



PLANNING DIVISION  
CRITICAL AREA  
IDENTIFICATION FORM

<b>STAFF USE ONLY</b>	
<input type="checkbox"/>	CA REPORT REQUIRED
<input type="checkbox"/>	EXEMPT FROM CAO

**This identification form is to be submitted in advance or concurrently with a project application if the proposed project is subject to the requirements found in the City's critical area code PMC 21.06. The purpose of this form is to determine if a critical area report is required due to the development site being on or near any critical areas. Please fill out this form completely where applicable.**

**APPLICATION INFORMATION**

<b>OWNER INFORMATION</b>		
NAME: Larsen Land LLC Att: Linn Larsen		
STREET ADDRESS: 3906 South 74th Street		
CITY: Tacoma	STATE: WA	ZIP CODE: 98409
PHONE: (253) 589-2222	EMAIL: linn@linnlarsen.com	
FAX: N/A		
<b>CONTACT INFORMATION (IF DIFFERENT FROM ABOVE)</b>		
NAME: Engineering Consultants Northwest, Inc. (ECNW) Att: Barb Ozanich		
STREET ADDRESS: 811 Porter Way		
CITY: Milton	STATE: WA	ZIP CODE: 98354
PHONE: (253) 952-7797	EMAIL: ecnw.barb@comcast.net	
FAX: (253) 952-7799		

<b>SITE INFORMATION</b>	
PARCEL NUMBER(S): 042027-4118	
ADDRESS: 210 10th Street SE	
PROJECT NAME: EcoLube Recovery	
PARCEL SIZE: 1.4 Acres	ZONING DESIGNATION: ML
<b>Briefly describe the proposed development project:</b>	
Updating an existing facility located at this site for use by EcoLube Recovery LLC an environmental service company that ultimately recycles motor oil and byproducts. This site will be utilized a transfer facility. The operations will collect and store used oil and byproducts to be shipped at a later date to an out of state processing facility.	

<b>Based on the proponent's knowledge and research of the project site, please select any of the critical areas listed below that are located on or within 300 feet of the property boundaries?</b>		
<input type="checkbox"/> Wetlands	<input type="checkbox"/> Lakes/Ponds	<input type="checkbox"/> Streams/Creeks
<input type="checkbox"/> Slopes 0% - 15%	<input type="checkbox"/> Slopes 16% - 39%	<input type="checkbox"/> Slopes 40% or Greater
<input type="checkbox"/> Puyallup River Shoreline	<input type="checkbox"/> Clarks Creek Shoreline	<input type="checkbox"/> Volcanic Hazard Areas
<input checked="" type="checkbox"/> Aquifer Recharge Area	<input type="checkbox"/> Wellhead Protection Area	<input type="checkbox"/> Habitat Conservation Area
	<input type="checkbox"/> Flood Zones	

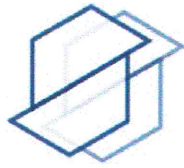
<b>Please describe the critical areas checked above and their location in relation to the proposed development: (Please show their location on any plans to be submitted)</b>
See attached Critical Aquifer Recharge Areas Report prepared by Associated Earth Sciences Inc. on August 12, 2014.

<b>Do you know of any present or past critical area studies that have been conducted for critical areas on-site or adjacent to the site? (Please describe below)</b>
Yes. CARA report dated August 12, 2014.

<b>Do you know if any critical areas have been placed inside a tract or a protection easement that is recorded on the title or plat for this site or any adjacent site? (Please describe below)</b>
No.

<b>AUTHORIZATION:</b> I, the undersigned hereby certify that this application has been made with the consent of the lawful property owner(s) and that all information submitted on or with this application is complete and correct. I understand that false statements, errors, and/or omissions may be sufficient cause for denial of any related applications. I acknowledge that if the City needs to obtain the services of an expert third party to review any technical information regarding my proposal, that I shall be responsible for any financial costs of said third party review.
<b>AUTHORIZED SIGNATURE</b> <span style="float:right"><b>DATE</b></span>

THIS BOX FOR STAFF USE ONLY		
<b>CRITICAL AREA REPORT REQUIRED:</b>	<input type="checkbox"/> YES	<input type="checkbox"/> NO
<b>EXEMPT FROM CRITICAL AREA ORDINANCE:</b>	<input type="checkbox"/> YES	<input type="checkbox"/> NO
<b>EXCEPTION FOR MINOR NEW DEVELOPMENT IN BUFFER:</b>	<input type="checkbox"/> YES	<input type="checkbox"/> NO
STAFF VERIFICATION	COMMENTS	
<input type="checkbox"/> WETLAND <input type="checkbox"/> GEOLOGICAL HAZARD AREA <input type="checkbox"/> VOLCANIC HAZARD AREA <input type="checkbox"/> FREQUENTLY FLOOD AREA <input type="checkbox"/> FISH AND WILDLIFE HABITAT <input type="checkbox"/> AQUIFER RECHARGE/WELLHEAD <input type="checkbox"/> STREAM/SHORELINE		



associated  
earth sciences  
incorporated

August 12, 2014  
Project No. KH140033A

Thermo Fluids Inc.  
4845 Forest Street  
Commerce City, Colorado 80022

Attention: Mr. Leonard Butler, P.E.

Subject: Critical Aquifer Recharge Areas Report  
213 10<sup>th</sup> Street Southeast Property  
213 10<sup>th</sup> Street Southeast  
Puyallup, Washington

Dear Mr. Butler:

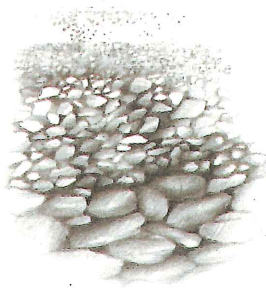
We are pleased to present the enclosed copies of the referenced report. This report summarizes the results of our hydrogeologic assessment and "Critical Aquifer Recharge Areas Report."

We have enjoyed working with you on this study and are confident that the recommendations presented in this report will aid in the successful completion of your project. Please contact me if you have any questions or if we can be of additional help to you.

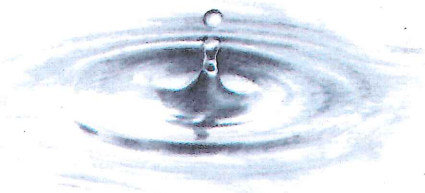
Sincerely,  
**ASSOCIATED EARTH SCIENCES, INC.**  
Kirkland, Washington

Curtis J. Koger, L.G., L.E.G., L.Hg.  
Senior Principal Hydrogeologist/Geologist

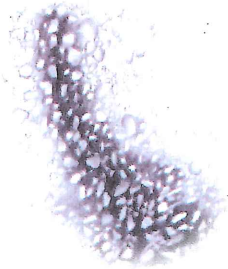
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*Geotechnical Engineering*



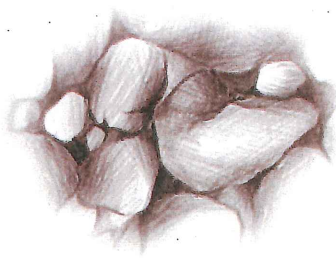
*Water Resources*



*Environmental Assessments  
and Remediation*



*Sustainable Development Services*



*Geologic Assessments*

# **Associated Earth Sciences, Inc.**

*Serving the Pacific Northwest Since 1981*

Critical Aquifer Recharge Areas Report

**213 10<sup>TH</sup> STREET SOUTHEAST  
PROPERTY**

Puyallup, Washington

Prepared for

**Thermo Fluids Inc.**

Project No. KH140033A

August 12, 2014

**CRITICAL AQUIFER RECHARGE AREAS REPORT**

**213 10<sup>TH</sup> STREET SOUTHEAST PROPERTY**

**Puyallup, Washington**

*Prepared for:*

**Thermo Fluids Inc.**

4845 Forest Street

Commerce City, Colorado 80022

*Prepared by:*

**Associated Earth Sciences, Inc.**

911 5<sup>th</sup> Avenue

Kirkland, Washington 98033

425-827-7701

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August 12, 2014

Project No. KH140033A

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## 1.0 INTRODUCTION

This report presents the results of Associated Earth Sciences, Inc.'s (AESI's) Critical Aquifer Recharge Area (CARA) evaluation for the proposed improvements at the 213 10<sup>th</sup> Street Southeast Property. This hydrogeologic report was completed with an understanding of the project based on information and plans provided by Thermo Fluids Inc., prepared by the current site owner, Archer Daniels Midland (ADM) Company, and on the general knowledge of the property vicinity.

### 1.1 Project Description

The 213 10<sup>th</sup> Street Southeast Property includes one tax parcel, 0420274118, totaling approximately 1.29 acres, located at 213 10<sup>th</sup> Street Southeast, in the SE  $\frac{1}{4}$  of NW  $\frac{1}{4}$  of Section 27, Township 20 North, Range 4 East, Puyallup, Washington. The location of the project is provided on Figure 1, "Vicinity Map," and the site plan is provided on Figure 2, "Site and Exploration Plan." Based on our current understanding of the project, the project would consist of the conversion of the existing corn syrup processing facility to a facility for used oil and petroleum waste materials and spent antifreeze for recycling. Final design plans for the proposed improvements have not been finalized at this time. Proposed improvements include landscaping, parking improvements, and modifications to the existing liquid storage tanks.

The site is located in a mixed, residential, commercial, and manufacturing area in the downtown area of Puyallup, and was formerly used as a corn syrup processing facility, owned and operated by ADM. As shown on Figure 2, the property is irregularly-shaped, and includes a large building and six large storage tanks. Small portions of the property are paved. Access to the property is via 10<sup>th</sup> Street Southeast, which borders the property to the east. Burlington Northern Santa Fe (BNSF) railroad borders the southern property boundary, beyond which lies East Pioneer Avenue. The properties to the north, west, and east include other commercial and manufacturing properties. Adjacent properties include Precasters (industrial light manufacturing) to the west, Nordstrom Sign/Woodruff Manufacturing (industrial light manufacturing) to the north, DW Briggs Company (lumber and wood manufacturing) to the east, and the Puyallup River is approximately 1,000 feet north of the property. The topography of the project site is relatively flat, and the elevation approximately 55 feet above mean sea level (amsl)

### 1.2 Purpose and Scope

The purpose of this study was to evaluate hydrogeologic conditions for the site under existing and developed conditions and prepare a CARA report, in accordance with *Puyallup Municipal Code* (PMC) 21.06.1150.



In accordance with PMC 21.06.1150, a CARA is required for this site because it is located within a Wellhead Protection Zone. The location of the site with respect to the City's Wellhead Protection Zones is shown on Figure 3, "Wellhead Protection Zones Map." The CARA report shall include the following information:

1. Available information regarding geologic and hydrogeologic characteristics of the site including the lateral extent and depth location of all critical aquifer recharge areas located on-site or immediately adjacent to the site, and the permeability of the unsaturated zone;
2. Ground water depth, flow direction, and gradient based on available information;
3. Currently available data on wells and springs within 1,300 feet of the project area;
4. Locations of other critical areas, including surface waters, within 1,300 feet of the project area;
5. Historic ground water and surface water quality data for the area to be affected by the proposed activity compiled for at least the previous 5-year period;
6. Federal, state, and local regulations and requirements that pertain to the proposed project;
7. Best management practices (BMPs) proposed to be used. The type, extent, and nature of the proposed BMPs shall be specific to the level of aquifer susceptibility (high or low) where the development is proposed;
8. Ground water monitoring plan provisions;
9. Discussion of the effects of the proposed project on the ground water quality and quantity, including predictive evaluation of ground water withdrawal effects on nearby wells and surface water features; and predictive evaluation of contaminant transport based on potential releases to ground water; and
10. A spill plan that identifies equipment and/or structures that could fail, resulting in an impact. Spill plans shall include provisions for regular inspection, repair, and replacement of structures and equipment that could fail.

Our study included review of available geologic and hydrogeologic literature and assessment of geologic, ground water, and soil conditions, including the type, thickness, distribution, and physical properties of the subsurface sediments and ground water.

### 1.3 Authorization

Authorization to proceed with this study was granted by Mr. Leonard Butler, P.E. of Thermo Fluids Inc. Our study was accomplished in general accordance with our proposal dated January 21, 2014. This report has been prepared for the exclusive use of Thermo Fluids Inc. and their agents for specific application to this project. Within the limitations of scope, schedule, and budget, our services have been performed in accordance with generally accepted hydrogeologic practices in effect in this area at the time our report was prepared. No other warranty, express or implied, is made.

### 1.4 Summary of Findings

Based on information provided by Thermo Fluids Inc., we understand that proposed improvements to the property will include 12 feet of landscaping on the eastern boundary along 10<sup>th</sup> Street Southeast. The existing parking on the eastern portion of the site will be paved, and additional parking may be required. The existing tanks will either be modified or replaced. As per the City of Puyallup, the sewer, and the storm lines will need improvements, including installation of oil/water separators. Information provided by Thermo Fluids Inc. indicates that peak rate runoff will be approximately 0.65 cubic feet per second (cfs) for a 2-year storm event.

Nearby well logs and geologic maps indicate that the subject property is underlain by Recent alluvial deposits. One individual commercial well was identified within the 1,300-foot search radius. No Group A or B domestic wells were identified within the 1,300-foot search radius. Based on available data, the project site does not lie within the 100-foot sanitary control radius of any of the off-site domestic wells. It is our opinion that none of the wells within the 1,300 feet of the site will be adversely impacted by the proposed 213 10<sup>th</sup> Street Southeast improvements.

## 2.0 METHODOLOGY

### 2.1 Data Review

AESI reviewed available soil, ground water, and geologic data to gain an understanding of existing conditions in the study area. Information reviewed included the following:

- Reports and maps published by the United States Geological Survey (USGS) and the Washington State Department of Natural Resources (WDNR), Division of Geology and Earth Resources, Pierce County, Washington State Department of Health, Division of

Environmental Health, Office of Drinking Water (ODW), and the Washington State Department of Ecology (Ecology);

- City of Puyallup Wellhead Protection Program (PMC Title 21);
- Well logs obtained from the online Ecology and Pierce County databases;
- Tacoma-Pierce County Health Department (TPCHD) Long-Term Groundwater Monitoring and City of Puyallup Ground Water Protection Program (PMC Title 21);
- ODW and Tacoma-Pierce County Health Department water quality data.

Selected citations for documents used during this study are contained in the “References” section of this report.

## **2.2 Hydrogeologic Analysis**

A conceptual hydrogeologic model of the site was developed to address depth to water, seasonal fluctuations, aquifer flow direction, recharge and discharge, hydrostratigraphy, and potential interaction between shallow and deeper aquifers. Our analysis also included evaluation of available water quality information from water wells within 1,300 feet of the site, identification of deleterious substances or hazardous materials that will be used, stored, or disposed of on-site, and an evaluation of potential impacts to ground water quality and quantity from the proposed improvement project.

### **2.2.1 Well Log Review**

Ecology, ODW, and Pierce County online well log databases were reviewed to obtain available water wells logs within 1,300 feet of the subject property. The well locations are approximately located on Figure 4, “Well Location Map,” and copies of selected logs are included in Appendix A. A review of these logs is presented in Section 4.1, which evaluates potential impacts to off-site wells from the proposed improvements.

### **2.2.2 Water Quality Analysis**

The water quality analysis included an evaluation of available water quality information from wells within 1,300 feet of the project site; BMPs to prevent degradation of the area aquifers; identification of deleterious substances or hazardous materials that will be used, stored, or disposed of on-site due to development of the site; and an evaluation of potential impacts on water quality due to potential releases to ground water.

### 3.0 EXISTING CONDITIONS

#### 3.1 Physical Setting and Topography

As shown on Figure 1, the site and vicinity are generally located in the Puyallup River Valley, which is bounded to the south and west by broad upland plateaus. Topographic features in the vicinity of the site were formed by glacial and post-glacial processes. The Puyallup River emanates from the western side of Mount Rainier, and flows north towards Orting and the confluence with the Carbon River. South of Sumner, east of the site, the Puyallup River joins the White River, and begins to flow west-northwest toward Tacoma and Commencement Bay. In the site vicinity, the west-east trending Puyallup River Valley is bordered to the north and south by upland terraces. The subject site is located within the east-west trending Puyallup River Valley Basin.

#### 3.2 Regional and Project Geology

Our interpretation of the geologic/hydrogeologic conditions in the vicinity of the project site is based on a review of selected information in the available literature, water well reports for wells located in the surrounding area, and our experience on numerous hydrogeology projects in the site vicinity. A geologic map of the site vicinity, adapted from Troost (2005 in review), is shown on Figure 5, "Geology Map."

One stratigraphic unit, in addition to fill, has been identified and delineated for this study termed Quaternary (Recent) alluvium. The stratigraphic unit was determined with regard to the following parameters: 1) stratigraphic position, 2) composition, and 3) importance of the unit in terms of the presence of ground water. The interpreted subsurface stratigraphy of the site and Puyallup River Valley area are in general agreement with that presented in the published geologic maps for the area, including the *Geologic Map of the Puyallup 7.5-minute Quadrangle, Washington*: U.S. Geological Survey Miscellaneous Field Investigation, scale 1:24,000 (Troost, 2005 in review).

##### 3.2.1 Fill

We anticipate that fill will be encountered throughout the site, especially under structures.

##### 3.2.2 Quaternary (Recent) Alluvium

According to the published geologic map (Troost, 2005 in review), Quaternary alluvium lies at the ground surface in the floor of the Puyallup River Valley. This geologic unit was deposited in the valley that remained after the Vashon glacier retreated at the end of the Vashon Stage of the Fraser Glaciation.

### 3.3 Hydrogeology

Water that is present in the pore spaces and sediments is part of the hydrologic cycle. In the natural state, the hydrologic cycle begins with infiltration of precipitation (recharge) and ends with discharge to springs, streams, wetlands, and/or wells. Under natural conditions, ground water recharge and discharge may shift with climatic cycles, but remain in overall balance. Ground water will flow under saturated conditions, preferentially through materials with greater porosity and permeability, such as clean gravels and sands. Where geologic conditions limit discharge, ground water accumulates in such permeable zones, which, if they can support production from wells, are termed aquifers. The sustainability of wells, or the long-term aquifer capacity, depends on the extent of the aquifer, its rate of recharge, and the amount of withdrawal by producing wells. Withdrawal of ground water by wells diverts a part of the ground water cycle, resulting in adjustments to natural recharge, discharge, or both.

Copies of selected well/boring logs from Ecology are presented in Appendix A. The approximate locations of these logs are shown on Figure 4. Note that the limited resolution provided by the well reports typically allows water users to be located only within the nearest quarter-quarter section. Some of the well locations were refined, based on address or parcel information. It should also be noted that most of these well reports are prepared by non-geologists and standardized geologic descriptions are not commonly utilized. Therefore, interpretations from the well reports are considered to be rough approximations and are only used to obtain a general overview of regional geologic/hydrogeologic conditions. Well locations for the City of Puyallup water supply wells were determined to be outside the 1,300-foot radius. Group A water systems have 15 connections or more serving 25 or more people per day. Group B systems serve 2 to 14 connections and fewer than 25 people per day.

Based on the information obtained to date (existing literature and nearby well logs), the principal ground water “regime” of the Puyallup River Valley is the alluvial aquifer. The Osceola Mudflow, which lies beneath the Recent alluvial deposits, is the major aquitard in the Puyallup River Valley. Ground water flow is interpreted to be downvalley to the west with the Puyallup River located north of the site (Dragovich et al., 1994). In the vicinity of the project site, ground water is estimated to be less than 10 feet below existing ground surface based on subsurface exploration data contained in AESI’s in-house project library.

### 4.0 PROJECT IMPACTS AND MITIGATIONS

The following sections provide information regarding the potential impacts the 213 10<sup>th</sup> Street Southeast improvement project will have on the surrounding properties and area ground water.

## 4.1 Summary of Nearby Well Systems

As shown on Figure 4, one commercial well is located within approximately 1,300 feet of the site. This section provides a summary of nearby well systems and an evaluation of potential water quality impacts to these wells associated with the proposed site improvements. No Group A or Group B water systems were identified within the 1,300-foot search radius. All of the Group A and B well systems identified on Figure 4 are more than 1,300 feet from the site. Selected well logs of the wells shown on Figure 4 are provided in Appendix A. Summaries of the well construction details for the wells located within the search radius are provided below.

### 4.1.1 Domestic Water Supply Well

- **Ice and Cold Storage Well:** The location of this well is identified in the well log as the NE  $\frac{1}{4}$  of the SE  $\frac{1}{4}$  of Section 27, Township 20N, Range 4E, approximately 1,100 feet east from the 213 10<sup>th</sup> Street Southeast Property. The original construction date of this well is indicated as December 15, 1953. The well was reportedly drilled to 233 feet, with 12-inch-diameter casing, and produced 500 gallons per minute (gpm) with 40 feet of drawdown. Well screen and static water level details are not available, however it is reported as under artesian pressure. Since the exact location of this well is unknown, it is not known if this well is still in use.

### 4.1.2 Surface Water Features

The Puyallup River flows generally east-west approximately  $\frac{1}{5}$  mile to the north of the site.

### 4.1.3 Impacts to Nearby Well

Based on the available data, the project site does not lie within the 100-foot sanitary control radius of any of the off-site wells. The current proposed plans include improvements to City of Puyallup stormwater and sewer system lines.

It is our opinion that the commercial well within 1,300 feet of the site will not be adversely impacted by the proposed improvements since the proposal is protective of ground water quality by conveying all stormwater originating from potential pollution-generating land uses to the City of Puyallup stormwater system for water quality treatment.

### 4.1.4 Impacts to Surface Water

It is our opinion that none of the surface water features (the Puyallup River) within 1,300 feet of the site will be adversely impacted by the proposed improvements since the proposal is protective of ground water quality by conveying all stormwater originating from potential

pollution-generating land uses to the City of Puyallup stormwater system for water quality treatment.

#### **4.2 Water Quality Results for Nearby Wells**

Pierce County and ODW water quality records were searched to identify any water quality information for wells within 1,300 feet of the project boundary. No public water supply wells were identified within the 1,300-foot radius. Water quality data was not available for the one commercial well identified (Ice and Cold Storage Well).

### **5.0 GROUND WATER QUANTITY AND QUALITY IMPACTS AND MITIGATION**

The proposed 213 10<sup>th</sup> Street Southeast Property will avoid significant adverse impacts to downgradient water resources by implementing required stormwater management controls, spill control, and proper storage of hazardous materials. The proposed modern stormwater management controls described in the following sections of this report are considered BMPs for keeping surface water flows at natural levels, maintaining ground water recharge, and mitigating water quality impacts to surface water and ground water in accordance with Washington Administrative Code (WAC) Chapter 173.200 and 173.201A (WAC, 2009).

The following sections describe how the stormwater system and selected BMPs will protect area ground water resources. The specific stormwater treatment and site construction BMPs that will protect ground water resources are described below.

#### **5.1 Proposed Stormwater Best Management Practices**

In accordance with the Pierce County *Stormwater Management and Site Development Manual* (SMSDM, 2012), the project will require water quality treatment for pollution-generating surfaces. At the issuance of this report, the design for the drainage and stormwater facility was in preliminary design. It is our understanding that the plans will implement BMPs to meet water quality requirements. Preliminary plans include oil/water separators which will convey surface water runoff to the sanitary sewer system for treatment. Parking areas will consist of pavement or concrete. New construction will include installation of spill/containment structures around the refurbished/rebuilt storage tanks. No uncontained outdoor storage of chemicals is proposed. Project approvals require preparation of spill/emergency response plans.

#### **5.2 Water Quantity Considerations**

Water, sanitary sewer, and stormwater service for the project will be provided by the City of Puyallup. The current proposed plans include improvements to City of Puyallup stormwater

and sewer system lines. There is no evidence indicating that ground water levels will be adversely impacted by the improvement project. Therefore, there will be no project-related withdrawal effects on the nearby well and surface water features, in our opinion.

### 5.3 Water Quality Considerations

This section provides an assessment of water quality considerations associated with the proposed improvement project. This assessment includes an evaluation of potential pollutants, fate and transport considerations, and mitigating measures that will be included in the proposed improvement project.

Pollutants generated during construction include suspended solids and trace petroleum hydrocarbons. Following construction, the two primary sources of pollutants include runoff from roadways and landscaping chemicals. Roadway runoff includes trace petroleum hydrocarbons and trace metals. Landscaping chemicals include fertilizers, pesticides, and herbicides.

General fate and transport for each of the pollutants identified above includes the following:

- Suspended solids (including heavy metals in a particulate form) are removed by filtration within several inches of the ground surface.
- Heavy metals in the dissolved form are strongly sorbed to soil particles and do not typically migrate more than several inches through the soil column.
- Dilute concentrations of petroleum hydrocarbons (typical of roadway runoff) are readily degradable in the natural environment.
- Most modern pesticides and herbicides are strongly sorbed in the soil column and/or readily degraded in the natural environment.

Fertilizers contain nitrogen that can be present as nitrate (or other forms of nitrogen) and may migrate into the soil column. The nitrogen is utilized by plants and microbes in the soil column and either incorporated into plant material or converted to nitrogen gas.

The proposed project will avoid significant adverse impacts to downgradient water resources by implementing required stormwater management controls. Modern stormwater management controls are considered BMPs for keeping surface water flows at natural levels, maintaining ground water recharge, and mitigating water quality impacts to surface water and ground water. For example the current proposed plans include improvements to City of Puyallup stormwater and sewer system lines.



The closest public water supply well is the Benston Group B, which is approximately 2,800 feet north of the northernmost boundary of the 213 10<sup>th</sup> Street Southeast Property and across the Puyallup River. The Puyallup River is expected to behave as a hydrologic barrier, limiting the potential for the Benston well to capture ground water south of the river. In addition, this well was constructed with a well seal to prevent local surface contamination. Since the proposed improvements will include converting the current facility to a used oil and petroleum waste materials and spent antifreeze for recycling facility, BMPs, including proper storage, oil/water separators, and spill/containment areas, will be implemented to protect the ground and surface water.

In summary, the available data indicate there is no potential for the proposed project to cause a significant adverse impact to water quality at any nearby water supply wells.

#### **5.4 Construction Erosion Hazard Best Management Practices**

Care must be taken during construction not to contaminate the stormwater facilities with untreated construction stormwater and silt. Therefore, a properly developed, constructed, and maintained erosion control plan consistent with City of Puyallup standards and best management erosion control practices will be required for the project. It is in our opinion that with the proper implementation of the Temporary Erosion and Sediment Control (TESC) Plan and by field-adjusting appropriate mitigation elements (BMPs) throughout construction, as recommended by the erosion control inspector, the potential adverse impacts from erosion hazards on the project may be mitigated.

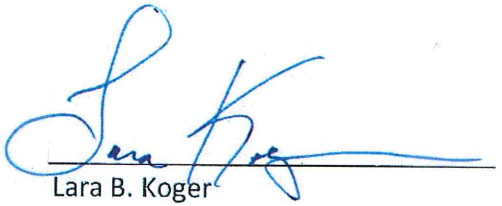
#### **5.5 Description and Management of Deleterious Substances and Hazardous Materials**

As specified in the PMC, a CARA hydrogeologic assessment shall identify any deleterious substances and hazardous materials that will be stored, handled, treated, used, produced, recycled, or disposed of on-site. And, if necessary, the assessment shall specify methods of storing and handling these substances and provide a spill plan. A used oil and petroleum waste materials and spent antifreeze for recycling is proposed for this site. As previously indicated, new construction will include spill/containment structures, and preparation of spill/emergency response plans is required prior to project approval.

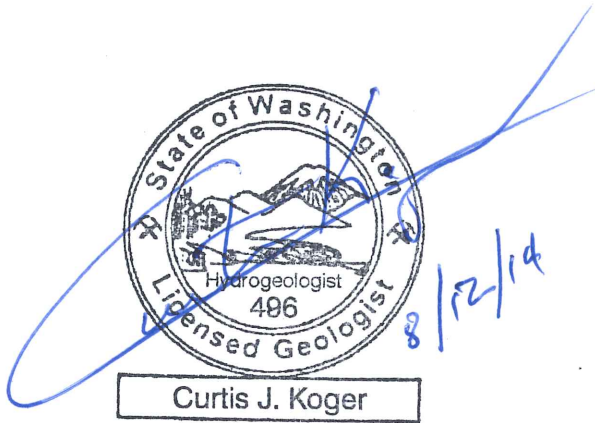
## 6.0 CLOSURE

We have enjoyed working with you on this study and are confident that these recommendations will aid in the successful completion of your project. If you should have any questions or require further assistance, please do not hesitate to call.

Sincerely,  
**ASSOCIATED EARTH SCIENCES, INC.**  
Kirkland, Washington



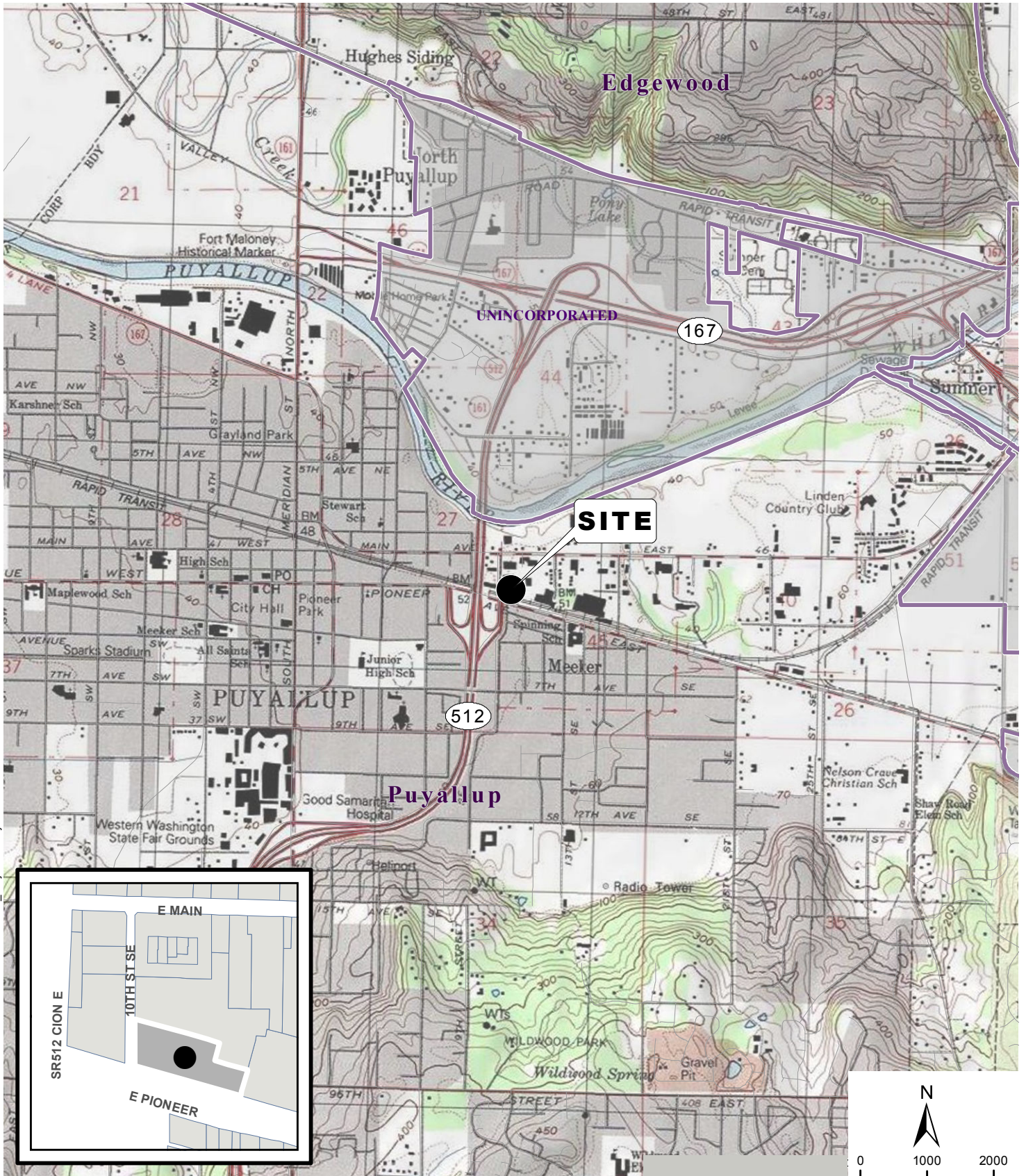
Lara B. Koger  
Project Scientist



Curtis J. Koger, L.G., L.E.G., L.Hg.  
Senior Principal Geologist/Hydrogeologist

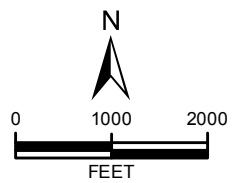
## 7.0 REFERENCES

- Dragovich, J.D., Pringle, P.T., Walsh, T.J., 1994, Extent and geometry of the Mid-Holocene Osceola Mudflow in the Puget Lowland – Implications for Holocene sedimentations and paleogeography: Washington State Department of Natural Resources, Division of Geology and Earth Resources, Washington Geology, Volume 22, No. 3, September 1994, p. 3-26.
- Pierce County, 2012, Stormwater management and site development manual: self-published.
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- Tacoma-Pierce County Health Department online well databases: <http://www.tpchd.org/environment/drinking-water-wells/>.
- Troost, K.A., 2005 in review, Geologic map of the Puyallup 7.5-minute quadrangle, Washington: U.S. Geological Survey Miscellaneous Field Investigation, scale 1:24,000.
- Washington Administrative Code (WAC), 2009, Chapter 173.200 and 173.201A, self-published.
- Washington State Department of Ecology: <http://apps.ecy.wa.gov/welllog/>.
- Washington State Department of Health, Division of Environmental Health, Office of Drinking Water: <https://fortress.wa.gov/doh/eh/portal/odw/si/Intro.aspx>.



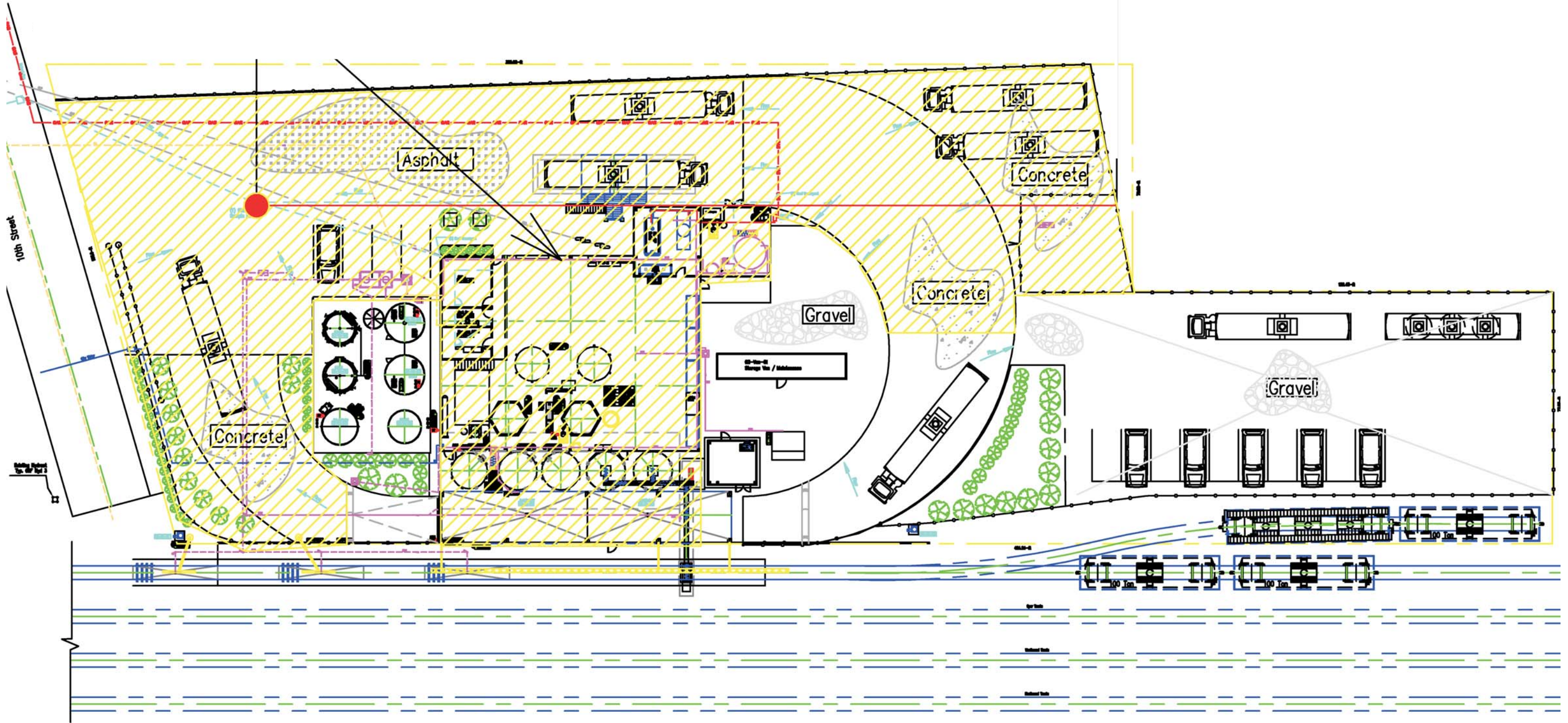
REFERENCE: USGS, PIERCE CO

NOTE: BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION.



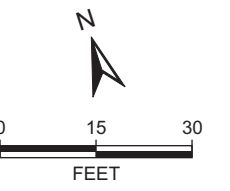
VICINITY MAP  
 10TH ST CARA  
 PUYALLUP, WASHINGTON

FIGURE 1  
 DATE 8/14  
 PROJ. NO. KH140033A

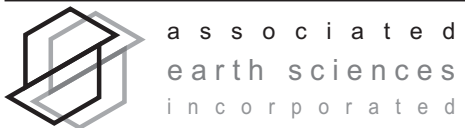


REFERENCE: ADM

NOTE: BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION.



140033\_10th St CARA 1\_140033 Site.cdr

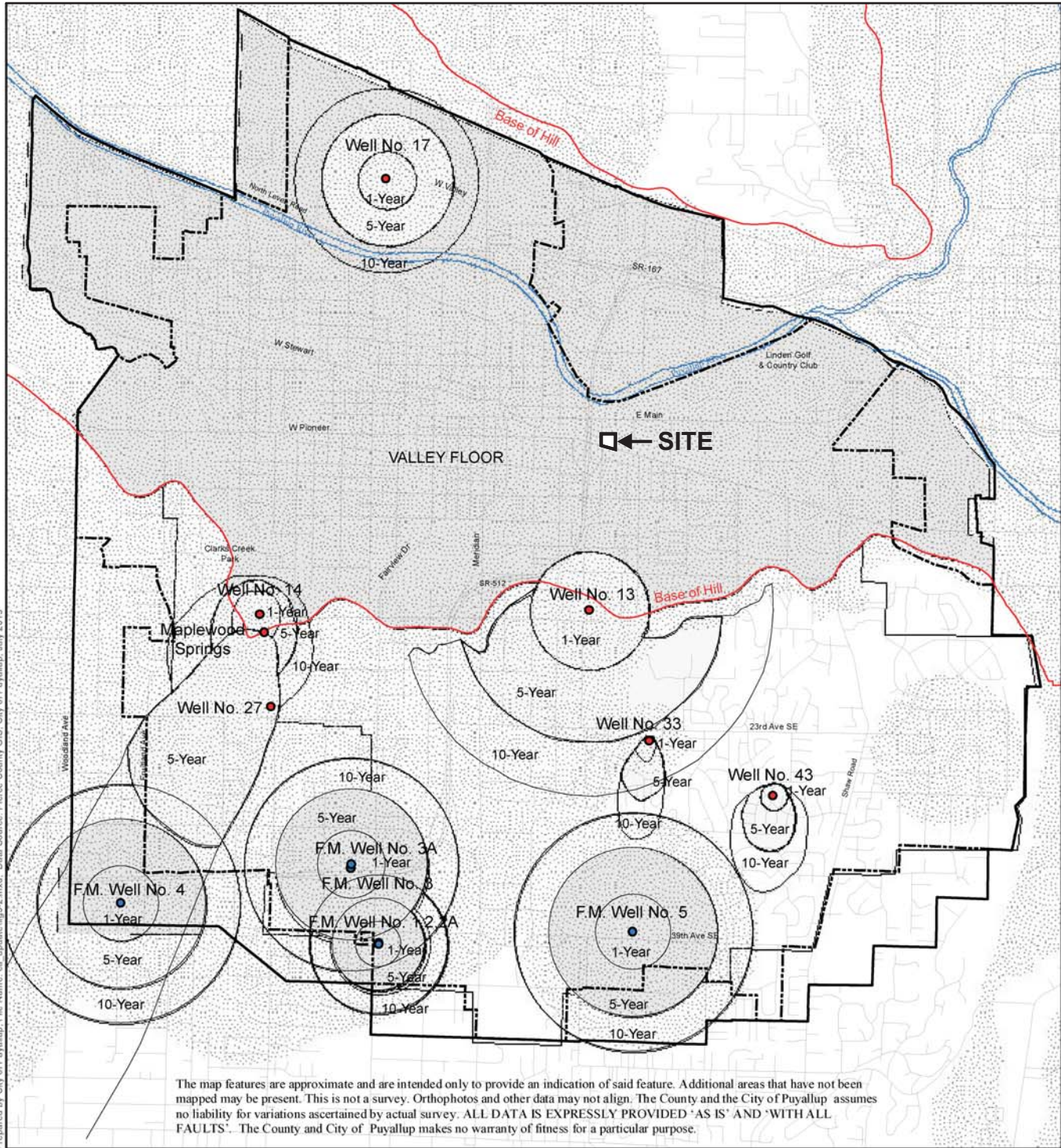


**SITE PLAN**  
 10TH STREET CARA  
 PUYALLUP, WASHINGTON

FIGURE 2

DATE 7/14

PROJ. NO. KH140033A



The map features are approximate and are intended only to provide an indication of said feature. Additional areas that have not been mapped may be present. This is not a survey. Orthophotos and other data may not align. The County and the City of Puyallup assumes no liability for variations ascertained by actual survey. ALL DATA IS EXPRESSLY PROVIDED 'AS IS' AND 'WITH ALL FAULTS'. The County and City of Puyallup makes no warranty of fitness for a particular purpose.



- City Limits
- Urban Growth Boundary
- Roads

0 2000 4000  
FEET - APPROXIMATE

- Puyallup Wells  
Per Puyallup Sept. 2000 Wellhead Protection Plan
- Fruitland Mutual Water Wells  
Per F.M. July 1996 Wellhead Protection Plan
- Aquifer Recharge Areas  
Per Pierce County DRASTIC Maps
- Aquifer Recharge Areas  
Designated as "High Vulnerability"

Figure 3-2  
Aquifer Recharge Areas  
& Well Head Protection  
Areas  
  
City of Puyallup

REFERENCE: CITY OF PUYALLUP

NOTE: BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION.

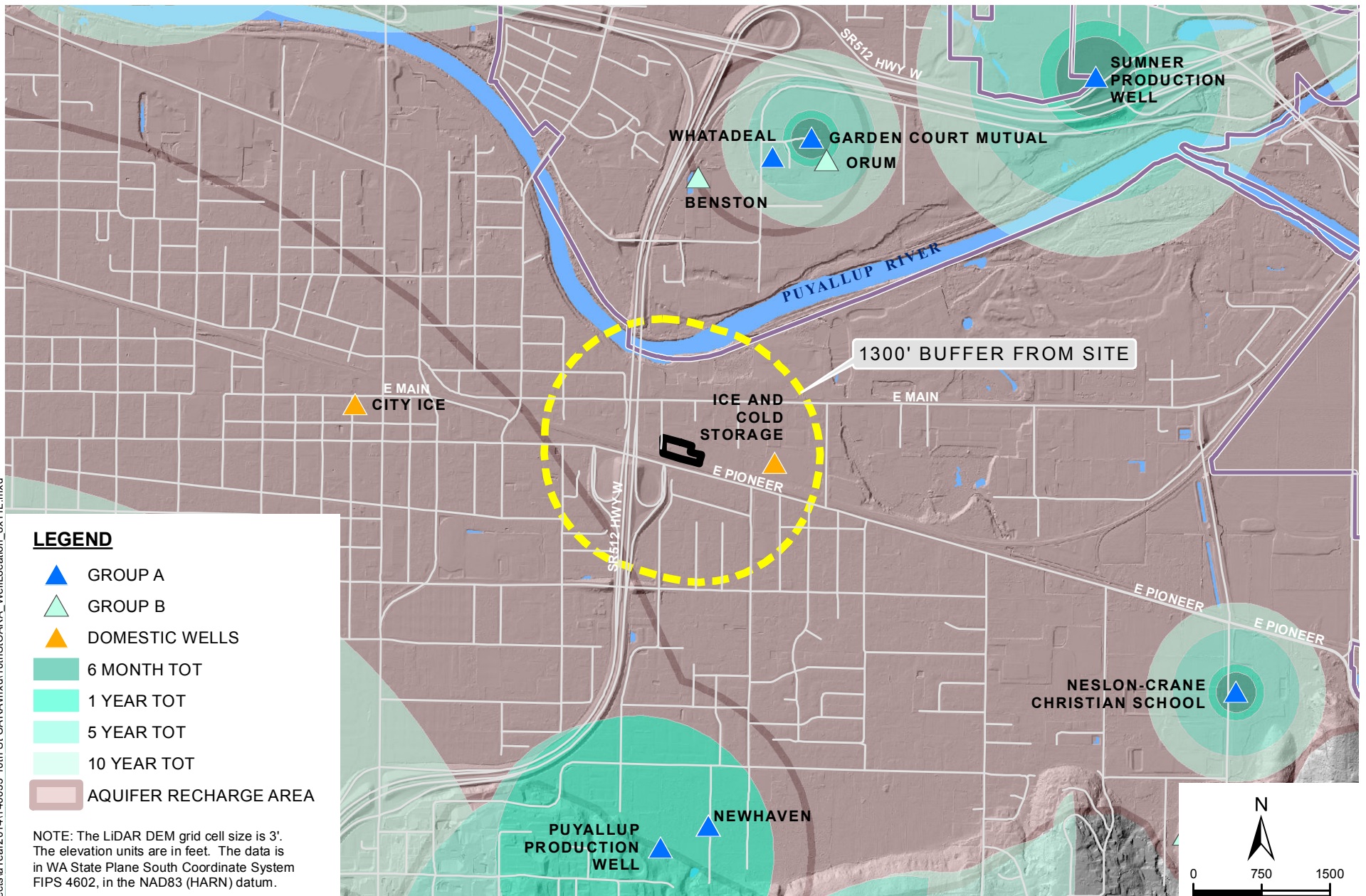
140033 10th St CARA \ 140033 Wellhead.cdr



associated  
earth sciences  
incorporated

WELLHEAD PROTECTION ZONES MAP  
10TH STREET CARA  
PUYALLUP, WASHINGTON

FIGURE 3  
DATE 7/14  
PROJ. NO. KH140033A



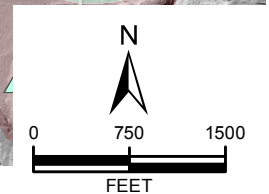
**LEGEND**

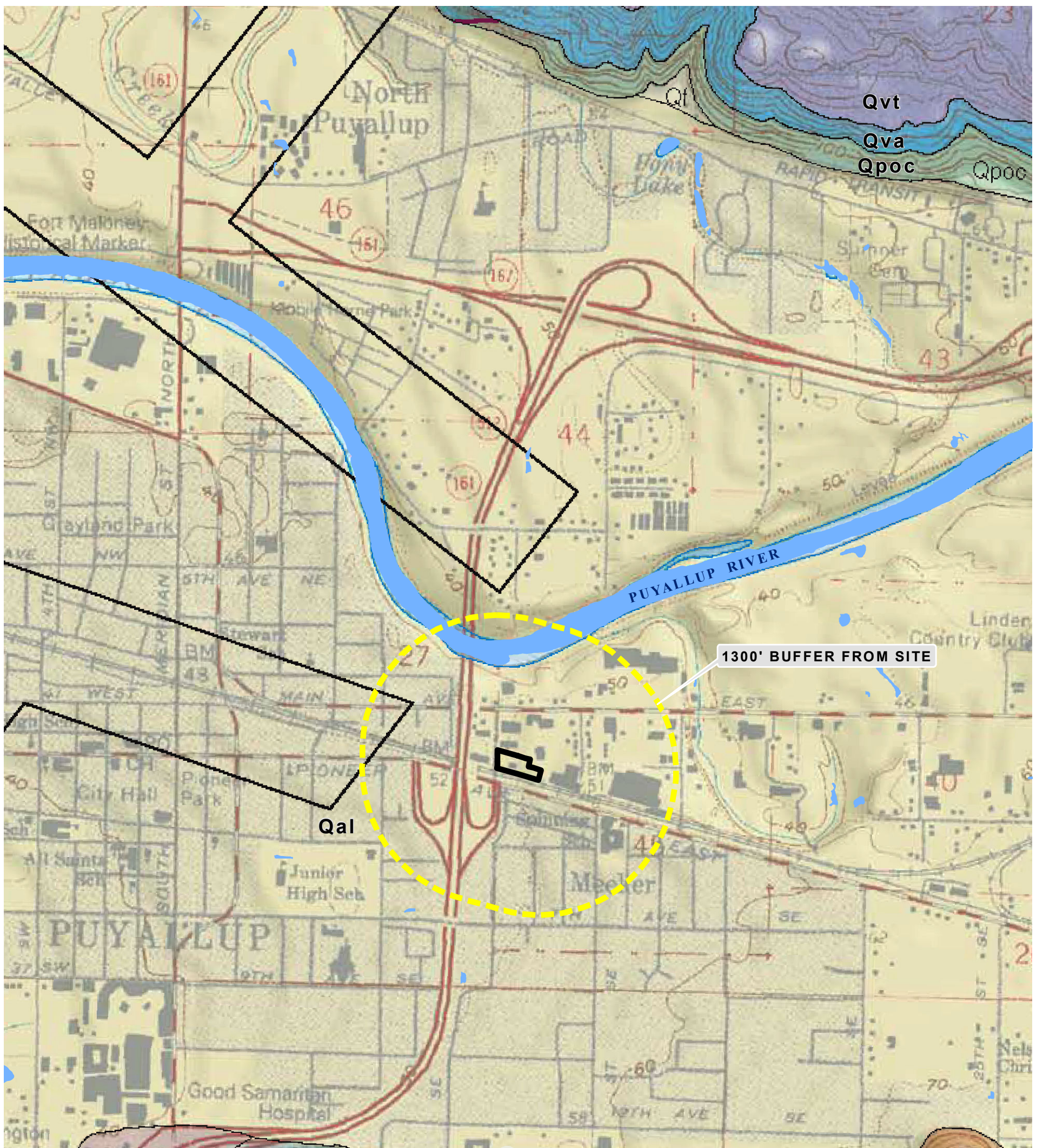
- ▲ GROUP A
- ▲ GROUP B
- ▲ DOMESTIC WELLS
- 6 MONTH TOT
- 1 YEAR TOT
- 5 YEAR TOT
- 10 YEAR TOT
- AQUIFER RECHARGE AREA

NOTE: The LiDAR DEM grid cell size is 3'. The elevation units are in feet. The data is in WA State Plane South Coordinate System FIPS 4602, in the NAD83 (HARN) datum.

REFERENCES: WADOH, PIERCE CO

NOTE: BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION.





1300' BUFFER FROM SITE

Qal

Qp

Qpon

Qvrl

Qp

Qvr

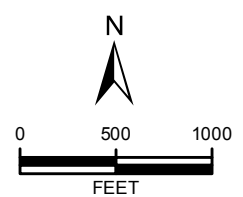
Qvsb4

**LEGEND**

- Qp - PEAT
- Qal - ALLUVIUM
- Qf - FAN DEPOSITS
- Qvr - VASHON RECESSONAL OUTWASH
- Qvrl - VASHON RECESSONAL LACUSTRINE
- Qvs - STEILACOOM GRAVEL
- Qvt - VASHON LODGEMENT TILL
- Qva - VASHON ADVANCE OUTWASH
- Qpoc - PRE-OLYMPIA COARSE GRAINED DEPOSITS
- Qpon - PRE-OLYMPIA NON-GLACIAL DEPOSITS

REFERENCE: PSLC, WADOE, GEOMAPNW DRAFT PUYALLUP, PIERCE CO

NOTE: BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION.





# **APPENDIX A**

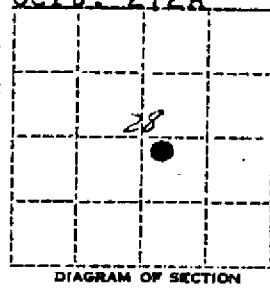
## **Ecology Water Well Reports**

City Ice Domestic Well

STATE OF WASHINGTON  
DEPARTMENT OF CONSERVATION  
AND DEVELOPMENT

WELL LOG No. Appl. 978  
 Date Aug. 28, 1947 Cert. 272A  
 Record by \_\_\_\_\_  
 Source Driller's record

Location: State of WASHINGTON  
 County Pierce  
 Area \_\_\_\_\_  
Map Lots 1 & 2, Block 2 of  
Central Addition to the Town  
of Puyallup 1/2 sec. T. N., R. W.  
 Drilling Co. Ralph R. Charlton  
 Address Rt. 4 Box 465, Puyallup, Wn.  
 Method of Drilling \_\_\_\_\_ Date Aug. 28 1948  
 Owner City Ice Company  
 Address 204 W Main St., Puyallup, Wn.  
 Land surface, datum \_\_\_\_\_ ft. <sup>above</sup>/<sub>below</sub> \_\_\_\_\_



CORRE- LATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
------------------	----------	---------------------	-----------------

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

	Water gravel	45	45
	Sand and clay	203	248
	Gravel	5	253
<b>Pump test:</b>			
	Dim: 253' x 5 1/4"		
	SWL: flowing		
	DD: 11'		
	Yield: 60 g.p.m.		
	Casing: 5 1/4" from 0 to 253'		
	Perforations: no information		

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

**Benston Group B Well**

WATER WELL REPORT

Start Card No. W136112  
 Unique Well I.D. # APN608  
 Water Right Permit No.

92979

STATE OF WASHINGTON

(1) OWNER: Name BENSTON DRIVE EAST L.L.C. Address 12419 51ST ST. COURT EAST EDGEWOOD, WA 98372-

(2) LOCATION OF WELL: County PIERCE - SE 1/4 NE 1/4 Sec 27 T 20 N, R 4E WM  
 (2a) STREET ADDRESS OF WELL (or nearest address) 11207 BENSTON DRIVE EAST,

(3) PROPOSED USE: DOMESTIC

(10) WELL LOG

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

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 112 ft.

MATERIAL	FROM	TO
BROWN SILTY TOPSOIL	0	5
BROWN SILTY W/ FINE SAND	5	12
BLACK SILTY & SAND	12	25
BLACK SILTY SOME	25	63
GRAY CLAY	25	63
GRAY SILTY ANGULAR GRAVEL	63	79
GRAY SILTY SOME	79	105
FINE SAND	79	105
BLACK COARSE SAND W/WATER	105	112
GRAY SILTY	112	122

(6) CONSTRUCTION DETAILS:  
 Casing installed: 6 " Dia. from +2.5 ft. to 107.5 ft.  
 WELDED " Dia. from ft. to ft.  
 " Dia. from ft. to ft.

Perforations: NO  
 Type of perforator used  
 SIZE of perforations in. by in.  
 perforations from ft. to ft.  
 perforations from ft. to ft.  
 perforations from ft. to ft.

Screens: YES  
 Manufacturer's Name  
 Type STAINLESS STEEL Model No.  
 Diam. 5 slot size 18 from 107 ft. to 112 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 9 ft. below top of well Date 04/09/01  
 Artesian Pressure lbs. per square inch Date  
 Artesian water controlled by N/A

Work started 04/03/01 Completed 04/09/01

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

Was a pump test made? YES If yes, by whom? R. OELKE  
 Yield: 60 gal./min with 13.5 ft. drawdown after 1 hrs.  
 60 13.75 3  
 60 13.75 3

Recovery data

Time	Water Level	Time	Water Level	Time	Water Level
1	9.9	5	9.75	10	9.5
15	9.5	20	9.5	25	9.5

Date of test 04/10/01  
 Bailer test gal./min. ft. drawdown after hrs.  
 Air test 100 gal./min. w/ stem set at 112 ft. for 1 hrs.  
 Artesian flow g.p.m. Date  
 Temperature of water Was a chemical analysis made? YES

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 4312-160 AVE E. SUMNER, WA

[SIGNED] *Roger Oelke* License No. 379 ROGER OELKE

Contractor's  
 Registration No. OELKEDI 136QC Date 04/11/01

RECEIVED

APR 23 2001

Washington State  
 Department of Ecology

STATE OF WASHINGTON  
DEPARTMENT OF CONSERVATION  
AND DEVELOPMENT

Flowing

WELL LOG

Date... December 15, 1953 No. Appl. #3472  
Permit #3239

Record by... John W. Robinson

Source... well driller's record

Location: State of WASHINGTON

County... Pierce

Area.....

Map.....

NE 1/4 SE 1/4 sec. 27 T. 20N, R. 4 E. W.

Drilling Co.....

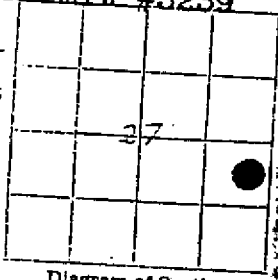
Address.....

Method of Drilling... drilled Date... Dec. 15, 1953

Owner... Puyallup Ice & Cold Storage Co.

Address... Tacoma 2, Washington

Land surface, datum... ft above  
below



CORRE- LATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
------------------	----------	---------------------	-----------------

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses if material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

	Sand	20	20
	Sandy clay	20	40
	Soft sandy clay & rocks	46	86
	Sand & gravel up to 3" dark grey	6	92
	Fine sand & clay	34	126
	Sand, clay & rocks	4	130
	Sand & clay	20	150
	Sand & gravel	5	155
	Clay	30	185
	Sand & clay	22	207
	Sand & gravel: dirty	6	213
	Sand & gravel, finer toward 221'	8	221
	Clay	6	227
	Sand & gravel	6	233

Turn up

(over)

Sheet of sheet

