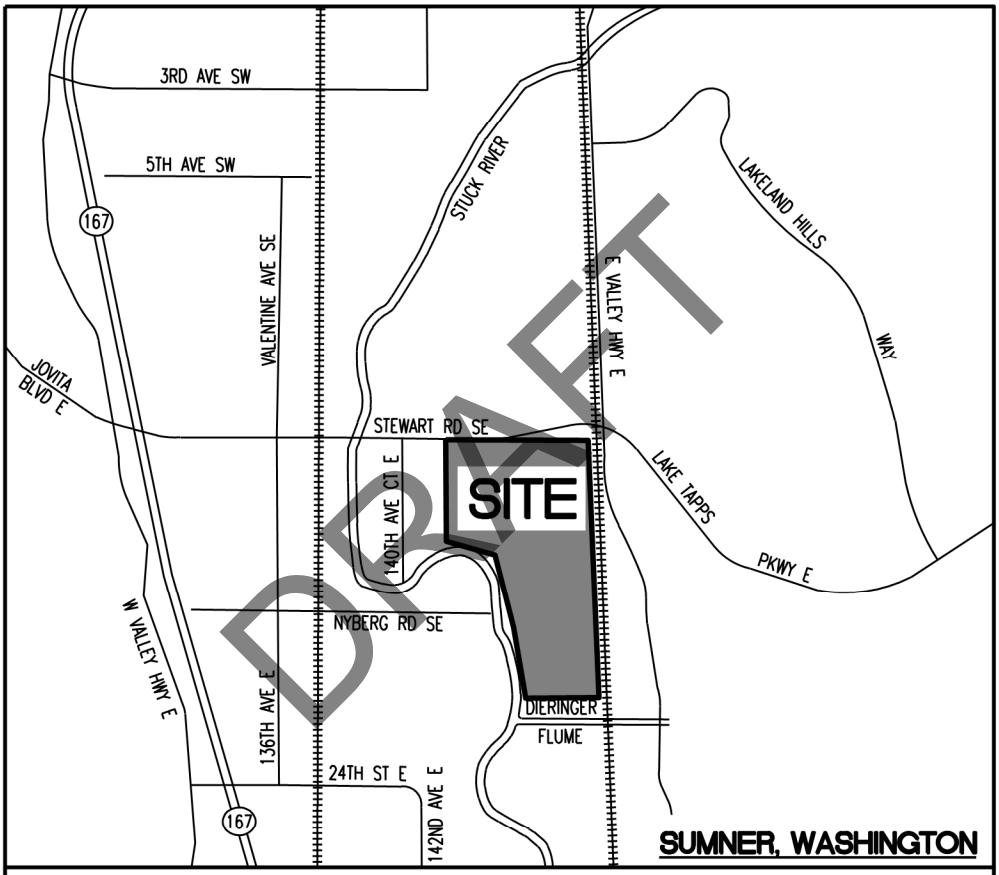

VICINITY MAP
N.T.S.

See City of Sumner Community Development Department for technical supporting materials.

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