



City of Yelm
EST. 1924
WASHINGTON

DETERMINATION OF NON-SIGNIFICANCE

SEPA #: 2022.0046

Description of Proposal: SE Reservoir, City of Yelm

Proponent: City of Yelm, WA

Location of the Proposal: 17021 103rd Ave. SE, Yelm, WA 98597

Lead Agency: City of Yelm

Threshold Determination The City of Yelm as lead agency for this proposal has determined that it does not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030 (2)(c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public on request.

This DNS is issued under WAC 197-11-340(2); the City of Yelm will not act on this proposal for 14 days from the date below.

November 23, 2022

Comments must be submitted by December 7, 2022 to planning@yelmwa.gov by 5:00 P.M.

Responsible Official: Maryam Moeinian, Associate Planner

Phone: (360) 400-5001

Address: 901 Rhoton Rd NW, Yelm WA 98597

Date of Issue: November 23, 2022

Maryam Moeinian, Associate Planner

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Posted: City of Yelm Website, www.yelmwa.gov : November 23, 2022

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Copies to: All agencies/citizens on SEPA mailing list Dept. of Ecology w/checklist

SEPA ENVIRONMENTAL CHECKLIST

Purpose of checklist:

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

Instructions for applicants:

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown. You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Instructions for Lead Agencies:

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

Use of checklist for nonproject proposals:

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B plus the [SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS \(part D\)](#). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in Part B - Environmental Elements –that do not contribute meaningfully to the analysis of the proposal.

A. Background [\[HELP\]](#)

1. Name of proposed project, if applicable: **SE Reservoir, City of Yelm**
2. Name of applicant: **City of Yelm, WA**

3. Address and phone number of applicant and contact person: **901 Rhoton Road NW, Yelm, WA 98597, Patrick T. Hughes, P.E.**

4. Date checklist prepared: **April 4, 2022**

5. Agency requesting checklist: **City of Yelm, WA**

6. Proposed timing or schedule (including phasing, if applicable): **Design Phase: Apr-Nov 2022, Construction Phase Feb-Nov 2023**

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? **No.** If yes, explain.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal. **None. Critical Areas Report and Geo technical Report**

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? **No.** If yes, explain.

10. List any government approvals or permits that will be needed for your proposal, if known.

None known. Department of Health project report and supporting documents
The project will disturb less than 1 acre of land and will not require a National Pollutant Discharge Elimination System Construction Stormwater General Permit from the Department of Ecology.

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.) **1.55 million gallon potable water storage reservoir, having a floor area of 1,600 square feet (45 feet diameter) and a height of 128 feet. Exterior paving will consist of 2,820 sq. ft. driveway (total 4,420 sq ft impervious surface).**

On less than 1 acre of land

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist. **17021 103rd Ave SE, Yelm, WA NW1/4 NE1/4 Sec 29, T17N R2E Parent Parcel No. 64303100500**

B. Environmental Elements [\[HELP\]](#)

1. Earth [\[help\]](#)

a. General description of the site:

(circle one): Flat rolling, hilly, steep slopes, mountainous, other _____

b. What is the steepest slope on the site (approximate percent slope)? **20%**

- c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils. **Loamy sand with gravel and large cobbles. Two (2) test pits were excavated in May 2020.**
- d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe. **No.**
- e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill. **The intent is to use existing, on-site soils to "balance grade" the site. Source of off-site fill, if needed, is to be determined.**
- f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe. **After exposure, surface erosion is possible along/near the existing slope south and west of the proposed reservoir during construction until the site is stabilized with paving and/or vegetation.**
- g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)? **4,420 sq ft impervious surface / 58,952 sq ft (area of Lot 1) = 7.5% impervious surfaces. There is an existing asphalt driveway and parking lot, a portion of which will be removed as part of construction. The net increase in impervious surface will be less than 5%.**
- h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any: **Construction plans will include a temporary erosion and sediment control plan.**

2. Air [\[help\]](#)

- a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known. **No air emissions.**
- b. Are there any off-site sources of emissions or odor that may affect your proposal? **No.** If so, generally describe.
- c. Proposed measures to reduce or control emissions or other impacts to air, if any: **None.**

3. Water [\[help\]](#)

- a. Surface Water: [\[help\]](#)
 - 1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? **No.** If yes, describe type and provide names. If appropriate, state what stream or river it flows into. **Site ultimately drains to Yelm Creek, located approx. 4,300 feet to the west.**

- 2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? **No.** If yes, please describe and attach available plans.
- 3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. **None.** Indicate the source of fill material.
- 4) Will the proposal require surface water withdrawals or diversions? **No.** Give general description, purpose, and approximate quantities if known.
- 5) Does the proposal lie within a 100-year floodplain? **No.** If so, note location on the site plan.
- 6) Does the proposal involve any discharges of waste materials to surface waters? **No waste materials discharge.** If so, describe the type of waste and anticipated volume of discharge.

b. Ground Water: [\[help\]](#)

- 1) Will groundwater be withdrawn from a well for drinking water or other purposes? **No.** If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known.
- 2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve. **There will be no waste material discharged into the ground (no septic tank, sewage, etc.)**

c. Water runoff (including stormwater):

- 1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe. **Stormwater runoff will be directed to the southwest, into an existing high groundwater area.**
- 2) Could waste materials enter ground or surface waters? **No waste materials will be generated from this site.** If so, generally describe.

3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site?
Existing overall drainage patterns will not be altered. If so, describe.

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any: **None. A site plan will be prepared as part of the construction drawings showing overall surface water flow and direction.** **None, paved area is minimal.**

4. **Plants** [\[help\]](#)

a. Check the types of vegetation found on the site:

- ☐ deciduous tree: alder, maple, aspen, other
- ☒ evergreen tree: fir, cedar, pine, other
- ☒ shrubs
- ☐ grass
- ☐ pasture
- ☐ crop or grain
- ☐ Orchards, vineyards or other permanent crops.
- ☐ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
- ☐ water plants: water lily, eelgrass, milfoil, other
- ☐ other types of vegetation

b. What kind and amount of vegetation will be removed or altered? **Approx. six (6) evergreen (fir) trees will be removed.** **Trees shall be replaced at a 2:1 ratio**

c. List threatened and endangered species known to be on or near the site. **None known.**
Mazama Pocket Gopher known to be near the site, not on the site due to previously existing impervious surface.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any: **None.**

Trees shall be replaced at a 2:1 ratio

e. List all noxious weeds and invasive species known to be on or near the site. **None known.**

5. **Animals** [\[help\]](#)

a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site.

Examples include:

birds: hawk, heron, eagle, songbirds, other:
mammals: deer, bear, elk, beaver, other:

fish: bass, salmon, trout, herring, shellfish, other _____

- b. List any threatened and endangered species known to be on or near the site. **Mazama pocket gopher.**

Mazama Pocket Gopher known to be near the site, not on the site due to previously existing impervious surface.

- c. Is the site part of a migration route? **No.** If so, explain.

- d. Proposed measures to preserve or enhance wildlife, if any: **None.**

- e. List any invasive animal species known to be on or near the site. **None known.**

6. Energy and Natural Resources [\[help\]](#)

- a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc. **None.**
- b. Would your project affect the potential use of solar energy by adjacent properties? **Possibly.** If so, generally describe. **The planned height (128 feet) of this water reservoir may obscure sunlight from the (wooded, undeveloped) property located on the north side of 103rd Ave SE.**
- c. What kinds of energy conservation features are included in the plans of this proposal? **None.** List other proposed measures to reduce or control energy impacts, if any:

7. Environmental Health [\[help\]](#)

- a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? **No.** If so, describe.
- 1) Describe any known or possible contamination at the site from present or past uses. **None known. Site was most recently used as residential (mobile home).**
 - 2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity. **None known.**
 - 3) Describe any toxic or hazardous chemicals that might be stored, used, or produced

during the project's development or construction, or at any time during the operating life of the project. **None known.**

4) Describe special emergency services that might be required. **None.**

5) Proposed measures to reduce or control environmental health hazards, if any: **None.**

b. Noise

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)? **None.**

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site. **None.**

3) Proposed measures to reduce or control noise impacts, if any: **None.**

8. Land and Shoreline Use [\[help\]](#)

a. What is the current use of the site and adjacent properties? **Site was most recently used as residential (mobile home).** Will the proposal affect current land uses on nearby or adjacent properties? **None.** If so, describe.

b. Has the project site been used as working farmlands or working forest lands? **Not known.** If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?

1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? **No.** If so, how:

c. Describe any structures on the site. **No structures remain. Previous mobile home has been removed, along with garage and shed.**

d. Will any structures be demolished? **Structures have been demolished by previous owner.** If so, what?

e. What is the current zoning classification of the site? **Moderate Density Residential (R-6)**

- f. What is the current comprehensive plan designation of the site? **Moderate Density Residential (R-6)**
- g. If applicable, what is the current shoreline master program designation of the site? **N/A**
- h. Has any part of the site been classified as a critical area by the city or county? **High groundwater area located along the southwest boundary of the proposed Lot 1.** If so, specify.
All of Yelm is considered a critical aquifer recharge area.
- i. Approximately how many people would reside or work in the completed project? No residents. **Occasionally, one or two City water employees would visit the site to perform routine maintenance duties.**
- j. Approximately how many people would the completed project displace? **Zero.**
- k. Proposed measures to avoid or reduce displacement impacts, if any: **N/A**
- l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any: **None.**
- m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any: **N/A**

9. Housing [\[help\]](#)

- a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing. **Zero.**
- b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing. **None.**
- c. Proposed measures to reduce or control housing impacts, if any: **None.**

10. Aesthetics [\[help\]](#)

- a. What is the tallest height of any proposed structure(s), not including antennas **128 feet**; what is the principal exterior building material(s) proposed? **Steel sheeting.**
- b. What views in the immediate vicinity would be altered or obstructed? **None. Most of the existing tall fir trees on this site will remain, in order to help obscure the view of the reservoir from nearby residents and businesses.**
- b. Proposed measures to reduce or control aesthetic impacts, if any: **The City is planning to paint the exterior of this reservoir with a “forest/tree” mural, similar to that used at the City’s SW Reservoir site.**

11. Light and Glare [\[help\]](#)

- a. What type of light or glare will the proposal produce? What time of day would it mainly occur? **Security lighting at night. Most likely two (2)-200-watt LED light poles.**
- b. Could light or glare from the finished project be a safety hazard or interfere with views? **No.**
- c. What existing off-site sources of light or glare may affect your proposal? **None.**
- d. Proposed measures to reduce or control light and glare impacts, if any: **None.**

12. Recreation [\[help\]](#)

- a. What designated and informal recreational opportunities are in the immediate vicinity?
Longmire Park (City of Yelm) is located approx. ¾ mile to the north-northeast.
- b. Would the proposed project displace any existing recreational uses? **No.** If so, describe.
- c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any: **None.**

13. Historic and cultural preservation [\[help\]](#)

- a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers ? **None known.** If so, specifically describe.

- b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? **None known or observed.** This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? **None known or observed.** Please list any professional studies conducted at the site to identify such resources.
- c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.

Thurston County GeoData, and GIS data

- d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.
None.

14. Transportation [\[help\]](#)

- a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. **103rd Ave SE runs east-west along the northern boundary of this property. Walmart Blvd. (future State Hwy 510 Loop) runs north-south along the west boundary of the parent parcel.** Show on site plans, if any. **Adjacent streets are shown on the Site Plan (previously submitted).**
- b. Is the site or affected geographic area currently served by public transit? If so, generally describe. **No.** If not, what is the approximate distance to the nearest transit stop? **InterCity Transit Bus #94 stops at the Walmart store. This bus stop is located approximately 1,600 feet southwest of this site.**
- c. How many additional parking spaces would the completed project or non-project proposal have? **Two (2) parking spaces for maintenance vehicles are anticipated. Parking for approx. four (4) vehicles existed at this site for its former use (residential).** How many would the project or proposal eliminate? **Approx. 2 eliminated.**
- d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? **No.** If so, generally describe (indicate whether public or private). **Off-site improvements included extension of an existing water main to the north boundary of this property. These improvements were completed in early 2020.**
- e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? **No.** If so, generally describe.

f. How many vehicular trips per day would be generated by the completed project or proposal? **Zero.** If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). **Zero.** What data or transportation models were used to make these estimates? **None.** **The planned use is a potable water storage reservoir (tank). This facility would be served by occasional (weekly) City water personnel for maintenance purposes only.** **Occasionally**

g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? **No.** If so, generally describe.

h. Proposed measures to reduce or control transportation impacts, if any: **None.**

15. Public Services [\[help\]](#)

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? **No.** If so, generally describe.

b. Proposed measures to reduce or control direct impacts on public services, if any. **None.**

16. Utilities [\[help\]](#)

a. Circle utilities currently available at the site:

electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other. **All of the above utilities/services are available, although only electricity and water are anticipated to be used.**

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed. **This project will provide for storage of potable water. This facility will be owned, operated and maintained by the City of Yelm.**

Electricity (Puget Sound Energy) and water (City of Yelm).

C. Signature [\[HELP\]](#)

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: 

Name of signee Patrick T. Hughes, P.E.

Position and Agency/Organization City Engineer, City of Yelm

Date Submitted: April 4, 2022

D. Supplemental sheet for nonproject actions [\[HELP\]](#)

(IT IS NOT NECESSARY to use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

Proposed measures to avoid or reduce such increases are:

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

3. How would the proposal be likely to deplete energy or natural resources?

Proposed measures to protect or conserve energy and natural resources are:

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

Proposed measures to protect such resources or to avoid or reduce impacts are:

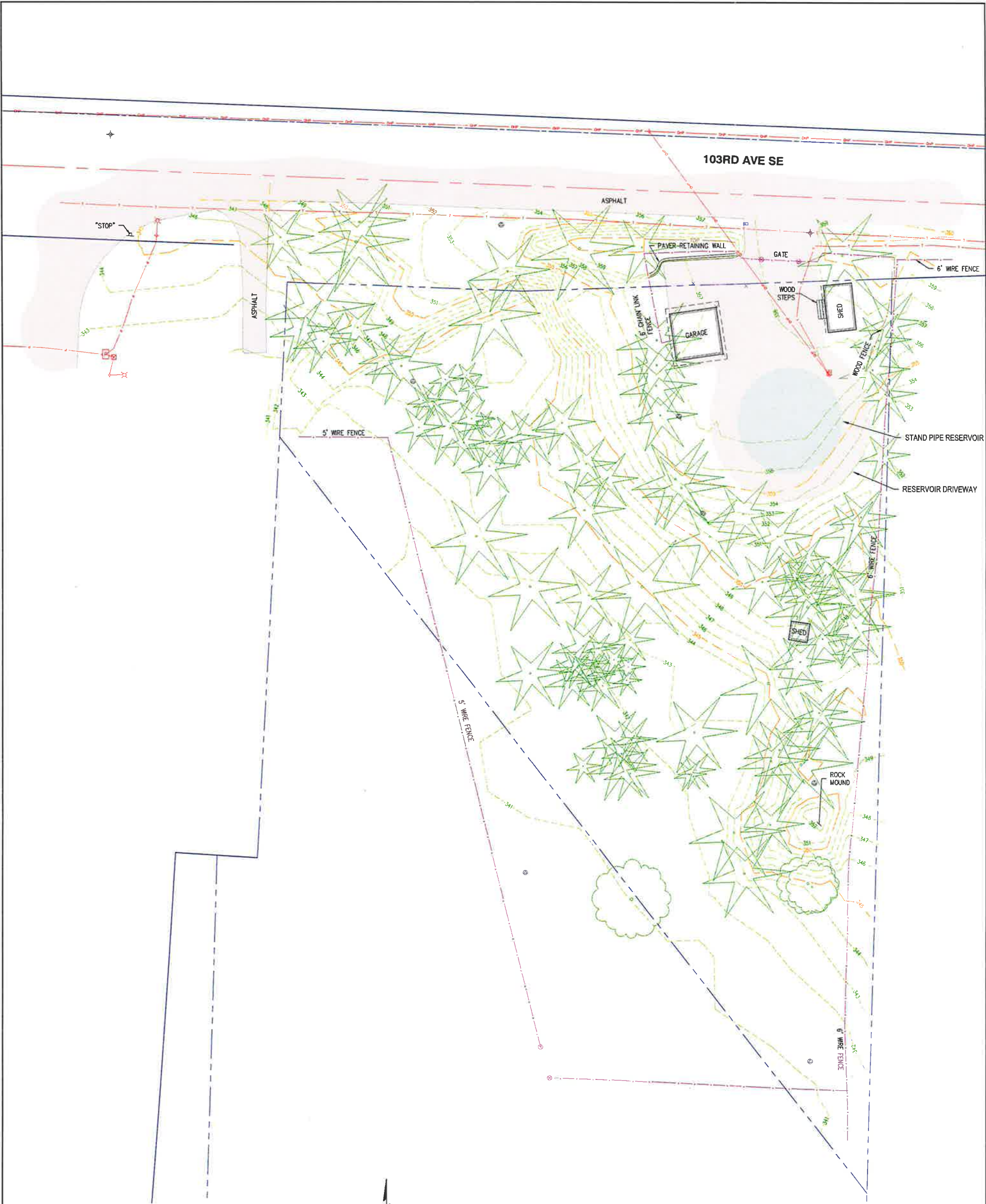
5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

Proposed measures to avoid or reduce shoreline and land use impacts are:

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

Proposed measures to reduce or respond to such demand(s) are:

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.



- | | |
|--|-------------------------|
| | ROADWAY ASPHALT AREA |
| | BUILDING FOUNDATION |
| | RESERVOIR |
| | OVERHEAD POWER |
| | UNDERGROUND POWER |
| | UNDERGROUND TELEPHONE |
| | RIGHT OF WAY CL |
| | RIGHT OF WAY LINE |
| | FENCE |
| | WOOD FENCE |
| | WSDOT RESTRICTED ACCESS |
| | TOP OF SLOPE |
| | SECTION LINE |
| | SURVEY BOUNDARY LINE |
| | POWER METER |
| | JUNCTION BOX (TYPE 1) |
| | POWER CABINET |
| | STREET LIGHT ASSEMBLY |
| | POWER POLE |
| | BOLLARD |
| | SIGN |
| | MAILBOX |
| | FENCE POST |
| | QUARTER CORNER |

PROPOSED SITE PLAN

1" = 20'

NOTES

- RESERVOIR TYPE : STANDPIPE
RESERVOIR DIAMETER: 45 FEET
RESERVOIR HEIGHT: 128 FEET
RESERVOIR VOLUME: 1.55 MG
IMPERVIOUS AREA:
1,600 SF - ROOF
2,820 SF - DRIVEWAY
4,420 SF - TOTAL
- GRADING QUANTITIES
CUT: 800 CY
FILL: 0 CY
- STORMWATER DETENTION NOT REQUIRED
 - RESERVOIR PLACED ON CUT SURFACE (UNDISTURBED NATIVE)
 - 1:1 HEIGHT SETBACK NOT ACHIEVED

0 1" 2"
DRAWING IS NOT TO SCALE
IF BAR IS NOT 2" LONG



TECHNICAL MEMORANDUM

Client:	City of Yelm		
Project:	SE Reservoir		
Project File:	YELM 517.121.01.104	Project Manager:	Edwin Halim, PE
Composed by:	Jenny Sandifer		
Reviewed by:	Alicia Pettibone		
Subject:	Critical Areas Reconnaissance for Proposed Reservoir		
Date:	June 19, 2020		

Project Overview

The City of Yelm (City) proposes the Southeast (SE) Reservoir project, which is a capital improvement project recommended in the City's 2009 *Water System Plan* to meet storage demands. The proposed reservoir will provide additional supply to the southeastern section of the City and improve fire flows to the commercial area along East Yelm Avenue. In addition to providing standby, equalizing, and fire flow storage needed to accommodate growth, this reservoir will help improve system hydraulics, increase fire flow rates, and increase reliability.

Construction of the new reservoir is proposed on the northern portion of parcel no. 64303100500. The lower portion of the parcel is in the process of being developed for an apartment complex. The project site is situated in the City limits, within Section 29 of Township 17 North, Range 02 East. Construction is scheduled for 2021/2022.

The City retained RH2 Engineering, Inc., (RH2) to assist with siting, design, and permitting compliance for this project. To facilitate design of the reservoir, RH2 performed a critical areas reconnaissance of the parcel. Results of the investigation are documented herein.

Methodology

Prior to field investigations, RH2 reviewed the following background data:

- Parcel-specific reports such as City of Yelm Notice of Decision 2019.0051, Mitigated Determination of Non-Significance for SEPA 2019.0345.EN0003, *Daly Mazama Pocket Gopher (Thomomys mazama) Absence Report* (Callender, 2018), and *Geotechnical Engineering Report for Proposed Multi-Family Residential Development* (GeoResources, LLC, 2019) (information provided for the nearby Nisqually Landing Apartments by the City)¹.
- Existing and historical aerial photography (Google Earth).

¹ Callender, A. Land Services Northwest, LLC. (2018). *Daly Mazama Pocket Gopher (Thomomys Mazama) Absence Report*. Prepared for Dennis Daly.
GeoResources, LLC. (2019). *Geotechnical Engineering Report for Proposed Multi-Family Residential Development*. Prepared for The Iris Group, PLLC.

- Stream, wetland, high groundwater hazard area, and gopher soil mapping (Thurston County (County), Washington State Department of Ecology (Ecology), Washington Department of Fish and Wildlife (WDFW), and U.S. Fish and Wildlife Service (USFWS)).
- Topography (County and existing topographic site surveys provided by the City).
- Geologic hazards and LiDAR mapping (County and Washington State Department of Natural Resources (DNR)).
- Fish and wildlife occurrence data (DNR, WDFW, and USFWS).
- Soils data (Natural Resources Conservation Service (NRCS) Soil Conservation Service).

RH2 performed a site reconnaissance on May 29, 2020, to assess the presence of wetland, stream, and/or fish and wildlife habitat on the project site. Two soil test pits were dug by hand and assessed for wetland indicators. One of the test pits was located in the lowest elevational area, which is within 300 feet of the proposed reservoir (which is also mapped as wetland on the National Wetland Inventory). Site investigations were guided by the following methodologies:

- *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (Version 2.0) (U.S. Army Corps of Engineers (USACE) Publication ERDC/EL TR-10-3, 2010).
- *Corps of Engineers Wetlands Delineation Manual* (USACE Publication Y-87-1, 1987).
- *Washington State Wetland Rating System for Western Washington: 2014 Update* (Hruby, Ecology Publication 14-06-029, 2014).
- Local Critical Areas regulations (contained in Yelm Municipal Code (YMC) Chapter 18.21).

Site Investigation Findings

General

The proposed reservoir project location is approximately within the footprint of an existing residence that will be demolished. Generally, the reservoir site has been previously graded and cleared of vegetation. Immediately south of the reservoir site is a forested and rocky upland area, with slopes towards the south and west at up to 25-percent grade. A grass field previously graded, mowed, and used for grazing is located further south. **Attachment A** includes a preliminary proposed site plan; **Attachment B** includes relevant background information; **Attachment C** includes site investigation data, and **Attachment D** contains site photographs.

Wetlands and Streams

County critical areas mapping does not show wetlands or streams on the project site. However, the National Wetland Inventory (USFWS) shows a palustrine forested shrub and palustrine emergent wetland within 200 feet of the proposed reservoir site, oriented from northwest to southeast across the parcel. This area coincides with County-mapped high groundwater hazard areas, which are regulated by the City as frequently flooded areas per YMC 18.21.080. In this

same area, DNR mapping shows a Type F (fish-bearing) stream flowing to the northwest corner of the parcel.

No wetlands or streams were observed during RH2's reconnaissance of the project site. The reservoir site and surrounding 300 feet that were investigated are dominated by upland plant species. Soils observed are dry and indicative of upland soils. No ponding, drainage, or other wetland or stream hydrology is present.

Vegetation

The northern portion and eastern corner of the parcel is a forested area dominated by a Douglas fir (*Pseudotsuga menziesii*) canopy. Western serviceberry (*Amelanchier alnifolia*), snowberry (*Symphoricarpos albus*), tall Oregon grape (*Mahonia aquifolium*), bracken fern (*Pteridium aquilinum*), and trailing blackberry (*Rubus ursinus*) are common undergrowth species. In the Western Mountains, Valleys, and Coast region, these species are facultative upland (FACU) plants, meaning they rarely occur within wetlands. Species present in the herbaceous community south of the forested area include tall oat-grass (*Arrhenatherum elatius*), red fescue (*Festuca rubra*), garden vetch (*Vicia sativa*), ox-eye daisy (*Leucanthemum vulgare*), and bedstraw (*Galium aparine*). Except for red fescue, which is equally likely to occur in upland and wetland habitats, these species are typical of upland forests in Western Washington. A few domesticated apple (*Malus pumila*), Oregon ash (*Fraxinus latifolia*), and, and Douglas fir individuals, including a snag with evidence of use by cavity nesting birds, are scattered throughout the grass field area.

Other than the presence of limited Oregon ash individuals, no hydrophytic plants (i.e. species specifically adapted to inundated soil conditions) were observed on the project site. Conversely, the site is dominated by upland plant species.

No golden paintbrush (*Castilleja levisecta*), a federally threatened plant species known to occur in prairie habitats, was observed on the parcel.

Soils

The County-mapped high groundwater hazard area and National Wetland Inventory mapped wetland areas correspond with the Spanaway stony sandy loam, 3 to 15 percent slopes, soil map unit (NRCS, 2020). This soil is not rated as hydric and is described as somewhat excessively drained with no frequency of ponding. The remainder of the parcel is within the Spanaway gravelly sandy loam, 0 to 3 percent slopes, soil unit, which is described similarly by NRCS. Both soils develop from glacial outwash materials on plains and terraces.

Shallow soil test pits dug on the parcel revealed soils that coincided with the NRCS soil descriptions. The upper 1 foot of the soil profile was very dark brown (10 YR 2/2) or dark yellowish brown (10 YR 3/4) atop very dark brown loam soil with 20- to 60-percent gravels and cobbles. Soils were dry and no groundwater was encountered. No redoximorphic concentrations, depletions, or other hydric soil indicators were observed in the test pits. Deeper geologic test pits were excavated on the reservoir site by RH2's geologists the same day. No groundwater or saturated soils were encountered in the geologic test pits, the deepest of which was 10 feet below ground surface. A Geologic Technical Memorandum will be

prepared to include the findings of the geologic investigation, anticipated to be completed in June 2020.

Hydrology

Between shallow and geologic test pits, no soil saturation or groundwater was observed in the upper 10 feet of soil. No primary or secondary hydrology indicators were observed within 300 feet of the proposed reservoir site. Wetland hydrology is absent within the mapped high groundwater hazard and National Wetland Inventory wetland areas.

Wildlife

The following wildlife or indications of wildlife were observed during RH2's site investigation: American robin, songbirds, and mole. Racoons, small rodents, and birds of prey are anticipated to use the adjacent undeveloped areas.

WDFW Priority Habitats and Species (PHS) data shows two documented occurrences of the Mazama pocket gopher (*Thomomys mazama*) on the parcel immediately west of 170th Street SE. Four subspecies of the Mazama pocket gopher (MPG) occur in Washington and are listed as threatened under the Endangered Species Act. Land Services Northwest, LLC surveyed the parcel for evidence of MPG in 2018 and concluded the site did not contain mounds or other signs of MPG presence (Callender, 2018). No MPG mounds were observed during site investigations by RH2.

PHS data indicates Yuma myotis (*Myotis yumanensis*) breeding area and Townsend's big eared bat (*Corynorhinus townsendii*) roosts occur within the township that encompasses the project site. These species tend to select roosting and breeding sites near caves but may utilize the forested and grassland areas on and surrounding the site for foraging. No other priority habitats or threatened, endangered, or sensitive plant or animal species, or critical habitat are documented within 300 feet of the project site.

High Groundwater Hazard Areas

The proposed reservoir site is approximately 100 feet away from the County-mapped high groundwater hazard area. The project will be designed to avoid impacts, including stormwater, to this area by complying with YMC 18.21.080.

Conclusion

Based on RH2's review of existing environmental data, a completed critical areas reconnaissance, and professional experience, the proposed SE Reservoir project site **does not contain any wetland or stream habitat or accompanying fish and wildlife habitat conservation areas. No impacts to these critical areas are anticipated to result from the project. The high groundwater hazard area that exists approximately 100 feet from the reservoir site will not be impacted by the project.** If you have any questions or require additional information, please contact me at (425) 951-5436 or apettibone@rh2.com.

Attachments

Attachment A – Preliminary Site Plan

Attachment B – Background Environmental Data

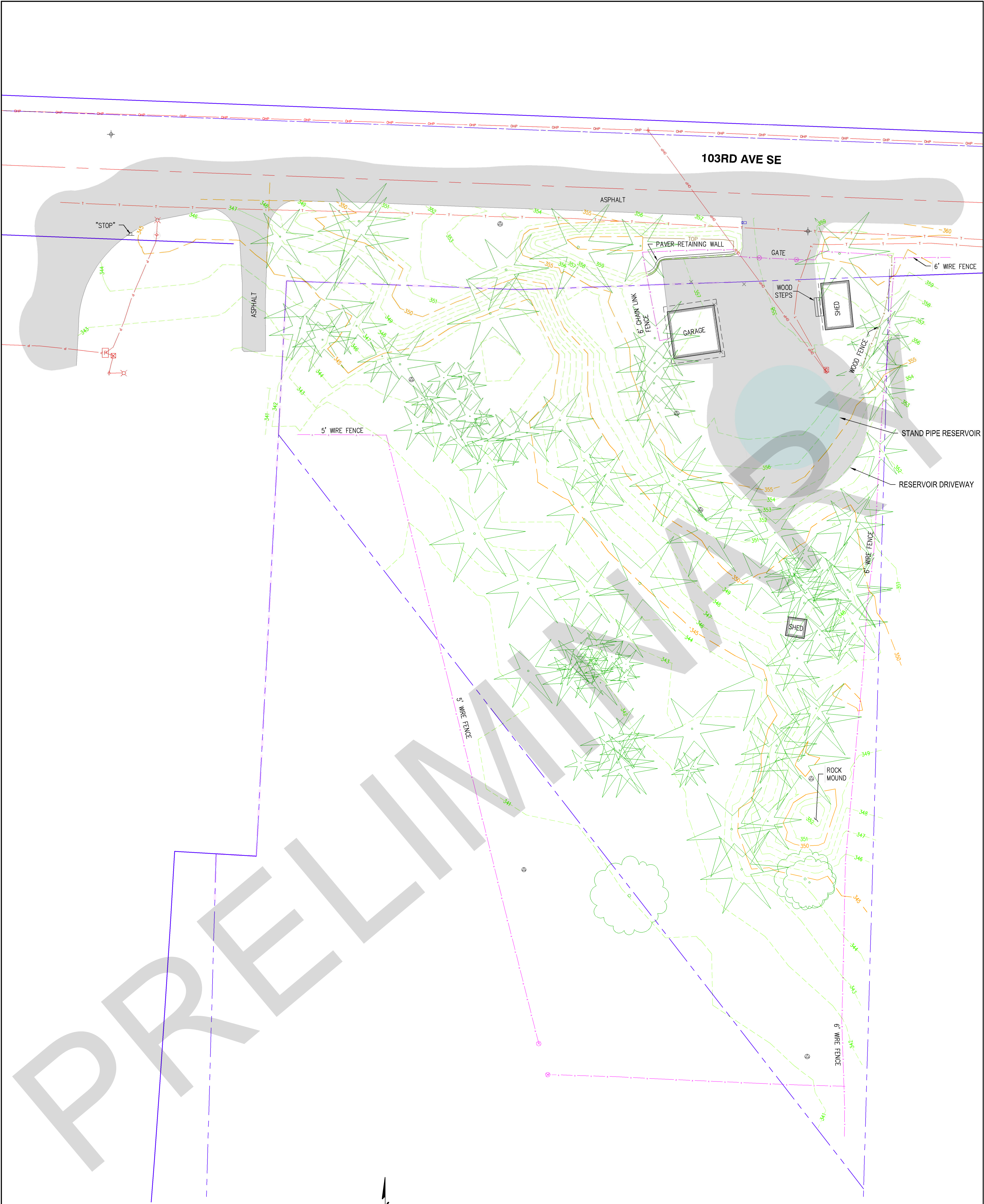
Attachment C—Site Investigation Data

Attachment D – Site Photographs

PRELIMINARY

Attachment A

Preliminary Site Plan



PROPOSED SITE PLAN

1" = 20'

- | | |
|--|-------------------------|
| | ROADWAY ASPHALT AREA/ |
| | BUILDING FOUNDATION |
| | RESERVOIR |
| | OVERHEAD POWER |
| | UNDERGROUND POWER |
| | UNDERGROUND TELEPHONE |
| | RIGHT OF WAY CL |
| | RIGHT OF WAY LINE |
| | FENCE |
| | WOOD FENCE |
| | WSDOT RESTRICTED ACCESS |
| | TOP OF SLOPE |
| | SECTION LINE |
| | SURVEY BOUNDARY LINE |
| | POWER METER |
| | JUNCTION BOX (TYPE 1) |
| | POWER CABINET |
| | STREET LIGHT ASSEMBLY |
| | POWER POLE |
| | BOLLARD |
| | SIGN |
| | MAILBOX |
| | FENCE POST |
| | QUARTER CORNER |

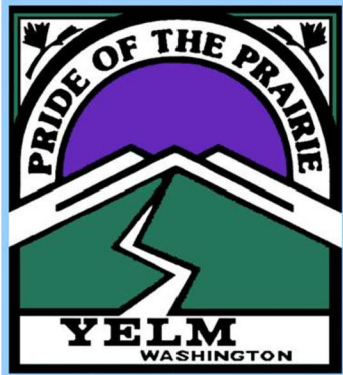
NOTES

RESERVOIR TYPE : STANDPIPE
RESERVOIR DIAMETER: 45 FEET
RESERVOIR HEIGHT: 128 FEET
RESERVOIR VOLUME: 1.55 MG
IMPERVIOUS AREA:
1,600 SF - ROOF
2,820 SF - DRIVEWAY
4,420 SF - TOTAL

GRADING QUANTITIES

- CUT: 800 CY
FILL: 0 CY
- STORMWATER DETENTION NOT REQUIRED
 - RESERVOIR PLACED ON CUT SURFACE (UNDISTURBED NATIVE)
 - 1:1 HEIGHT SETBACK NOT ACHIEVED

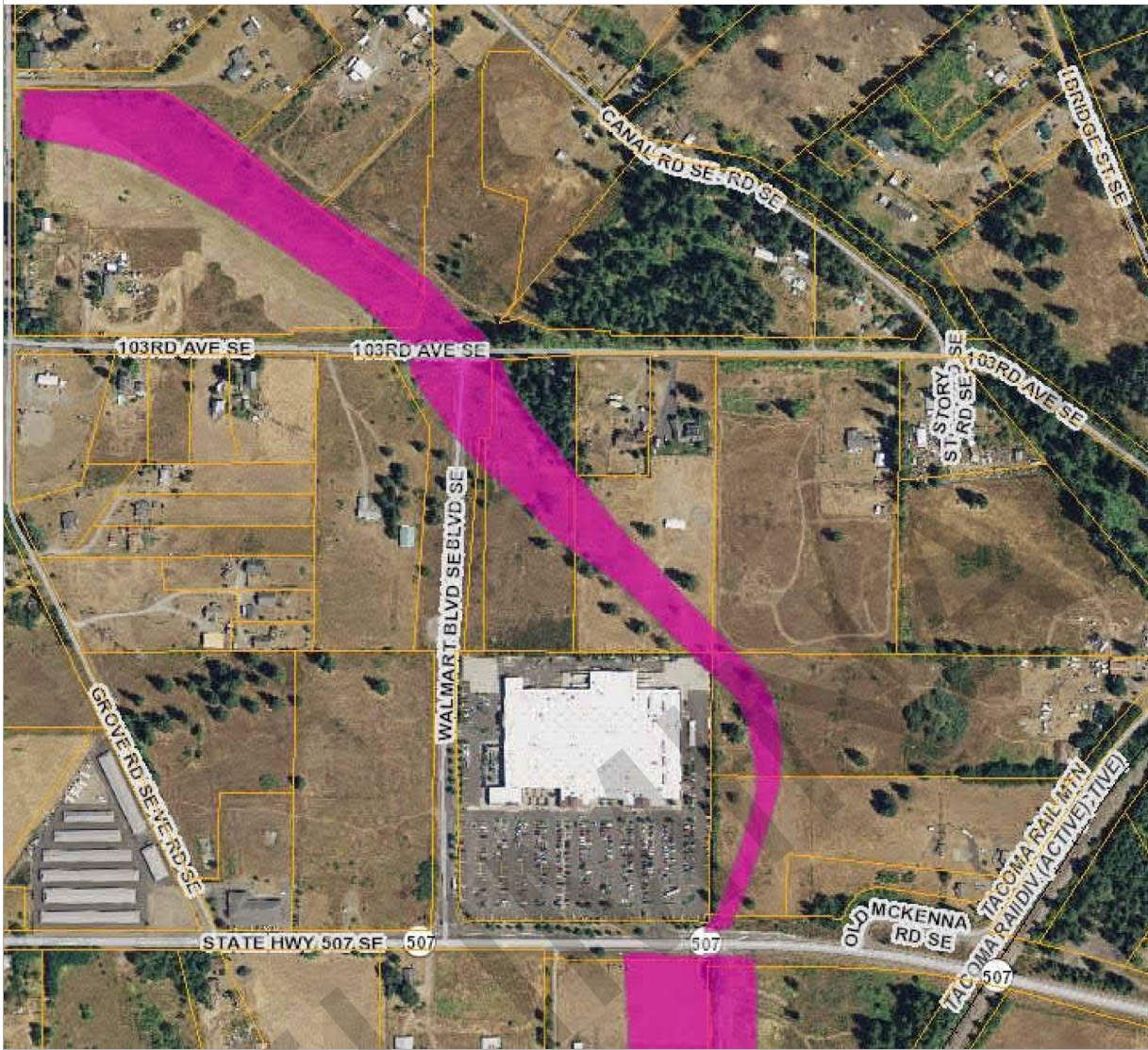
0 1" 2"
DRAWING IS NOT TO SCALE
IF BAR IS NOT 2" LONG



Attachment B

Background Environmental Data

High GW Hazard Areas



Legend

High Groundwater Hazard Areas

High Groundwater Hazard Area

Salmon Creek High Groundwater Hazard

Parcel Boundaries

Roads - Major

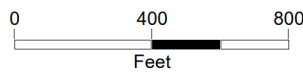
Major Roads

Ramp

I 5; US 101

Roads (Large Scale)

Scale 1: 8,338



Map Created Using GeoData Public Website

Published: 5/28/2020

Note:



The information included on this map has been compiled by Thurston County staff from a variety of sources and is subject to change without notice. Additional elements may be present in reality that are not represented on the map. Ortho-photos and other data may not align. The boundaries depicted by these datasets are approximate. This document is not intended for use as a survey product. ALL DATA IS EXPRESSLY PROVIDED 'AS IS' AND 'WITH ALL FAULTS'. Thurston County makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. In no event shall Thurston County be liable for direct, indirect, incidental, consequential, special, or tort damages of any kind, including, but not limited to, lost revenues or lost profits, real or anticipated, resulting from the use, misuse or reliance of the information contained on this map. If any portion of this map or disclaimer is missing or altered, Thurston County removes itself from all responsibility from the map and the data contained within. The burden for determining fitness for use lies entirely with the user and the user is solely responsible for understanding the accuracy limitation of the information contained in this map. Authorized for 3rd Party reproduction for personal use only.



U.S. Fish and Wildlife Service

National Wetlands Inventory

Yelm SE Reservoir Site



October 2, 2019

Wetlands

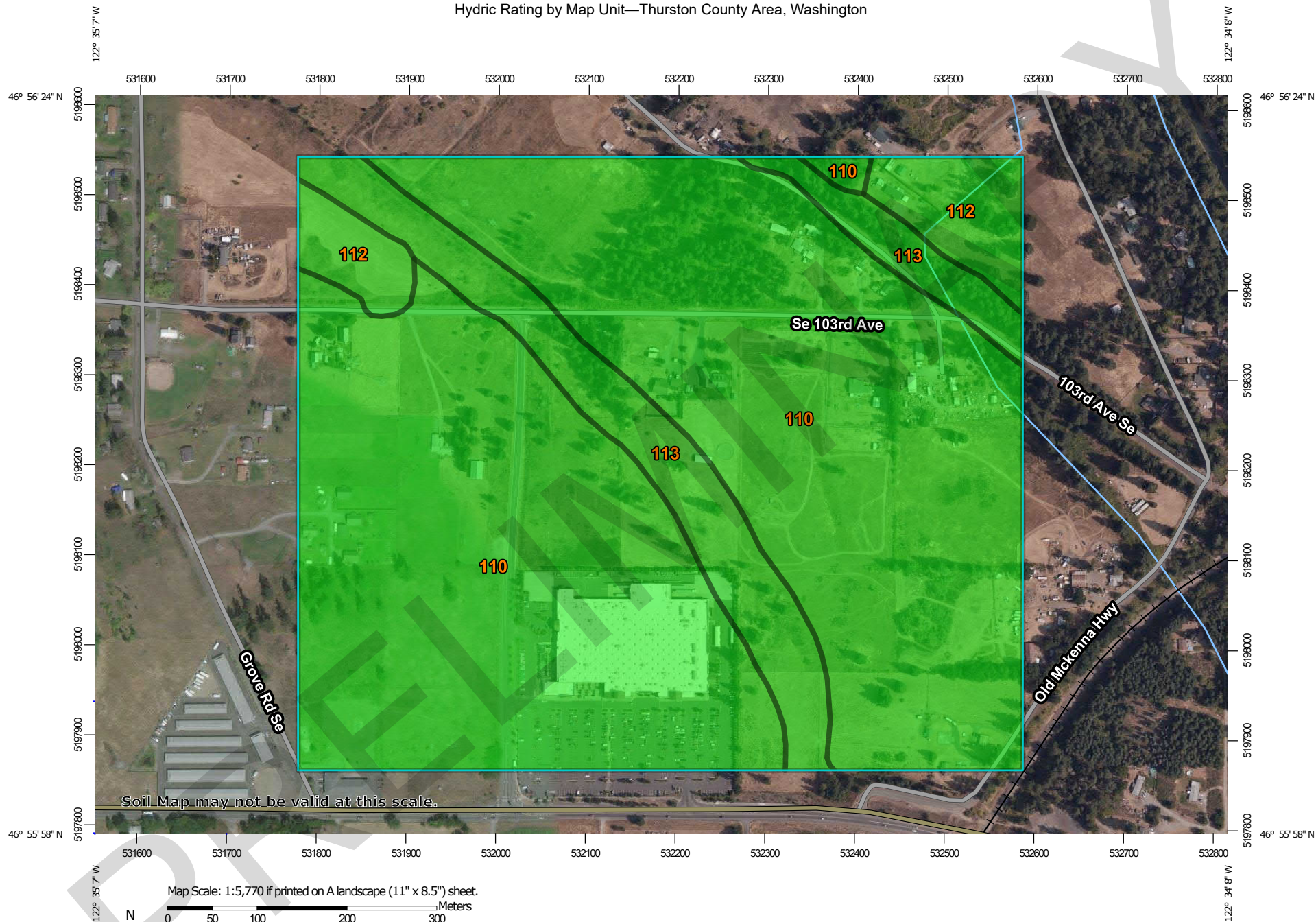
- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

Hydric Rating by Map Unit—Thurston County Area, Washington



Soil Map may not be valid at this scale.

Map Scale: 1:5,770 if printed on A landscape (11" x 8.5") sheet.

0 50 100 200 300 Meters

0 250 500 1000 1500 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84




**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

5/28/2020
Page 1 of 5







MAP LEGEND

Area of Interest (AOI)







 Area of Interest (AOI)

Soils







Soil Rating Polygons

-  Hydric (100%)
-  Hydric (66 to 99%)
-  Hydric (33 to 65%)
-  Hydric (1 to 32%)
-  Not Hydric (0%)
-  Not rated or not available

Soil Rating Lines

-  Hydric (100%)
-  Hydric (66 to 99%)
-  Hydric (33 to 65%)
-  Hydric (1 to 32%)
-  Not Hydric (0%)
-  Not rated or not available






Soil Rating Points

-  Hydric (100%)
-  Hydric (66 to 99%)
-  Hydric (33 to 65%)
-  Hydric (1 to 32%)
-  Not Hydric (0%)
-  Not rated or not available

Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Thurston County Area, Washington
Survey Area Data: Version 13, Sep 16, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 29, 2016—Sep 2, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydric Rating by Map Unit

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
110	Spanaway gravelly sandy loam, 0 to 3 percent slopes	0	112.2	82.1%
112	Spanaway stony sandy loam, 0 to 3 percent slopes	0	7.5	5.5%
113	Spanaway stony sandy loam, 3 to 15 percent slopes	0	16.9	12.4%
Totals for Area of Interest			136.6	100.0%

Description

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Rating Options

Aggregation Method: Percent Present

Component Percent Cutoff: None Specified

Tie-break Rule: Lower



WASHINGTON DEPARTMENT OF FISH AND WILDLIFE

PRIORITY HABITATS AND SPECIES REPORT

SOURCE DATASET: PHSPublic
REPORT DATE: 05/28/2020 1.57

Query ID: P200528135725

Common Name Scientific Name Notes	Site Name Source Dataset Source Record Source Date	Priority Area Occurrence Type More Information (URL) Mgmt Recommendations	Accuracy	Federal Status State Status PHS Listing Status	Sensitive Data Resolution	Source Entity Geometry Type
Freshwater Emergent	N/A NWIWetlands	Aquatic Habitat Aquatic habitat http://www.ecy.wa.gov/publications/pub.php?	NA	N/A N/A PHS Listed	N AS MAPPED	US Fish and Wildlife Service Polygons
Freshwater Forested/Shrub	N/A NWIWetlands	Aquatic Habitat Aquatic habitat http://www.ecy.wa.gov/publications/pub.php?	NA	N/A N/A PHS Listed	N AS MAPPED	US Fish and Wildlife Service Polygons
Mazama (Western) pocket Thomomys mazama	103RD ROW WS_OccurPoint 141180 November 07, 2013	Occurrence Biotic detection http://wdfw.wa.gov/publications/pub.php?	GPS	Threatened Threatened PHS LISTED	N AS MAPPED	WA Dept. of Fish and Wildlife Points
Mazama (Western) pocket Thomomys mazama	103RD ROW WS_OccurPoint 141181 November 07, 2013	Occurrence Biotic detection http://wdfw.wa.gov/publications/pub.php?	GPS	Threatened Threatened PHS LISTED	N AS MAPPED	WA Dept. of Fish and Wildlife Points
Mazama (Western) pocket Thomomys mazama	TENALQUOT PRAIRIE WS_OccurPolygon 4498 September 23, 2010	Occurrence Concentration http://wdfw.wa.gov/publications/pub.php?	GPS	Threatened Threatened PHS LISTED	N AS MAPPED	WA Dept. of Fish and Wildlife Polygons
Townsend's Big-eared Bat Corynorhinus townsendii	WS_OccurPoint 109970 June 22, 2009	Communal Roost Biotic detection http://wdfw.wa.gov/publications/pub.php?	GPS	N/A Candidate PHS LISTED	Y TOWNSHIP	WA Dept. of Fish and Wildlife Points
Townsend's Big-eared Bat Corynorhinus townsendii	WS_OccurPoint 109972 June 23, 2009	Communal Roost Biotic detection http://wdfw.wa.gov/publications/pub.php?	GPS	N/A Candidate PHS LISTED	Y TOWNSHIP	WA Dept. of Fish and Wildlife Points








Common Name	Site Name	Priority Area	Accuracy	Federal Status	Sensitive Data	Source Entity
Scientific Name	Source Dataset	Occurrence Type		State Status	Resolution	Geometry Type
Notes	Source Record	More Information (URL)		PHS Listing Status		
	Source Date	Mgmt Recommendations				
Yuma myotis		Breeding Area	GPS	N/A	Y	WA Dept. of Fish and Wildlife
Myotis yumanensis	WS_OccurPoint	Biotic detection		N/A	TOWNSHIP	Points
	141079					
	June 05, 2004	http://wdfw.wa.gov/publications/pub.php?		PHS LISTED		

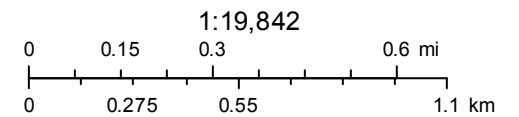
DISCLAIMER. This report includes information that the Washington Department of Fish and Wildlife (WDFW) maintains in a central computer database. It is not an attempt to provide you with an official agency response as to the impacts of your project on fish and wildlife. This information only documents the location of fish and wildlife resources to the best of our knowledge. It is not a complete inventory and it is important to note that fish and wildlife resources may occur in areas not currently known to WDFW biologists, or in areas for which comprehensive surveys have not been conducted. Site specific surveys are frequently necessary to rule out the presence of priority resources. Locations of fish and wildlife resources are subject to variation caused by disturbance, changes in season and weather, and other factors. WDFW does not recommend using reports more than six months old.

WDFW Test Map



May 28, 2020

- | | | | | | |
|---|----------------------|---|---|---|----------|
|  | PHS Report Clip Area | POLY |  | QTR-TWP | |
|  | PT |  | AS MAPPED |  | TOWNSHIP |
|  | LN |  | SECTION | | |



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Forest Practices Activity Map - Application



Map Symbols

~~~	Harvest Boundary	●	Landing
---	Road Construction	▽	Waste Area
~	Stream	🌲	Clumped WRTS/GRTS
▨	RMZ / WMZ Buffers	🏠	Existing Structure
✂	Rock Pit		

## Additional Information

Extreme care was used during the compilation of this map to ensure its accuracy. However, due to changes in data and the need to rely on outside information, the Department of Natural Resources cannot accept responsibility for errors or omissions, and therefore, there are no warranties that accompany this material.

## Legal Description

S29 T17.0N R02.0E, S20 T17.0N R02.0E



Date: 6/2/2020

Time: 10:20:45 AM



# IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

## Location

Thurston County, Washington



## Local office

Washington Fish And Wildlife Office

☎ (360) 753-9440

📠 (360) 753-9405

510 Desmond Drive Se, Suite 102  
Lacey, WA 98503-1263

<http://www.fws.gov/wafwo/>

# Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species¹ and their critical habitats are managed by the [Ecological Services Program](#) of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries²).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact [NOAA Fisheries](#) for [species under their jurisdiction](#).

1. Species listed under the [Endangered Species Act](#) are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the [listing status page](#) for more information.
2. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

## Mammals

NAME	STATUS
Fisher <i>Pekania pennanti</i> No critical habitat has been designated for this species. <a href="https://ecos.fws.gov/ecp/species/3651">https://ecos.fws.gov/ecp/species/3651</a>	Threatened

Olympia Pocket Gopher *Thomomys mazama pugetensis* Threatened  
There is **final** critical habitat for this species. Your location is outside the critical habitat.  
<https://ecos.fws.gov/ecp/species/6713>

Tenino Pocket Gopher *Thomomys mazama tumuli* Threatened  
There is **final** critical habitat for this species. Your location is outside the critical habitat.  
<https://ecos.fws.gov/ecp/species/6290>

Yelm Pocket Gopher *Thomomys mazama yelmensis* Threatened  
There is **final** critical habitat for this species. Your location is outside the critical habitat.  
<https://ecos.fws.gov/ecp/species/7257>

## Birds

NAME	STATUS
Marbled Murrelet <i>Brachyramphus marmoratus</i> There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat. <a href="https://ecos.fws.gov/ecp/species/4467">https://ecos.fws.gov/ecp/species/4467</a>	Threatened
Streaked Horned Lark <i>Eremophila alpestris strigata</i> There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat. <a href="https://ecos.fws.gov/ecp/species/7268">https://ecos.fws.gov/ecp/species/7268</a>	Threatened
Yellow-billed Cuckoo <i>Coccyzus americanus</i> There is <b>proposed</b> critical habitat for this species. Your location is outside the critical habitat. <a href="https://ecos.fws.gov/ecp/species/3911">https://ecos.fws.gov/ecp/species/3911</a>	Threatened

## Amphibians

NAME	STATUS
Oregon Spotted Frog <i>Rana pretiosa</i> There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat. <a href="https://ecos.fws.gov/ecp/species/6633">https://ecos.fws.gov/ecp/species/6633</a>	Threatened

## Fishes

NAME	STATUS
Bull Trout <i>Salvelinus confluentus</i> There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat. <a href="https://ecos.fws.gov/ecp/species/8212">https://ecos.fws.gov/ecp/species/8212</a>	Threatened

# Flowering Plants

NAME

STATUS

Golden Paintbrush *Castilleja levisecta*  
No critical habitat has been designated for this species.  
<https://ecos.fws.gov/ecp/species/7706>

Threatened

Water Howellia *Howellia aquatilis*  
No critical habitat has been designated for this species.  
<https://ecos.fws.gov/ecp/species/7090>

Threatened

## Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

## Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

1. The [Migratory Birds Treaty Act](#) of 1918.
2. The [Bald and Golden Eagle Protection Act](#) of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern <http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>
- Measures for avoiding and minimizing impacts to birds <http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php>
- Nationwide conservation measures for birds <http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf>

THERE ARE NO MIGRATORY BIRDS OF CONSERVATION CONCERN EXPECTED TO OCCUR AT THIS LOCATION.

**Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.**

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests



and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures](#) and/or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

#### **What does IPaC use to generate the migratory birds potentially occurring in my specified location?**

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [AKN Phenology Tool](#).

#### **What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?**

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

#### **How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?**

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: [The Cornell Lab of Ornithology All About Birds Bird Guide](#), or (if you are unsuccessful in locating the bird of interest there), the [Cornell Lab of Ornithology Neotropical Birds guide](#). If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

#### **What are the levels of concern for migratory birds?**

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

## Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

## What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

## Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

## Facilities

### National Wildlife Refuge lands

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

### Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

## Wetlands in the National Wetlands Inventory

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND

[PEM1C](#)

FRESHWATER FORESTED/SHRUB WETLAND

[PSSC](#)

RIVERINE

[R4SBC](#)

A full description for each wetland code can be found at the [National Wetlands Inventory website](#)

### Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

### Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tubercid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

### Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in



a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

**Attachment C**  
**Site Investigation Data**

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YELM SE RESERVOIR



Google Earth

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# WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Yelm SE Reservoir City/County: Thurston Co. - Yelm Sampling Date: 5/29/20  
 Applicant/Owner: Dennis Daly State: WA Sampling Point: TP 1  
 Investigator(s): A. Pettibone, J. Sandifer (R12) Section, Township, Range: T 17 N R 02 E S 29  
 Landform (hillslope, terrace, etc.): prairie Local relief (concave, convex, none): concave Slope (%): 5%  
 Subregion (LRR): A Lat: 46.936830 N Long: -122.578156 W Datum: NAD84  
 Soil Map Unit Name: Spanaway gravelly sandy loam 0-3% slopes NWI classification: R70K5  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)  
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐  
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		
Wetland Hydrology Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		
Remarks:			

## VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>r=30'</u> )	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. <u>Fraxinus latifolia</u>	<u>55</u>	<u>Y</u>	<u>≠ FACW</u>	
2. <u>Budotsuga menziesii</u>	<u>25</u>	<u>Y</u>	<u>≠ FACU</u>	Total Number of Dominant Species Across All Strata: <u>5</u> (B)
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>60%</u> (A/B)
4. _____	_____	_____	_____	Prevalence Index worksheet:
<u>80</u> = Total Cover				Total % Cover of: _____ Multiply by: _____
Sapling/Shrub Stratum (Plot size: <u>r=15'</u> )				OBL species _____ x 1 = _____
1. _____	_____	_____	_____	FACW species _____ x 2 = _____
2. _____	_____	_____	_____	FAC species _____ x 3 = _____
3. _____	_____	_____	_____	FACU species _____ x 4 = _____
4. _____	_____	_____	_____	UPL species _____ x 5 = _____
5. _____	_____	_____	_____	Column Totals: _____ (A) _____ (B)
_____ = Total Cover				Prevalence Index = B/A = _____
Herb Stratum (Plot size: <u>r=5'</u> )				Hydrophytic Vegetation Indicators:
1. <u>Alopecurus lanatus</u>	<u>30</u>	<u>Y</u>	<u>FAC</u>	1 - Rapid Test for Hydrophytic Vegetation
2. <u>Festuca rubra</u>	<u>15</u>	<u>N</u>	<u>FAC</u>	<input checked="" type="checkbox"/> 2 - Dominance Test is >50%
3. <u>Dactylis glomerata</u>	<u>7</u>	<u>N</u>	<u>FACU</u>	3 - Prevalence Index is ≤3.0 ¹
4. <u>Anthoxanthum odoratum</u>	<u>5</u>	<u>N</u>	<u>FACU</u>	4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet)
5. <u>Rumex acetosella</u>	<u>15</u>	<u>N</u>	<u>FACU</u>	5 - Wetland Non-Vascular Plants ¹
6. <u>Galium aparine</u>	<u>30</u>	<u>Y</u>	<u>FACU</u>	Problematic Hydrophytic Vegetation ¹ (Explain)
7. _____	_____	_____	_____	¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
8. _____	_____	_____	_____	Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
<u>102</u> = Total Cover				
Woody Vine Stratum (Plot size: <u>r=15'</u> )				
1. <u>Rubus americanus</u>	<u>10</u>	<u>Y</u>	<u>FAC</u>	
2. _____	_____	_____	_____	
<u>10</u> = Total Cover				
% Bare Ground in Herb Stratum <u>0</u>				
Remarks:				

## SOIL

Sampling Point: TP 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-5	10 YR 3/4	100	—	—	—	—	loam	70% fibrous roots, Humus
5-12	10 YR 2/2	100	—	—	—	—	gravelly loam	gravels 60%
12-16	10 YR 2/1	100	—	—	—	—	" "	gravels 30%

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 2 cm Muck (A10)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)	

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if present):</b> Type: _____ Depth (inches): _____	Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/>
--------------------------------------------------------------------------------	-----------------------------------------------------------------------

Remarks:

## HYDROLOGY

Wetland Hydrology Indicators:		
Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A)	<input type="checkbox"/> Raised Ant Mounds (D6) (LRR A)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Frost-Heave Hummocks (D7)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)		
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)		

<b>Field Observations:</b> Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? (includes capillary fringe) Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:



# WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Yelm SE Reservoir City/County: Thurston Co. - Yelm Sampling Date: 5/29/10  
 Applicant/Owner: Dennis Daly State: WA Sampling Point: TP 2  
 Investigator(s): A. Pettibone, J. Sandifer, RHZ Section, Township, Range: T 17 N R 02 E S 29  
 Landform (hillslope, terrace, etc.): prairie Local relief (concave, convex, none): concave Slope (%): 5%  
 Subregion (LRR): A Lat: 46.937304 N Long: -122.578268 W Datum: NAD 83  
 Soil Map Unit Name: Spanaway stony sandy loam, 3 + 15% slopes NWI classification: NPL  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)  
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐  
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		
Wetland Hydrology Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		
Remarks:			

## VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test worksheet:</b> Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>33%</u> (A/B)
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
= Total Cover				<b>Prevalence Index worksheet:</b> Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<b>Sapling/Shrub Stratum (Plot size: <u>15'</u>)</b>				
1. <u>Myrica pennsylvanica</u>	<u>20%</u>	<u>Y</u>	<u>NI</u>	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
= Total Cover				<b>Hydrophytic Vegetation Indicators:</b> ___ 1 - Rapid Test for Hydrophytic Vegetation ___ 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ 5 - Wetland Non-Vascular Plants ¹ ___ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
<b>Herb Stratum (Plot size: <u>5'</u>)</b>				
1. <u>Festuca rubra</u>	<u>70%</u>	<u>Y</u>	<u>FAC</u>	
2. <u>Vicia sativa</u>	<u>30%</u>	<u>Y</u>	<u>UPL</u>	
3. <u>Galium aparine</u>	<u>10%</u>	<u>N</u>	<u>FACU</u>	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
= Total Cover				
<b>Woody Vine Stratum (Plot size: _____)</b>				<b>Hydrophytic Vegetation Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
= Total Cover				
<b>% Bare Ground in Herb Stratum</b> <u>0</u>				
Remarks:				

## SOIL

Sampling Point: TP2

**Profile Description:** (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

[illegible]

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

### Indicators for Problematic Hydric Soils³:

- |                                                            |                                                                   |
|------------------------------------------------------------|-------------------------------------------------------------------|
| <input type="checkbox"/> Histosol (A1)                     | <input type="checkbox"/> Sandy Redox (S5)                         |
| <input type="checkbox"/> Histic Epipedon (A2)              | <input type="checkbox"/> Stripped Matrix (S6)                     |
| <input type="checkbox"/> Black Histic (A3)                 | <input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1) |
| <input type="checkbox"/> Hydrogen Sulfide (A4)             | <input type="checkbox"/> Loamy Gleyed Matrix (F2)                 |
| <input type="checkbox"/> Depleted Below Dark Surface (A11) | <input type="checkbox"/> Depleted Matrix (F3)                     |
| <input type="checkbox"/> Thick Dark Surface (A12)          | <input type="checkbox"/> Redox Dark Surface (F6)                  |
| <input type="checkbox"/> Sandy Mucky Mineral (S1)          | <input type="checkbox"/> Depleted Dark Surface (F7)               |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4)          | <input type="checkbox"/> Redox Depressions (F8)                   |

- ☐ 2 cm Muck (A10)  
☐ Red Parent Material (TF2)  
☐ Very Shallow Dark Surface (TF12)  
☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ☒

Remarks:

## HYDROLOGY

### Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

Secondary Indicators (2 or more required)

- |                                               |                                                     |                                                   |
|-----------------------------------------------|-----------------------------------------------------|---------------------------------------------------|
| ___ Surface Water (A1)                        | ___ Water-Stained Leaves (B9) ( <b>except</b>       | ___ Water-Stained Leaves (B9) ( <b>MLRA 1, 2,</b> |
| ___ High Water Table (A2)                     | ___ <b>MLRA 1, 2, 4A, and 4B)</b>                   | ___ <b>4A, and 4B)</b>                            |
| ___ Saturation (A3)                           | ___ Salt Crust (B11)                                | ___ Drainage Patterns (B10)                       |
| ___ Water Marks (B1)                          | ___ Aquatic Invertebrates (B13)                     | ___ Dry-Season Water Table (C2)                   |
| ___ Sediment Deposits (B2)                    | ___ Hydrogen Sulfide Odor (C1)                      | ___ Saturation Visible on Aerial Imagery (C9)     |
| ___ Drift Deposits (B3)                       | ___ Oxidized Rhizospheres along Living Roots (C3)   | ___ Geomorphic Position (D2)                      |
| ___ Algal Mat or Crust (B4)                   | ___ Presence of Reduced Iron (C4)                   | ___ Shallow Aquitard (D3)                         |
| ___ Iron Deposits (B5)                        | ___ Recent Iron Reduction in Tilled Soils (C6)      | ___ FAC-Neutral Test (D5)                         |
| ___ Surface Soil Cracks (B6)                  | ___ Stunted or Stressed Plants (D1) ( <b>LRR A)</b> | ___ Raised Ant Mounds (D6) ( <b>LRR A)</b>        |
| ___ Inundation Visible on Aerial Imagery (B7) | ___ Other (Explain in Remarks)                      | ___ Frost-Heave Hummocks (D7)                     |
| ___ Sparsely Vegetated Concave Surface (B8)   |                                                     |                                                   |

**Field Observations:**

Surface Water Present? Yes _____ No ☒ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? Yes _____ No ☒ Depth (inches): _____

(includes capillary fringe)

Wetland Hydrology Present? Yes _____ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Figure 19-7 Rainfall documentation worksheet

**Rainfall Documentation**  
(use with photographs)

Date: 5/29/20

Weather station: Olympia Airport Landowner: Dennis, Daly Tract no.: —

County: Thurston State: WA

Soil name: Spanaway Growing season: 4/15 - 10/27

Photo date: 5/29/20

→ Adjusted to be the 1st 29 days of May

Long-term rainfall records								
Month	3 yrs. in 10 less than	Normal	3 yrs. in 10 more than	Rain fall	Condition dry, wet, normal	Condition value	Month weight value	Product of previous two columns
1st prior month*	May	1.31	2.12	2.56	2.65	Wet	3	9
2nd prior month*	April	2.53	3.58	4.24	1.40	Dry	1	2
3rd prior month*	March	3.91	5.29	6.20	3.35	Dry	1	1
							Sum	12

* Compared to photo date

Note: If sum is

6 - 9	then prior period has been drier than normal
10 - 14	then prior period has been normal
15 - 18	then prior period has been wetter than normal

Condition value:

Dry	=1
Normal	=2
Wet	=3

Conclusions: Precipitation conditions prior to fieldwork considered normal.

## Attachment D

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### Site Photographs



## Site Photographs — SE Reservoir — City of Yelm

Critical Areas Site Investigations — May 29, 2020



Upland forest area south of the proposed reservoir site dominated by Douglas fir and various upland understory species. Facing northeast.



Glacial outcroppings south of the proposed reservoir site. Facing east.



Area mapped as high groundwater hazard area and NWI wetland. No wetland indicators were observed. Facing northeast.



Area mapped as high groundwater hazard area and NWI wetland. No wetland indicators were observed. Facing south.



A panoramic photograph of the northern half of the parcel taken from approximately the center of the parcel.



# RH2 TECHNICAL MEMORANDUM

---

Client:	City of Yelm		
Project:	SE Reservoir		
Project File:	YELM 517.121.01.104	Project Manager:	Clayton Posey, PE
Composed by:	Sue Cook, LG		
Reviewed by:	Steve Nelson, LG, LHG, LEG, and Geoff Dillard, PE		
Subject:	Engineering Geology Investigation		
Date:	July 27, 2020		

---



Suzanne Sweet Cook

Signed: 07/27/2020



STEPHEN ERIC NELSON

Signed: 07/27/2020



Signed: 07/27/2020

## INTRODUCTION

The City of Yelm (City) selected RH2 Engineering, Inc., (RH2) to provide professional services to locate and provide preliminary design for a reservoir in the southeastern section of the City, as recommended in the City's *2009 Water System Plan* to meet the City's water storage demands. Currently, all City sources and storage reservoirs are located at the central and western sections of the City's water system. The proposed SE Reservoir will provide additional storage for the southeastern section of the City and help improve fire flows to the commercial area along East Yelm Avenue toward Walmart. In addition to providing standby, equalization, and fire flow storage needed to accommodate growth, this reservoir will help improve system hydraulics, increase fire flow rates, and increase reliability. A new transmission main is anticipated to connect the proposed reservoir to the existing system.

This technical memorandum summarizes the findings of a limited subsurface investigation to observe, characterize, and document earth and groundwater conditions of the proposed SE Reservoir site, identify potential geologic hazards, provide a preliminary infiltration design rate for on-site stormwater management, and provide preliminary recommendations for design and construction of the proposed reservoir, transmission main, and other facility improvements.

The proposed SE Reservoir site (the Site) is located on the north portion of Parcel No. 64303100500, which is currently owned by Mr. Dennis Daly at 17021 103rd Avenue SE, Yelm, Washington. The Site is in the NW  $\frac{1}{4}$  of the NE  $\frac{1}{4}$  of Section 29, Township 17 N, Range 02 E, centered at latitude



46.9378 degrees north and longitude 122.5781 degrees west at approximately 355 feet in elevation above mean sea level (AMSL). The Site is located approximately 1 mile east of the center of the City of Yelm. The general layout of the property is shown in the attached **Proposed Site Plan**.

The area of the proposed reservoir and associated improvements is partially developed as a single-family residence and partially cleared of vegetation. The surrounding area is used primarily for residences, agriculture, and commercial business. The existing residence and improvements to the site generally are located on the northwest portion of the site, which has been partially cut and filled to create a level surface immediately surrounding the existing residence and driveway, as indicated by the topography shown on the attached **Proposed Site Plan**.

## PROPOSED SITE DESIGN

Construction of the proposed reservoir and transmission main will require excavating into native soil to create a level surface to install a stem wall and mat foundation that will support the reservoir. Trenches will be excavated to install 16-inch outside diameter (OD) ductile iron (DI) pipe to connect to a new transmission main that will be installed in 103rd Avenue SE during a separate phase of water system improvements. The Site will be graded to construct an asphalt-paved access road.

Stormwater generated on site will be managed in accordance with the Washington State Department of Ecology (Ecology) 2019 *Stormwater Management Manual for Western Washington* (SWMMWW), adopted by the City. Preliminary plans propose downspout infiltration for roof runoff and sheet flow dispersion or bioretention for pavement. A pond to detain 1 hour of reservoir overflow will be constructed on the site and may provide additional stormwater detention and infiltration.

## REGIONAL GEOLOGY

RH2 reviewed geologic maps and descriptions of regional geologic conditions provided by the Washington State Department of Natural Resources (WDNR) website (<https://geologyportal.dnr.wa.gov/>) and United States Geological Survey (USGS). RH2 reviewed the driller's logs for borings and wells completed within 1 mile of the Site and recorded at Ecology's well log website. Relevant logs are included in the **Soil Boring and Well Logs** attachment. RH2 reviewed a geotechnical investigation completed for the south half of the subject parcel provided by the City (*Geotechnical Engineering Report for Proposed Multi-Family Residential Development*, GeoResources, LLC, 2019). The **GeoResources Site Map** showing the geotechnical investigation locations for this report is attached.

The surficial geology unit mapped at the site is recessional glacial outwash consisting of poorly sorted, stratified gravel and sand with cobbles and boulders, and small amounts of silt and clay that includes ice-contact deposits and small amounts of ablation till. The National Resources Conservation Service (NRCS) identifies the local soil as Spanaway gravelly sandy loam and Spanaway stony sandy loam, which is derived from gravelly glacial outwash.

Monitoring wells installed on the southern half of the subject parcel indicate that groundwater exists within the recessional outwash at depths of about 13 to 15 feet below ground surface (bgs) (GeoResources, LLC, 2019). Monitoring well logs are attached in the **Soil Boring and Well Logs**.



The Thurston County-identified High Groundwater Hazard Area near the center of the parcel south of the proposed improvements is regulated by the City as frequently groundwater-flooded areas per Yelm Municipal Code (YMC) 18.21.080. The delineated hazard area is attached (**Thurston County High Groundwater Hazard Area**).

The WDNR website, based on the USGS National Earthquake Hazards Reduction Program, assigns a Seismic Site Class C, Hard Soil, and low risks of liquefaction, landslide, and erosion at the site.

## SITE INVESTIGATION

### Geologic Evaluation

Before site exploration, RH2 reviewed available geologic maps, soil maps, and soil boring and well logs for the local area. On May 29, 2020, RH2 observed the excavation of two exploration test pits (TP-1 and TP-2) to a depth of 8 to 8.5 feet bgs that were excavated by City staff with a City backhoe. A small-scale Pilot Infiltration Test (PIT) was performed in TP-1 at a depth of 3.5 feet bgs in general accordance with the 2019 Ecology SWMMWW. After completion of the test pits and infiltration test, the City backfilled the excavations with excavated soil and tamped. The test pit locations are shown on the attached **Proposed Site Plan. Test Pit Logs** and **PIT results** are attached.

RH2 observed soil samples retrieved from the excavations to identify stratigraphy, composition, texture, structure, and cohesion of native earth materials encountered in the excavations. The earth materials encountered in the excavations consisted of brown to gray, loose to dense sandy gravel with cobbles and boulders, and variable silt, which is interpreted as glacial recessional outwash. Loose cobbles and boulders were present at the ground surface at the test pit locations and surrounding the cut and fill level surface that supports the existing residence.

No groundwater seepage was encountered or entered the test pit excavations. Two monitoring wells on the southern portion of the parcel were completed in sediments interpreted to be recessional outwash (see attached **Soil Boring and Well Logs**). GeoResources (2019) observed water levels over the winter of 2018 to 2019 and reported a seasonal high groundwater level of 12.8 and 14.6 feet bgs, or 327 and 331 feet AMSL in B-1 and B-2, respectively.

### High Groundwater Hazard Area

As delineated on the **Thurston County High Groundwater Hazard Area**, the hazard area generally aligns with the lowest elevations of the parcel, south of the Site, generally below an elevation of 340 feet. The mapped groundwater flood elevation along the eastern edge of the hazard area, closest to the proposed improvements, corresponds to an elevation of about 341.5 feet AMSL according to topographic survey presented on the **Proposed Site Plan**.

RH2 did not observe indications of high groundwater in its geologic test pits to the terminal depths of approximately 8 to 8.5 feet bgs or approximately 341 feet AMSL (TP-1) and 342.5 feet AMSL (TP-2). Based on the findings of RH2's *Critical Areas Reconnaissance for Proposed Reservoir*, dated June 19, 2020, no soil saturation or groundwater was observed in shallow test pits up to 2 feet deep, no primary or secondary hydrology indicators were observed within 300 feet of the proposed reservoir site, and wetland hydrology features are absent within the mapped high groundwater hazard. Based on review of soil borings and test pits performed by GeoResources, including Test Pit 6 located



approximately 100 feet west of the proposed improvements within the High Groundwater Hazard Area, no indications of high groundwater or wet soils were encountered. Monitoring wells located on the south end of the parcel measured a seasonal high groundwater of approximately 331 feet AMSL in the winter of 2018-2019.

According to performance standards for High Groundwater Hazard Areas presented in YMC 18.21.080, no development shall occur within 50 feet of the edge or less than 2 feet above the base flood elevation of the hazard area. In addition, the base of stormwater infiltration facilities must be at least 6 feet above the base flood elevation. As delineated on the **Thurston County High Groundwater Hazard Area**, the proposed reservoir and access road improvements will be constructed more than 100 feet east of the eastern edge of the hazard area and their lowest elevation will be approximately 355 feet, which is more than 10 feet above the base flood elevation (341 feet AMSL) of the hazard area. The base of the stormwater infiltration facilities will be located above 347.5 feet elevation, which is approximately 6 feet above the mapped base flood elevation. The project will be designed to avoid impacts, including stormwater, to this area by complying with YMC 18.21.080.

### Infiltration Test

A small-scale PIT was performed in TP-1 at a depth of 3.5 feet in general accordance with the Ecology SWMMWW. Prior to testing, the test pit was excavated to a depth of approximately 3.5 feet with a bottom area of approximately 16 square feet. A garden hose attached to an outside house spigot was used to introduced water into the base of the excavation. The garden hose was inserted into a 5-foot-long section of slotted polyvinyl chloride (PVC) placed in the test pit to diffuse the flow and prevent sidewall erosion during the test. Flow rate was measured using a 5-gallon bucket and stopwatch and recorded when the flow was adjusted. A leveling rod marked with 0.01-foot increments was placed into the base of the pit to measure the water level during the test. Water levels were measured and recorded at a minimum of 15-minute increments. The test pit was initially filled to a depth of about 1 foot, and flow was adjusted at the spigot valve to maintain a constant head in the test pit between 0.7 to 1.3 feet throughout the soak and test period.

Approximately 1,300 gallons of water were introduced into the test pit over 6 hours of soak and test time. Immediately following the test period, flow was turned off and the falling water level (falling head test) was recorded for 26 minutes during which the water level dropped 0.43 feet.

After completion of the falling head test, the test pit was excavated approximately 5 feet deeper to observe the underlying sediments for evidence of perched groundwater or changes in stratigraphy that may restrict the downward flow of infiltrating water. Sediments below the test depth consisted of medium dense to dense sandy gravel with cobbles, few non-plastic fines, and trace boulders. No restrictive layers were observed in the deepened test pit, and no seepage or test water entered the test pit to the terminal depth.

**PIT Results** are attached and illustrate the water level during the soak, infiltration test, and falling head test periods. The final hour of the infiltration test and falling head test indicate a field infiltration rate of 12 inches per hour (IPH) prior to application of correction factors.



## GEOLOGIC HAZARDS

The WDNR website was reviewed for geologic hazards at the Site. The information that follows summarizes the geologic hazards and relative risk that they pose to the proposed reservoir.

- Risks from shallow and deep-seated landslides are negligible.
- Risks from surface water and groundwater flooding are low.
- The risk of earthquakes of magnitude 5 (M5) to 6 (M6) during the next 50 years is high (80 percent).
- Liquefaction risk is very low due to the coarse soil grain size and medium dense soil conditions.
- The risk of persistent groundwater seepage from surrounding native soil into site excavations during site development is low. Trace amounts of groundwater (less than 1 gallon per minute) may seep into excavations during late winter or spring months.
- The risk of caving and sidewall sloughing of native soil into open-cut trenches or excavations is moderate to high.
- An uncontrolled release or overflow of water from the reservoir or a break in the water main could allow water to flow to low lying areas of the Site south of the improvements.
- The risk of stormwater generated by the proposed improvements to impact the High Groundwater Hazard Area and low lying areas to the south is low due to the horizontal distance from the improvements and the delineated hazard area and the vertical (elevation) distance from the base of the stormwater facilities and the highest elevation of the hazard area.
- The risk of encountering soil or groundwater that potentially contains toxic or hazardous materials is low.

## GEOTECHNICAL PROPERTIES

The following geotechnical properties for the native soil at the Site are estimated based on the observed soil composition and density of the medium dense sandy gravel with cobbles unit at a depth of approximately 0 to 4 feet.

The native soil may support a structure with an appropriately designed foundation that spreads a load that does not exceed a net allowable bearing capacity of 3,000 pounds per square foot (psf). This estimate may be increased by one-third for transient loading due to seismic or wind effects.

The following earth pressures are estimated assuming a friction angle of 34 degrees and a unit weight of 115 pounds per cubic foot (pcf) for the native soil and compacted fill:

- At rest: 51 psf per foot of depth.
- Active: 33 psf per foot of depth.
- Passive: 271 psf per foot of depth.

The design can assume a coefficient of friction of 0.40 between native soil and granular fill.

The native soil should be considered as a Site Class C, Hard Soil.

## PROPOSED SITE CONSTRUCTION

The stem-wall and mat foundation for the proposed reservoir will be constructed by excavating to create a uniform level surface at a depth of 2 to 3 feet bgs. The associated water transmission main and stormwater piping will be constructed by excavating 3- to 4-foot-deep trenches into native soil and placing piping with imported bedding material and imported structural fill.

Stormwater infiltration Best Management Practices (BMPs) will be designed in accordance with the 2019 Ecology SWMMWW using the design infiltration rate recommended as follows, as needed. In accordance with City performance standards, the base of the stormwater infiltration facilities will be at least 6 feet above the base flood elevation and will be located above 347.5 feet AMSL.

The access road will be graded and covered with a layer of surfacing base coarse and paved with hot asphalt mix.

## RECOMMENDATIONS

### EXCAVATION FOR FOUNDATIONS AND UNDERGROUND UTILITIES

- The native soil and potential fill may be excavated readily with a backhoe or excavator. Large boulders and cobbles likely will be encountered during excavation and may be removed by over-excavation and replaced with structural backfill. Excavation should proceed until a uniformly dense surface has been cut into native soil at or below the design depth. Excavation for utility trenches below a depth of 4 feet will require shoring to maintain excavation sidewall stability for the safety of the workers.

### SLOPES AND SHORING

- The loose to medium dense recessional outwash may not support temporary slopes, and shoring would be required for excavations deeper than 4 feet.
- If present under existing improvements, excavations into native soil may support temporary slopes for a few hours to 24 hours at 2H:1V as long as they are protected from erosion, runoff, and vibration.
- Shoring should be designed to protect workers inside excavations and to support slopes, particularly where native soil or backfill associated with existing utilities may be loose. All excavations should comply with all Occupational Safety and Health Administration (OSHA) safety requirements.
- All excavated slopes should be reviewed periodically for stability, including review of the top of the slope for tension cracks and the sidewalls and floors for evidence of seepage or saturated soil conditions.
- The native soil and fill are moderately erodible. All excavated slopes should be protected from erosion during precipitation events by plastic sheeting or other techniques that prevent rain splash erosion and rilling.
- The maximum permanent slope constructed in the native soil should be no steeper than 3H:1V.



## INSPECTION AND TREATMENT OF SUBGRADE

- A Licensed Engineering Geologist (LEG) or Professional Engineer with geotechnical experience (PEG) should inspect the excavations to confirm whether the earth exposed during excavation is consistent with this technical memorandum and favorable for proceeding with the project as planned.

## SUBGRADE PREPARATION

- The excavation subgrade for the reservoir site should be flat and free of loose earth materials and cobbles and boulders greater than 4 inches in diameter. Any fill used to replace loose native soil or cobbles and boulders at the subgrade of the reservoir and BPS site should consist of imported trench backfill placed in 8-inch lifts and compacted with a plate compactor or equivalent. Each lift should be compacted to a firm and unyielding surface to achieve 95 percent of maximum dry density (MDD), as determined by the modified proctor test (ASTM D-1557).

## PIPE ZONE BEDDING

- Pipe zone bedding for utility trenches should be placed and compacted to a firm and unyielding condition at the base of the trench and with hand tools above the utilities.

## USE OF EXCAVATED EARTH MATERIALS

- Excavated native soil will contain a high percentage of fines, cobbles, and boulders and should be exported off site and not used for structural fill. However, if the excavated material is screened of material larger than 3 inches in diameter and is maintained at optimum soil moisture, the excavated material may be used for trench backfill above pipe zone bedding in areas that will not be covered by pavement.

## COMPACTION AND TESTING OF IMPORTED FILL

- Representative samples of imported fill should be tested to establish optimum moisture content and MDD.
- Imported trench backfill material should be tested for moisture content just prior to placement. Trench backfill should be within plus 3 percentage points of its optimum moisture content when placed.
- Trench backfill should be placed in lifts that are not more than 8 inches in thickness. Placement and compaction of the fill should be observed by an LEG or PEG.
- All imported fill used as backfill below the reservoir foundation and below pavement should be compacted to 95 percent of MDD, as determined in accordance with the modified proctor test (ASTM D-1557).
- All imported fill not placed below foundations and pavement should be compacted to 90 percent of MDD, as determined in accordance with the modified proctor test (ASTM D-1557).

## PRELIMINARY DESIGN INFILTRATION RATE

The simplified approach described in Section V-5.4 of the 2019 Ecology SWMMWW was used to estimate the design infiltration rate ( $K_{sat\text{design}}$ ) of native soil by applying appropriate correction factors to the field measured infiltration rate ( $K_{sat\text{initial}}$ ) of 12 IPH. Correction factors account for: 1) site variability and number of tests conducted ( $CF_v$ ); 2) uncertainty of the test method ( $CF_t$ ); and 3) the potential for long-term clogging due to siltation and bio-buildup ( $CF_m$ ).

Table V-5.1 in the SWMMWW provides correction factor values for small-scale PITs as follows:

$$CF_v = 0.33 \text{ to } 1.0;$$

$$CF_t = 0.50 \text{ for small-scale PIT; and}$$

$$CF_m = 0.9.$$

$CF_v$ , site variability, and number of tests conducted accounts for the level of uncertainty regarding how representative the test(s) are of the site conditions. In conditions where uncertainty is low because conditions are known to be uniform, a value on the high end of the range may be appropriate. When conditions may be highly variable with little certainty, a correction factor on the low end of the range may be appropriate. The explorations performed for this study and previous explorations performed on the parcel describe fairly uniform subsurface conditions across the Site and parcel, consisting of coarse recessional outwash. Additionally, the proposed improvements will generate less than 5,000 square feet of impervious surfaces over mainly existing impervious surfaces. Given the uniform conditions, permeable native soil, and limited new impervious surfaces added by the proposal, a  $CF_v$  value of 0.90 was chosen.

Correction factors  $CF_t$  and  $CF_m$  are prescribed in the SWMMWW.

Correction factors can be applied using the following equation:

$$K_{sat\text{design}} = K_{sat\text{initial}} \times CF_v \times CF_t \times CF_m$$

Therefore,

$$K_{sat\text{design}} = 12 \text{ IPH} \times 0.90 \times 0.50 \times 0.9$$

$$K_{sat\text{design}} = 4.9 \text{ IPH. This value should be used for onsite infiltration design.}$$

## ATTACHMENTS

1. Proposed Site Plan
2. Soil Boring and Well Logs
3. GeoResources Site Map
4. Thurston County High Groundwater Hazard Area
5. Test Pit Logs
6. PIT Results



## **Attachments**

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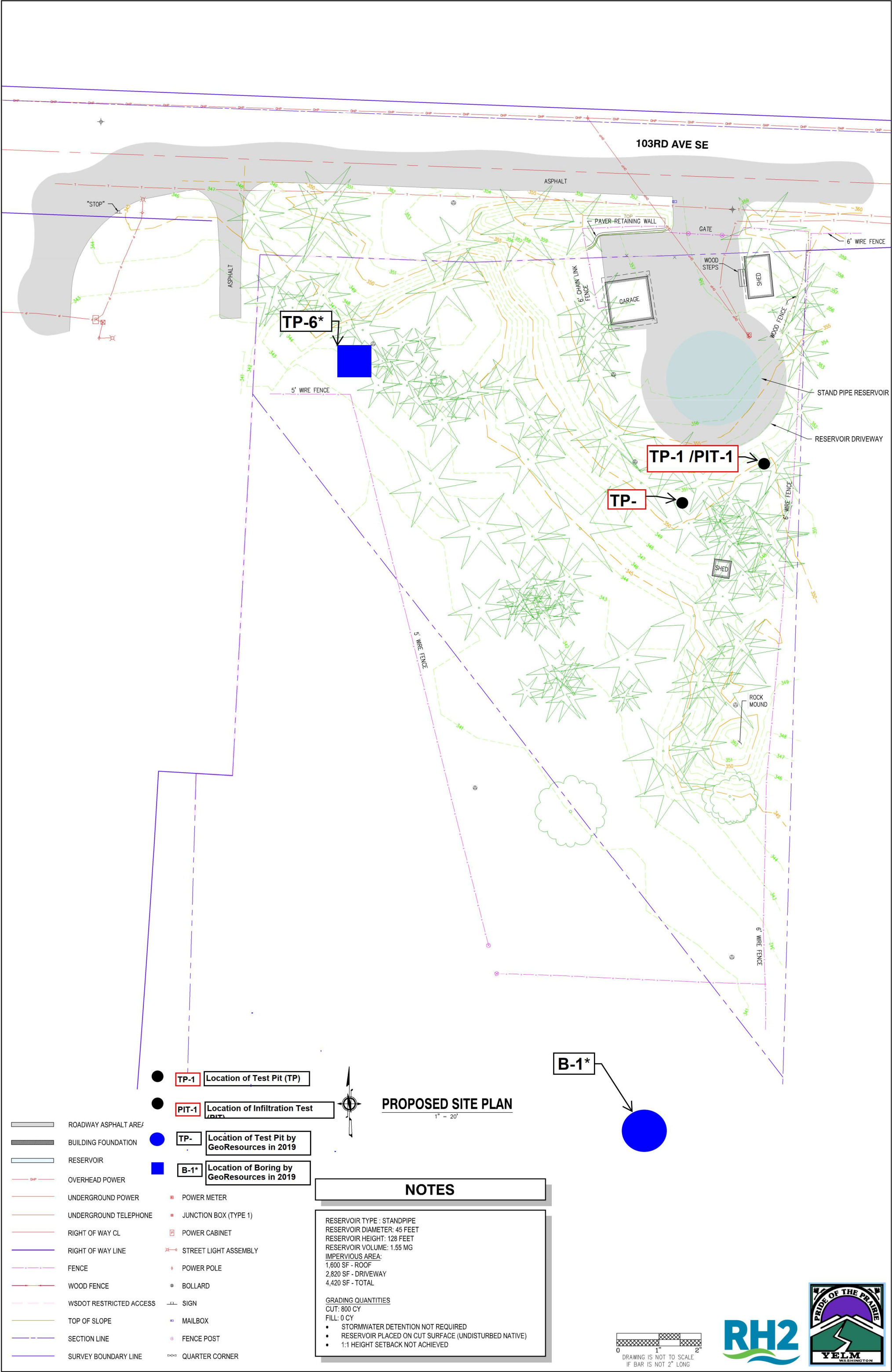
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## **Proposed Site Plan**

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## **Soil Boring and Well Logs**

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<b>TOTAL DEPTH:</b> 20.75 ft	<b>DRILLING METHOD:</b> HSA	<b>LOGGED BY:</b> VRM/NT
<b>TOP ELEVATION:</b> 340'	<b>DRILLING COMPANY:</b> Bore-tec	<b>HAMMER TYPE:</b> Cat head
<b>LATITUDE:</b>	<b>DRILL RIG:</b> EC95	<b>HAMMER WEIGHT:</b> 140 lbs
<b>LONGITUDE:</b>	<b>NOTES:</b>	

Depth	Elevation	SOIL DESCRIPTION	DRILLING NOTES	Sample	Sampler	Symbol	TEST RESULTS					Blow Count	Ground Water	Well Schematic
							Plastic Limit   Liquid Limit							
							% Water Content ●							
							% Fines (<0.075mm) ◇							
Penetration - ▲ (blows per foot)														
10 20 30 40 50														
0	340	Topsoil/duff												
		Brown sandy gravel with silt (medium dense, moist to wet)												
4	336			1								50/4		
8	332			2								16 50/2		
12	328													
16	324		No recovery	3								4 22 23		
20	320													
		Bottom of Boring Completed 11/16/18	Refused on boulder									16 50/3		
24	316													

#### NOTES

1. Refer to log key for definition of symbols, abbreviations and codes
2. USCS designation is based on visual manual classification and selected lab testing
3. Groundwater level, if indicated, is for the date shown and may vary
4. N.E. = Not Encountered

Proposed Apartments

### LOG OF BORING B-1

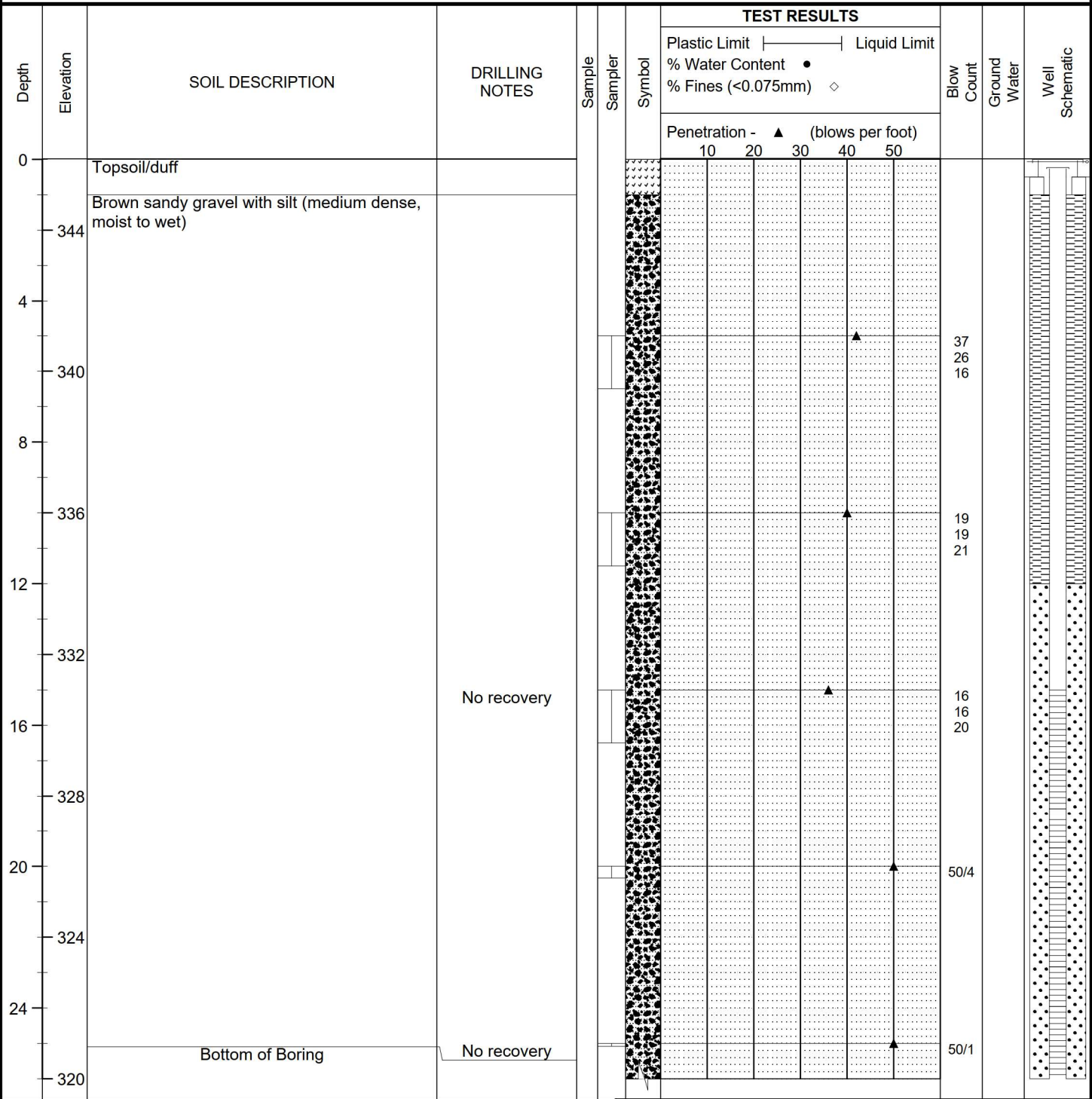
JOB: IrisGroup.103rdAveSE

Sheet of 3

GeoResources, LLC

FIG.

TOTAL DEPTH:	25.1	DRILLING METHOD:	HSA	LOGGED BY:	VRM/NT
TOP ELEVATION:	346'	DRILLING COMPANY:	Bore-tec	HAMMER TYPE:	Cat head
LATITUDE:		DRILL RIG:	EC95	HAMMER WEIGHT:	140 lbs
LONGITUDE:		NOTES:			



NOTES 1. Refer to log key for definition of symbols, abbreviations and codes 2. USCS designation is based on visual manual classification and selected lab testing 3. Groundwater level, if indicated, is for the date shown and may vary 4. N.E. = Not Encountered	Proposed Apartments	
	LOG OF BORING B-2	
	JOB: IrisGroup.103rdAveSE GeoResources, LLC	Sheet of 3 FIG.



TOTAL DEPTH: 25.1		DRILLING METHOD: HSA		LOGGED BY: VRM/NT	
TOP ELEVATION: 346'		DRILLING COMPANY: Bore-tec		HAMMER TYPE: Cat head	
LATITUDE:		DRILL RIG: EC95		HAMMER WEIGHT: 140 lbs	
LONGITUDE:		NOTES:			

Depth	Elevation	SOIL DESCRIPTION	DRILLING NOTES	Sample	Sampler	Symbol	TEST RESULTS					Blow Count	Ground Water	Well Schematic
							Plastic Limit   Liquid Limit % Water Content • % Fines (<0.075mm) ◇  Penetration - ▲ (blows per foot) 10 20 30 40 50							
320		Completed 11/16/18												
28														
316														
32														
312														
36														
308														
40														
304														
44														
300														
48														
296														
52														

NOTES

1. Refer to log key for definition of symbols, abbreviations and codes

2. USCS designation is based on visual manual classification and selected lab testing

3. Groundwater level, if indicated, is for the date shown and may vary

4. N.E. = Not Encountered

Proposed Apartments

LOG OF BORING B-2

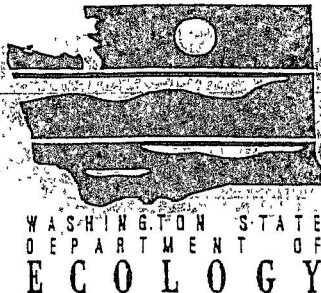
JOB: IrisGroup.103rdAveSE

GeoResources, LLC

Sheet of 3

FIG.

ECY 050-1-20



# Well Tagging Form

PWS ID #: W15177WSource #: 01Unique Well Tag No: AHF 036

## RECORD VERIFICATION (check one)



Well Report available (please attach this form to the well report and submit it to the Ecology Regional Office near you)



Verification inconclusive



Well Report not available

## PUBLIC WATER SYSTEM INFORMATION

Water System Name: Bridge Court C/O DAVID FiskStreet Address: 17216 SE. CARWilliam LANECity: YelmState: WA 98597

## LOCATION OF WELL, IF DIFFERENT FROM WELL REPORT

Well Address: 17242 SE. CARWilliam LANECity: YelmWACounty: THURSTONT. 17 N. R. 02 E W.M. Sec. 20 SW 1/4 of the NE

## FOR AGENCY USE ONLY

Latitude _____ "

Longitude _____ "

Elevation at land surface _____ feet/meters (circle one)

Additional information, if available:



Location marked on topographic map (please attach)



Location marked on air photo (please attach)



GPS

Topographic Map

Survey

Computer generated



Digital Altimeter

Topographic Map

Other Gis



354 feet AMSL  
WDNR

## WATER WELL REPORT

Start Card No. W058799  
Unique Well I.D. # ABY031  
Water Right Permit No.

STATE OF WASHINGTON

(1) OWNER: Name CHAMBERS, JOHN Address 1103 YELM AVENUE WEST YELM, WA 98597-  
(2) LOCATION OF WELL: County THURSTON - NE 1/4 NE 1/4 Sec 29 T 17 N., R 2E WM  
(2a) STREET ADDRESS OF WELL (or nearest address) 10424 OLD MCKENNA ROAD,

(3) PROPOSED USE: DOMESTIC

(10) WELL LOG

(4) TYPE OF WORK: Owner's Number of well  
(If more than one)  
NEW WELL Method: ROTARY

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change in formation.

(5) DIMENSIONS: Diameter of well 6 inches  
Drilled 120 ft. Depth of completed well 106 ft.

MATERIAL	FROM	TO
BROWN GRAY GRAVEL	0	25
W/ BOULDERS & COBBLES	0	25
BROWN GRAVEL COBBLES	25	34
BROWN SILTY GRAVEL & COBBLES	34	41
BROWN GRAVEL & COBBLES	41	52
BOULDER	52	55
CONGLOMERATE GRAVEL & COBBLES	55	61
BROWN SILTY ROCKS	61	65
BROWN SILT SOME GRAVEL	65	72
TIGHT BROWN SANDY GRAVEL	72	95
CLEAN TIGHT ANGULAR GRAVEL	95	108
TIGHT ANGULAR GRAVEL SILTY	108	120

(6) CONSTRUCTION DETAILS:  
Casing installed: 6 " Dia. from +1 ft. to 106 ft.  
WELDED " Dia. from ft. to ft.  
" Dia. from ft. to ft.

Perforations: NO

Type of perforator used	in. by	in.
SIZE of perforations	ft. to	ft.
perforations from	ft. to	ft.
perforations from	ft. to	ft.

Screens: NO

Manufacturer's Name

Type	Model No.
Diam. slot size	from ft. to ft.
Diam. slot size	from ft. to ft.

Gravel packed: NO Size of gravel  
Gravel placed from ft. to ft.

Surface seal: YES To what depth? 18 ft.  
Material used in seal BENTONITE CLAY  
Did any strata contain unusable water? NO  
Type of water? Depth of strata ft.  
Method of sealing strata off N/A

(7) PUMP: Manufacturer's Name  
Type N/A H.P.

(8) WATER LEVELS: Land-surface elevation  
above mean sea level ... ft.  
Static level 56 ft. below top of well Date 07/14/95  
Artesian Pressure lbs. per square inch Date  
Artesian water controlled by N/A

Work started 06/30/95

DEPARTMENT OF ECOLOGY  
S.W. REGIONAL OFFICE

95 AB-1 A8-36

RECEIVED

(9) WELL TESTS: Drawdown is amount water level is lowered below static level.

Was a pump test made? NO If yes, by whom?  
Yield: gal./min with ft. drawdown after hrs.

Recovery data  
Time Water Level Time Water Level Time Water Level

Date of test / /  
Bailer test gal/min. ft. drawdown after hrs.  
Air test 8 gal/min. w/ stem set at 106 ft. for 1 hrs.  
Artesian flow g.p.m. Date  
Temperature of water Was a chemical analysis made? NO

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME OELKE DRILLING, INC.

(Person, firm, or corporation) (Type or print)

ADDRESS 4312-166 AVE E. SUMNER, WA

[SIGNED]  License No. 837 K.MCKENNAContractor's  
Registration No. OELKEDI 136QC

Date 07/27/95

## **GeoResources Site Map**

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### Approximate Site Location

Map created from Thurston County GeoData  
<http://map.co.thurston.wa.us/Html5Viewer/Index.html?viewer=uMap.Main>

- TP-1 - Number and Approximate Location of Test Pit
- B-1 - Number and Approximate Location of Boring



Not to Scale

### Site and Exploration Map

Proposed Multi-Family Residential Development  
 17021 – 103rd Avenue SE  
 Yelm, Washington  
 PN: 64303100500

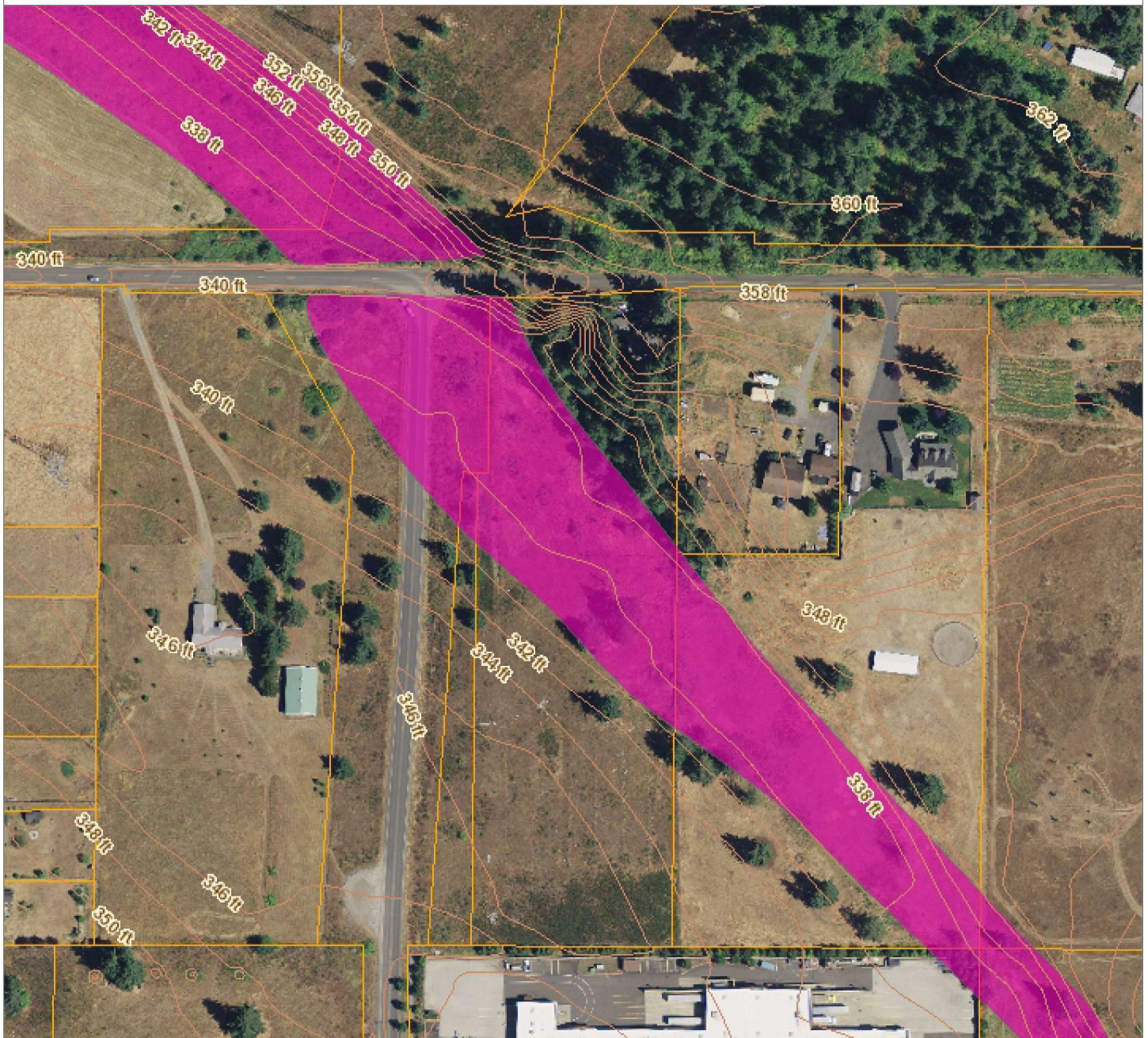
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## **Thurston County High Groundwater Hazard Area**



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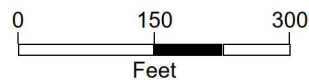
# Thurston County High Groundwater Hazard Area



## Legend

- Contours 2ft 1996 (NGVD 29)
- Streams
- High Groundwater Hazard Areas
  - High Groundwater Hazard Area
  - Salmon Creek High Groundwater Hazard
- Parcel Boundaries
- Roads - Major
  - Major Roads

Scale 1: 3,718



Map Created Using GeoData Public Website

Published: 7/13/2020

Note:



The information included on this map has been compiled by Thurston County staff from a variety of sources and is subject to change without notice. Additional elements may be present in reality that are not represented on the map. Ortho-photos and other data may not align. The boundaries depicted by these datasets are approximate. This document is not intended for use as a survey product. ALL DATA IS EXPRESSLY PROVIDED 'AS IS' AND 'WITH ALL FAULTS'. Thurston County makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. In no event shall Thurston County be liable for direct, indirect, incidental, consequential, special, or tort damages of any kind, including, but not limited to, lost revenues or lost profits, real or anticipated, resulting from the use, misuse or reliance of the information contained on this map. If any portion of this map or disclaimer is missing or altered, Thurston County removes itself from all responsibility from the map and the data contained within. The burden for determining fitness for use lies entirely with the user and the user is solely responsible for understanding the accuracy limitation of the information contained in this map. Authorized for 3rd Party reproduction for personal use only.



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## Test Pit Logs

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	<b>Test Pit/Exploration Log</b> <b>YELM TP-1</b> Exploration Name	<b>SE Reservoir – Siting and Preliminary Design</b> <b>City of Yelm</b> Project	<b>50 feet S of Existing House and 20 feet W of Property Line</b>  Location
<b>Sue Cook, LG</b>  Observed By	<b>May 29, 2020</b>  Date	<b>YELM 517-121</b>  Project No.	<b>CASE 580, 2-foot toothed bucket</b> <b>City of Yelm</b>  Backhoe and Operator
Depth	Description		Sketch/Photo
0 to 2.0 feet	Silty Gravelly SAND (SP-SM); brown to gray; fine to coarse sand, fine to coarse rounded to subrounded gravel, non-plastic fines with rounded to subrounded cobbles and boulders; slightly moist; medium dense; very poorly sorted; minor caving; abundant roots; grass, forest duff, abundant cobbles and boulders at ground surface (recessional outwash).		
2.0 to 4.0 feet	Sandy GRAVEL (GP-GM); brown; fine to coarse rounded to subrounded gravel, fine to coarse sand, few non-plastic fines with rounded to subrounded cobbles, trace boulders; dry to slightly moist; medium dense to dense; partially cemented (recessional outwash).		
4.0 to 8.5 feet	Sandy GRAVEL with Cobbles (GP); brown; fine to coarse rounded to subrounded gravel, fine to coarse sand, rounded to subrounded cobbles, few non-plastic fines, trace boulders; moist; medium dense to dense; poorly sorted (recessional outwash).  Infiltration test performed at 3.5 feet.  No test water seepage or groundwater encountered.  Minor caving at 0 to 2 feet and 6 to 8.5 feet.		
Exploration backfilled with excavated soil.			



	<b>Test Pit/Exploration Log</b> <b>YELM TP-2</b> Exploration Name	<b>SE Reservoir – Siting and Preliminary Design</b> <b>City of Yelm</b> Project	<b>55 feet S of Existing House and 50 feet W of Property Line</b>  Location
<b>Sue Cook, LG</b>  Observed By	<b>May 29, 2020</b>  Date	<b>YELM 517-121</b>  Project No.	<b>CASE 580, 2-foot toothed bucket</b> <b>City of Yelm</b>  Backhoe and Operator
Depth	Description		Sketch/Photo
0 to 4.0 feet	Silty Gravelly SAND (SP); brown; fine to coarse sand, fine to coarse rounded to subrounded gravel, non-plastic fines, with rounded to subrounded cobbles and boulders; dry to slightly moist; loose to medium dense; abundant roots; grass, forest duff, abundant cobbles and boulders at ground surface (recessional outwash).		
4.0 to 6.0 feet	Sandy GRAVEL (GP); brown; fine to coarse rounded to subrounded gravel, fine to coarse sand, few non-plastic fines, with rounded to subrounded cobbles and boulders; dry to slightly moist; medium dense to dense; partially cemented (recessional outwash).		
6.0 to 8.0 feet	GRAVEL with cobbles (GP); brown; fine to coarse rounded to subrounded gravel, rounded to subrounded cobbles, few fine to coarse sand, few non-plastic fines, trace boulders; dry to slightly moist; medium dense to dense (recessional outwash).  No groundwater encountered.  Moderate caving at 0 to 4 feet; minor caving at 6 to 8 feet.		
Exploration backfilled with excavated soil.			

## **PIT Results**

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**YELM PIT-1 Infiltration Analysis**  
**SE Reservoir Site**  
**City of Yelm**

