The 166th Avenue Townhomes

NE 85th Street and 166th Avenue NE
Redmond, WA

Storm Drainage Analysis

Ashworth Homes

June 25, 2015

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PROJECT OVERVIEW

Site Location:
The property is located on the northwest corner of 166th Avenue Northeast and Northeast 85th Street, in the City of Redmond, Washington. The project site consists of two parcels the westernmost parcel is currently developed with a two-story apartment building and the easternmost parcel was previously developed as a single-family residential home. The existing structure has been demolished and the site is currently vacant. The project proposal includes constructing 18 single family three story townhomes. The project will consist of (2) four unit and (2) five unit townhome clusters. Parking will be provided by use of private garages on the first story of the units.

Design Criteria:
The City of Redmond issued a Stormwater Technical Notebook Issue No. 6 dated February 23, 2012 to complement the 2005 Department of Ecology Stormwater Management Manual for Western Washington. The 2012 City of Redmond stormwater quantity and quality requirements generally follow that which is contained in the 2005 DOE Manual. However, the City has implemented a program specifically for the City Center area. This project is located within the City Center area and therefore the project will be required to pay a contribution in lieu of Flow Control and Stormwater Quality Treatment. The contribution will be assessed through the City's standard and City Center Stormwater Capital Facilities Charge in accordance with City of Redmond Code section 13.20.040 and 13.20.045. The Downtown Sub-basin Stormwater Capital Facilities Charge is being assessed for the City's use in constructing and maintaining sub area storm water conveyance, detention and water quality facilities to detain and treat stormwater generated by properties within the City Center area. The stormwater conveyance system will be designed to for the 10 year peak flows.

Table 1

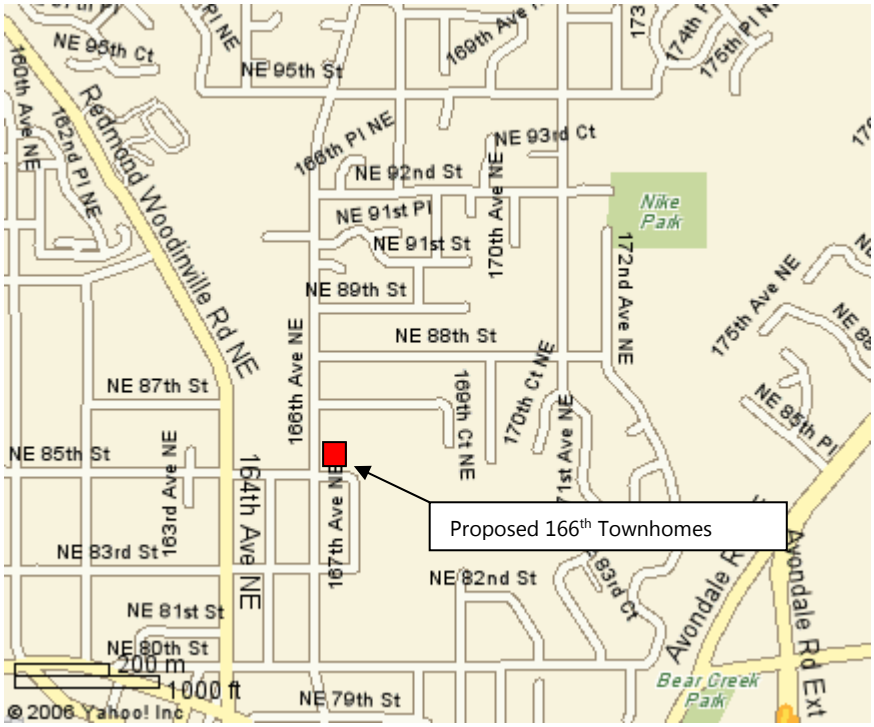
Jurisdictional Requirements	
50% of 2-year to 50-year:	Match Flow Duration to size for detention (when/if required)
Downstream Analysis:	To Sammamish River

Proposed Drainage System:
The project proposal is to collect runoff from the buildings, roadway and landscaped areas utilizing underground pipes, catch basins, curbs, and gutter. The surface water runoff will be conveyed to the City's existing drainage conveyance system in NE 85th and 167th Ave NE. The onsite stormwater will be conveyed to a new manhole constructed over the existing storm conveyance system in 166th Ave NE. The site impacts to the upstream and downstream conveyance systems have been analyzed and shown to have an insignificant impact to the City's existing drainage system.

LID Consideration:

Infiltration and dispersion are not an option for this project site as outlined in the Hydrogeological report prepared by Zipper Zeman Associates, Inc., See Appendix F. The report describes the site as underlain by relatively impervious glacial till. It is the opinion of Zipper Zeman Associates, Inc that direct recharge of the underlying aquifers due to infiltration at the subject site is minimal. Due to the proposed site improvements the project is not a good candidate for dispersion. Implementation of Low Impact Development has been determined to be not feasible on this project.

Vicinity Map:



Location: NW Corner 166th Avenue and NE 85th
City of Redmond Sub-basin: Downtown
Section/Township/Range: NW ¼ SW ¼ Sec. 1, T.25N, R.5E of W.M.
Parcel/Tax Lot: 0125059168 and 0125059077
Size: Building Site: 0.54 acre, Roadway Site: 0.45 acre
City, County, State: Redmond, King County, Washington
Governing Agency: City of Redmond
Design Criteria: 2012 City of Redmond Clearing, Grading, and Stormwater Management Technical Notebook Issue February 23, 2012, 2005 Department of Ecology Stormwater Management Manual for Western Washington.

Project Areas Summary:

Table 2

Onsite Areas	
Description	**Area**
Site Area	0.54 Acres
Existing Impervious	0.16 Acres
New PGIS	0.15 Acres
New NPGIS	0.28 Acres
Total New Impervious	0.43 Acres
Replaced PGIS	0.00 Acres
Replaced NPGIS	0.00 Acres
Total Replaced Impervious	0.00 Acres
TDA Site Area	0.54 Acres
TDA Impervious Subject to WQ Treatment	0.15 Acres
Total PGIS Subject to WQ Treatment	0.15 Acres*
Total NPGIS Routed to Regional Facility	0.28 Acres*
Total NPGIS That Infiltrates or Bypasses Regional Facility	0.00 Acres

*Project is within the regional surcharge area and will contribute a fee in lieu of providing water quality treatment and quantity treatment.

Table 3

Offsite Areas	
Description	**Area**
Offsite Area	0.40 Acres
Existing Impervious	0.21 Acres
New PGIS	0.10 Acres
New NPGIS	0.00 Acres
Total New Impervious	0.10 Acres
Replaced PGIS	0.21 Acres
Replaced NPGIS	0.00 Acres
Total Replaced Impervious	0.21 Acres
TDA Site Area	0.40 Acres
TDA Impervious Subject to WQ Treatment	0.10 Acres
Total PGIS Subject to WQ Treatment	0.10* Acres
Total NPGIS Routed to Facility	0.00* Acres
Total NPGIS That Infiltrates	0.00 Acres

*Project is within the regional surcharge area and will contribute a fee in lieu of providing water quality treatment and quantity treatment.

EXISTING CONDITIONS SUMMARY

Existing Site Hydrology

The areas to the north, east and west of the site are currently developed or being developed with residential uses. The area to the west of the site is the developed with mixed uses including offices, single and multifamily residences, and commercial developments.

The existing site consists of two parcels that are currently developed with a two-story apartment building and a demolished single-family residential home site. Aside from the development, the site consists of mainly lawn with some gravel and forested areas. Approximately 46% of the site is covered with impervious surfaces. Storm runoff sheet flows across the property from the northeast. A curve number of 98 has been assigned to both paved and rooftop areas, while a curve number of 80 has been assigned to the open areas. Table 4 provides a summary of the existing conditions.

Table 4

Existing Conditions		
Area	**Condition**	**CN**
Building Site		
0.10 AC	Rooftop	98
0.15 AC	Paved	98
0.29 AC	Open Space	80
Roadway Site (off-site)		
0.21 AC	Paved	98
0.19 AC	Open Space	80

The estimate stormwater runoff generated from the existing on-site and off-site drainage basin during the 10 year-24 hour storm event is 0.28 cfs.

The site is not located within 100 Year Floodplain or the FEMA Floodway per the City of Redmond property viewer tool. See Appendix A Figure 14 for maps.

Nearby Receiving Waters

The stormwater on site will flow into the City conveyance system on Northeast 85th Street. Once in the public system, stormwater runoff will be conveyed through the City's regional systems prior to being ultimately discharged to the Sammamish River.

OFF-SITE ANALYSIS REPORT

In accordance with the 2005 Ecology Manual, Section 2.6.2, the City's Fee in Lieu of providing Stormwater Flow Control and Water Quality Treatment guidelines, and to verify that suitability of the on site improvements, a downstream analysis was performed. This involves studying the defined watershed and identifying any existing or predicted issues.

Study Area

The study area for the proposed site includes approximately 208 acres: 130.0 impervious acres and 78.5 pervious acres. The entire study area ultimately drains into the Sammamish River. The existing Stormwater System Maps were obtained from the City of Redmond and the applicable upstream and downstream conveyance systems were identified for this site. The upstream and downstream basins contribute a significant amount of runoff to the Sammamish River.

"StormShed3G", which uses the Santa Barbara Urban Hydrograph (SBUH) methodology, was used to model the 10-year Event Peak Flow for pre-developed and developed runoff conditions. With a specific design storm or precipitation value in combination with its associated distribution, the model calculates runoff hydrographs. The hydrographs are composed based on approximated characteristics including curve number, areas, and time of concentration.

Rainfall Distribution: 24-hour, Type 1A Distribution
Hydrograph Interval: 10 minutes

Table 5

Precipitation Values	
Storm Event	**Rainfall Amount (inches)**
2-year, 24 hour	1.83
10-year, 24 hour	2.76
25-year, 24 hour	3.20
100-year, 24 hour	3.73

Upstream Analysis

The upstream basin consists of 88.6 acres. The upstream area is zoned R5. Based on Table 3.2.2.D from the 2005 King County Surface Water Design Manual, the estimated impervious coverage for R5 zoning is approximately 48%. The resulting impervious area is approximately 42.5 acres and pervious area is 46.1 acres. The upstream basin has a 10 year-24 hour event peak flow rate of 32.7 cfs.

Downstream Analysis

The downstream basin consists of approximately 119.6 acres. The downstream area consists of the following land use designations per the City zoning map:

- R20 – 23.8 acres
- R5 – 3.4 acres
- SMT – 25.3 acres
- TSQ – 61.0 acres
- VV – 6.1 acres

Based on these land use designations, it is conservatively estimated that approximately 80% of the downstream basin is impervious. The resulting impervious area is approximately 95.6 acres and pervious area is 24.0 acres. The downstream basin has a 10-year event peak flow rate of 35.7 cubic feet per second (including the existing site).

With the addition of the proposed basin, the 10-year event peak flow rate for the total basin increases from 59.99 cubic feet per second to 60.21 cubic feet per second. From the additional 0.22 cubic feet per second, the entire basin increases the 10-year peak flow rate by 0.36%.

Under existing and proposed conditions, the site will drain into a 12-inch storm drain in NE 85th. At the intersection with 166th Avenue Northeast, the existing conveyance system increases to a 36-inch pipe as it continues to the west in NE 85th. The conveyance system ultimately increases to a 54" storm pipe before being discharged to the Sammamish River.

Table 6

Basin	10-year Event Peak Flow Rate (cfs)
Upstream	23.95
Downstream	35.75
Total	59.70

Table 7

Basin	10-year Event Peak Flow Rate (cfs)
Existing Site	0.28
Proposed Site	0.51
Total (w/ Existing Site)	59.98
Total (w/ Proposed Site)	60.21

PERMANENT STORMWATER CONTROL PLAN

EXISTING SITE HYDROLOGY

The existing site consists of two parcels that are currently developed with a two-story apartment building and a demolished single-family residential home site. Aside from the development, the site consists of mainly lawn with some gravel and forested areas. Approximately 46% of the site is covered with impervious surfaces. Storm runoff sheet flows across the property from the northeast.

DEVELOPED SITE HYDROLOGY

The project proposal includes constructing (2) four unit and (2) five unit townhome clusters with a total building footprint of 12,200 square feet on the existing 0.54 acre site. The three story townhomes will be constructed above individual private garages. Access to the site will be onto Northeast 85th Street. Offsite improvement include reconstruction of NE 85th to meet the City of Redmond standards, improvements to the existing three leg traffic signal at NE 85th and 166th to create a full four legged intersection, and widening of 167th to 20 feet. Curb, gutter and sidewalks will be constructed on the north side of NE 85th and on the east side of 167th. The offsite drainage basin area is approximately 0.40 acres. Stormwater will continue to discharge to the existing public stormwater conveyance system in NE 85th and 167th. Table 3 summarizes the proposed surface areas:

Table 8

Proposed Conditions		
Area	**Condition**	**CN**
Building Site		
0.28	Rooftop	98
0.15	Paved	98
0.11	Open Space	80
Roadway Site		
0.31	Paved	98
0.09	Open Space	80

The estimate stormwater runoff generated from the proposed on-site and off-site drainage basin during the10 year-24 hour storm event is 0.51 cfs. The total estimated net increase in stormwater runoff from the on-site and off-site basins during the 10 year-24 hour storm event is 0.23 cfs.

PERFORMANCE STANDARDS AND GOALS

The project is classified as a Large Project according to Chapter 3 section 3.5 of the City of Redmond Clearing, Grading, and Stormwater Management Technical Notebook. Per the Notebook a Large Project is a project that exceeds one or more of the criteria for Medium Projects. The new impervious area on the proposed site conditions exceeds 5,000 square feet.

As required by the City of Redmond Stormwater Technical Notebook Issue No. 6, the storm drainage design for this project is required to meet Minimum Requirements #1 through #9 of the City of Redmond Clearing, Grading, and Stormwater Management Technical Notebook. The Minimum Requirements applicable to this project are:

Minimum Requirement No. 1: *Preparation of Stormwater Site Plans: All projects must provide a stormwater site plan for local government review.*
Response: *This Storm Drainage Analysis fulfills the requirements of Minimum Requirement No. 1. A copy of the project site plan can be found in Appendix A, Figure 1.*

Minimum Requirement No. 2: *Construction Stormwater Pollution Prevention Plan (SWPPP): All new development, redevelopment and maintenance projects are responsible for preventing erosion and discharge of sediment and other pollutants into receiving waters. Because the project is classified as a "Large Project" this project is subject to Minimum Requirement No. 2 and is required to provide a Construction Stormwater Pollution Prevention Plan (SWPPP) as part of the Stormwater Site Plan.*
Response: *The Construction SWPP Plan will be included as part of the construction document submittal, but is not included in this preliminary drainage report.*

Minimum Requirement No. 3: *Source Control of Pollution: BMPs shall be applied to the project where reasonable, available and appropriate. Source Control BMPs must be selected, designed, and maintained in accordance with Volume IV of the 2005 Ecology Manual.*
Response: *The City requires projects to apply stormwater quality treatment measures as outlined by the 2005 Ecology Manual with an alternative option, which is to provide a contribution in lieu of stormwater quality treatment. The contribution from the project site is used to fund the regional stormwater management facilities. The City's regional facilities will address pollution from the proposed site.*

Minimum Requirement No. 4: *Preservation of Natural Drainage Systems and Outfalls: Drainage patterns and discharge from the site shall be maintained as it would be naturally.*
Response: *The drainage patterns for the proposed site will mimic the existing conditions, which flow away from the northeast corner of the site into the City conveyance system.*

Minimum Requirement No. 5: *On-site Stormwater Management: Projects are required to implement on-site stormwater management BMPs to infiltrate, disperse, and retain stormwater*

runoff on-site to the maximum extent feasible without causing flooding, groundwater contamination, or erosion impacts.
Response: *Because the project site is located within the City Center Area, the City of Redmond requires the project to contribute a fee in lieu of building site specific stormwater facilities. The potential impacts from all new development or redevelopment within the City are addressed in a manner that meets the City's obligations on a watershed basis to protect water quality and prevent erosion of streams. The contributed fee in lieu of onsite facilities will fund the construction and maintenance of regional stormwater management facilities. Roof downspouts will be dispersed to ground by use of splash blocking and outfalls onto the proposed asphalt driveways. Landscape areas within the project area shall be constructed with compost amended soils per COR Technical Notebook 2.5.5.*

Minimum Requirement No. 6: *Runoff Treatment: Construction of stormwater facilities must be provided to reduce pollutant loads and concentration from stormwater runoff.*
Response: *The City of Redmond requires a contribution in lieu of providing on-site storm water quality treatment and flow control. The contribution in lieu of providing stormwater quality treatment and flow control will fund the construction and maintenance of stormwater facilities for the City of Redmond. The City has the responsibility to ensure that impacts from development or redevelopment are addressed to protect water quality and prevent erosion of streams. Therefore, stormwater facilities will be constructed at the regional level, instead of site specific, to reduce pollutant loads.*

Minimum Requirement No. 7: *Flow Control: Flow control must be provided to lessen the impact of development.*
Response: *The City of Redmond requires a contribution in lieu of providing on-site storm water quality treatment and flow control. The contribution in lieu of providing stormwater quality treatment and flow control will fund the construction and maintenance of stormwater facilities for the City of Redmond. The City has the responsibility to ensure that impacts from development or redevelopment are addressed to protect water quality and prevent erosion of streams. Therefore, stormwater facilities are provided at the regional level, instead of site specific, to reduce stream bank erosion.*

Minimum Requirement No. 8: *Wetlands Protection: Where applicable, protection shall be included on plans to ensure that wetlands receive the same level of protection as other waters.*
Response: *The proposed project does not discharge into a wetland or associated buffer either directly or indirectly; therefore, wetland protection does not apply to the site.*

Minimum Requirement No. 9: *Operation and Maintenance: To ensure flow control facilities are maintained and operated in a proper manner, an operation and maintenance manual shall be provided for all detention or water quality facilities.*
Response: *The City of Redmond has developed a regional approach for managing stormwater for the City Center area. This involves the utilization of regional stormwater facilities instead of site specific facilities. This project site is required to make a contribution in lieu of flow control and*

stormwater quality treatment. Therefore, the operation and maintenance for detention and water quality facilities will take place at the regional facilities and be the responsibility of the City.

FLOW CONTROL SYSTEM

The City of Redmond requires new development and redevelopment to provide flow control for stormwater. From Section 8.8 – Regional Facilities Program, of the City of Redmond Stormwater Technical Notebook, the proposed site is required to provide a contribution in lieu of onsite facilities because the City has coordinated a regional approach to manage stormwater in the City Center. The contribution for this proposed site will fund construction and maintenance for these regional facilities. From the Regional Stormwater Facilities Map, shown in the Appendix, Figure 5, the proposed site is within the boundaries of the City Center Regional Surcharge Area (i.e. City Center).

The contribution in lieu of onsite facilities is outlined in the City of Redmond Municipal Code Chapter 13.20 – Stormwater Capital Facilities Charges. The Citywide Capital Facilities Charge is $958.00 for every impervious unit (IU) created by the development. In addition to the Citywide Stormwater Capital Facilities Charge, a Downtown Sub-basin Stormwater Capital Facilities Charge of $5,435.00 shall be calculated for every impervious unit. An impervious unit is defined as a configuration or conglomeration of impervious surface estimated to contribute an equivalent amount of runoff to the City's stormwater management system which is approximately equal to that created by the average single family residential parcel. One Impervious Unit (IU) is equivalent to two thousand square feet of impervious surface area. For purposes of computation of the charges the code requires that the IU be rounded down to the nearest tenth. The existing site contains 0.46 acres of impervious area, which is increased to 0.74 acres from the new development. The Citywide Stormwater and Downtown Sub-Basin Capital Facilities Charges will apply to all of the proposed impervious area on the building site and increased impervious area for the roadway site.

Existing Conditions – Impervious Area:
Building Site = 0.25 AC
Roadway Site = 0.21 AC
Total = 0.46 AC

Proposed Conditions – Impervious Area:
Building Site = 0.43 AC
Roadway Site = 0.31 AC
Total = 0.74 AC

Site Impervious Area = 0.43 AC
Roadway Increase in Impervious Area = 0.10 AC
Total impervious area = 0.53 AC

Citywide Stormwater Capital Facilities Charge
0.53 acres = 23,086.8 square feet
23,086.8 square feet = 11.5 IU
11.5 IU x $958.00 = $11,017.00

Downtown Sub-basin Capital Facilities Charge
0.53 acres = 23,086.8 square feet
23,086.8 square feet = 11.5 IU
11.5 IU x $5,435.00 = $62,502.50

Total Facilities Charge
$11,017.00 + $62,502.50 = $73,519.50

Therefore, the total contribution for the proposed site is $73,519.50.

WATER QUALITY SYSTEM

The city requires stormwater quality treatment measures for proposed projects to be in accordance with the 2005 Ecology Manual. However, the City of Redmond has an alternative to this requirement, which is the contribution in lieu of stormwater quality treatment on the site. The proposed site is eligible for the contribution because it is located within the boundary of the Regional Surcharge Area on the Regional Stormwater Facilities Map, shown in the Appendix. The contribution in lieu of providing stormwater quality treatment requirement will replace site specific facilities.

Per discussions with Jeff Dendy, a regional stormwater facility downstream of the project site will have available capacity for the runoff from this site. The contribution in lieu of flow control will ensure the runoff to be treated at either a current or proposed regional stormwater facility.

The contribution from the capital facilities charge and the city center capital facilities charge has been calculated in the Flow Control Discussion section of this report.

Should the site have been required to provide an on-site water quality facility, the water quality flow on which it would have been based is 0.29 cfs. This is the flow produced by this site during the 2 year-24hour storm event. The associated water quality volume is 4273 cubic feet. See appendix E for calculations.

CONVEYANCE SYSTEM ANALYSIS AND DESIGN

The proposed system will drain away from the northeast corner of the site. The flow will be diverted into two different routes. One route will take roof runoff counter clockwise around the

building to the southeast corner. The flow will enter a catch basin and feed into the existing 24-inch public storm drain under Northeast 85th Street. The other route on the site will take the runoff from the northeast corner clockwise around the building and enter a catch basin in the center of the south site border. From that catch basin, the flow will enter the 12" public storm drain under Northeast 85th Street.

The peak runoff for the 10-Year Event Peak Flow Rate of the proposed site is 0.51 cubic feet per second. The runoff has increased from the existing by 0.23 cubic feet per second.

Table 9

Basin	10-Year Event Peak Flow Rate (cfs)
Existing	0.28
Proposed	0.51

Assuming a slope of 0.5%, a 12-inch storm drain pipe has the capacity of 2.73 cfs. All proposed storm drainage pipe for this project will consist of 12-inch diameter sewer grade PVC, which is preferred for normal installations by the City of Redmond. The 12-inch diameter pipe has sufficient capacity to handle runoff from the proposed site.

CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN

The Construction SWPP Plan will be included as part of the construction document submittal, but is not included in this drainage report.

SPECIAL REPORTS AND STUDIES

See Appendix F for Hydrogeologic Report by Zipper Ziemen and Associates.

OPERATION AND MAINTENANCE MANUAL

The owner or operator of the project shall be responsible for maintaining the stormwater facilities in accordance with local requirements. Proper maintenance is important for adequate functioning of the stormwater facilities. The following maintenance program is recommended for this project:

Table 10

Maintenance Checklist for Catch Basins and Inlets

Maintenance Component	√	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance is Performed
General		Trash & Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%.	No trash or debris located immediately in front of catch basin or on grate opening.
			Trash or debris (in the basin) that exceeds 60% of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe.	No trash or debris in the catch basin.
			Trash or debris in any inlet or pipe blocking more than 1/3 of its height.	Inlet and Outlet pipes free of trash or debris.
			Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No dead animals or vegetation present within the catch basin.

		Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the catch basin.
		Structural damage to frame and/or top slab	Top slab has holes larger than 2 square inches or cracks wider than ¼ inch. (Intent is to make sure no material is running into basin).	Top slab is free of holes and cracks.
			Frame not sitting flush on top slab, i.e., separation of more than ¾ inch of the frame from the top slab. Frame not securely attached.	Frame is sitting flush on the riser rings or top slab and firmly attached.
		Fractures or Cracks in basin walls/bottom	Maintenance person judges that structure is unsound.	Basin replaced or repaired to design standards.
			Grout fillet has separated or cracked wider than ½ inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	Pipe is regrouted and secure at basin wall.
		Settlement/ misalignment	If failure of basin has created a safety,	Basin replaced or repaired to design

			function or design problem.	standards.
		Vegetation	Vegetation growing across and blocking more than 10% of the basin opening.	No vegetation blocking opening to basin.
			Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation or root growth present.

If you are unsure whether a problem exists, please contact a Professional Engineer.

Maintenance Checklist for Conveyance Pipes and Ditches

Maintenance Component	√	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance is Performed
Pipes		Sediment & debris accumulation	Accumulated sediment or debris that exceeds 20% of the diameter of the pipe.	Water flows freely through pipes.
		Vegetation/roots	Vegetation/roots that reduce free movement of water through pipes.	Water flows freely through pipes.
		Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
		Damage to protective coating or corrosion	Protective coating is damaged; rust or corrosion is weakening the structural integrity of any part of pipe.	Pipe repaired or replaced.
		Damaged	Any dent that decreases	Pipe repaired or

			the cross section area of pipe by more than 20% or is determined to have weakened structural integrity of the pipe.	replaced.
Ditches		Trash and debris	Trash and debris exceeds 1 cubic foot per 1,000 square feet of ditch and slopes.	Trash and debris cleared from ditches.
		Sediment accumulation	Accumulated sediment that exceeds 20% of the design depth.	Ditch cleaned/flushed of all sediment and debris so that it matches design.
		Noxious weeds	Any noxious or nuisance vegetation which may constitute a hazard to personnel or the public.	Noxious and nuisance vegetation removed according to applicable regulations. No danger of noxious vegetation where personnel or the public may normally be.
		Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
		Vegetation	Vegetation that reduces free movement of water through ditches.	Water flows freely through ditches.
		Erosion damage to slopes	Any erosion observed on a ditch slope.	Slopes are not eroding

Appendix

Appendix A **Figures**

Figure 1 – Site Plan
Figure 2 – Existing Site Drainage Basin Map
Figure 3 – Proposed Site Drainage Basin Map
Figure 4 – Offsite Drainage Basin Map
Figure 5 – Redmond Stormwater Facilities Maps
Figure 6 – SCS/USDA Soils Map
Figure 7 – 2-year, 24-hour Isopluvial
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Figure 9 – 25-year, 24-hour Isopluvial
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Figure 11 – City of Redmond Residential Zones Site Requirements Chart
Figure 12 – Percent Impervious Coverage for Existing Residential Areas
Figure 13 – Stormwater System Maps
Figure 14 – Frequently Flooded Areas Map
Figure 15 – Landslide Hazard Map
Figure 16 – Erosion Hazard Map
Figure 17 – Wetland Map
Figure 18 – Seismic Hazard Areas Map
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Appendix B **Upstream Basin Hydrology Output Data/Calculations**

Appendix C **Downstream Basin Hydrology Output Data/Calculations**

Appendix D **Existing Basin Hydrology Output Data/Calculations**

Appendix E **Proposed Basin Hydrology Output Data/Calculations**

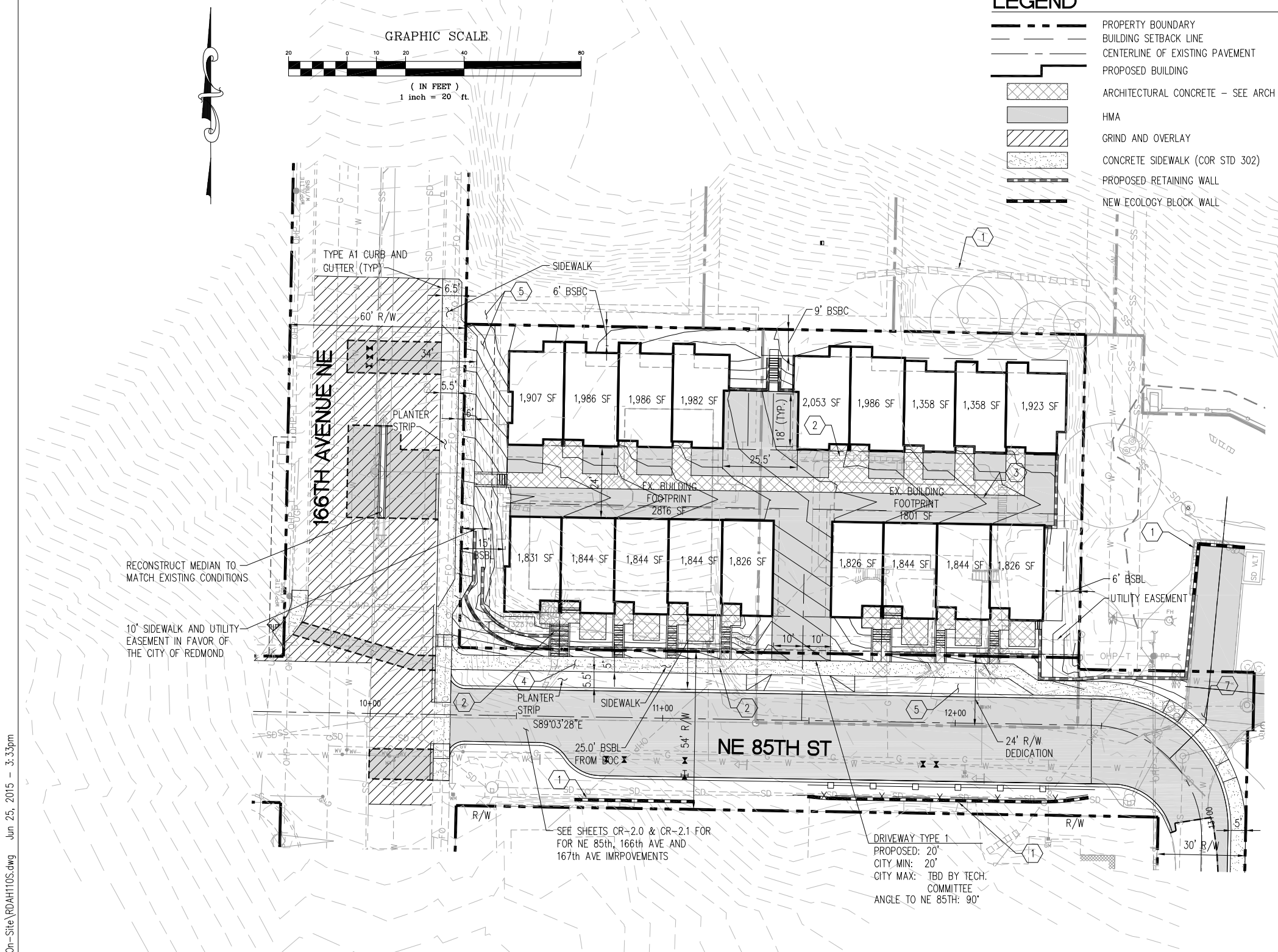
Appendix F **Hydrogeologic Report**

Appendix G **Geotechnical Report**

Appendix A - Figures

Figure A1 – Site Plan

ATTACHMENT 14



LEGEND

- PROPERTY BOUNDARY
- BUILDING SETBACK LINE
- CENTERLINE OF EXISTING PAVEMENT
- PROPOSED BUILDING
- ARCHITECTURAL CONCRETE – SEE ARCH PLANS
- HMA
- GRIND AND OVERLAY
- CONCRETE SIDEWALK (COR STD 302)
- PROPOSED RETAINING WALL
- NEW ECOLOGY BLOCK WALL

CIVIL CONTACT

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CALL 48 HOURS BEFORE YOU DIG 1-800-424-5555

CITY OF REDMOND GENERAL NOTES

1. STANDARD SPECIFICATIONS
   A. ALL WORK PERFORMED AND MATERIALS USED SHALL BE IN ACCORDANCE WITH THESE STANDARD DETAILS AND SPECIFICATIONS AND SHALL BE USED IN CONJUNCTION WITH THE LATEST EDITION OF "STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION" ISSUED BY WASHINGTON STATE DEPARTMENT OF TRANSPORTATION AND AMERICAN PUBLIC WORKS ASSOCIATION WASHINGTON STATE CHAPTER, WHICH HEREIN SHALL BE REFERRED TO AS "STANDARD SPECIFICATIONS."
   B. THE STANDARD SPECIFICATIONS, EXCEPT AS THEY MAY BE MODIFIED OR SUPERSEDED BY THESE STANDARD DETAILS AND SPECIFICATIONS, SHALL GOVERN ALL PHASES OF WORK FOR, BUT NOT LIMITED TO PUBLIC AND PRIVATE STREETS, DRIVEWAYS, PARKING LOTS, COMMERCIAL AND INDUSTRY DEVELOPMENTS, APARTMENTS, WITHIN THE CITY OF REDMOND FRANCHISED UTILITY INSTALLED WITHIN KING COUNTY.
2. PERMITS AND LICENSES
   PRIOR TO CONSTRUCTION, AND IN ADDITION TO ANY OTHER PERMITS REQUIRED, A CITY OF REDMOND "RIGHT OF WAY USE PERMIT" MUST BE OBTAINED FOR ALL CONSTRUCTION WORK WITHIN THE CITY'S RIGHT-OF-WAY. IN ADDITION, CONTRACTORS AND SUBCONTRACTORS ARE REQUIRED TO POSSESS A CURRENT CITY OF REDMOND BUSINESS LICENSE. SUPPLIERS ARE EXEMPT.
3. PLANS
   IT IS REQUIREMENT OF THE CITY OF REDMOND, DEPARTMENT OF PUBLIC WORKS, THAT AN APPROVED SET OF CONSTRUCTION PLANS FOR ALL WORK BE KEPT ON THE CONSTRUCTION SITE AT ALL TIMES. IN ADDITION, A COPY OF THE CURRENT CITY OF REDMOND STANDARD DETAILS AND SPECIFICATIONS SHALL ALSO BE AVAILABLE AT THE CONSTRUCTION SITE.
4. PRECONSTRUCTION
   THE CONTRACTOR/OWNER, ENGINEER/MANAGER, UTILITY AND CITY REPRESENTATIVES SHALL HOLD A PRE-CONSTRUCTION CONFERENCE PRIOR TO STARTING ANY CONSTRUCTION ON THE PROJECT. ONE WEEK'S NOTICE IS REQUIRED FOR SCHEDULING PRE-CONSTRUCTION MEETINGS. CONTACT THE DEPARTMENT OF PUBLIC WORKS CONSTRUCTION DIVISION (425) 556-2723 OR THE INSPECTION HOTLINE (425) 556-2435 TO COORDINATE THE MEETING.
5. INSPECTION
   THE DEPARTMENT OF PUBLIC WORKS CONSTRUCTION DIVISION (425) 556-2723 OR THE INSPECTION HOTLINE (425) 556-2435 SHALL BE NOTIFIED 48 HOURS PRIOR TO STARTING ANY TYPE OF CONSTRUCTION INCLUDING CLEARING & GRADING, SANITARY SEWERS, WATER MAINS, FIRE SPRINKLER, SUPPLY MAINS, FIRE STANDPIPES, FIRE DEPARTMENT CONNECTIONS, STORM DRAINS, CURB AND GUTTERS, SIDEWALKS, DRIVEWAYS, STREET GRADING AND PAVING OR UTILITIES AND SURFACE IMPROVEMENTS.
6. NOISE CONTROL
   UNLESS OTHERWISE EXPLICITLY APPROVED HOURS OF CONSTRUCTION SHALL BE LIMITED FROM 7:00 A.M. TO 7:00 P.M., MONDAY THROUGH FRIDAY; SATURDAY 9:00 A.M. TO 6:00 P.M.; SUNDAY, NO WORK PERMITTED. THIS SHALL APPLY TO ALL CONSTRUCTION WORK ENFORCED BY THE REDMOND COMMUNITY DEVELOPMENT GUIDE SECTION 20D.100 (NOISE STANDARDS). SEE THE SECTION FOR EXCEPTION AND DETAILS. WORK NOT IMPACTING RESIDENTIAL AREAS SHALL BE 7:00 A.M. – 10:00 P.M. MONDAY THROUGH SATURDAY.
7. CONTROL OF MATERIAL
   THE SOURCE OF SUPPLY OF EACH OF THE MATERIALS FURNISHED BY THE CONTRACTOR SHALL BE SUBMITTED TO THE CITY FOR APPROVAL PRIOR TO DELIVERY. ONLY MATERIALS CONFORMING TO THE REQUIREMENTS OF THE STANDARD SPECIFICATIONS AND APPROVED BY THE CITY SHALL BE USED IN THE WORK. TESTING OF MATERIALS MAY INCLUDE TESTS OF ACTUAL SAMPLES, MANUFACTURER'S CERTIFICATIONS, APPROVAL OF CATALOG CUTS OR FIELD ACCEPTANCE REPORTS.

NOTE:
CONTRACTOR TO SUBMIT A CONSTRUCTION HAULING FORM TO THE CITY OF REDMOND.

THIS DEVELOPMENT SHALL BE CONSTRUCTED IN ACCORDANCE WITH CITY OF REDMOND STANDARD SPECIFICATIONS AND DETAILS LATEST EDITION.

SITE DATA

PROPOSED PROPERTY DATA:

PARCEL #0125059168	= 0.26 ACRES
PARCEL #0125059077	= 0.34 ACRES
TOTAL	= 0.60 ACRES
ZONING DESIGNATION	= EH
PROPOSED USE	= MULTI-FAMILY RESIDENCE

BUILDING DATA

TOTAL APPROXIMATE BUILDING AREA = 33,068 SF

SETBACKS

WEST = 15' FROM PROPERTY LINE
EAST = 6' FROM PROPERTY LINE
NORTH
EAST BUILDING = 9' FROM PROPERTY LINE
WEST BUILDING = 6' FROM PROPERTY LINE
SOUTH = 25' FROM BACK OF CURB

KEY NOTES

1. EXISTING WALL TO REMAIN/ TO BE REPLACED
2. EXISTING WALL TO BE REMOVED
3. EXISTING BUILDING DEMOLISHED
4. EXISTING DRIVEWAY 53'±
5. EXISTING DRIVEWAY 12'±
6. EXISTING DRIVEWAY 25'±
7. EXISTING DRIVEWAY 19'±

APPROVED FOR CONSTRUCTION

FOR: WILLIAM J CAMPBELL
DIRECTOR OF PUBLIC WORKS
CITY OF REDMOND

PLAN CHECK ENGR. _____
STORM DRAIN ENGR. _____
UTILITY ENGR. _____
FIRE DEPT. _____
TRANSPORTATION ENGR. _____
PLANNING DEPT. _____

THIS APPROVAL IS FOR THE DESIGN CONCEPT ONLY. THESE PLANS APPEAR TO BE IN CONFORMANCE WITH THE CITY OF REDMOND DESIGN STANDARDS FOR CONSTRUCTION. THIS APPROVAL SHALL NOT BE CONSTRUED AS AUTHORIZING CONSTRUCTION NOT IN ACCORDANCE WITH APPLICABLE CITY STANDARDS. THE CITY RESERVES THE RIGHT TO REQUIRE REVISIONS TO THE APPROVED PLANS TO ASSURE CONFORMANCE WITH CITY OF REDMOND DESIGN STANDARDS FOR CONSTRUCTION AT ANY TIME THAT IT IS DISCOVERED THAT THE PROPOSED CONSTRUCTION DOES NOT OTHERWISE MEET THE APPLICABLE CONSTRUCTION STANDARDS. THE OWNER IS REQUIRED TO PROVIDE DESIGNS AND PLANS IN ACCORDANCE WITH APPLICABLE CITY STANDARDS AND ASSURES THAT CONSTRICTION IS ACCOMPLISHED IN ACCORDANCE WITH THOSE STANDARDS. THE OWNER AND/OR DESIGN ENGINEER AND/OR DEVELOPER, MAY BE REQUIRED TO MAKE NECESSARY APPROVED FIELD REVISIONS TO CORRECT ANY ERRORS OR OMISSIONS FOUND ON THE APPROVED PLAN.

No.	Date	By	Revision Description
	3/17/15		REVISED 30% SUBMITTAL
	6/11/15		REVISED 60% SUBMITTAL
	6/25/15		REVISED 90% SUBMITTAL

Issue Date: 6/11/2015 — 90% SUBMITTAL
Project No: 30458001
Designed By: JJJ
Drawn By: KM
Checked By: MSN

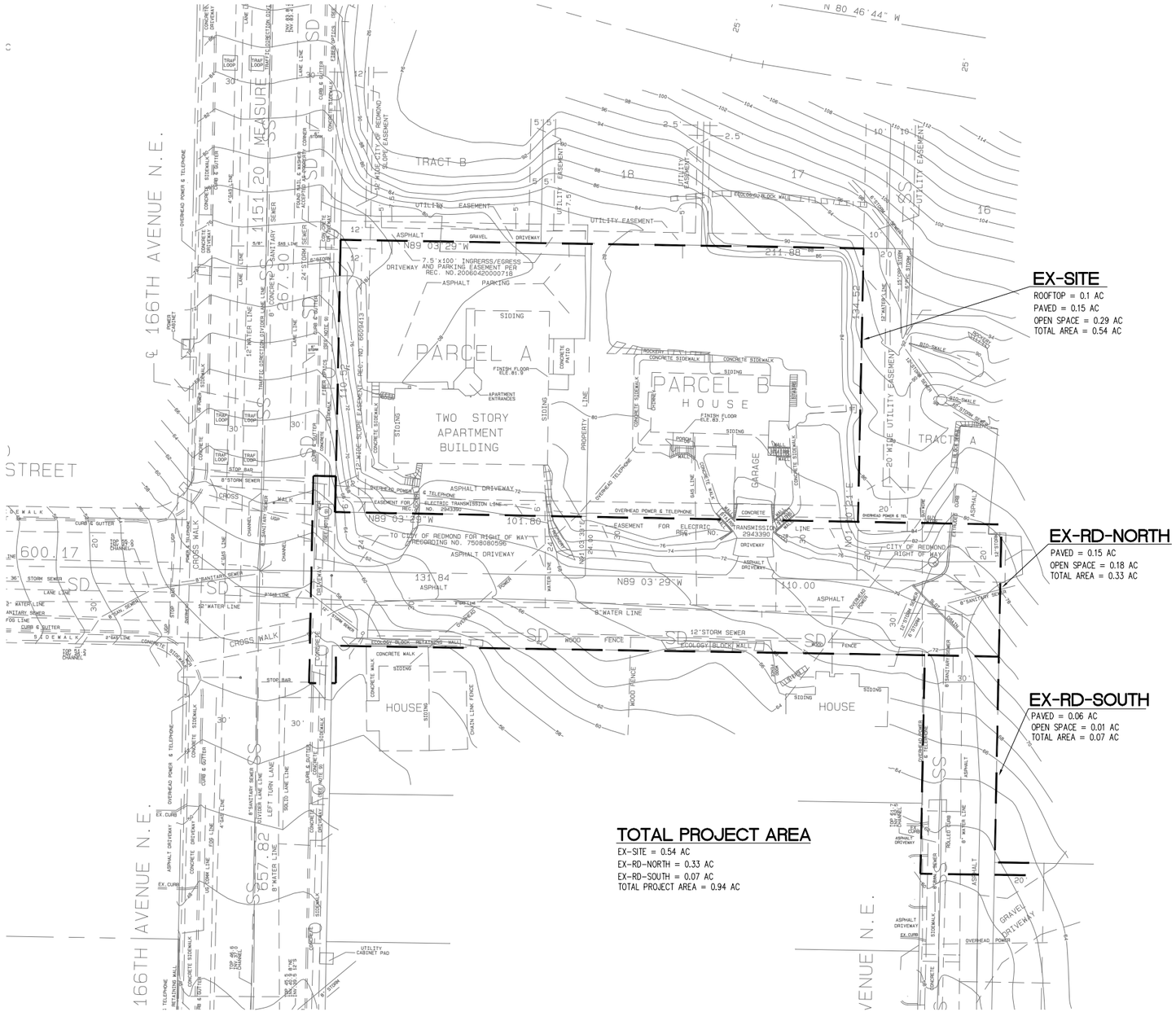
PACLAND
606 Columbia St. N.W., Suite 106
Olympia, WA 98501
T (360) 786-9500
F (360) 786-9505
www.PacLand.com

166TH AVE. TOWNHOMES
166TH AVE NE & NE 85TH ST
REDMOND, WA

SITE PLAN

C-1.0

Figure A2 – Existing Site Drainage Basin Map



0: \Washington\Redmond\Ashworth\2 Drawings\On-Site\Exhibits\2015-03-03 DRAINAGE EXHIBIT\EXIST_BASINS.dwg

166TH AVE TOWNHOMES
REDMOND, WA
EXISTING DRAINAGE BASIN MAP
SCALE: 1" = 50'

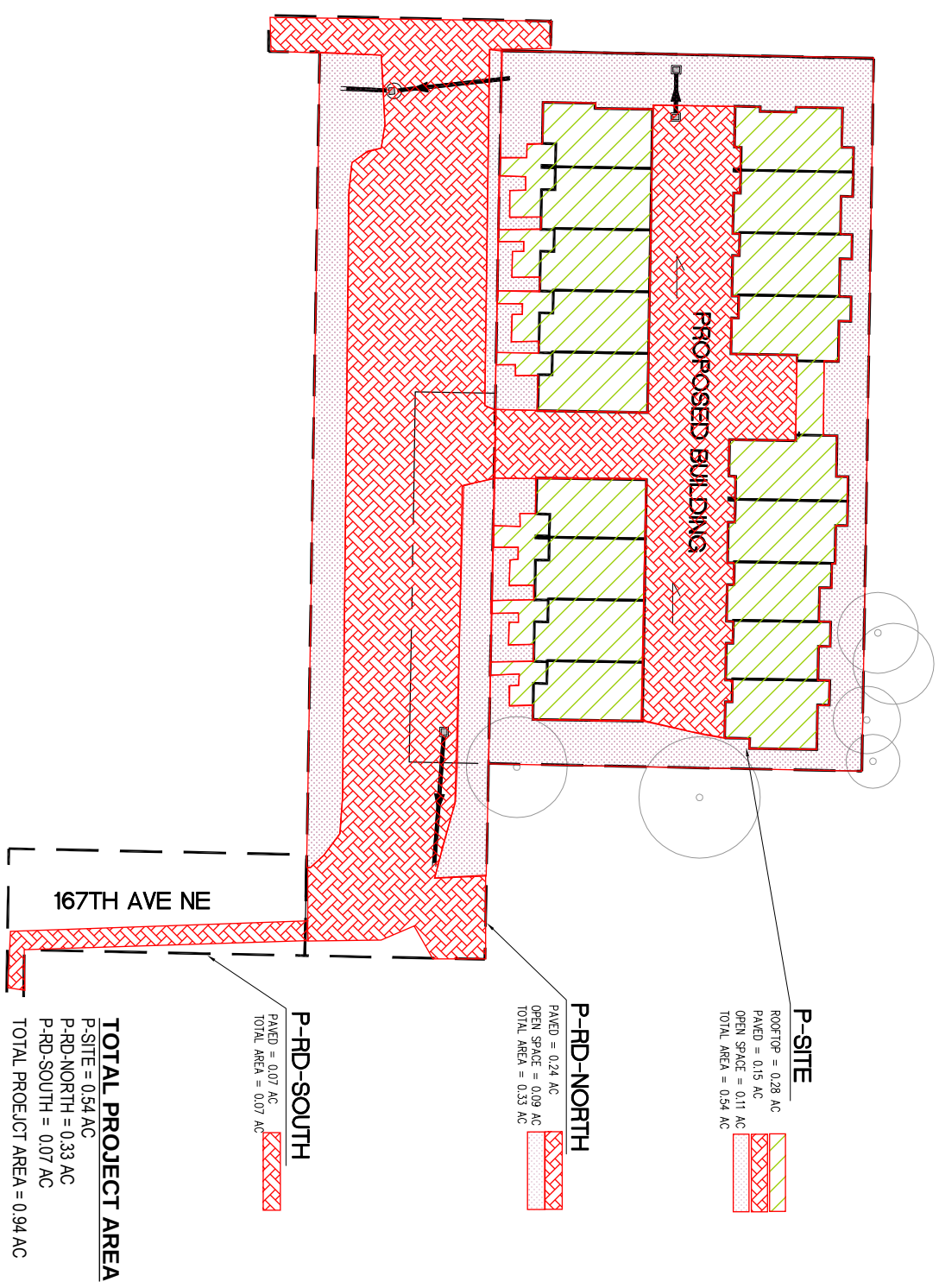
6/11/2015

FIG. A2

PACLAND
11235 SE 6th ST.
Suite 220
Bellevue, WA 98004
T (425) 453-9501
F (425) 453-8208
www.PacLand.com

Figure A3 – Proposed Drainage Basin Map

O:\Washington\Redmond\Ashworth\2 Drawings\On-Site\Exhibits\2015-03-03 DRAINAGE EXHIBIT\PROP BASINS.dwg



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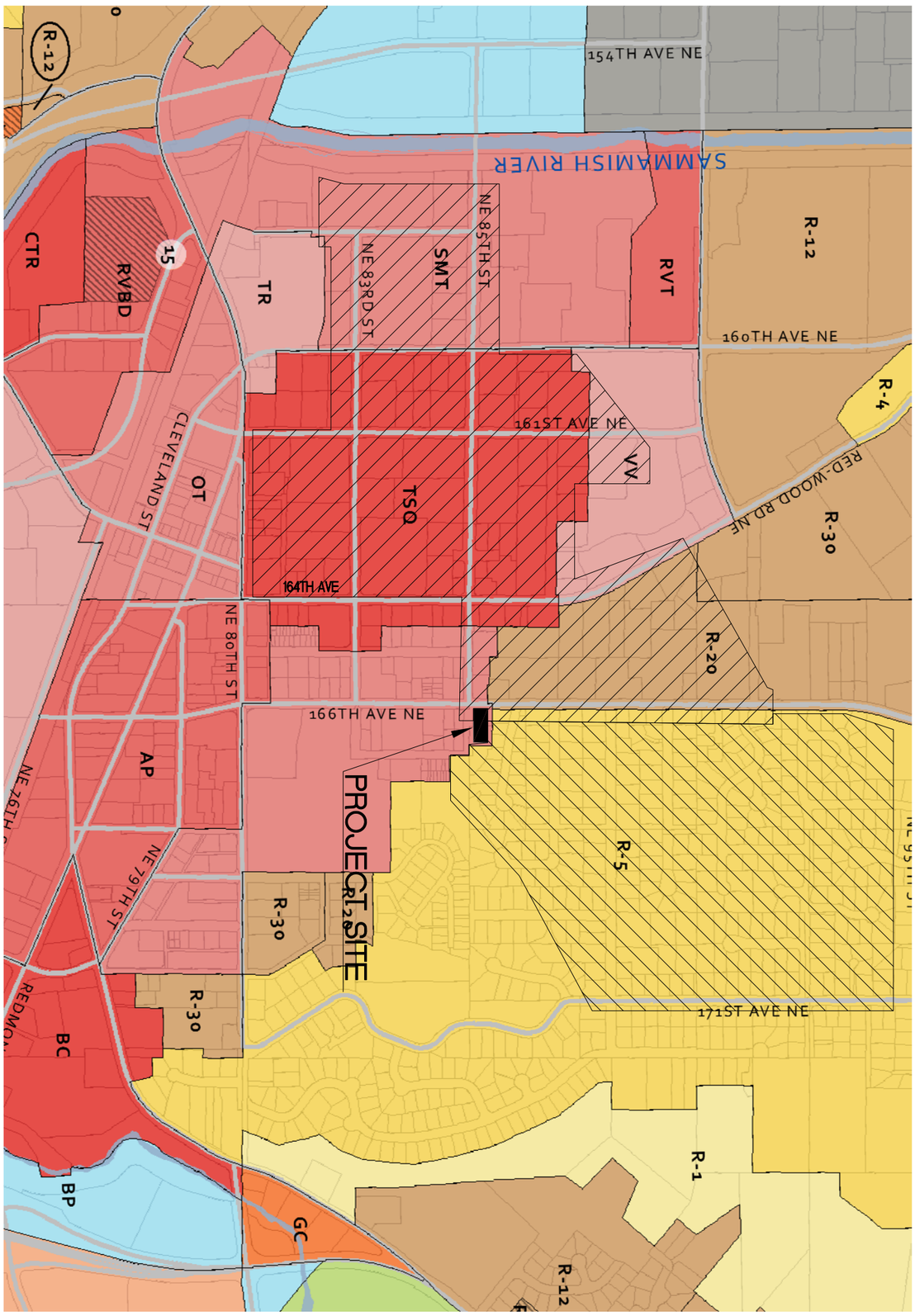
11235 SE 6th ST.
Suite 220
Bellevue, WA 98004
T (425) 453-9501
F (425) 453-8208
www.PacLand.com

166TH AVE TOWNHOMES
REDMOND, WA
PROPOSED DRAINAGE BASIN MAP
SCALE: 1" = 50'
4/26/2015

FIG. A3

Figure A4 – Offsite Drainage Basin Map

O:\Washington\Redmond\Ashworth\2 Drawings\On-Site\Exhibits\2015-03-03 DRAINAGE EXHIBIT\OFFSITE_BASINS.dwg



LEGEND:

UPSTREAM AREA:
IMPERVIOUS AREA = 42.5 AC
PERVIOUS AREA = 46.1 AC
TOTAL = 88.6 AC

DOWNSTREAM AREA:
IMPERVIOUS AREA = 95.7 AC
PERVIOUS AREA = 23.9 AC
TOTAL = 119.5 AC

PACLAND
11235 SE 6th ST.
Suite 220
Bellevue, WA 98004
T (425) 453-9501
F (425) 453-8208
www.PacLand.com

166TH AVE TOWNHOMES
REDMOND, WA
OFFSITE DRAINAGE BASIN MAP
SCALE: 1" = 750'
3/3/2015

FIG. A4

ATTACHMENT 14

Figure A5 – Redmond Stormwater Facilities Map

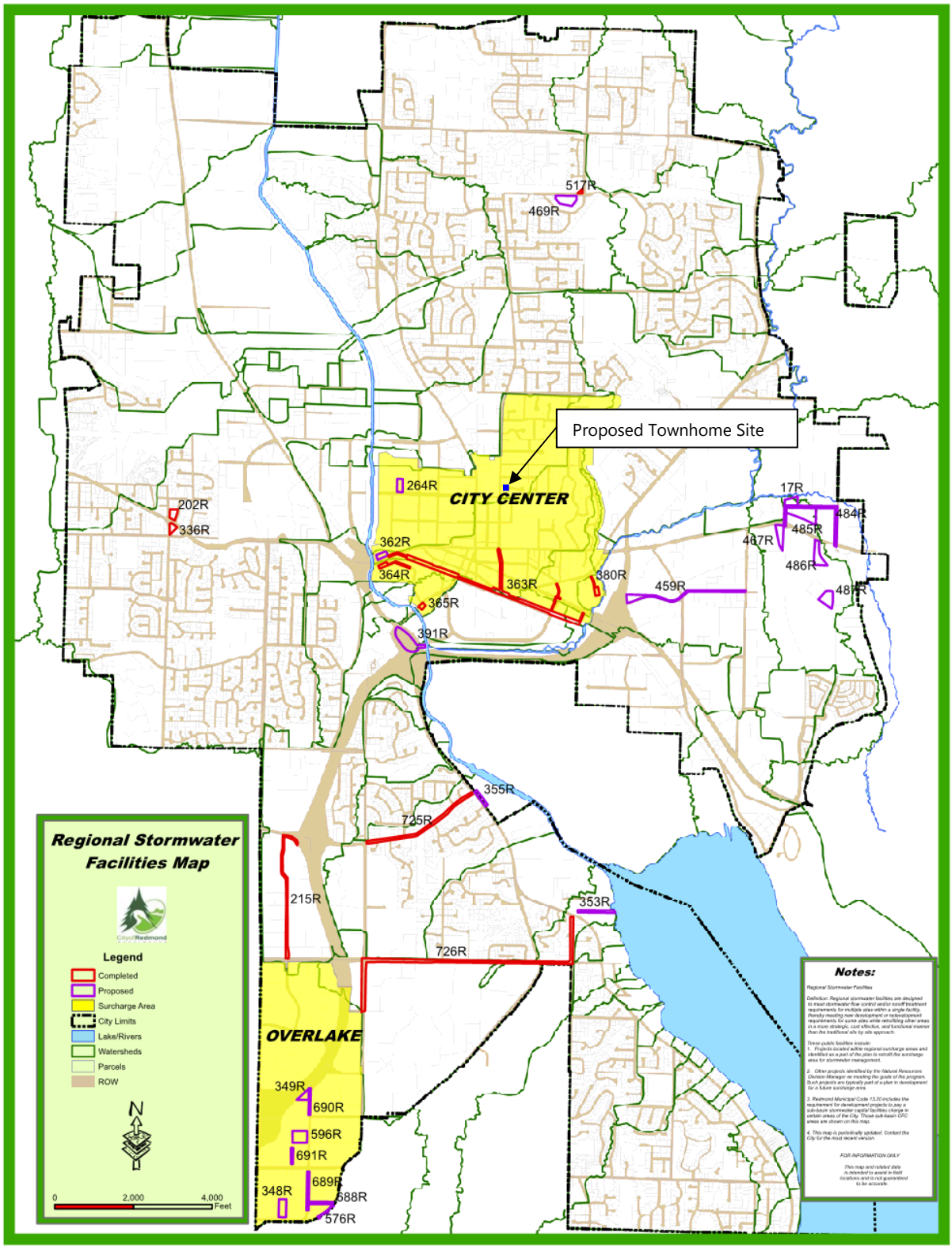


Figure A6 – SCS/USDA Soils Map

Key: AgD = Alderwood gravelly sandy loam
AgC = Adlerwood gravelly sandy loam
EvB = Everett gravelly sandy loam

Figure A7 – 2-year, 24 hour Isopluvial

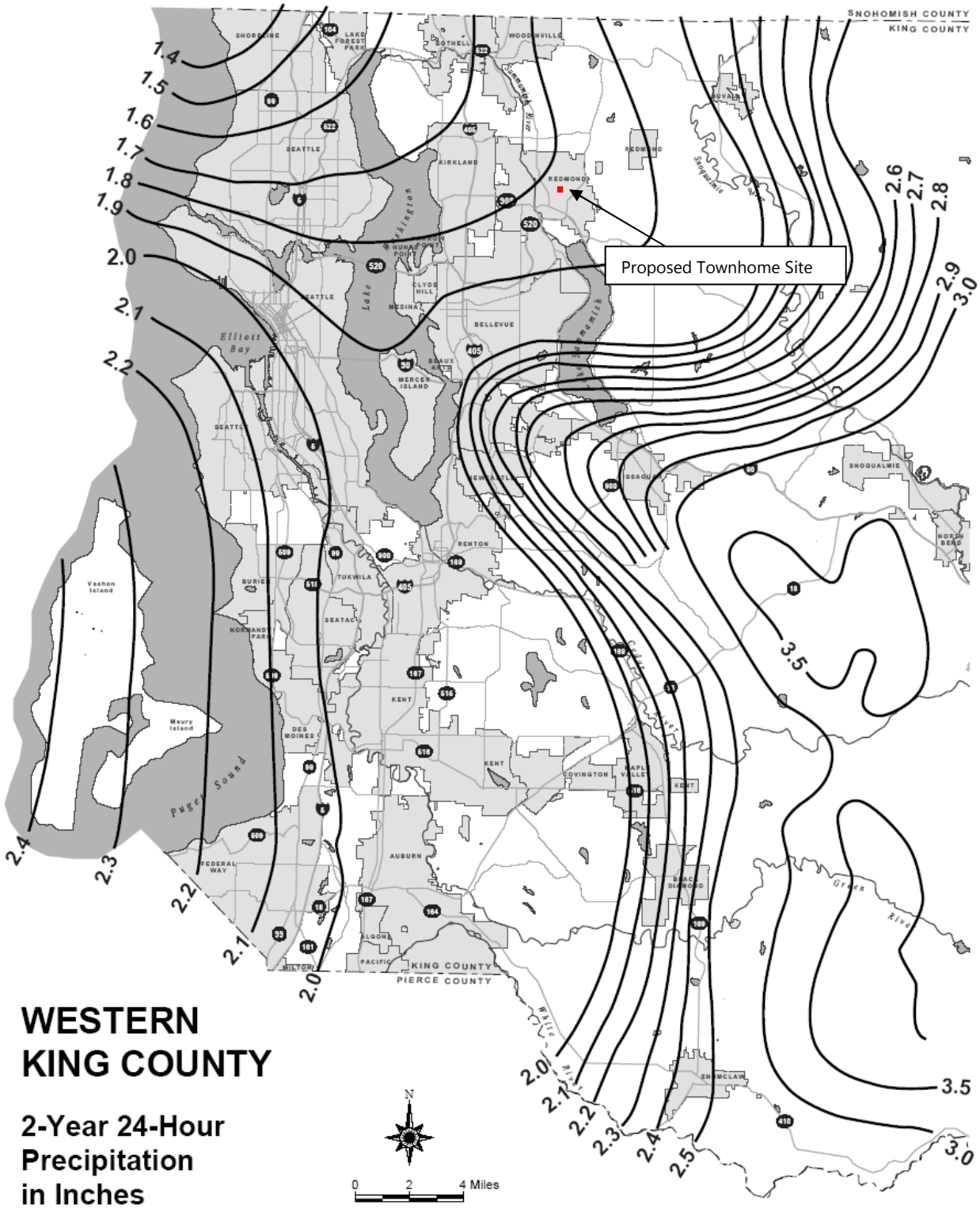


Figure A8 – 10-year, 24 hour Isopluvial

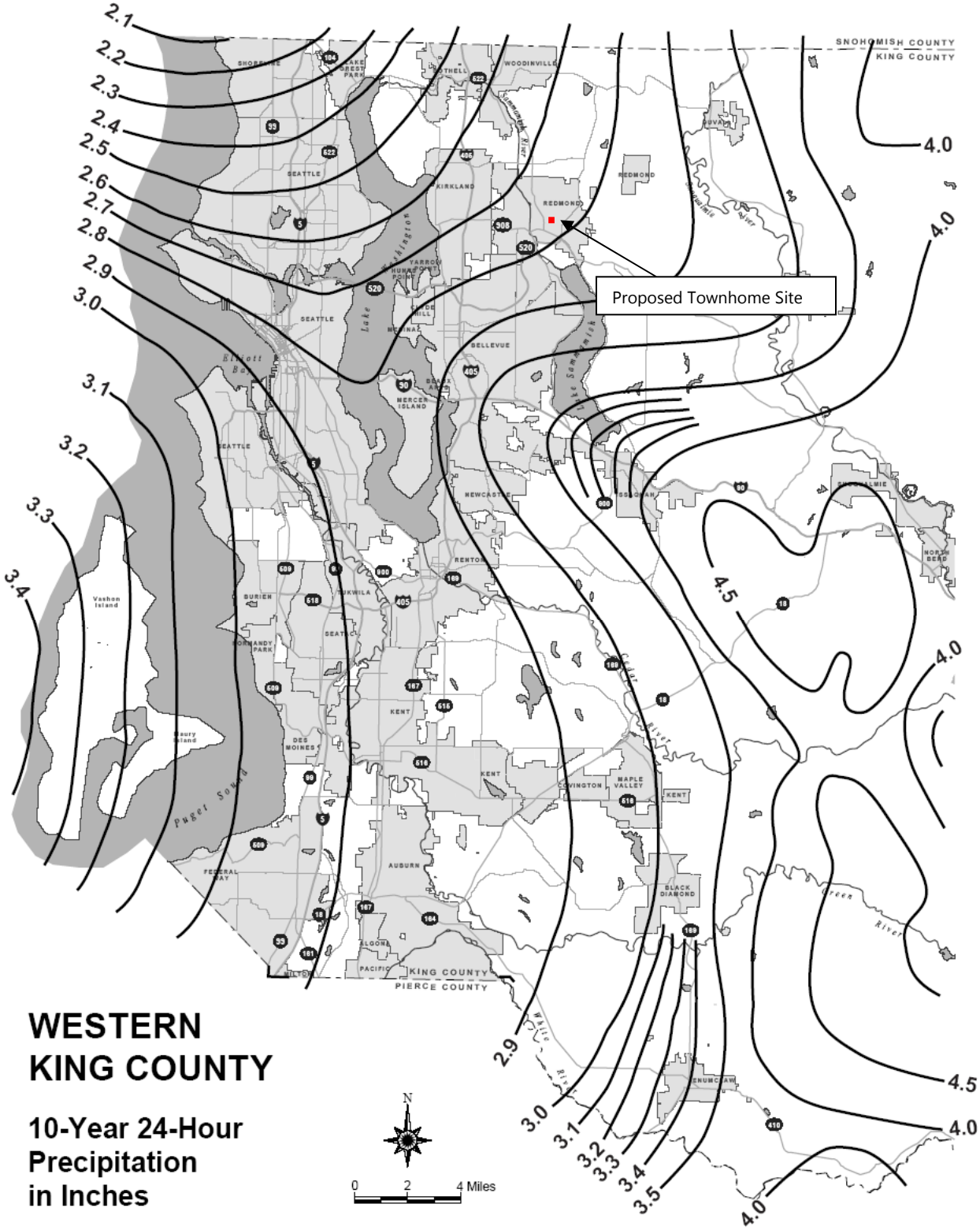


Figure A9 – 25-year, 24 hour Isopluvial

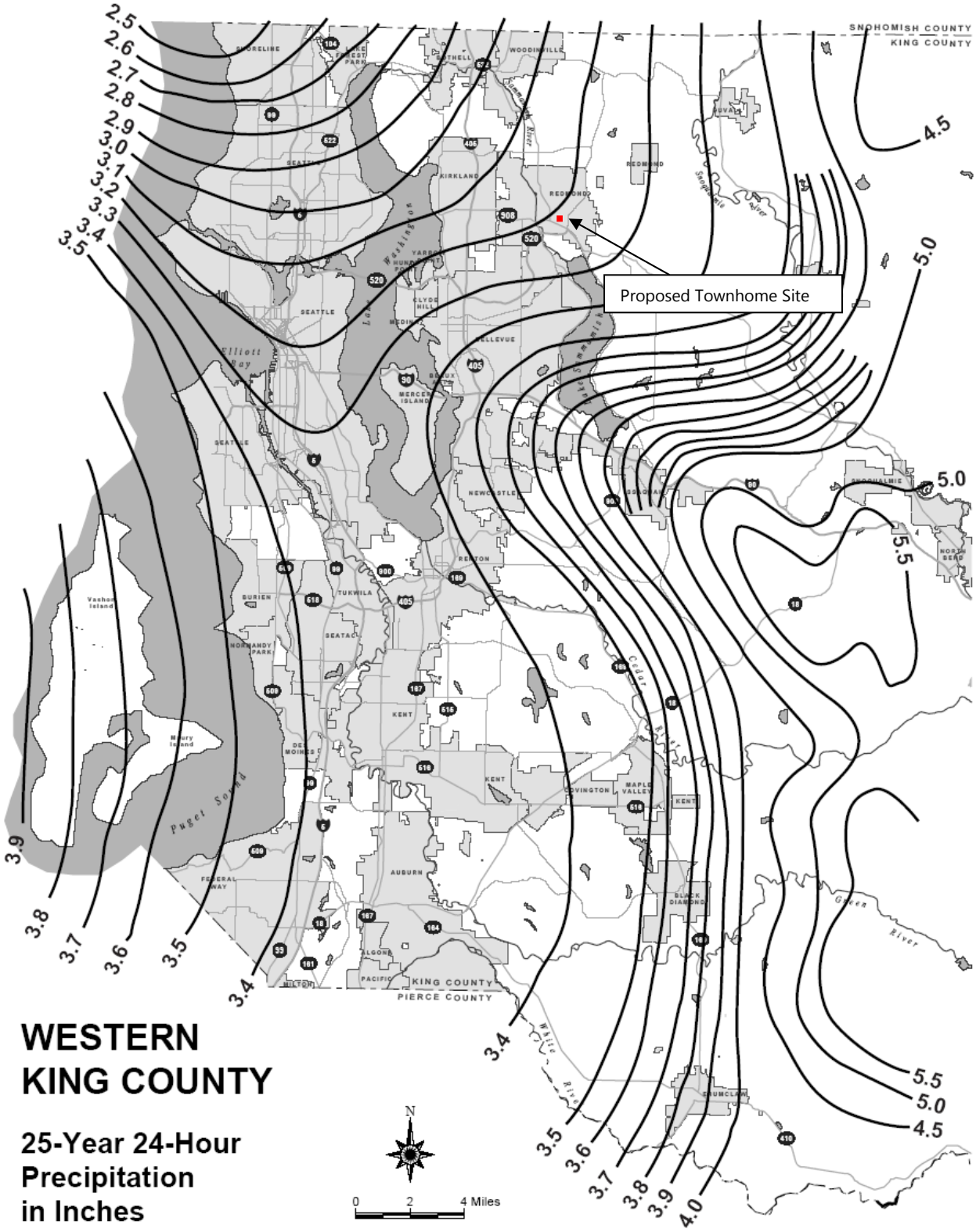


Figure A10 – 100-year, 24 hour Isopluvial

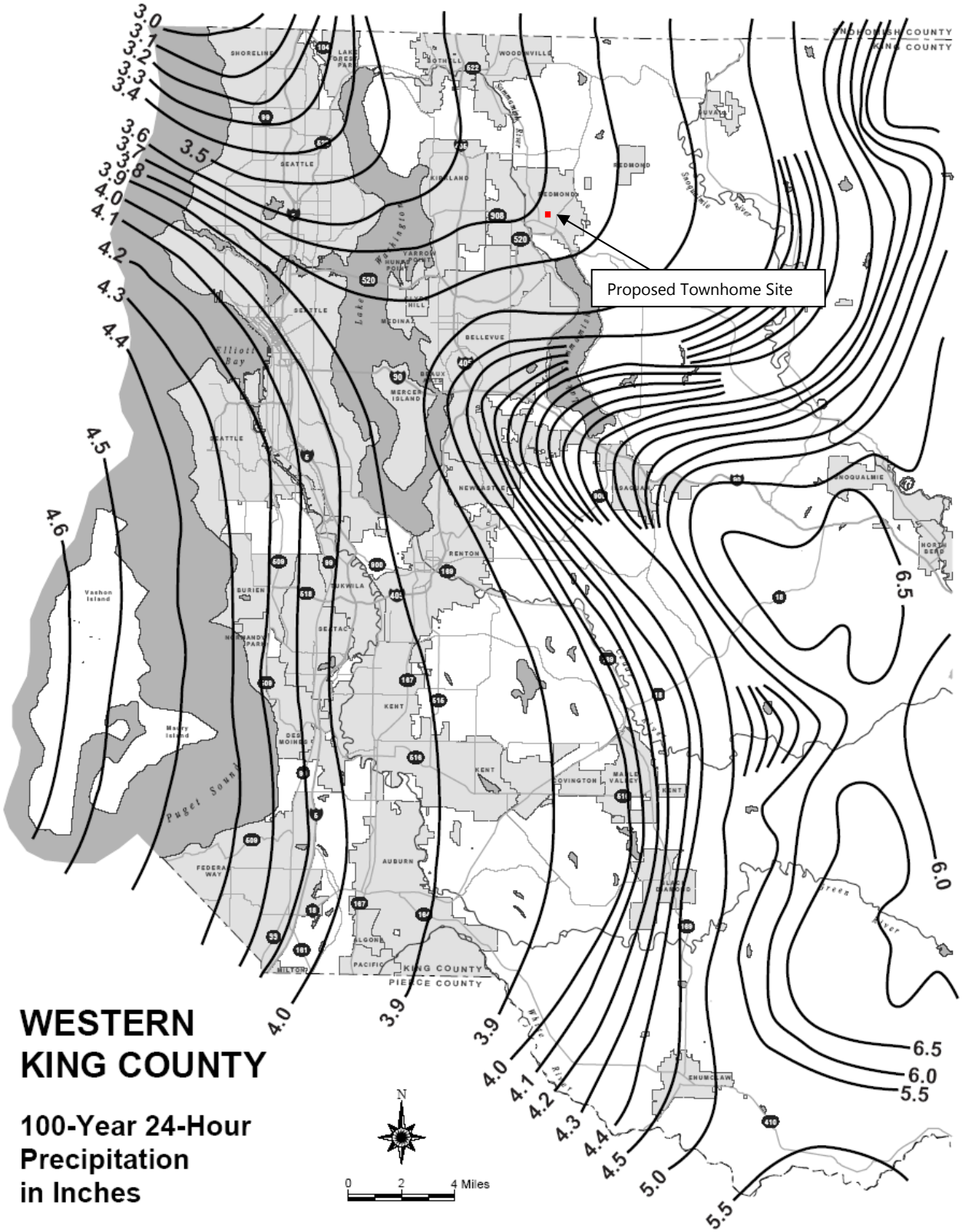

Proposed Townhome Site
WESTERN
KING COUNTY
100-Year 24-Hour
Precipitation
in Inches
N
0 2 4 Miles
SNOHOMISH COUNTY
KING COUNTY
PIERCE COUNTY
SEATTLE
BELLEVUE
REDMOND
KIRKLAND
RENTON
KENT
AUBURN
3.0
3.1
3.2
3.3
3.4
3.5
3.6
3.7
3.8
3.9
4.0
4.1
4.2
4.3
4.4
4.5
4.6
5.0
5.5
6.0
6.5

Figure A11 – City of Redmond Residential Zones Site Requirements Chart

(b) The modified building height does not exceed the maximum height permitted by the underlying zone for properties outside the transition overlay.

(c) The proposal, with the height modification, will provide an equivalent or better transition to the protected properties as the maximum height of structures without bonuses in RCDG 20C.30.25-135(1), Maximum Height of Structures in a Transition Overlay. (Ord. 2027)

20C.30.25-140 Site Requirements Chart and Flexibility.

The Site Requirements Chart, RCDG 20C.30.25-140, establishes the basic dimensional requirements for residential development in each residential zone of the City. Flexibility from these requirements may be obtained through a number of residential development processes:

(1) Clustering allows for some reduction in average lot size requirements (see RCDG 20C.30.50);

(2) Zero Lot Line Development allows for some modification to the setback standards defined in the chart (see RCDG 20C.30.100);

(3) Multiplex requirements define special lot size dimensions and other requirements (see RCDG 20C.30.70);

(4) The planned residential development process (see RCDG 20C.30.105) establishes special site requirements that are intended to enhance the overall design of a project and that, in many cases, are different and independent from those described in RCDG 20C.30.25-140.

Residential Zones Site Requirements Chart
Subject to Neighborhood Requirements

Site Requirement	Zoning Districts												Residential Innovative
	RA-5	R-1	R-2	R-3	R-4	R-5	R-6	R-8	R-12	R-18	R-20	R-30	RIN
Allowed Density (dwelling units per gross acre)	0.2	1	2	3	4	5	6	8	12	18	20	30	16
Minimum Required Density (percent of net acres)	80%	80%	80%	80%	80%	80%	80%	75%	75%	65%	65%	65%	80%
Average Lot Size	4.5 acres[1]	35,000 sq. ft.[1,2]	18,000 sq. ft.	12,000 sq. ft.	7,000 sq. ft.	5,500 sq. ft.	4,000 sq. ft.	3,000 sq. ft.	3,000 sq. ft.	2,500 sq. ft.	NS	NS	17
Minimum Lot Width Circle (in feet)[3]	100'	85'	70'	60'	40'	35'	35'	30'	30'	NS	NS	NS	17
Minimum Lot Frontage (in feet)[4]	20'	20'	20'	20'	20'	20'	20'	20'	20'	20'	30'	30'	20'
Front Setback (in feet)	30'	30'	30'	20'	15'[5]	15'[5]	5'[5]	10'[5]	10'	10'	20'	20'	15'
Side/Interior Setback (each side) (in feet)[6]	30'	20'	5'/10'	5'/10'	5'/10'	5'/10'	5'/10'	5'	5'[7]	5'	15'[8]	15'	5'/10'
Side Street													

Figure A12 – Percent Impervious Coverage for Existing Residential Areas

KCRTS is the "Effective Impervious Area" (EIA), the total impervious area multiplied by the **effective impervious fraction**. See Table 3.2.2.E, p. 3-29 for effective impervious fractions that apply to standard impervious surfaces. Table 1.2.3.C lists effective impervious factions for alternative materials and approaches.

Non-effective impervious area (i.e., total impervious area less EIA) is assumed to have the same hydrologic response as the immediately surrounding pervious area. For example, for existing residential areas with rooftops draining to splash pads on lawns or landscaping, the non-effective portion of the roof areas would be treated as pasture for predevelopment conditions (if DU/GA < 4.0) and grass for post-development conditions. *Note: Credits for infiltration/dispersion of downspouts on individual lots in proposed single family residential subdivisions are applied separately on a site-specific basis (see Note 3,* Table 3.2.2.E*).*

The effective impervious fraction can be selected from Table 3.2.2.E or determined from detailed ***site*** surveys. With the exception of figures for compacted gravel and dirt roads and parking lots, the figures in Table 3.2.2.E are average figures cited by the USGS (Dinicola, 1990).

TABLE 3.2.2.D PERCENT IMPERVIOUS COVERAGE FOR EXISTING RESIDENTIAL AREAS

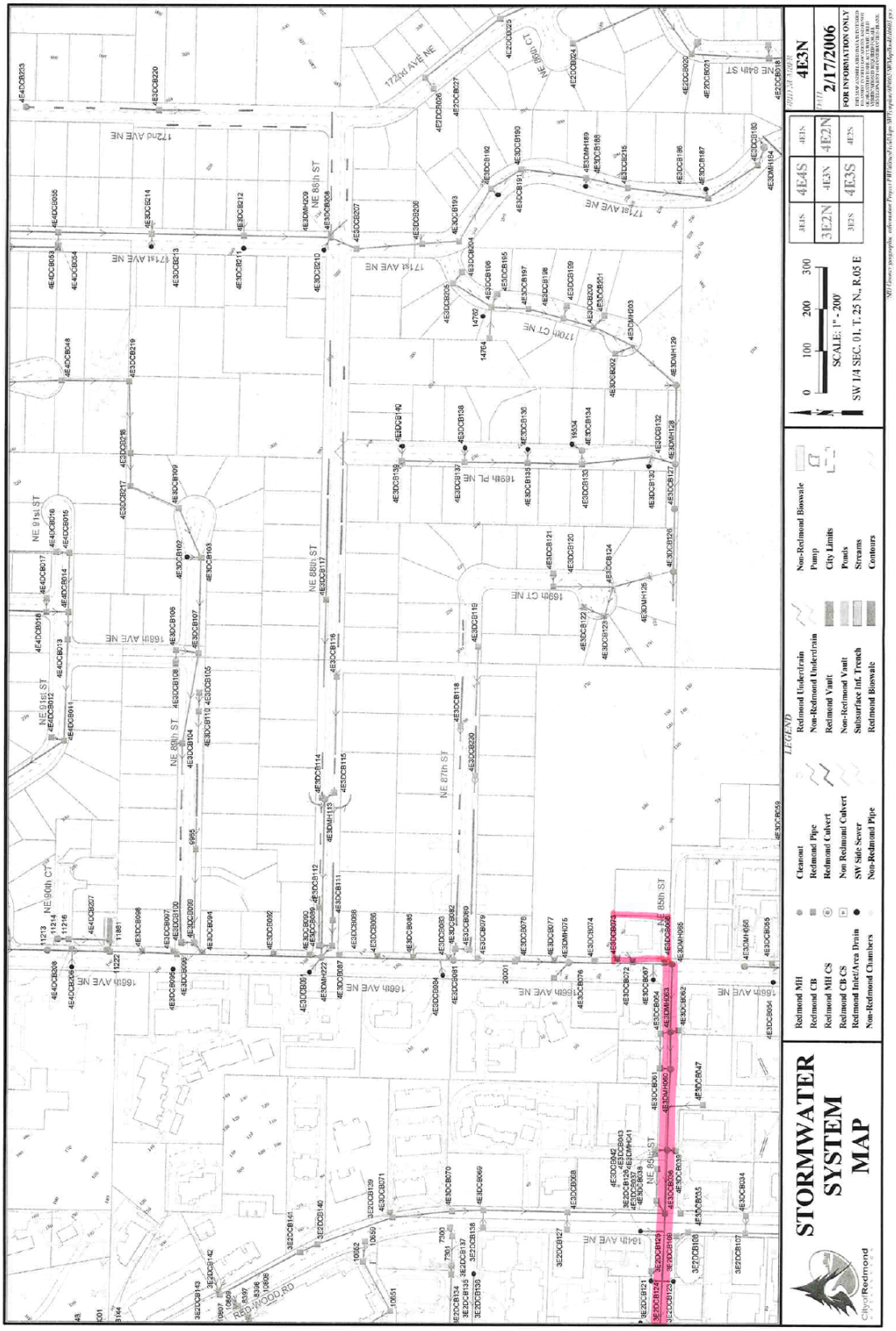
Dwelling Units/Gross Acre	% Impervious[1]	Dwelling Units/Gross Acre	% Impervious
1.0 DU/GA	15[2]	4.5 DU/GA	46
1.5 DU/GA	20	5.0 DU/GA	48
2.0 DU/GA	25	5.5 DU/GA	50
2.5 DU/GA	30	6.0 DU/GA	52
3.0 DU/GA	34	6.5 DU/GA	54
3.5 DU/GA	38	7.0 DU/GA	56
4.0 DU/GA	42	7.5 DU/GA	58
For PUDs, condominiums, apartments, commercial businesses, and industrial areas, percent impervious coverage must be computed.			

Notes:

(1) Includes streets and sidewalks.

(2) These figures should be adjusted by the effective impervious fraction given in Table 3.2.2.E, if applicable. Values from Table 3.2.2.E may be interpolated as necessary.

Figure A13 – Stormwater System Maps


STORMWATER SYSTEM MAP
City of Redmond
LEGEND
Redmond MH
Redmond CB
Redmond MH CS
Redmond CB CS
Redmond Inlet/Area Drain
Non-Redmond Chambers
Cleanout
Redmond Pipe
Redmond Culvert
Non Redmond Culvert
SW Side Sewer
Non-Redmond Pipe
Redmond Underdrain
Non-Redmond Underdrain
Redmond Vault
Non-Redmond Vault
Subsurface Inf. Trench
Redmond Bioswale
Non-Redmond Bioswale
Pump
City Limits
Ponds
Streams
Contours
SCALE: 1" - 200'
SW 1/4 SEC. 01, T. 25 N., R.05 E
4E3N
2/17/2006
FOR INFORMATION ONLY
NE 91st ST
NE 90th CT
NE 88th ST
NE 87th ST
NE 86th ST
172nd AVE NE
171st AVE NE
170th CT NE
169th PL NE
169th CT NE
169th AVE NE
168th AVE NE
167th AVE NE
166th AVE NE
165th AVE NE
164th AVE NE
163rd AVE NE
162nd AVE NE
161st AVE NE
160th AVE NE
159th AVE NE
158th AVE NE
157th AVE NE
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153rd AVE NE
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144th AVE NE
143rd AVE NE
142nd AVE NE
141st AVE NE
140th AVE NE
139th AVE NE
138th AVE NE
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134th AVE NE
133rd AVE NE
132nd AVE NE
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17th AVE NE
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15th AVE NE
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5th AVE NE
4th AVE NE
3rd AVE NE
2nd AVE NE
1st AVE NE
REDMOND RD

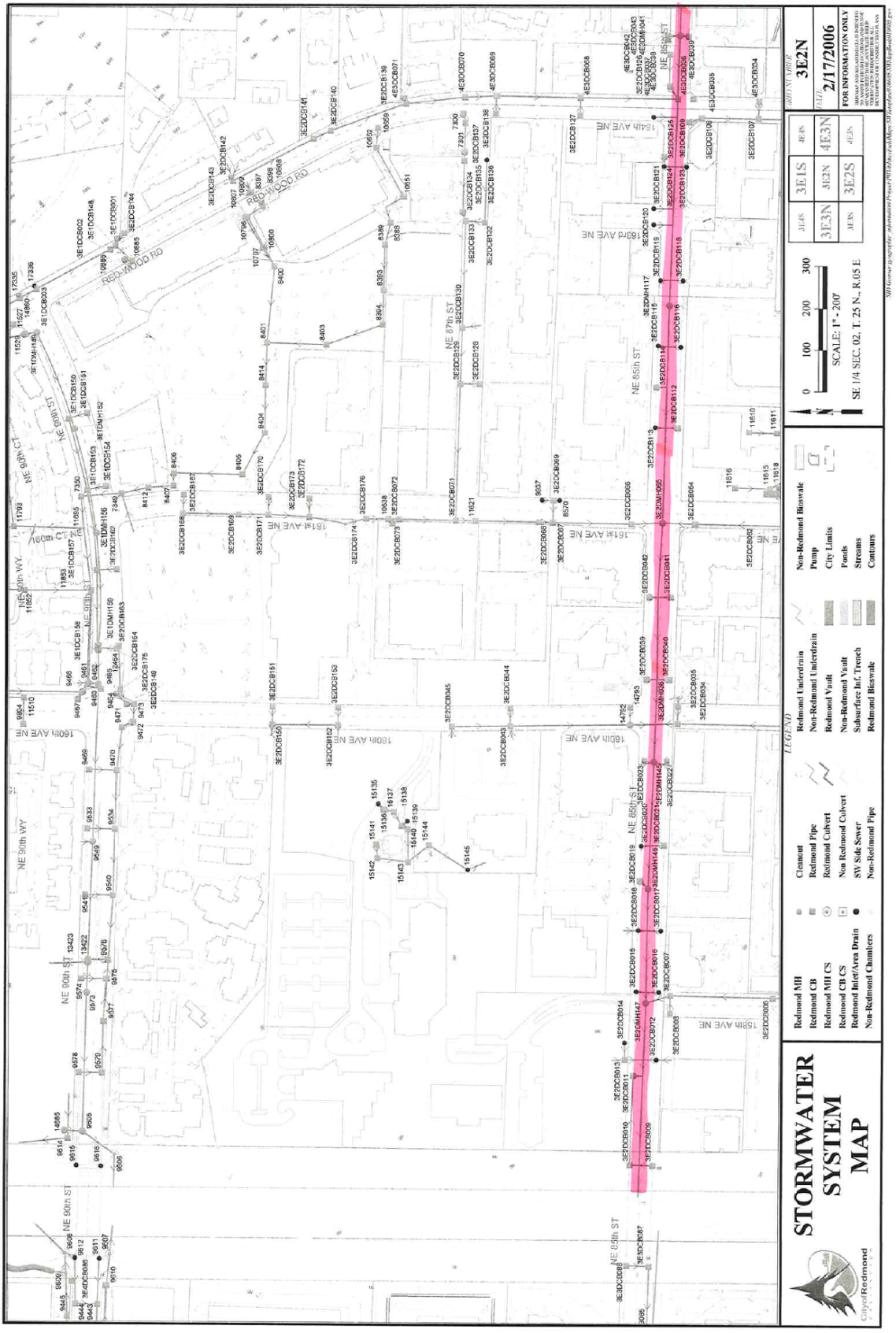

STORMWATER SYSTEM MAP
City of Redmond
LEGEND
Redmond MH
Redmond CB
Redmond MH CS
Redmond CB CS
Redmond Inlet/Area Drain
Non-Redmond Chambers
Cleanout
Redmond Pipe
Redmond Culvert
Non Redmond Culvert
SW Side Sewer
Non-Redmond Pipe
Redmond Underdrain
Non-Redmond Underdrain
Redmond Vault
Non-Redmond Vault
Subsurface Inf./Trench
Redmond Bioswale
Non-Redmond Bioswale
Pump
City Limits
Ponds
Streams
Contours
SCALE: 1" - 200'
SE 1/4 SEC. 02, T. 25 N., R.05 E
3E2N
2/17/2006
FOR INFORMATION ONLY
3E3N
3E1S
3E2N
4E3N
3E3S
3E2S
RED-WOOD RD
NE 90th ST
NE 90th CT
NE 90th WY
NE 89th ST
NE 87th ST
NE 85th ST
160th AVE NE
161st AVE NE
162nd AVE NE
164th AVE NE
158th AVE NE

Figure A14 – Frequently Flooded Areas Map

Data Source:
FEMA Flood Insurance Rate Maps

Note:
This map shall be used as a general guide. It represents approximate locations.
Consult the Critical Areas Ordinance (CAO) for reporting requirements.
In the event there is a conflict between the map and the criteria or standards of the CAO, the criteria shall prevail.

Frequently Flooded Areas

Critical Areas Map

City of Redmond, Washington

Effective: 05/28/2005

0 0.5 1
Miles

N

CityofRedmond
WASHINGTON

100 Year Floodplain
FEMA Floodway
City Limit
Park and Open Space
Water

Disclaimer: This map is created and maintained by GIS Services Group,Finance and Information Services, City of Redmond, Washington, for reference purposes only.

The City makes no guarantee as to the accuracy of the features shown on this map.

File Name:\\redmond.man\fs\GIS\User\GIS\GISServicesProject\GISServices\RedmondGovWebsite\03GIS\FrequentlyFloodedAreas_11x17.mxd

Figure A15 – Landslide Hazard Areas Map

ATTACHMENT 14

PROJECT SITE

Landslide Hazard Areas

Critical Areas Map

City of Redmond, Washington

Effective: 05/28/2005

0 0.5 1 Miles

N

Data Source:
USGS Topographic Maps
USGS Geologic Maps

Note:
This map shall be used as a general guide. It represents approximate locations.
Consult the Critical Areas Ordinance (CAO) for reporting requirements.
In the event there is a conflict between the map and the criteria or standards of the CAO, the criteria shall prevail.

Contour
Landslide Hazard Area
City Limit
Park and Open Space
Water

CityofRedmond
WASHINGTON

File Name:File Name:\\redmond.main\fs\GIS\User\GIS\GISServicesProject\GISServices\RedmondGovWebsite\03GIS\LandslideHazardAreas_11x17.mxd

Figure A16 – Erosion Hazard Areas Map

ATTACHMENT 14

PROJECT SITE

Erosion Hazard Areas

Critical Areas Map

City of Redmond, Washington

Effective: 05/28/2005

0 0.5 1

Miles

N

CityofRedmond
WASHINGTON

Disclaimer: This map is created and maintained by GIS Services Group,Finance and Information Services, City of Redmond, Washington, for reference purposes only.

The City makes no guarantee as to the accuracy of the features shown on this map.

Contour

Erosion Hazard Area

City Limit

Park and Open Space

Water

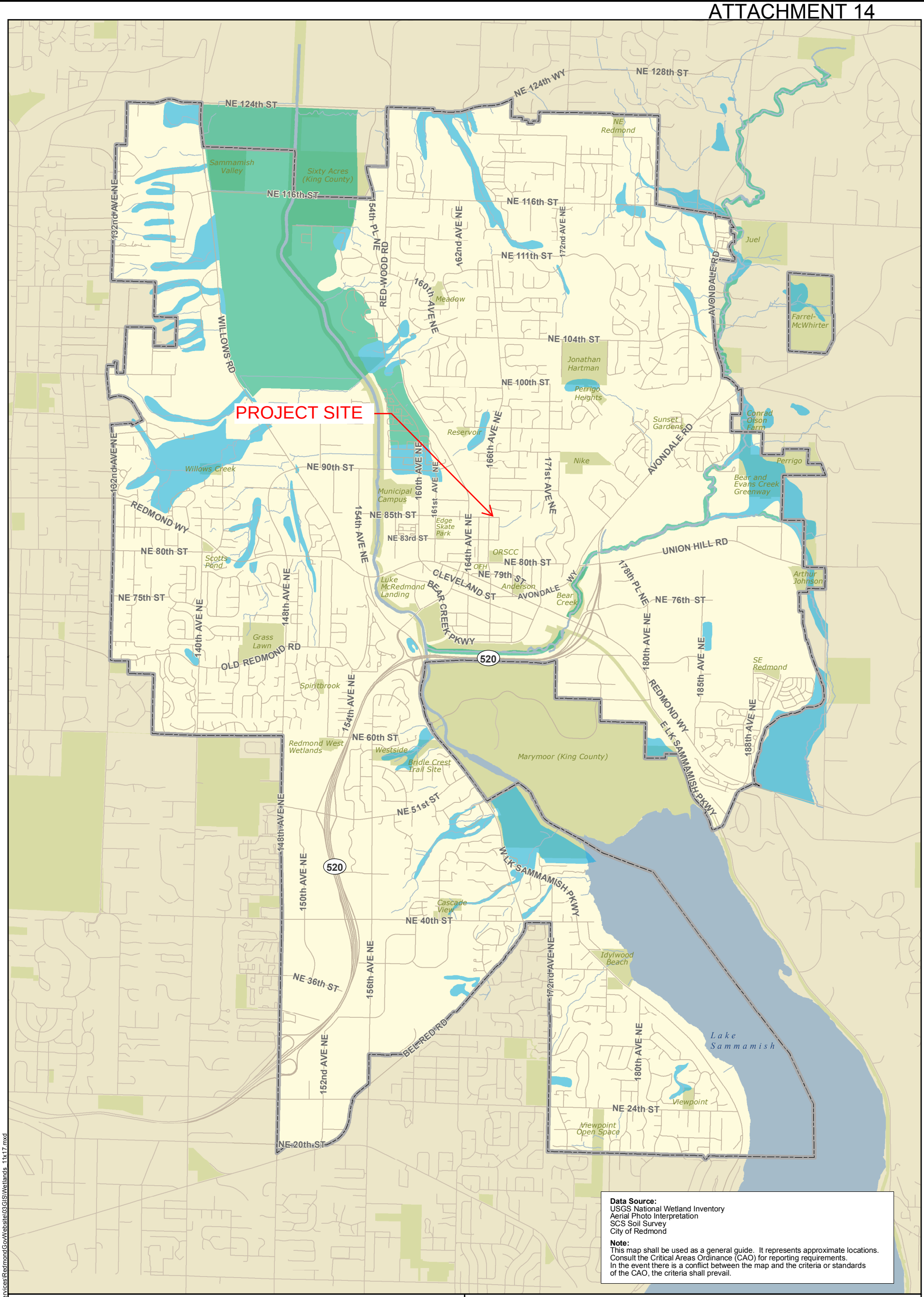
Data Source:
SCS Soil Survey

Note:
This map shall be used as a general guide. It represents approximate locations.
Consult the Critical Areas Ordinance (CAO) for reporting requirements.
In the event there is a conflict between the map and the criteria or standards of the CAO, the criteria shall prevail.

File Name:\\redmond.man\ts\GISUser\GIS\GISServicesProject\GISServices\RedmondGovWebsite\03GIS\ErosionHazardAreas_11x17.mxd

Figure A17 – Wetland Map

ATTACHMENT 14



Data Source:
USGS National Wetland Inventory
Aerial Photo Interpretation
SCS Soil Survey
City of Redmond

Note:
This map shall be used as a general guide. It represents approximate locations.
Consult the Critical Areas Ordinance (CAO) for reporting requirements.
In the event there is a conflict between the map and the criteria or standards of the CAO, the criteria shall prevail.

Wetlands

Critical Areas Map

City of Redmond, Washington

Effective: 05/28/2005

0 0.5 1
Miles

N

CityofRedmond
WASHINGTON

Mixed Wetland/Upland
Wetland
City Limit
Park and Open Space
Water

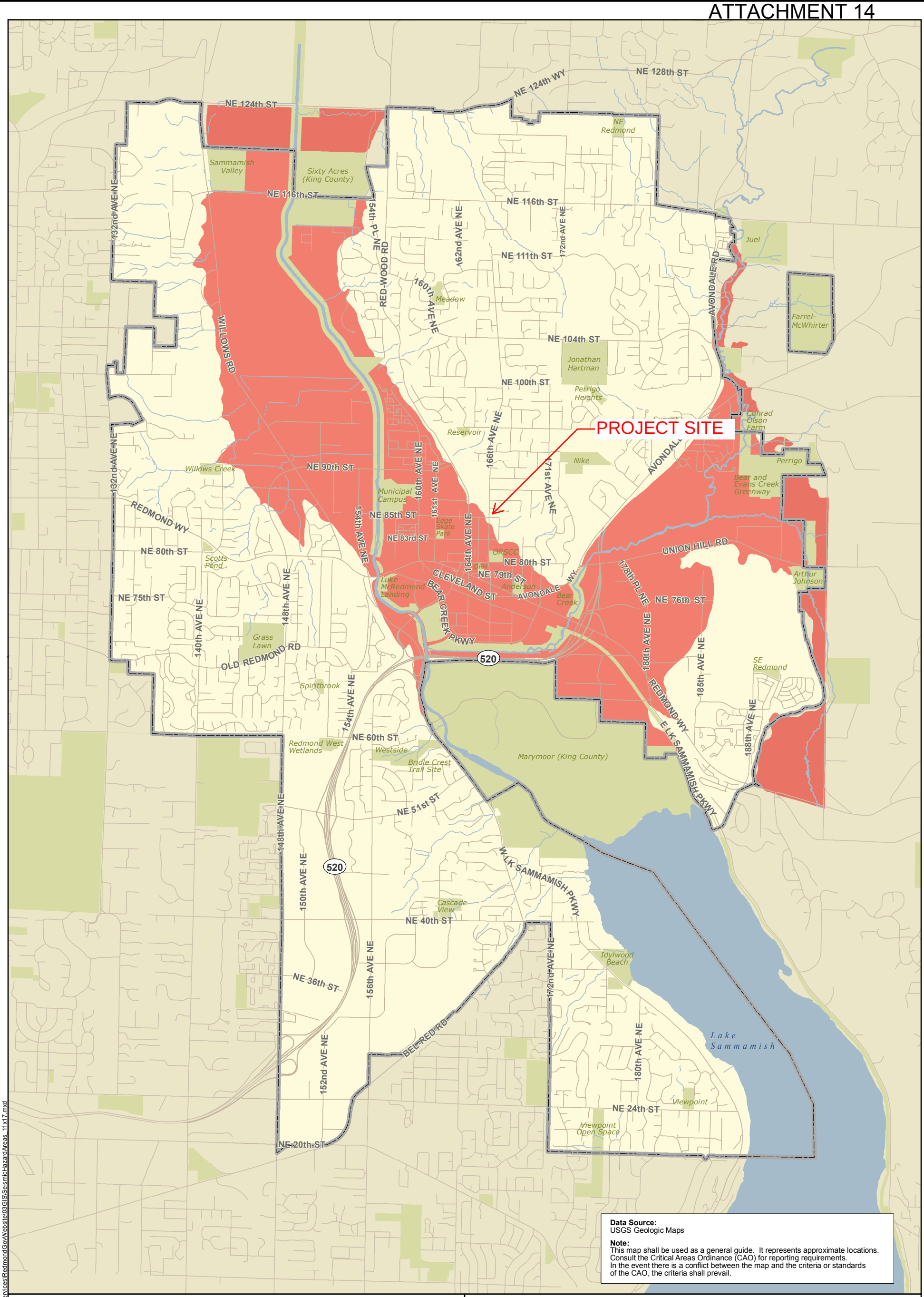
Disclaimer: This map is created and maintained by GIS Services Group,Finance and Information Services, City of Redmond, Washington, for reference purposes only.

The City makes no guarantee as to the accuracy of the features shown on this map.

File Name:\\redmond.man\fs\GIS\User\GIS\GISServicesProject\GISServices\RedmondGovWebsite\03GIS\Wetlands_11x17.mxd

Figure A18 – Seismic Hazard Areas Map

ATTACHMENT 14



Data Source:
USGS Geologic Maps

Note:
This map shall be used as a general guide. It represents approximate locations.
Consult the Critical Areas Ordinance (CAO) for reporting requirements.
In the event there is a conflict between the map and the criteria or standards of the CAO, the criteria shall prevail.

Seismic Hazard Areas

Critical Areas Map

City of Redmond, Washington

Effective: 05/28/2005

0 0.5 1
Miles

N

CityofRedmond
WASHINGTON

Seismic Hazard Area
City Limit
Park and Open Space
Water

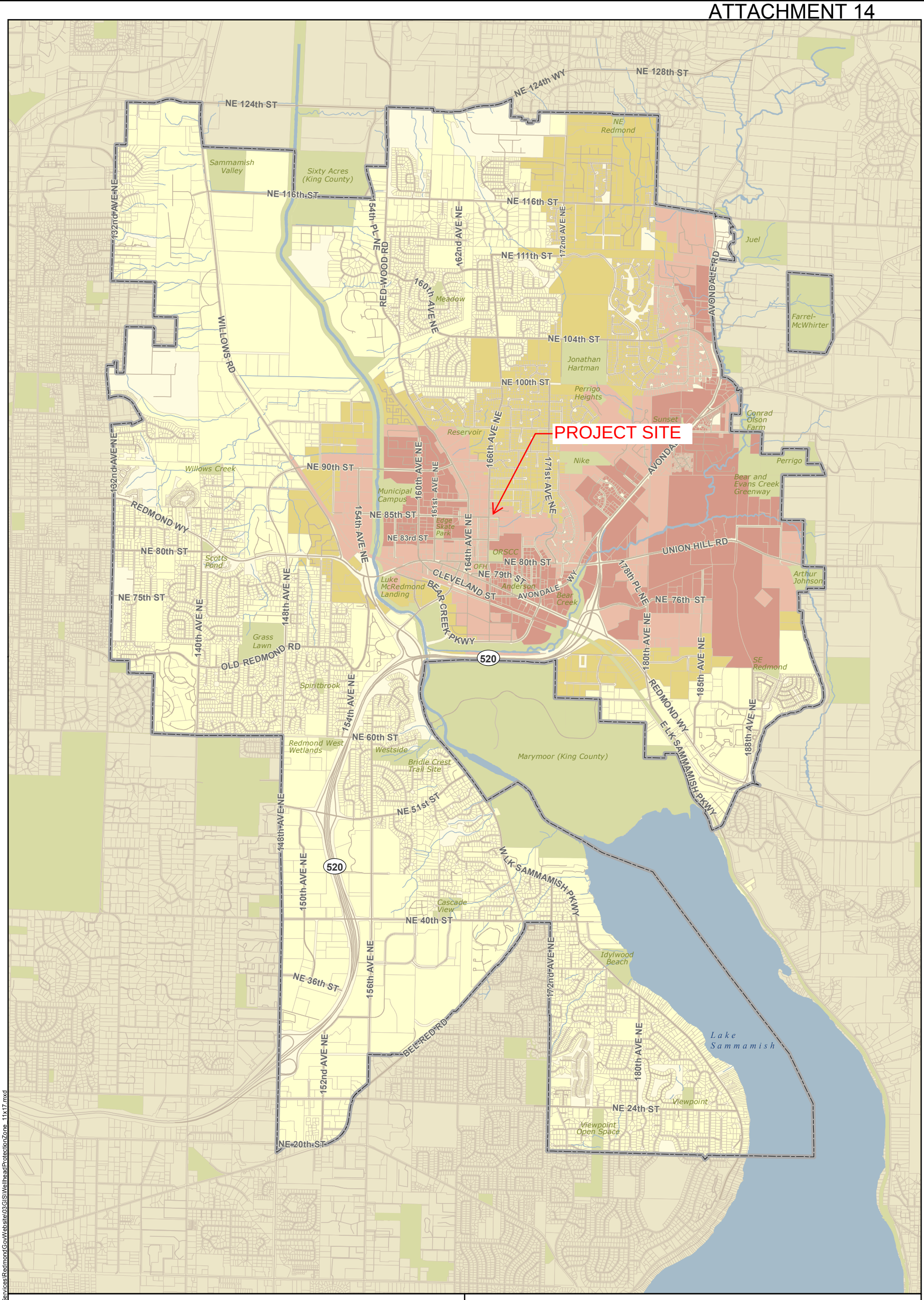
Disclaimer: This map is created and maintained by GIS Services Group,Finance and Information Services, City of Redmond, Washington, for reference purposes only.

The City makes no guarantee as to the accuracy of the features shown on this map.

File Name:\\redmond.man\fs\GISUser\GIS\GISServicesProject\GISServices\RedmondGovWebsite\03GIS\SeismicHazardAreas_11x17.mxd

Figure A19 – Wellhead Protection Zones Map

ATTACHMENT 14



Wellhead Protection Zones

City of Redmond, Washington

11/18/2010

0 0.5 1

Miles

N

CityofRedmond
WASHINGTON

Wellhead Zone 1
Wellhead Zone 2
Wellhead Zone 3
Wellhead Zone 4

City Limit
Park and Open Space
Water

Disclaimer: This map is created and maintained by GIS Services Group,Finance and Information Services, City of Redmond, Washington, for reference purposes only.

The City makes no guarantee as to the accuracy of the features shown on this map.

File Name:\\redmond.man\fs\GIS\User\GIS\GISServicesProject\GISServices\RedmondGovWebsite\03GIS\WellheadProtectionZone_11x17.mxd

Appendix B – Upstream Basin Hydrology Output

Appended on: Friday, March 06, 2015 8:26:52 AM

UB01 Event Summary

Event	Peak Q (cfs)	Peak T (hrs)	Hyd Vol (acft)	Area (ac)	Method
2 yr 24 hr	11.5052	8.1667	6.7264	88.60	SBUH
10 year	23.9552	8.1667	12.6514	88.60	SBUH
25 year	30.202	8.1667	15.6015	88.60	SBUH
100 year	37.8739	8.1667	19.2296	88.60	SBUH

All results based on storm duration of **24.0** hours. This is ok if all precipitations are appropriate for the storm duration. If some design event precipitations are for different duration storms, those results are incorrect

Record Id: UB01

Design Method	SBUH	**Rainfall type**	TYPE1A.RAC
Hyd Intv	10.00 min	**Peaking Factor**	484.00
Storm Duration	24.00 hrs	**Abstraction Coeff**	0.20
Pervious Area	88.60 ac	**DCIA**	0.00 ac
Pervious CN	89.37	**DC CN**	0.00
Pervious TC	35.727 min	**DC TC**	0.00 min

Pervious CN Calc

Description	SubArea	Sub cn
Open spaces, lawns,parks (>75% grass)	42.50 ac	80.00
Impervious surfaces (pavements, roofs, etc)	46.10 ac	98.00
Pervious Composited CN (AMC 2)		89.3657

Pervious TC Calc

Type	Description	Length	Slope	Coeff	Misc	TT
Sheet	Short prairie grass and lawns.	200.00 ft	1.0%	0.15	0.00 in	29.766 min
Shallow	Paved	50.00 ft	1.0%	0.01		0.4099 min
Int Channel	Concrete pipe (n=0.012)	3950.00 ft	7.8%	0.012		5.551 min
Pervious TC						35.727 min

Appendix C – Downstream Basin Hydrology Output

Appended on: Friday, March 06, 2015 8:27:13 AM

DB01 Event Summary

Event	Peak Q (cfs)	Peak T (hrs)	Hyd Vol (acft)	Area (ac)	Method
2 yr 24 hr	20.2886	8.1667	12.652	119.55	SBUH
10 year	35.7535	8.1667	21.4783	119.55	SBUH
25 year	43.128	8.1667	25.7315	119.55	SBUH
100 year	52.0023	8.1667	30.8908	119.55	SBUH

All results based on storm duration of **24.0** hours. This is ok if all precipitations are appropriate for the storm duration. If some design event precipitations are for different duration storms, those results are incorrect

Record Id: DB01

Design Method	SBUH	**Rainfall type**	TYPE1A.RAC
Hyd Intv	10.00 min	**Peaking Factor**	484.00
Storm Duration	24.00 hrs	**Abstraction Coeff**	0.20
Pervious Area	119.55 ac	**DCIA**	0.00 ac
Pervious CN	94.39	**DC CN**	0.00
Pervious TC	57.8662 min	**DC TC**	0.00 min

Pervious CN Calc

Description	SubArea	Sub cn
Open spaces, lawns,parks (>75% grass)	23.98 ac	80.00
Impervious surfaces (pavements, roofs, etc)	95.57 ac	98.00
Pervious Composited CN (AMC 2)		94.3895

Pervious TC Calc

Type	Description	Length	Slope	Coeff	Misc	TT
Sheet	Short prairie grass and lawns.	300.00 ft	1.0%	0.15	1.83 in	41.1712 min
Shallow	Paved	600.00 ft	1.0%	0.01		4.9193 min

Int Channel	Concrete pipe (n=0.012)	3550.00 ft	1.4%	0.012		11.7757 min
Pervious TC						57.8662 min

Licensed to: Engenious Systems, Inc.

Appendix D – Existing Basin Hydrology Output

EXISTING SITE Event Summary

Event	Peak Q (cfs)	Peak T (hrs)	Hyd Vol (acft)	Area (ac)	Method
2 yr 24 hr	0.1341	8.1667	0.0687	0.94	SBUH
10 year	0.2811	8.1667	0.1307	0.94	SBUH
25 year	0.3549	8.1667	0.1618	0.94	SBUH
100 year	0.4457	8.1667	0.20	0.94	SBUH

All results based on storm duration of **24.0** hours. This is ok if all precipitations are appropriate for the storm duration. If some design event precipitations are for different duration storms, those results are incorrect

Record Id: EXISTING SITE

Design Method	SBUH	**Rainfall type**	TYPE1A.RAC
Hyd Intv	10.00 min	**Peaking Factor**	484.00
Storm Duration	24.00 hrs	**Abstraction Coeff**	0.20
Pervious Area	0.94 ac	**DCIA**	0.00 ac
Pervious CN	88.81	**DC CN**	0.00
Pervious TC	23.498 min	**DC TC**	0.00 min

Pervious CN Calc

Description	SubArea	Sub cn
Open spaces, lawns,parks (>75% grass)	0.48 ac	80.00
Impervious surfaces (pavements, roofs, etc)	0.46 ac	98.00
Pervious Composited CN (AMC 2)		88.8085

Pervious TC Calc

Type	Description	Length	Slope	Coeff	Misc	TT
Sheet	Short prairie grass and lawns.	135.00 ft	1.0%	0.15	1.83 in	21.7352 min
Shallow	Paved	215.00 ft	1.0%	0.01		1.7627 min
Pervious TC						23.498 min

Appendix E – Proposed Basin Hydrology Output

PROPOSED SITE Event Summary

Event	Peak Q (cfs)	Peak T (hrs)	Hyd Vol (acft)	Area (ac)	Method
2 yr 24 hr	0.2929	8.00	0.0981	0.94	SBUH
10 year	0.5068	8.00	0.1672	0.94	SBUH
25 year	0.6081	8.00	0.2006	0.94	SBUH
100 year	0.7297	8.00	0.2411	0.94	SBUH

All results based on storm duration of **24.0** hours. This is ok if all precipitations are appropriate for the storm duration. If some design event precipitations are for different duration storms, those results are incorrect

Record Id: PROPOSED SITEDesign Method	SBUH	**Rainfall type**	TYPE1A.RAC
Hyd Intv	10.00 min	**Peaking Factor**	484.00
Storm Duration	24.00 hrs	**Abstraction Coeff**	0.20
Pervious Area	0.94 ac	**DCIA**	0.00 ac
Pervious CN	94.17	**DC CN**	0.00
Pervious TC	5.00 min	**DC TC**	0.00 min

Pervious CN Calc		
Description	**SubArea**	**Sub cn**
Open spaces, lawns,parks (>75% grass)	0.20 ac	80.00
Impervious surfaces (pavements, roofs, etc)	0.74 ac	98.00
Pervious Composited CN (AMC 2)		94.1702

Pervious TC Calc						
Type	**Description**	**Length**	**Slope**	**Coeff**	**Misc**	**TT**
Sheet	Short prairie grass and lawns.	15.00 ft	1.0%	0.15	1.83 in	3.7477 min
Shallow	Paved	70.00 ft	1.0%	0.01		0.5739 min
Cont Channel	Other streams, man-made channels and pipe	15.00 ft	1.0%	0.001		0.0031 min
Pervious TC						4.3247 min

Appendix F – Hydrogeologic Report

LEVEL II HYDROGEOLOGIC REPORT
PROPOSED REDMOND TOWN CENTER CONDOMINIUMS
REDMOND, KING COUNTY, WASHINGTON

Terracon Project No. 81077006
Date: April 6, 2007

Prepared for:

Redmond Town Center, LLC.
333 156th Street NE
Arlington, Washington 98223

Prepared by:

ZZA
Zipper Zeman Associates, Inc.
Geotechnical and Environmental Consulting
A Terracon Company

Lynnwood, Washington

Zipper Zeman Associates, Inc.
Geotechnical and Environmental Consulting
A Terracon Company

April 6, 2007

Redmond Town Center, LLC
333 156th Street NE
Arlington, Washington 98223

Attention: Mr. Todd Leabman

Re: Level II Hydrogeologic Report
Proposed Redmond Town Center Condominiums
Redmond, Washington
ZZA Project No. 81077006

Dear Mr. Leabman,

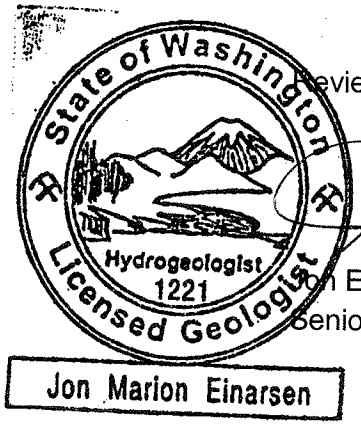
Zipper Zeman Associates, Inc. (ZZA), a Terracon Company, is pleased to submit the enclosed hydrogeologic report for the above-referenced site. We appreciate the opportunity to perform these services for you. Please contact us if you have questions regarding this information or if we can provide any other services.

Sincerely,

Zipper Zeman Associates, Inc.
A Terracon Company

Prepared by:

Alex DeOme
Staff Geologist



Reviewed by:

Jon Einarsen Ph.D., P.G.
Senior Geologist

18905 33rd Avenue West #117, Lynnwood, WA 98036 425-771-3304 Fax: 425-771-3549

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APPENDICES

LEVEL II HYDROGEOLOGIC REPORT
PROPOSED REDMOND TOWN CENTER CONDOMINIUMS
REDMOND, KING COUNTY, WASHINGTON
PROJECT NO. 81077006

1.0 INTRODUCTION

1.1 Site Description

The approximate site location is depicted on Figure 1 of Appendix A, which was reproduced from a portion of the USGS 7.5-minute series topographic map for Redmond, Washington. The approximate location of the site relative to the City of Redmond Wellhead Protection Area is included in Figure 2 of Appendix A. .

1.2 Scope of Services

This Level II Hydrogeologic Report was performed in general accordance with our Agreement for Services (P-3671) dated February 1, 2007 and Appendix 20D-2 (Critical Areas Reporting Requirements) of the Redmond Community Development Guide. The purpose of this hydrogeologic report was to assist the client in evaluating potential impacts to the groundwater supply that development of the subject site could pose as reflected by the scope of this report. This purpose was undertaken through a review of readily available published documents relevant to subsurface conditions of the site and vicinity. Limitations are evident from reviewing the applicable scope of services and the report text.

1.3 Standard of Care

This Level II Hydrogeologic Report was performed in accordance with generally accepted practices of this profession undertaken in similar studies at the same time and in the same geographical area. We have endeavored to meet this standard of care but may be limited by conditions encountered during performance, a client-driven scope of services, or inability to review information not received by the report date.

Hydrogeologic reports, such as the one performed at this site, are of limited scope, are non-invasive and can not conclusively determine the impact that development of the subject site will have on the groundwater quality of the area. In conducting the limited scope of services described herein, certain sources of information and public records were not reviewed. It should be recognized that additional information may be documented in records that were not reviewed. No hydrogeologic report can wholly eliminate uncertainty regarding groundwater impacts in connection with the proposed property development. Performance of this project is intended to reduce, but not eliminate, uncertainty regarding the potential for groundwater impacts due to the proposed site development. No warranties, express or implied, are intended or made. The limitations herein must be considered when the user of this report formulates

opinions as to risks associated with the site or otherwise uses the report for any other purpose. These risks may be further evaluated – but not eliminated – through additional research or assessment. We will, upon request, advise you of additional research or assessment options that may be available and associated costs.

1.5 Reliance

This report is prepared for the exclusive use of Redmond Town Center, LLC. Reliance by any other party is prohibited without the written authorization of Redmond Town Center, LLC and ZZA.

2.0 REGIONAL PHYSICAL SETTING

2.1 Location and Physiographic Setting

The subject site is located in the southwest quarter of Section 1, Township 25 North, Range 5 East. The subject site consists of two parcels (0125059168 and 0125059077) totaling approximately 26,000 square feet located in an urban setting in the City of Redmond. Parcel A (0125059168), located at 8502 166th Avenue NE, is approximately 11,500 square feet. Parcel B (0125059077), abutting Parcel A to the east, is located at 16640 NE 85th Street and is approximately 14,800 square feet. The subject site is bound by NE 85th Street to the south, 166th Avenue NE to the west, and residential developments currently under construction to the north and east.

Parcel A contains limited vegetation and is currently developed with a two story multi-family residence. Parcel B is currently developed with a single-family residence which is surrounded by deciduous and conifer trees. Based on our review of LiDAR (Light Detection and Ranging) data maintained by the Puget Sound LiDAR Consortium, the subject site is generally level, with ground surface elevations ranging from approximately 80 to 84 feet except near the western and southern property lines, where the ground surface slopes towards 166th Avenue NE and NE 85th Street, respectively. In general, the vicinity of the subject site is characterized by medium to high density residential and commercial development and forested land.

The general region is comprised of a glacially deposited plain largely consisting of unconsolidated glacial and non-glacial sediments which have been incised by the Sammamish River. Locally, the area slopes down to the southwest from Education Hill, located northeast of the subject site. The subject site vicinity is drained by the city stormwater system, which discharges into the Sammamish River, approximately 3,300 feet to the west of the subject site.

2.2 Climatology

Climate data for the City of Redmond was not readily available. Conditions at the subject site are assumed to be similar to those encountered at the University of Washington weather station in Seattle, approximately 8.5 miles to the west-southwest. However, according to the City of Redmond Wellhead Protection Report, the average precipitation for the city is approximately 42 inches per year, rather than the 35.86 inches per year reported by the University of Washington weather station. Climatological data is documented on a daily basis at this station by the National Oceanic and Atmospheric Administration (NOAA). Summary climate records for this station are presented in Table 1

Table 1
Climate Records – University of Washington, Seattle, Washington
Period of Record: 6/ 2/1948 to 7/31/1983

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	44.7	50.1	53.4	59.4	66.7	71.2	76.9	76.3	71.0	61.3	52.0	47.1	60.8
Average Min. Temperature (F)	34.2	37.1	38.2	41.6	47.1	52.2	55.1	55.6	52.1	46.1	40.5	37.1	44.7
Average Total Precipitation (in.)	4.94	4.23	3.52	2.30	1.50	1.50	0.96	1.08	1.92	3.24	4.89	5.79	35.86
Average Total Snow Fall (in.)	2.6	0.8	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.8	4.9
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Data from Western Regional Climate Center, a division of NOAA

January is typically the coldest month, with an average low temperature of 34.2 ^{0}F. The warmest average temperature occurs in July, with an average high temperature of 76.9^{0}F. The average annual precipitation at the University of Washington station is 35.86 inches. Rainfall is typically scarce during May through September, with monthly averages below 2 inches. Conversely, November, December, January, and February are the wettest months with averages above 4 inches per month. Snowfall generally occurs in November through March, with January as the peak snowfall month, averaging approximately 2.6 inches.

The 2-year and 100-year design storms for the area are approximately 3.21 and 6.3 inches of precipitation in a 24 hour period, respectively (National Oceanic and Atmospheric Administration). Based on a review of the FEMA Flood Insurance Rate Map panel 53033C0390G, the subject site is in Zone X, described as an area determined to be outside the 500-year floodplain.

2.3 Geologic Setting

The most recent glacial geology of the Puget Sound Lowland, including King County, was developed by successive glacial events between about 18,000 and 11,000 year ago during the Vashon Glaciation. During this time, a characteristic sequence of unconsolidated glacial sediments was deposited over the underlying older glacial and non-glacial unconsolidated sediments and bedrock. As glaciers advanced southward into the Puget Sound Lowland, coarse debris carried by the glacier was carried southward by meltwater streams to form a layer of sand and gravel that is referred to as the advance outwash. As the glacial advance continued, the glacier overrode the advance outwash and additional sediments were deposited beneath the glacier and above the advance outwash. These sediments comprise a very well compacted, unsorted mixture of silt, sand, gravel, and boulders referred to as glacial till. As the glaciers receded, meltwater streams carried additional sand and gravel which was deposited as recessional outwash on top of the glacial till.

Regional geologic conditions in the vicinity of the subject site are described in a geologic map prepared by Booth and Minard (1988). We interpret this map to indicate that the general stratigraphic succession near the subject site consists of (from youngest to oldest): Alluvium, Vashon recessional outwash, Vashon till, Vashon advance outwash, Transitional Beds, Olympia Formation, and older undifferentiated deposits (Pre-Vashon sediments).

We have also reviewed several driller well logs from nearby wells. It should be noted that these logs are of highly variable quality, and should only be used as a generalized indication of subsurface conditions. Our interpretation of driller logs (Appendix B) has been included in the following geologic and hydrogeologic descriptions.

Alluvium

Alluvium deposited by local streams after the retreat of the Vashon glacier comprises the uppermost unit found in most valleys of the area. Near surface deposits consists primarily of silt, clay, fine grained sand, and organics. This unit can be relatively thin, with a maximum thickness of approximately 40 feet. However, the contact between this unit and the underlying Vashon recessional outwash (where present) can be difficult to define.

Vashon Glaciation

Three broadly defined geological units resulted from the Vashon glaciation; recessional outwash, glacial till, and advance outwash. The retreat of the Vashon glacier released vast amounts of water which enabled the transportation and deposition of material that had been trapped within the glacier. In the Redmond area these deposits, referred to as recessional outwash, are predominately comprised of sand and gravel with sparse silt and clay. Minor zones of lacustrine and ice-contact stratified drift deposits exist in some areas. Permeability

and porosity is inversely tied to the silt and clay content in this unit. Due to the characteristics of the contact between the recessional outwash and the alluvium above, the thickness of this unit is hard to define. The bottom extent of these deposits appears to have a maximum depth of approximately 70 feet below the ground surface. This unit does not appear to be present in the vicinity of the subject site

While the Vashon glacier covered the land, glacial till was deposited directly by the glacier. Glacial till deposits are primarily diamictons, consisting or unsorted clay, silt, sand, and gravel. Lenses of moderate to well-sorted clays, silts, sands, and gravels may be present. It is generally very compact. Nonetheless, deposits of less dense material can be found where deposition took place on the flanks of the glacier, rather than below, or where the material has been significantly weathered. This unit can vary in thickness. It appears to have a local maximum thickness of approximately 100 feet. One well log near the subject site depicts till from the ground surface to the bottom of the boring at 60 feet. Other well logs north, northeast, and east of the subject site, in the uplands north of downtown Redmond, depict glacial till near the surface with thicknesses less than 60 feet. According to the Booth and Minard, glacial till is confined to the local uplands of the Redmond area.

During the advance of the Vashon glacier, melt water from the toe of the glacier deposited material, called advance outwash deposits, in fluvial and lucustrine environments. The advance outwash deposits of sand and gravel, which often include layers or lenses of sandy silt, silty sand, clayey sand, and silty and/or clayey gravel are the result of this process. Similar to the glacial till, this unit can be up to 100 feet thick. A well log in the uplands north-northwest of the subject site describes sand and gravel throughout the 29 foot well. This sand and gravel may be part of an advance outwash deposit. Booth and Minard depict advance outwash below glacial till on the local uplands. According to their geologic map, advance outwash is exposed along the slopes of the uplands north of downtown Redmond in the vicinity of the subject site.

Transitional Beds

The transitional beds underlie the Vashon glacial deposits and alluvium in some areas. These deposits are composed of clay and silt with lenses of sand, gravel, wood, and peat. Deposition of this material took place where water ponded in front of the advancing Vashon glacier. This unit is known to be up to 180 feet thick in the King County region. Silt, fine sand, and peat, typical of transitional bed deposits are described in two well logs north-northwest of the subject site with thicknesses up to 30 feet. Booth and Minard mapped transitional bed deposits in a small area along the slope of the hill north of downtown Redmond, near these well locations. Transitional bed deposits may be described in well logs in the Sammamish Valley, but similarities between these deposits and alluvium deposits make deciphering between the two units difficult. Transitional deposits are believed to underlie alluvial deposits in the valley.

Pre-Vashon Sediments

Pre-Vashon interglacial deposits of stratified sand and gravel with minor silt and clay are referred to as the Olympia Formation. This material was deposited by local streams, similar to alluvium that has been recently deposited in the region. In the Redmond area this unit can be upwards of 135 feet thick. It underlies younger deposits in most places in the Redmond area.

Older undifferentiated deposits comprise the lower part of the known stratigraphy of the Redmond region. Varying layers of clay, silt, sand, and gravel make up this unit. Depositional environments consist of both pre-Vashon glaciation and interglacial environments. This unit is generally greater than 400 feet thick and likely underlies all younger deposits in the Redmond area.

2.4 Hydrogeologic Setting

Evans Creek, Bear Creek and the Sammamish River are the two closest surficial water bodies to the subject site. Evans Creek flows from the uplands east of the site, and discharges into Bear Creek. Bear Creek flows from the uplands northeast of the subject site, eventually discharging into the Sammamish River south-southeast of the subject site. At its nearest point, Evans Creek and Bear Creek lie approximately 3,000 feet southeast of the subject site. The Sammamish River reaches its closest point to the subject site approximately 3,300 feet to the west.

The City of Redmond is located within the Sammamish River Valley and on the valley's surrounding uplands. The subject site is located just above the transition from the valley floor to the uplands. Surface water runoff from the uplands and the valley flows into the Sammamish River, which in turn drains into Lake Washington.

2.4.1 Hydrostratigraphic Units

There are three principle aquifers and three principle aquitards in the Redmond area. Principle aquifers consist of the Alluvial Aquifer (consisting of alluvium and the Vashon recessional outwash), Local Upland Aquifers (consisting of the Vashon advance outwash), and the Sea Level Aquifers (consisting of the Olympia Formation). The Vashon glacial till, Transitional Beds, and portions of the older undifferentiated deposits comprise the principal aquitards.

Post-glaciation alluvium and Vashon recessional outwash comprise the youngest, and in some areas the uppermost hydrostratigraphic units in the Redmond area. Alluvium exists throughout the Sammamish River, Bear Creek, and Evans Creek valleys. This unit consists of sand, silt, clay, and organic matter. Recessional outwash exists primarily in local valleys, exposed at the surface in the upper reaches of the Bear Creek Valley and underlying alluvium elsewhere in the local valleys. Sand and gravel comprises most of this aquifer with sparse areas containing silt

and clay. These two units are water bearing. There is no confining layer between the units, thus where both are present groundwater flow occurs between the units. The City of Redmond Wellhead Protection Report regards the alluvium and the Vashon recessional outwash as one aquifer, referred to as the Alluvial Aquifer. The five municipal water supply wells for Redmond are completed within the Alluvial Aquifer. The well completion depths reportedly range from approximately 20 feet to 68 feet beneath the ground surface. The Alluvial Aquifer has an average thickness of approximately 70 feet.

Vashon glacial till is commonly exposed at the surface on upland areas near Redmond. Consisting of compact, unsorted clay, silt, sand, and gravel, glacial till can have a very low permeability. Glacial till often acts as an aquitard, perching groundwater above or confining groundwater below. For the most part, glacial till exists as the uppermost unit where it is present, thus it only acts as a confining layer for groundwater contained in advance outwash deposits below. However, higher permeability soil locally exists in weathered sections or where sand lenses are present. In these areas groundwater may be present within the glacial till. The unit can be up to 100 feet thick in the Redmond area, although it is thought to be not as thick near the subject site. The glacial till is typically not developed as a water source.

Vashon advance outwash underlies the glacial till in most places. This unit is similar to the recessional outwash. The unit is composed mostly of sand and gravel with rare silt and clay. This unit is known to be a reliable aquifer throughout King County. The City of Redmond Wellhead Protection Report refers to this unit as part of the Local Upland Aquifers. Private wells in the Redmond area may be completed in this unit. The advance outwash can be upwards of 100 feet thick in the region.

Transitional Beds of clayey silt to clay with lenses of sand, gravel, peat, and wood act as an important aquitard in the region. This unit perches water contained in the Local Upland Aquifers in the uplands and the Alluvial Aquifer in the valley areas. However, test wells drilled in the Marymoor Park and lower Evans Creek regions indicate that this unit may not be present in places. Where the Transitional Beds are missing, the Alluvial Aquifer may be in direct contact with the underlying Olympia Formation. The Transitional Beds are rarely exposed in the Redmond area, with the exception of some incised drainages. The unit can range up to 180 feet thick in King County.

The Olympia Formation consists of non-glacial fluvial deposits of stratified sand and gravel with minor silt and clay. Due to the high porosity of the sand and gravel, this unit is a significant aquifer. As indicated before, this unit is usually confined by the Transitional Beds above, but it may be unconfined in the eastern lowlands of Redmond. Thicknesses up to 135 feet have been noted in the region.

Older undifferentiated deposits located below the Olympia Formation deposits consist of stratified and unstratified clay, silty, sand, and gravel deposited in both glacial and non-glacial

environments. Where fine grained material is present this unit can act as a perching layer to aquifers above. This unit is rarely exposed at the surface in the area. Thicknesses recorded during deep drilling events indicate that the unit is greater than 400 feet thick.

2.4.2 Groundwater Recharge and Flow

Due to the lack of a confining layer over the Alluvial Aquifer, recharge of this unit can be very rapid. Recharge of this unit is primarily through direct infiltration from precipitation and discharge from the Local Upland Aquifers, although some recharge may be derived from vertical movement of groundwater up from the Sea Level Aquifers. Discharge for the Alluvial Aquifer is directly into the Sammamish River, Bear Creek, and Evans Creek. Recharge of the Local Upland Aquifers through precipitation infiltration may be slower, depending on the characteristics of the overlying glacial till. Discharge of this aquifer is to regional springs and creeks, upward to the Alluvial Aquifer and downward to the Sea Level Aquifers where contacts are present. Recharge of the deeper Sea Level Aquifers is from vertical movement downward from the Local Upland Aquifers while discharge is from upwelling into the Alluvial Aquifer and westward lateral movement towards Lake Washington and Puget Sound.

Groundwater movement between all three regional aquifers appears to be unrestricted in some areas of the Redmond vicinity. Flow from the Local Upland Aquifers located to the north and east of the city generally follows the local topography. Due to this, groundwater flow in the Bear Creek and Evans Creeks basins is towards the Alluvial Aquifer in the respective valleys. Groundwater in the Alluvial Aquifers contained in the valleys generally flows south, down the Bear Creek Valley and west, down the Evans Creek Valley, towards the Sammamish Valley. From there, groundwater flow through the Alluvial Aquifer is generally northerly down the Sammamish Valley. Groundwater flow in the Local Upland Aquifers located on the hill north of the subject site generally follows topography as well. It is assumed that the Local Upland Aquifers discharge into the Alluvial Aquifer at the base of the hill, southwest of the subject site. The Sea Level Aquifer contains groundwater flow that is generally independent of the local topography. Where an insufficient confining layer is present above, vertical flow from the Sea Level Aquifer to the Alluvial Aquifer is present. Groundwater in the Sea Level Aquifer is assumed to flow in a generally westerly direction.

2.4.3 Local Hydrogeologic Information

We reviewed reports on file with the Washington State Department of Ecology for three nearby sites. It is our interpretation that groundwater monitoring wells at these three sites were completed in the Alluvial Aquifer. Reported groundwater flow directions at these sites are generally consistent with our regional interpretation, described above.

Three groundwater monitoring wells were installed at a service station located approximately two blocks southwest of the subject site. According to Geraghty and Miller (1991), these wells

were completed in soils described as "young alluvium". Groundwater reportedly flowed in a northwesterly direction at this location.

According to GeoEngineers (2006), groundwater flowed in a west to southwesterly direction at the former T&D Feeds facility, located approximately four blocks south of the subject site.

A groundwater investigation has been completed by ENSR at the Overlake Cleaners facility located approximately four blocks southeast of the subject site. According to ENSR (1997) groundwater is present at a depth of approximately 23 feet beneath the ground surface at the Overlake Cleaners site, and flowed in a northwesterly direction.

3.0 SITE SPECIFIC CONDITIONS

3.1 Proposed Development Plans

It is our understanding that development plans have not been completed for this project, but the proposed development on the subject site generally consists of a four story multi-family residential building with two levels of underground parking. Based on a conversation with Bob Bogarth of Taylor Gregory Butterfield Architects, an elevator is to be included in the project. The elevator shaft is estimated to reach an approximate depth of 56 feet below the surface elevation. Additional improvements to underground utilities and stormwater facilities are also included in the proposed project.

3.2 Subsurface Conditions

ZZA advanced two borings on the subject site for a geotechnical investigation in December of 2006. A copy of our geotechnical report is included in Appendix B. Both borings were advanced to a depth of approximately 18 feet below the ground surface. Boring B-1, advanced in the north parking lot of Parcel A, encountered very dense, moist to wet, silty gravelly sand, interpreted to be glacial till. Boring B-2, advanced at the south end of the driveway on Parcel B, encountered wet, silty gravely sand interpreted to be fill extending to an approximate depth of 4.5 feet below the ground surface. Medium dense to dense, wet, silty gravelly sand was encountered from 4.5 feet to the approximately 11 feet below the ground surface, underlain by very dense, moist, silty sandy gravel with thin layers containing sand with a trace silt. These soils were interpreted to consist of weathered glacial till overlying unweathered glacial till.

Groundwater was observed in boring B-1 at approximately 16½ feet and in boring B-2 at approximately 6 feet below the ground surface. Groundwater in B-1 appeared to be contained in thin saturated sand lenses within the glacial till. Groundwater in the weathered till of boring B-2 likely is perched over the very dense glacial till below, which can impede vertical groundwater flow. Based on the presence of glacial till near the surface, it is our opinion the direct recharge of the underlying aquifers due to infiltration at the subject site in minimal.

3.2 Conceptual Hydrogeologic Model

The purpose of the conceptual model is to integrate the known or estimated hydrogeologic characteristics of the groundwater systems in the vicinity of the subject site. The conceptual model can then be used to estimate ground water elevations, flow paths, gradients, and the location of recharge and discharge areas. The theoretical aquifer characteristics set forth in the conceptual model can provide important constraints for the design of subsurface investigations to quantitatively assess the accuracy of the model.

There are five municipal water supply wells located in the City of Redmond Wellhead Protection Area. These wells are all competed in the Alluvial Aquifer. The Alluvial Aquifer is likely recharged through infiltration of precipitation from above, upwelling of water from the Local Upland and Sea Level Aquifers below, and lateral recharge from the Local Upland Aquifer.

According to 25 well logs located in the Sammamish Valley within approximately 3,000 feet of the subject site, the depth to groundwater in the Alluvial Aquifer ranges from approximately 8 and 23 feet. The average depth to groundwater from the reviewed well logs is 14.7 feet. Only one well log reviewed from the upland area north of downtown Redmond contained groundwater information. The well log, located approximately 2,500 feet northeast of the subject site, described groundwater at 19 feet. Groundwater data for the subject site vicinity is only available through ZZA's prior geotechnical investigation. Groundwater was interpreted to be contained within glacial till in a sand lens at 16.5 feet and in weathered till at 6 feet, perched over dense till.

The hydrostratigraphy below the subject site likely includes the following units (from uppermost down): Vashon glacial till, Vashon advance outwash, transitional beds, Olympia Formation, and older undifferentiated deposits. The Redmond Municipal Code 20D.140.10-040 designates the subject site as in Wellhead Protection Zone 2, representing land that is within the one-year-time-of-travel zone for a municipal water supply well. According to available groundwater contour maps, geologic cross-sections, and our interpretation of the hydrogeology of the area, of the five City wells only Well #4 is located down gradient of the subject site (Figure 3). Based on our interpretation of local hydrogeologic conditions, we assume that Vashon advance outwash below the subject site provides a component of the groundwater recharge to the Alluvial Aquifer near Well #4. However, glacial till overlies the advance outwash at the subject site, which should provide a low permeability barrier to infiltration from surface activities at the site.

4.0 POTENTIAL DEVELOPMENT IMPACTS

It is our understanding that development plans have not been completed for this project, but the proposed development on the subject site generally consists of a four story multi-family residential building with two levels of underground parking. It is our opinion that the proposed development plans for the subject site present a low risk of impacting groundwater quality in the

underlying aquifers, provided that the proposed elevator shaft is constructed and maintained in accordance with the City of Redmond Municipal Code (as described in general terms below). We recommend that you consult with your design professionals and legal council with respect to interpretation of the City of Redmond Municipal Code.

Based on a review of published geologic maps, nearby driller well logs, and the results of our subsurface explorations for an associated geotechnical investigation, the subject site appears to be underlain by low permeability soil of the Vashon glacial till. We assume that that the till layer lies above the Local Upland Aquifer, which discharges into the Alluvial Aquifer utilized by the municipal water supply wells.

Based on the known and assumed hydrogeologic conditions at the subject site, it is our opinion that a groundwater monitoring plan is not warranted, provided that the proposed multi-family residential site development is completed in accordance with the City of Redmond Municipal Code.

The proposed development is not anticipated to generate significant amounts of potential contaminants. Limited amounts of fertilizer, herbicides, and pesticides may be used on the landscaped parts of the site following construction. It is our opinion that limited use of these substances in accordance with label instructions does not pose a significant threat to groundwater quality. Other identified sources of potential contamination consist of runoff from building roofs and leaking vehicle fluids. It is our understanding that runoff from the facility will be diverted into the Redmond stormwater system, thus mitigating the potential effects of surface water runoff from the site.

Fill material from an offsite source may be required during earthwork phases of construction. Material derived from a known or unknown source could potentially contain contamination. Strict measures should be heeded in order to prevent contaminated fill material from entering the construction site. Fill material in excess of 10 cubic yards to be used onsite for a time period greater than 6 months that is not obtained from a Washington State Department of Transportation approved source is required to have analytical documentation or a source statement issued by a licensed engineer, geologist, engineering geologist, or hydrogeologist stating that the material is below cleanup standards specified by Washington Administrative Code 173-340-740. This documentation must be submitted to the Department off Public Works prior to the material's arrival on site.

Spills or leaks of hazardous materials from vehicles and equipment used during construction pose another threat to groundwater quality. Any leaking vehicles or equipment must immediately be repaired or removed from the site. According to Redmond Municipal Code 20D.140.50-040, any "hazardous material storage, dispensing, refueling areas, and use and handling areas" are required to have secondary containment system adequate enough to contain a spill from the largest container of hazardous materials onsite in order to prevent a

release into the soil, surface water, or groundwater. Also, hazardous materials left unsupervised on site must be inaccessible to the public.

The proposed development of the four-story residential building includes an elevator servicing all floors of the structure. Preliminary design of the elevator depicts an elevator shaft that reaches an approximate depth of 56 feet below the existing ground surface. We anticipate that groundwater within the Local Uplands Aquifer may be encountered during construction of the elevator shaft, and dewatering may be necessary. According to Redmond Municipal Code 20E.90.10-195, all hydraulic elevators within Wellhead Protections Zones 1 and 2 are required to contain an "outer plastic casing constructed of Schedule 40 or thicker-wall polyethylene, polyvinyl chloride, or equivalent pipe". The plastic casing shall be capped at the bottom and all joints shall be solvent or heat welded to insure water tightness." According to the Redmond Municipal Code 13.07.100 all facilities located within Wellhead Protections Zones 1 or 2 that contain a hydraulic elevator cylinder are required to inspect the annulus for evidence of hydraulic fluid leakage at least once every six months. Results of these inspections must be reported to the Director of the Public Works Department. If leakage is discovered repairs must be completed within thirty days, and a report of the repair must be submitted to the Director within thirty days of completion.

The final identified issue with site development is the replacement of pervious surfaces which supply recharge water to the aquifers with impervious surfaces which channel water off the site and potentially out of the aquifer recharge area. If enough of the area within the recharge zone is covered with impervious media, water inflow into the aquifers will not be sufficient to account for the natural and human derived discharge of the aquifers. However, due to the size of the development and the amount of impervious surface planned, and because the site appears to be underlain by low permeability glacial till (and consequently does not provide significant infiltration in its present condition), it is our opinion that this does not pose a significant threat at this time.

5.0 REFERENCES

Booth, D. B., Minard, J. P., 1988, *Geologic Map of the Redmond Quadrangle, King County, Washington:* United States Geologic Survey.

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GeoEngineers, 2006, *Supplemental Site Characterization and Remedial Action Summary, Former T&D Feeds, 16355 Cleveland Street, Redmond, Washington*: on file with the Washington State Department of Ecology.

Geraghty and Miller, 1991, *Additional Site Characterization, ARCO Service Station #6067, 8009 164th Avenue Northeast, Redmond, Washington*: on file with the Washington State Department of Ecology.

Liesch, Bruce A., Price, Charles E., Walters, Kenneth L., 1963. *Geology and Groundwater Resources of Northwestern King County, Washington Volume 1:* Washington State Department of Conservation, Division of Water Resources.

Parametrix, Pacific Groundwater Group, and Carolyn Browne Associates, October 30, 1997, *City of Redmond: Wellhead Protection Report*: Redmond, Washington.

Seattle – King County Health Department, Environmental Health Division, Groundwater Section and Redmond – Bear Creek Valley Groundwater Advisory Committee, November 4, 1994, *Redmond – Bear Creek Valley Groundwater Management Plan.*

Snyder, Dale E., Gale, Philip S., Pringle, Russell F., November 1973, *Soil Survey of King County, Washington*: United States Department of Agriculture, Soil Conservation Service, in cooperation with Washington Agriculture Experiment Station.

United States Department of the Interior Geological Survey, 1982, *Bellevue North Quadrangle, Washington – King County, 7.5 Minute Series (Topographic).*

Zipper Zeman Associates, January 17, 2007, *Geotechnical Report, Proposed Multi-Family Development*: Redmond, Washington. ZZA Job #81065239.

APPENDIX A

FIGURES

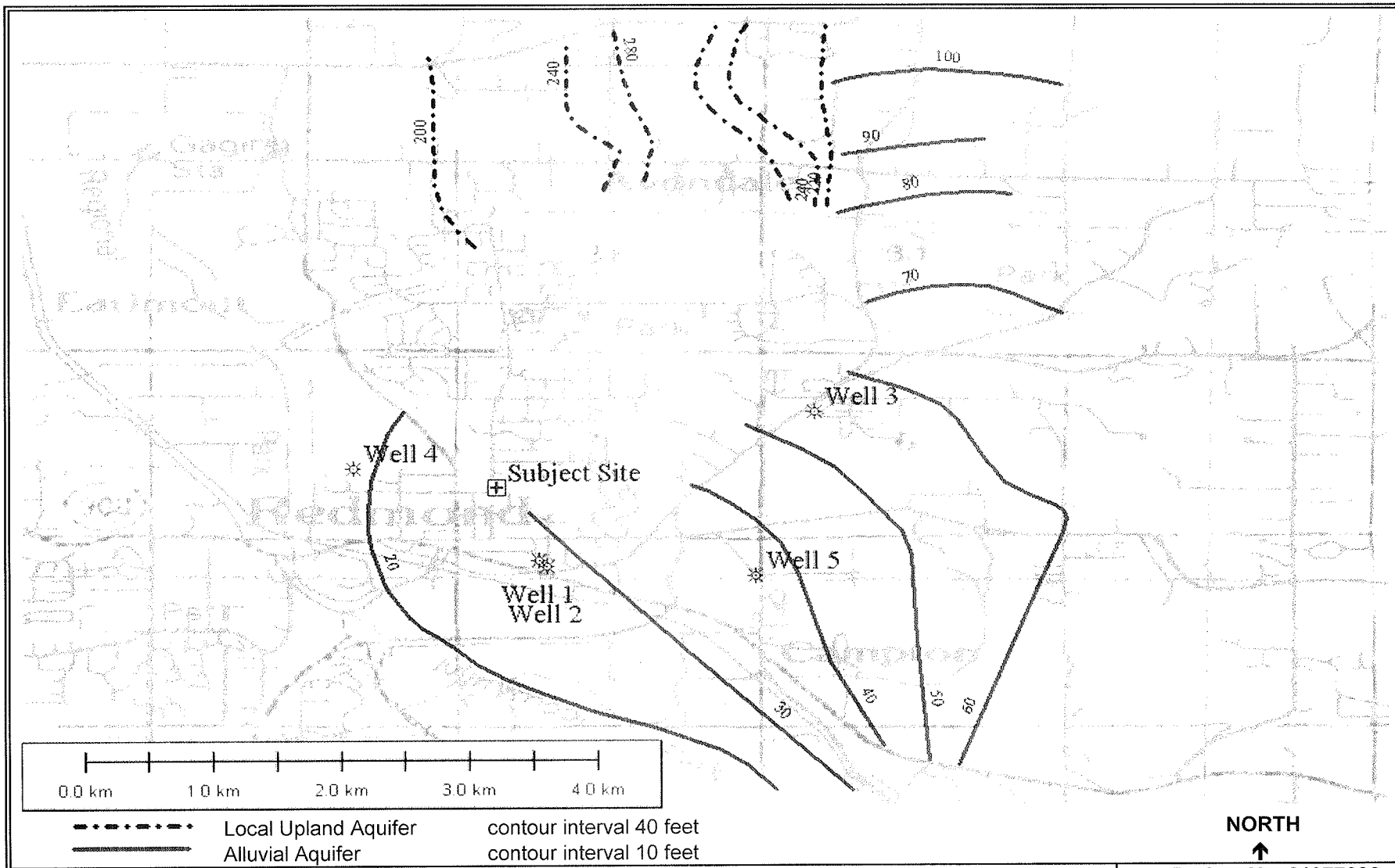


Figure 3
Groundwater Contours (Adapted from *City of Redmond: Wellhead Protection Report*)

Terracon

Project No. 81077006
Redmond Towncenter Condos
Redmond, King County, WA

ATTACHMENT 14

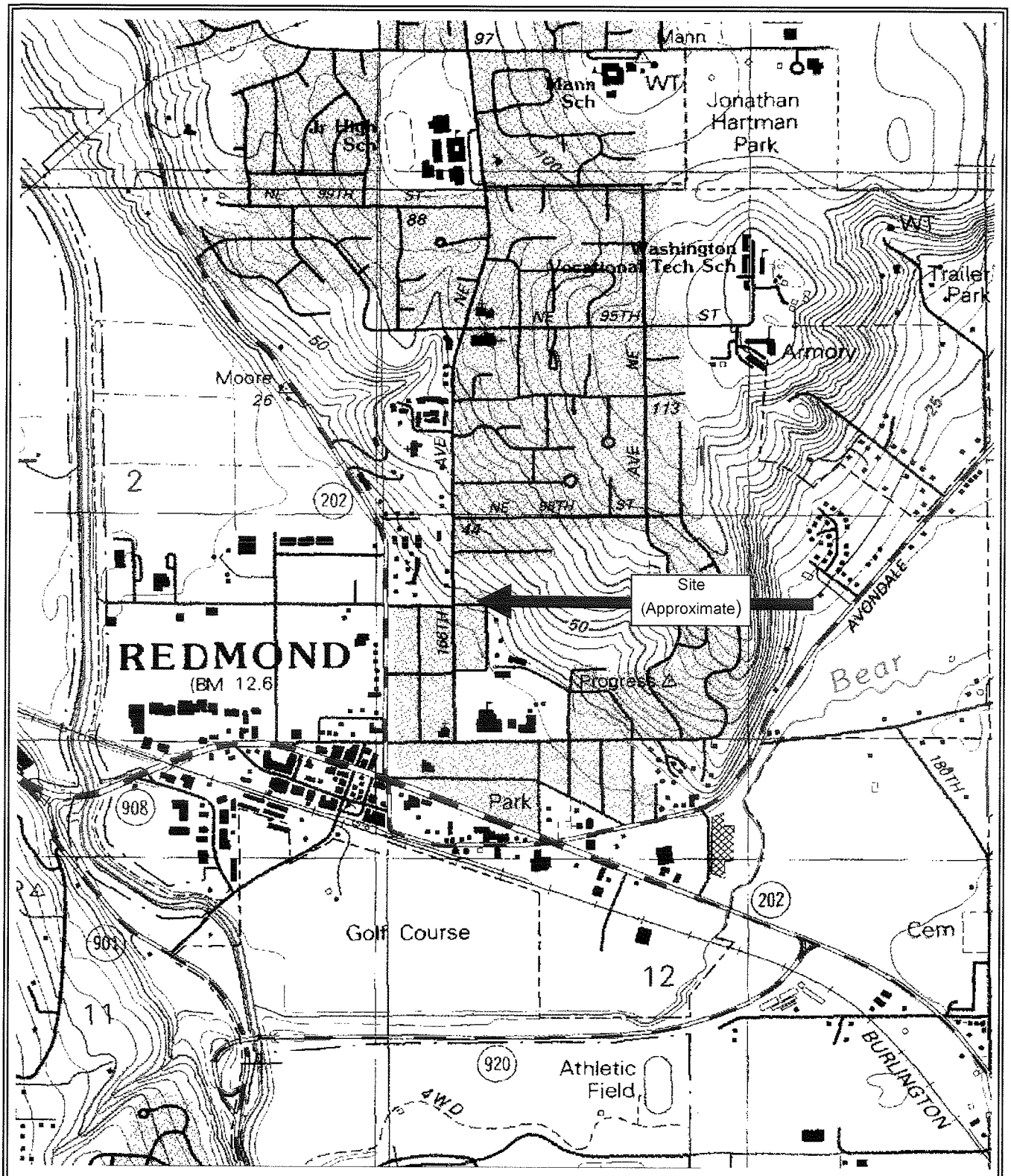


Figure 1 Topographic Map	Terracon	Project No. 81077006 Site: Redmond Town Center Condominiums Redmond, Washington

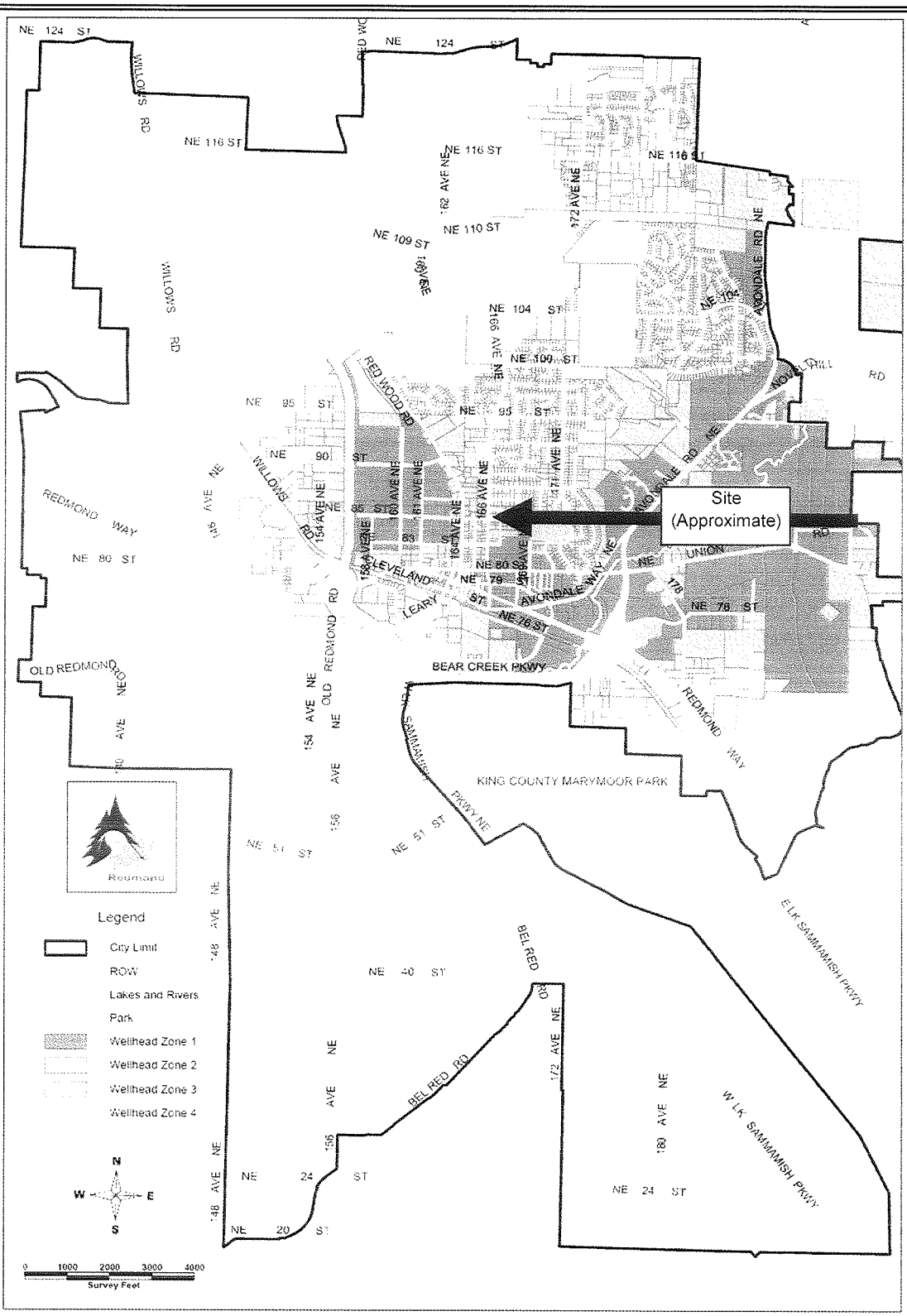
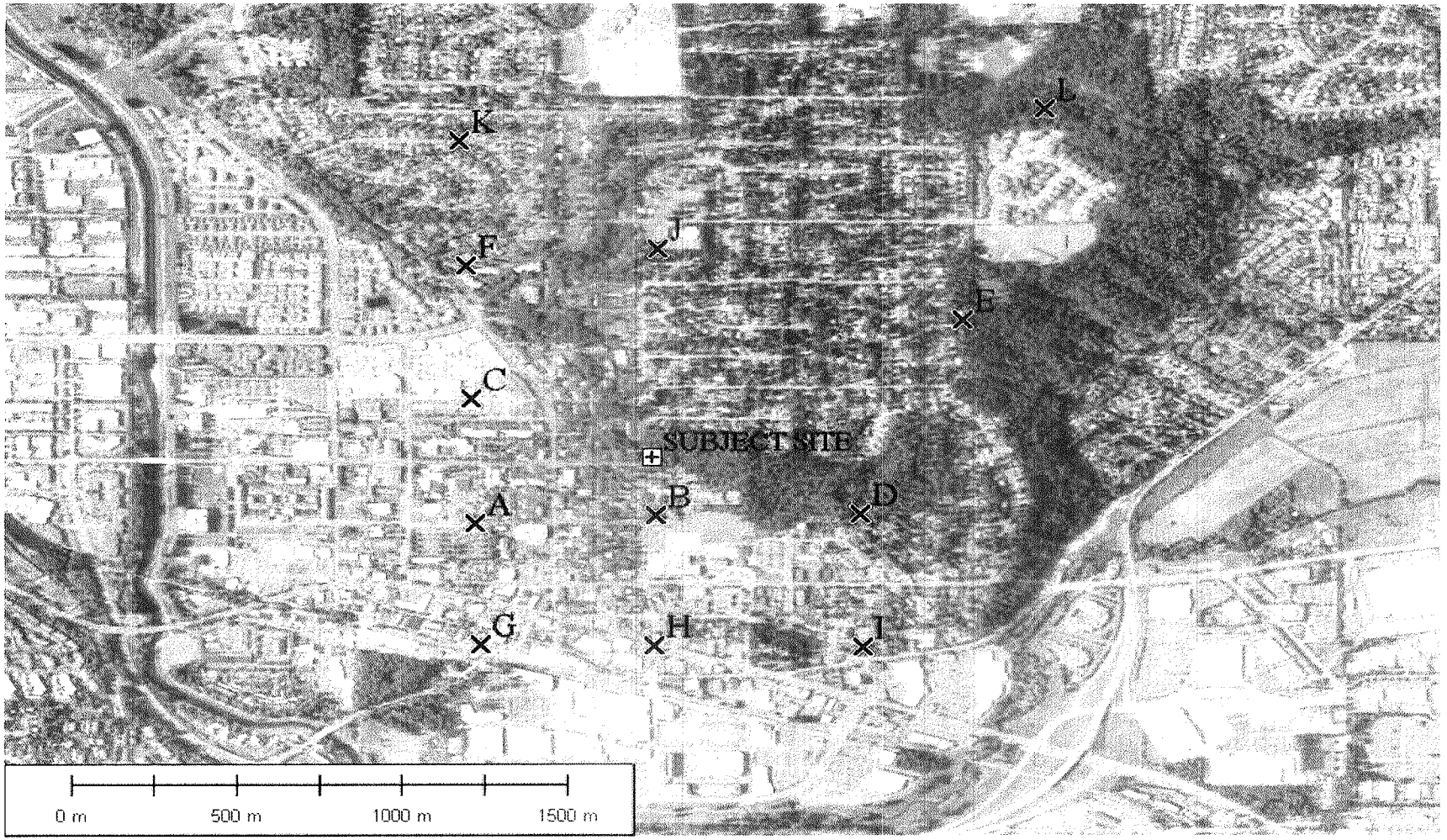


Figure 2 Wellhead Protection Areas	Terracon	Project No. 81077006 Site: Redmond Town Center Condominiums Redmond, Washington

APPENDIX B

WELL LOGS



NORTH

General Well Log Locations	Terracon	Project No. 81077006 Redmond Towncenter Condos Redmond, King County, WA

ATTACHMENT 14

ATTACHMENT 14

RECEIVED
OCT 25 1993
DEPT. OF ECOLOGY

~~WELL #: AA 654~~ A1

25/5E/2R

M.W. -3

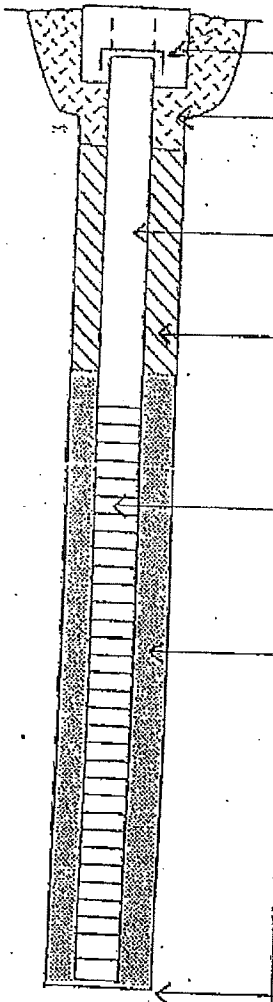
RESOURCE PROTECTION WELL REPORT

START CARD NO. R-01515

PROJECT NAME: ARCO Products Co.
WELL IDENTIFICATION NO. MW-3
DRILLING METHOD: H.S.A.
DRILLER: Brent Maloy
FIRM: Cascade Drilling, Inc.
SIGNATURE:
CONSULTING FIRM: Beraghty & Miller
REPRESENTATIVE: AMR AMR

COUNTY: King
LOCATION: SE¼ SE¼ Sec 2 Twn 25N R 5E
STREET ADDRESS OF WELL: 8009 164th Ave NE
Redmond, WA
WATER LEVEL ELEVATION: ~~15.5~~ 18.5
GROUND SURFACE ELEVATION: N/A
INSTALLED: 10-11-93
DEVELOPED: 10-11-93

AS-BUILT | WELL DATA | FORMATION DESCRIPTION



WELL COVER
CONCRETE SURFACE SEAL
DEPTH = 3 /ft
PVC BLANK 2 "x 10'
BACKFILL 10 ft.
TYPE: Bentonite chips
PVC SCREEN 2 "x 15'
SLOT SIZE: 020
GRAVEL PACK 12 ft.
MATERIAL: 8-12 sand
WELL DEPTH 25'

0 - 25 ft.
Poorly graded sand & gravels

- ft.

- ft.

SCALE: 1" = _____ PAGE _____ OF _____

ECY 050-12 (Rev. 11/89)

ATTACHMENT 14

4 A2 25N/5E/2R

RESOURCE PROTECTION WELL REPORT

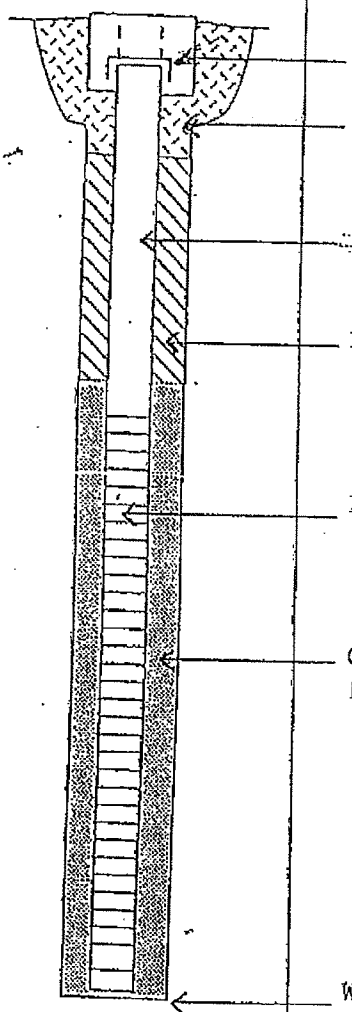
START CARD NO. 07857

PROJECT NAME: Chelsea Square Apts
WELL IDENTIFICATION NO. 1-2-3-4
DRILLING METHOD: H.S.A.
DRILLER: Scott Krueger
FIRM: Cascade Drilling, Inc.
SIGNATURE: Scott
CONSULTING FIRM: Seacor Environmental
REPRESENTATIVE: Dan Delanaise

COUNTY: King
LOCATION: SE¼ SE¼ Sec 2 Twn 25N R 5E
STREET ADDRESS OF WELL: 16340 N.E. 85th ST Redmond WA
WATER LEVEL ELEVATION: 12
GROUND SURFACE ELEVATION: N/A
INSTALLED: 8-4-93
DEVELOPED: No

RECEIVED
NOV 0 1993
DEPT. OF ECOLOGY

AS-BUILT | WELL DATA | FORMATION DESCRIPTION



WELL COVER
CONCRETE SURFACE SEAL DEPTH = 1/ft
PVC BLANK 2 "x 10'
BACKFILL 7 ft.
TYPE: Bent chips
PVC SCREEN 2 "x 10'
SLOT SIZE: .020
GRAVEL PACK 12 ft.
MATERIAL: 8/12, Colo
WELL DEPTH 20 '

0 - 20 ft.
light brown silty sand, gravels, cobbles
- ft.

- ft.

SCALE: 1" = _____ PAGE _____ OF _____

ECY 050-12 (Rev. 11/09)

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

ATTACHMENT 14

A3

RESOURCE PROTECTION WELL REPORT

Notice of Intent No. R 603395

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

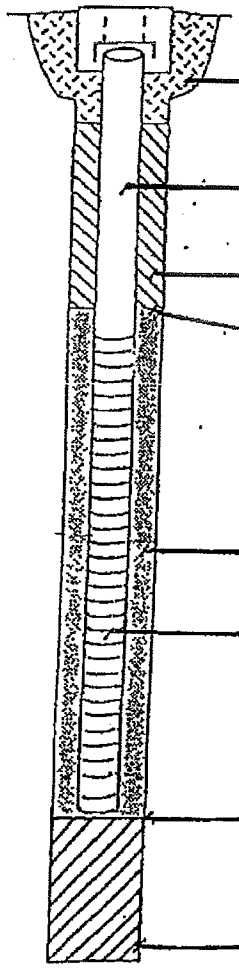
The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

Construction/Decommission *("x" in circle)*
135152
- (X) Construction
- ( ) Decommission *Original Construction Notice of Intent Number* _____

Type of Well *("x" in circle)*
- (X) Resource Protection
- ( ) Geotech Soil Boring

Property Owner: Chevron #9-8795
Site Address: 16010 Redmond Way
Unique Ecology Well ID Tag No.: AHQ 778
City: Redmond County: King
Consulting Firm: SAIC
Location: SE 1/4-1/4 SE 1/4 Sec 2 Twp 25N R 5E (E/W/WWM) circle one
Driller or Trainee Name: Scott Krueger
Lat/Long (s, t, r still REQUIRED) Lat Deg _____ Lat Min/Sec _____
Driller or Trainee Signature: [signature]
Long Deg _____ Long Min/Sec _____
Driller or Trainee License No.: 2073
Tax Parcel No. /
If trainee, licensed driller's Signature and License no. /
(Cased) or Uncased Diameter 9" Static Level 15
Work/Decommission Start Date 6/20/03
Work/Decommission Completed Date 6/20/03

Construction/Design — Well Data 3357-3 — Formation Description



Well Cover
Concrete Surface Seal Depth = 1
Blank Casing 2 " 10'
Material PVC
Backfill 7 ft
Type: Bent chips
Seal
Material
Gravel Pack 12 ft
Material: 2/12
Screen 2 "x 10'
Slot Size .010
Material PVC
Well Depth 20 ' "
Backfill
Material
Total Hole Depth

0 - 20 ft
brown Sandy gravel "Some Cobbles"
- ft
- ft

RECEIVED
JUL 0 2 2003
Washington State Department of Ecology

Scale 1"= _____

Page 4 of 4

ECY 050-12 (Rev 2/01)

ATTACHMENT 14

A4

ENTERED 16691

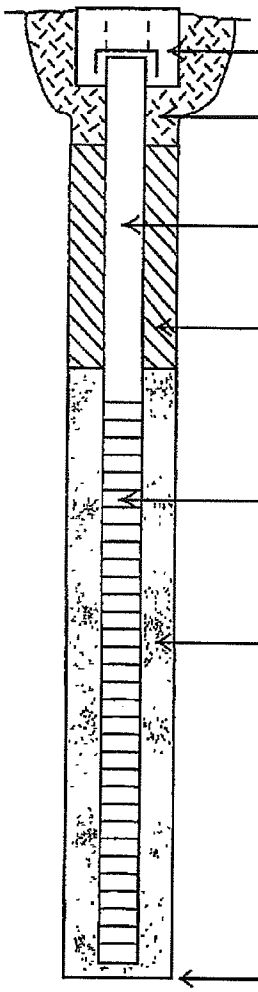
HOLT DRILLING, INC.

Resource Protection Well Report 25-5E-2R

Project Name Frasier Apts.
Well Identification # P-1
Drilling Method 4" HSA
Driller M. Reynolds
License # 2442

Date 5-21-99
County King, SE ¼ SE ¼
Section 2 T. 25N R. 5E
Street Address 85th St & 163rd Ave NE Redmond
Start Card R036737
Consulting Firm Golder Associates

AS-BUILT



WELL DATA

MONUMENT TYPE: Flush
CONCRETE SURFACE SEAL: 2 ft.
PVC BLANK: 1 "x '
BACKFILL: 14.5 ft.
TYPE: Bentonite chips
PVC SCREEN: 1 "x '
SLOT SIZE: Hacksaw
TYPE: PVC
GRAVEL PACK: 12 ft.
MATERIAL: 10/20 Sand
WELL DEPTH: 29.5 "

FORMATION DESCRIPTION

0 - 8 ft. compact sand+gravel
8 - 29.5 ft. Sand gravel + cobbles
- ft.
- ft.
- ft.

RECEIVED
JUL 8 1999
DEPT OF ECOLOGY

REMARKS

Signature Dale J Smith 1229
For M. Reynolds 2442

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

D15332 FDRID41099 FRS

ATTACHMENT 14

A5

25/05/02R

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No. .....

Permit No. .....

(1) OWNER: Name HAAG (DOCTOR'S CLINIC) WESTCOTT CO Address .....

(2) LOCATION OF WELL: County KING — SE ¼ SE ¼ Sec. 2 T. 25 N., R. 5E W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☐ Industrial ☑ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☒

(4) TYPE OF WORK: Owner's number of well (if more than one) 1
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☒ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 8 inches.
Drilled 38 ft. Depth of completed well 38 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 8 " Diam. from 0 ft. to 38 ft.
Threaded ☐ ..... " Diam. from ..... ft. to ..... ft.
Welded ☒ ..... " Diam. from ..... ft. to ..... ft.

Perforations: Yes ☐ 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 ☒ No ☐
Manufacturer's Name JOHNSON
Type STAINLESS Model No. .....
Diam. 8 Slot size .100 from 33 ft. to 38 ft.
Diam. ..... Slot size ..... from ..... ft. to ..... ft.

Gravel packed: Yes ☐ No ☒ Size of gravel: .....
Gravel placed from ..... ft. to ..... ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.
Material used in seal BENTONITE
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? ..... Depth of strata .....
Method of sealing strata off .....

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

(8) WATER LEVELS: Land-surface elevation above mean sea level .... ft.
Static level 8 ft. below top of well Date DEC 10
Artesian pressure ..... lbs. per square inch Date .....
Artesian water is controlled by ..... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? A. AXELSEN
Yield: 110 gal./min. with 4 ft. drawdown after 6 hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level
ALMOST		INSTANTLY			

Date of test .....
Bailer test ..... gal./min. with ..... ft. drawdown after ..... hrs.
Artesian flow ..... g.p.m. Date .....
Temperature of water ..... Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

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 of formation.

MATERIAL	FROM	TO
BRN SILTY GVLY SAND	0	6
BRN SANDY GVL	6	38

RECEIVED
OCT 9 1986
DEPT. OF ECOLOGY

Work started ....., 19..... Completed DEC 10, 1986

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME AXELSEN DRILLING
(Person, firm, or corporation) (Type or print)

Address 18802 - 92 NE BOTHELL

[Signed] A. Axelsen
(Well Driller)

License No. 0008 Date SEPT 10, 1986

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

ATTACHMENT 14

A6

RESOURCE PROTECTION WELL REPORT

ENTERED

WELL TAG NO. ACJ 431 ± 19106

START CARD NO. R-041151

PROJECT NAME: InTra Corp.

COUNTY: King 25-5E-2R

WELL IDENTIFICATION NO. Piezometer

LOCATION: SE¼ SE¼ Sec 2 Twn 25N R 5E

DRILLING METHOD: Hollow Stem Auger

STREET ADDRESS OF WELL: 162nd ± 80th Redmond, Wa.

DRILLER: Larry Gregory

WATER LEVEL ELEVATION: n/a

FIRM: Gregory Drilling Inc.

GROUND SURFACE ELEVATION: n/a

SIGNATURE: Larry Gregory

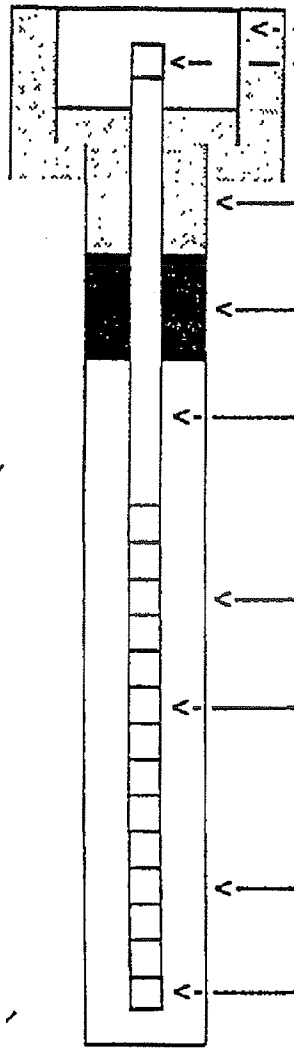
INSTALLED: 5/14/99

CONSULTING FIRM: Golder + Assoc.

DEVELOPED: Golder + Assoc

REPRESENTATIVE: Jim Johnson

Soil Type	Depth (in feet below ground surface)
0 – 3" Asphalt	0
3" – 6" Crushed Rock	
6" – 9.0 Silt + Gravel	2'
9.0 – 25.0 Cobbles Sand Gravel	13'
	15'
	25'



Stick-up Height (if applicable) _____

Monument Type 8" flush Monument

Well Cap Type 1" Cap.

Grout Type/#Sacks 2 Concrete mix

Bentonite Seal/#Sacks 6 chips

Well Casing I.D.: 1"

Type of casing Sch 40 P.V.C

Type of connection glued

Filter Pack/size/#Sacks 10-20 Silica 6 Sks

Well Screen I.D 1"

Type of Screen Sch 40 P.V.C

Slot size .010

Diameter of borehole 8"

Endcap Type glued cap.

RECEIVED

JUN 4 1999

DEPT OF ECOLOGY

Remarks:

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

ATTACHMENT 14

A7

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. E 003385

Construction/Decommission 197401

[X] Construction

[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Type of Well

[X] Resource Protection

[ ] Geotechnical Soil Boring

Property Owner King County Park-N-Ride

Site Address 161st AVE NE + NE 83rd St

City Redmond County King

Consulting Firm Farallon

Unique Ecology Well ID
Tag No. ~

Location 1/4 SE 1/4 SE Sec 2 Twn 25N R 5E or E/W WWM

WELL CONSTRUCTION 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.

Lat/Long (s,t,r still Required) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No. ~

[X] Driller [ ] Trainee Name (Print) Jaymin Lauer

Driller/Trainee Signature _____

Driller/Trainee License No. 2745T

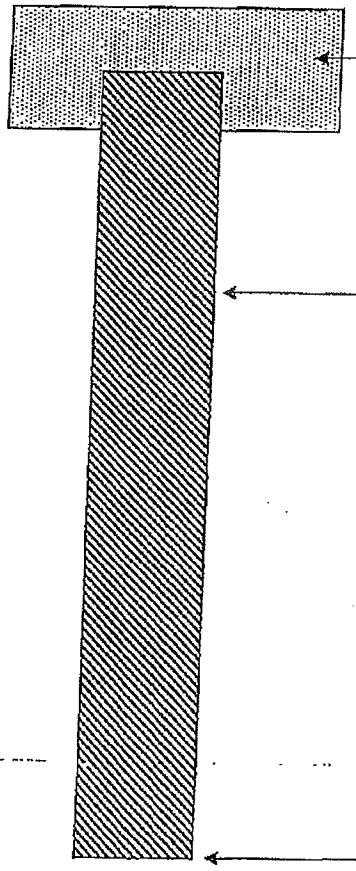
Cased or Uncased Diameter 2" Static Level 15'

Work/Decommision Start Date 5/12/06

If trainee, licesned drillers' Signature and License No. Kasey Gotch 2501

Work/Decommision Completed Date 5/12/06

Construction/Design



Well Data W06-325

Formation Description

CONCRETE SURFACE SEAL 1 FT — 0 - 3 FT Fill

BACKFILL Bentonite Chips — 3 - 18 FT Light Brown Sandy Gravel

DEPTH OF BORING 18 FT

_____ - _____ FT

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MAY 22 2006
DEPT. OF ECOLOGY

Scale 1" = _____

Page 1 of 6

ECY 050-12 (Rev=v 2/01)

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

ATTACHMENT 14

A8

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. S 260581

Construction/Decommission 197075

[X] Construction

[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Type of Well

[ ] Resource Protection

[X] Geotechnical Soil Boring

Property Owner King Co. Park-N-Ride

Site Address 8178 161st AVE NE

Consulting Firm Terra Associates

City Redmond County King

Unique Ecology Well ID ~

Tag No. _____

Location 1/4 SE 1/4 SE Sec 2 Twn 25N R 5E or E WWM

WELL CONSTRUCTION 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.

Lat/Long (s,t,r still Required) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

[X] Driller [ ] Trainee Name (Print) Frank Scott

Driller/Trainee Signature F. Scott

Driller/Trainee License No. 2549

Tax Parcel No. ~

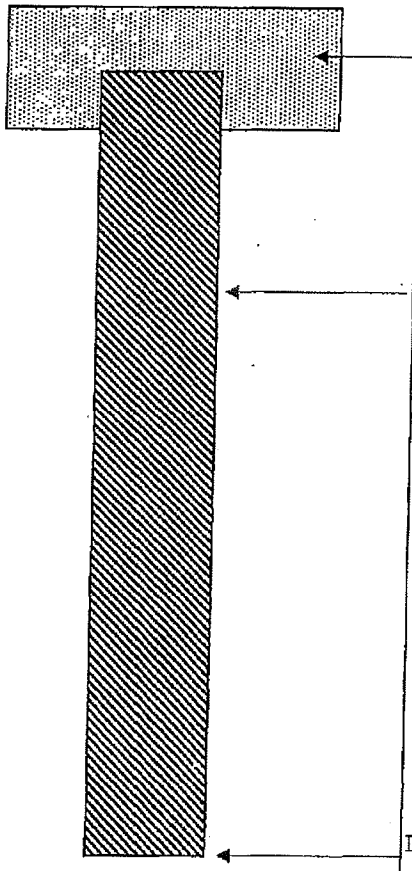
Cased or Uncased Diameter 8" Static Level 15'

If trainee, licesned drillers' Signature and License No. /

Work/Decommision Start Date 5/17/06

Work/Decommision Completed Date 5/18/06

Construction/Design (X3) Well Data W006-340



Formation Description	
CONCRETE SURFACE SEAL 2 FT	0 - 1 FT Fill
BACKFILL Bent Chips	1 - 15 FT Brown silty sand gravels & cobbles
	15 - 30 FT Brown sand gravels & cobbles
DEPTH OF BORING 30 FT	

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JUN 0 8 2006
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Scale 1" = _____

ECY 050-12 (Rev 2/01)

ATTACHMENT 14

A9

22433

ENTERED

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JUL 25 2000

DEPT OF ECOLOGY

HOLT DRILLING, INC.

25-5E-2Q

Resource Protection Well Report

Project Name Nelson Properties

Well Identification # MW-8

Drilling Method HSA 4"

Driller Michael B Sharp

License # 2310

Date 13 April 2000

County King, SW ¼ SE ¼

Section 2 T. 25N R. 5E

Start Card # 246182

Consulting Firm GeoEngineers

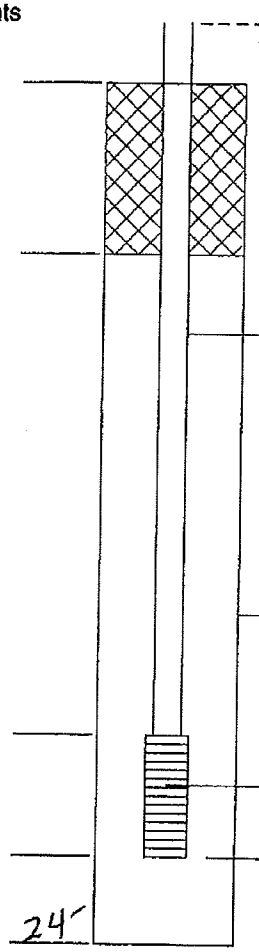
Soil Log

Depth of Components in Feet

0-3 Fill

3-5 Silt

5-24 Outwash



Stick up 1' on Monument Casing

Type of Surface Seal 8" Concrete

Amount 3'

ID of Riser Pipe 2"

Type of Riser Pipe PVC.

Amount 6'

Type of Connection Threaded

Type of Backfill around Riser Bent Chips

Amount 4

Diameter of Borehole 6"

Screen Size or Type .020 x 2" x 15'

Type of Filter Material 10/20

Amount 17'

Remarks:

Signature

ATTACHMENT 14

A10

25/05/02R

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No. .....

Permit No. .....

(1) OWNER: Name DOCTOR'S CLINIC Address .....

(2) LOCATION OF WELL: County KING SE ¼ SE ¼ Sec. 2 T. 25 N., R. 5E W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☒

(4) TYPE OF WORK: Owner's number of well (If more than one) 2
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 8 inches.
Drilled 37 ft. Depth of completed well 37 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 8 " Diam. from 0 ft. to 37 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☒ " Diam. from ft. to ft.

Perforations: Yes ☐ 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 ☒ No ☐
Manufacturer's Name JOHNSON
Type STAINLESS Model No .....
Diam. 8" Slot size .100 from 32 ft. to 37 ft.
Diam. ..... Slot size ..... from ..... ft. to ..... ft.

Gravel packed: Yes ☐ No ☒ Size of gravel: .....
Gravel placed from ..... ft. to ..... ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.
Material used in seal BENTONITE
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? ..... Depth of strata .....
Method of sealing strata off .....

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

(8) WATER LEVELS: Land-surface elevation above mean sea level ..... ft.
Static level 8 ft. below top of well Date DEC. 10, 86
Artesian pressure ..... lbs. per square inch Date .....
Artesian water is controlled by ..... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? A.C. AXELSEN
Yield: 110 gal./min. with 5 ft. drawdown after 3 hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level
	ALMOST		INSTANTLY		

Date of test .....
Bailer test ..... gal./min. with ..... ft. drawdown after ..... hrs.
Artesian flow ..... g.p.m. Date .....
Temperature of water ..... Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

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 of formation.

MATERIAL	FROM	TO
BRN SI GRVY SA	0	6
BRN SANDY GVL	6	37
BRN FI SA	37	—

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OCT 3 1986
DEPT. OF ECOLOGY

Work started ....., 19..... Completed DEC. 10, 1986

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME AXELSEN DRILLING
(Person, firm, or corporation) (Type or print)

Address 18802 - 92ND AVE BOTHELL,

[Signed] A. Axelsen
(Well Driller)

License No. 0008 Date SEPT 10, 1986

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

ATTACHMENT 14

B1

HOLT DRILLING, INC.

211308

Resource Protection Well Report

25-5E-1N

Project Name AES - Redmond

Well Identification # EB-3

Drilling Method MR

Driller DUANE STEVENSON

License # 2795

Date 10-3-6

County KING SL1/4 SL1/4

Section 1 T. 25N R. 5E

Street Address 109th Ave NE Near NE 84th St

Start Card 5 31254

Consulting Firm AESI

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DEPT. OF ECOLOGY

AS-BUILT | WELL DATA | FORMATION DESCRIPTION

MONUMENT TYPE:

CONCRETE SURFACE SEAL ft.

PVC BLANK 2" ft.

BACKFILL 30 ft.

TYPE: BENT CHIPS

PVC SCREEN 2" ft.

SLOT SIZE:

TYPE:

GRAVEL PACK ft.

MATERIAL:

WELL DEPTH 30 ft.

0 - 10 ft. DRY BRN DENSE SANDY SILT SOME ORG.

10 - 20 ft. MOIST DENSE GRY SILT SOME GRAVELS

20 - 30 ft. DAMP SILTY SAND, SOME GRAVEL LAYERS DENSE

ft. - ft.

ft. - ft.

REMARKS BACKFILL WITH BENT. CHIPS

Signature

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

B2

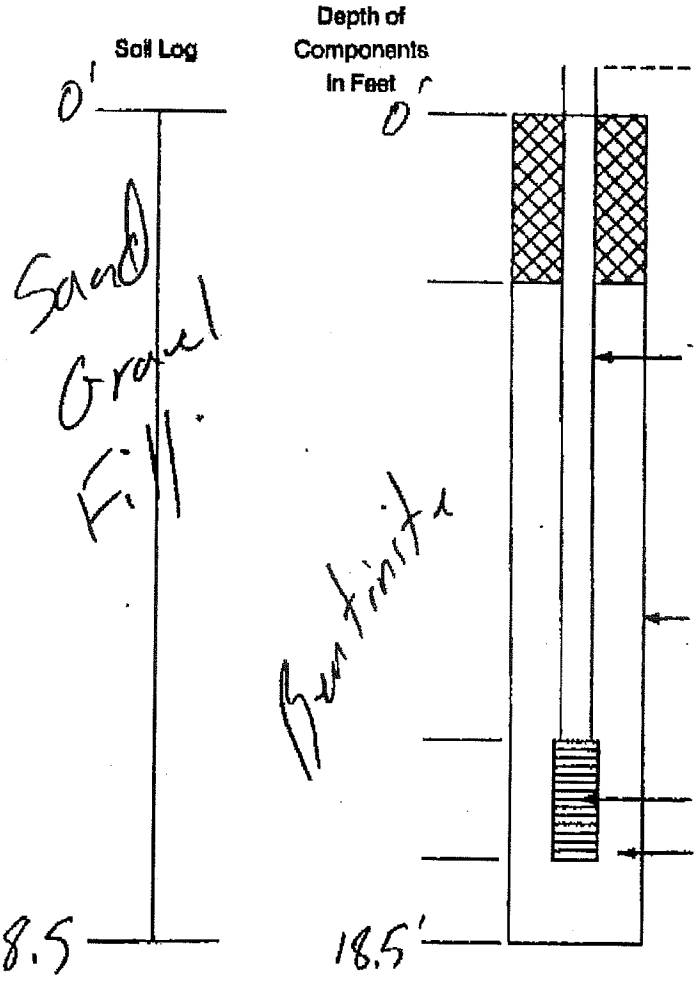
Geoboring & Development, Inc.

RECEIVED
JUN 29 1994
DEPT. OF ECOLOGY

Resource Protection Well Report

Project Name Lake Washington School Dist.
Well Identification # B-1
Drilling Method HSA 4"
Driller Terry Burns
License # 1733
Job # 276

Date 10/2/90
County King SW 1/4 SW 1/4
Section 1 T. 25N R. 5E
Start Card OL0607
Consulting Firm Geo Engineers



Stick up 0 on Monument Casing

Type of Surface Seal Bentinite
Amount

ID of Riser Pipe 0
Type of Riser Pipe 0
Amount
Type of Connection 0
Type of Backfill around Riser Bentinite
Amount
Diameter of Borehole 8 3/4"

Screen Size or Type 0
Type of Filter Material 0
Amount

Remarks:

Signature Terry Burns

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

ATTACHMENT 14

C1

RESOURCE PROTECTION WELL REPORT

Notice of Intent No. R66298

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

25-5E.2J

Construction/Decommission *("x" in circle)* 151579

⊗ Construction

○ Decommission *Original Construction Notice of Intent Number* _____

Type of Well *("x" in circle)*

⊗ Resource Protection

○ Geotech Soil Boring

Property Owner Bella Dry Cleaners

Site Address 8867-161st Ave NE

Unique Ecology Well ID Tag No. AHN 591

City Redmond County: King

Consulting Firm Farallon Consulting

Location NE 1/4-1/4 SE 1/4 Sec 2 Twn 25N R 5E (EWM) or WWM *circle one*

Driller or Trainee Name Frank J. Scott

Lat/Long (s, t, r still REQUIRED) Lat Deg n/a Lat Min/Sec n/a

Driller or Trainee Signature [signature]

Long Deg n/a Long Min/Sec n/a

Driller or Trainee License No. 2549

Tax Parcel No. n/a

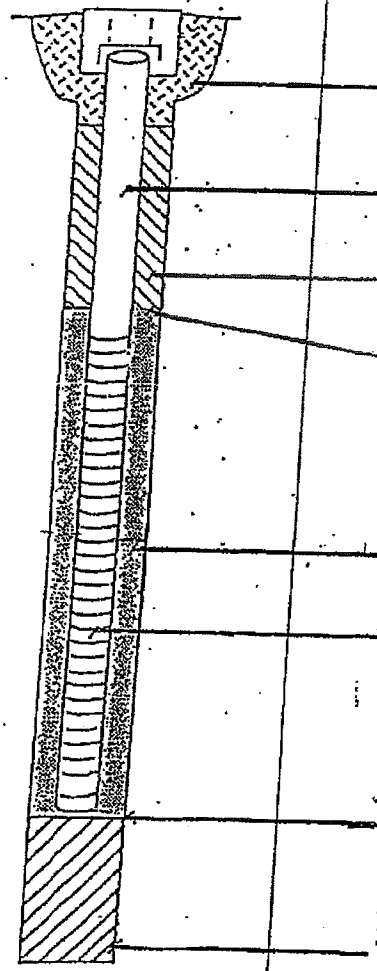
If trainee, licensed driller's Signature and License no. _____

Cased or Uncased Diameter 8-6" Static Level 15

Work/Decommission Start Date 5-7-04

Work/Decommission Completed Date 5-7-04

Construction/Design — Well Data 4289 — Formation Description



Well Cover

Concrete Surface Seal Depth = 2'

Blank Casing 2" 10'

Material PVC

Backfill 6 ft

Type: Bent chips

Seal _____

Material _____

Gravel Pack 14 ft

Material: 2/12 Sand

Screen 2" x 12'

Slot Size .010

Material PVC

Well Depth 22.0"

Backfill _____

Material _____

Total Hole Depth _____

0 - 1 ft
Fill

Dark Brown - 5 ft
Sandy silt

5 - 22 ft
Gray Sand & gravels

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JUN 30 2004
DEPT OF ECOLOGY

Scale 1"= _____ Page _____ of _____

ECY 050-12 (Rev 2/01)

C2

25-3E-2J

190860

PIEZOMETER WELL REPORT

RECEIVED
FEB 27 2006
DEPT. OF ECOLOGY

START CARD NO. 047548

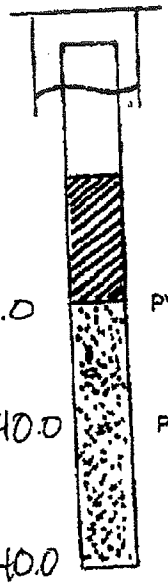
RECEIVED
FEB 0 1 2006
DEPT OF ECOLOGY

WELL ID NO AHS 996
DRILLER Bob Sheldon
CONSULTING FIRM Zipper Zeman Assoc
REPRESENTATIVE Barb
COUNTY King
LOCATION NE ¼ SE ¼ Sec 2 T25N R5E
STREET ADDRESS –
WATER LEVEL –
DATE INSTALLED 12.22.05

Driller Robert Sheldon
Driller* 1815

WELL DATA

GROUND LEVEL
FLUSH MONUMENT
CEMENT 0-2.0
BENTONITE 2.0-25.0
SAND PACK 25.0-40.0
BOTTOM OF WELL 40.0



PVC blank 0-30.0
PVC screen 30.0-40.0

FORMATION DESCRIPTION

0-40 sand/gravel

ATTACHMENT 14

C3

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT Notice of Intent No. E 004964

Construction/Decommission *("x" in circle)* 146427
- X Construction
- O Decommission *ORIGINAL INSTALLATION Notice of Intent Number*

Type of Well *("x" in circle)*
- X Resource Protection 25-5E-2J
- O Geotech Soil Boring

Consulting Firm Golder Associates

Unique Ecology Well ID Tag No: ✓

Property Owner Dry Cleaner

Site Address 8567 161st AVE NE

City Redmond County: King

Location NE 1/4 SE 1/4 Sec 2 Twn 25N R 5E E/W/WM (circle one)

Lat/Long (s, t, r still REQUIRED) Lat Deg ____ Lat Min/Sec ____ Long Deg ____ Long Min/Sec ____

Tax Parcel No. ✓

WELL CONSTRUCTION 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.

X Driller ☐ Engineer ☐ Trainee Name (Print) Rodney LaBrosse

Driller/Engineer/Trainee Signature Rodney LaBrosse

Driller or Trainee License No. 2182

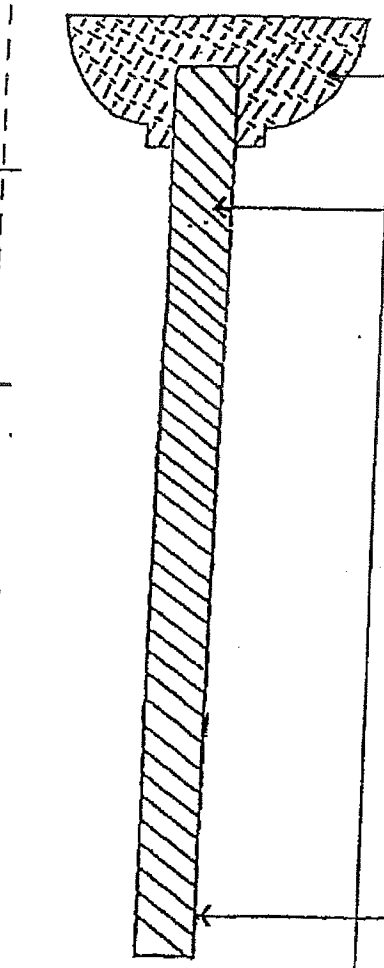
If trainee, licensed driller's Signature and License no. ✓

Cased or Uncased Diameter 2" Static Level 14'

Work/Decommission Start Date 2/5/04

Work/Decommission Completed Date 2/5/04

Well Data 4064-19



Construction/Design

Formation Description

0 - 1 ft. Concrete

1 — 20 ft. Lt Brown Sand w/Gravel

— ft.

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DEPT OF ECOLOGY

Scale 1"=____ Page____ of ____

ECY 050-12 (Rev 2/01)

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

ATTACHMENT 14

148180 C4

RESOURCE PROTECTION WELL REPORT

Notice of Intent No R 65436

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

25-5E-25

Construction/Decommission *("x" in circle)*
- ⊗ Construction
- ○ Decommission *Original Construction Notice of Intent Number* _____

Type of Well *("x" in circle)*
- ⊗ Resource Protection
- ○ Geotech Soil Boring

Property Owner Dry Cleaners

Site Address 8867 161st AVE NE

Unique Ecology Well ID Tag No AHN 588

City Redmond County King

Consulting Firm Golder Associates

Location NE 1/4-1/4 SE 1/4 Sec 2 Twn 25N R 5E (E/W or WWM) *circle one*

Driller or Trainee Name Andrew Flagan

Lat/Long (s, t, r still REQUIRED) Lat Deg _____ Lat Min/Sec _____

Driller or Trainee Signature [signature]

Long Deg _____ Long Min/Sec _____

Driller or Trainee License No 2551

Tax Parcel No ~

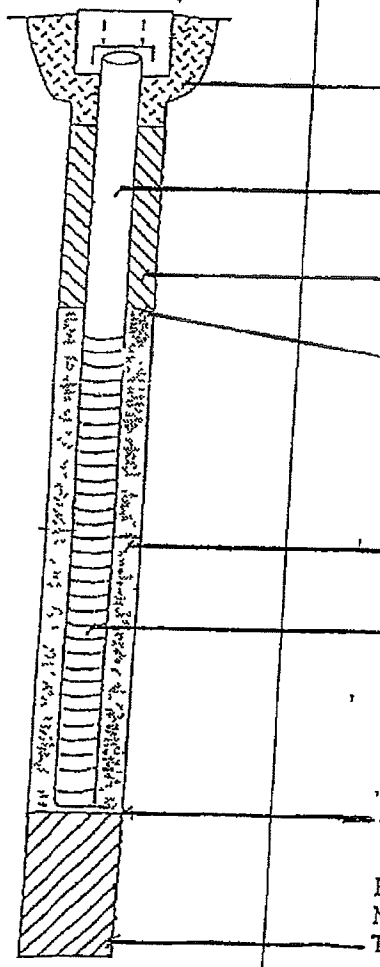
If trainee, licensed driller's Signature and License no ~

Cased or Uncased Diameter 4 1/4 Static Level 14

Work/Decommission Start Date 3/5/04

Work/Decommission Completed Date 3/5/04

Construction/Design — Well Data 4140-21 — Formation Description



Well Cover

Concrete Surface Seal Depth = 2

Blank Casing 2 "/ 10 '
Material PVC

Backfill 6 ft.
Type Bent chips

Seal _____
Material ~~X~~

Gravel Pack 12 ft
Material 2-12

Screen 2 "x 10 '
Slot Size 010
Material PVC

Well Depth 20 ' 0 "

Backfill _____
Material _____
Total Hole Depth _____

0 - 20 ft
grey silty sand w gravels

_____ - _____ ft

_____ - _____ ft

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APR 16 2004
DEPT OF ECOLOGY

Scale 1"= _____

Page 4 of 4

ECY 050 12 (Rev 2/01)

ATTACHMENT 14

C5

4-056

WATER WELL REPORT

STATE OF WASHINGTON ECOLOGY Original & 1st copy - Ecology, 2nd copy - owner, 3rd copy - driller

Construction/Decommission *("x" in circle)*
☒ Construction 159677
○ Decommission *ORIGINAL CONSTRUCTION Notice of Intent Number*

PROPOSED USE: ☐ Domestic ☐ Industrial ☐ Municipal ☒ DeWater ☐ Irrigation ☐ Test Well ☐ Other

TYPE OF WORK: Owner's number of well (if more than one) 4
☒ New Well ☐ Reconditioned *Method:* ☐ Dug ☒ Bored ☐ Driven ☐ Deepened ☐ Cable ☐ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 30 inches, drilled 30 ft.
Depth of completed well 30 ft.

CONSTRUCTION DETAILS
Casing Installed: ☐ Welded ____" Diam. from ____ ft. to ____ ft.
☒ Liner installed 10" Diam. from 0 ft. to 30 ft.
☐ Threaded ____" Diam. from ____ ft. to ____ ft.

Perforations: ☐ Yes ☒ No
Type of perforator used
SIZE of perfs ____ in. by ____ in. and no. of perfs ____ from ____ ft. to ____ ft.

Screens: ☒ Yes ☐ No ☐ K-Pac Location
Manufacturer's Name
Type PVC Model No.
Diam. 10" Slot Size .020 from 10 ft. to 20 ft.
Diam. ____ Slot Size ____ from ____ ft. to ____ ft.

Gravel/Filter packed: ☒ Yes ☐ No ☐ Size of gravel/sand 3/8" Pea Gravel
Materials placed from 5 ft. to 30 ft.

Surface Seal: ☒ Yes ☐ No To what depth? 0-5 ft
Materials used in seal Bentonite
Did any strata contain unusable water? ☐ Yes ☒ No
Type of water? Depth of strata
Method of sealing strata off

PUMP: Manufacturer's Name
Type: H.P.

WATER LEVELS: Land-surface elevation above mean sea level ____ ft.
Static level 17' ft. below top of well Date 10-21-04
Artesian pressure ____ lbs. per square inch Date
Artesian water is controlled by (cap, valve, etc.)

WELL TESTS: Drawdown is amount water level is lowered below static level.
Was a pump test made? ☐ Yes ☒ No If yes, by whom?
Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.
Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.
Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.
Recovery data (time taken as zero when pump turned off)(water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test ____ gal./min. with ____ ft. drawdown after ____ hrs.
Airtest ____ gal./min. with stem set at ____ ft. for ____ hrs.
Artesian flow ____ g.p.m. Date
Temperature of water ____ Was a chemical analysis made? ☐ Yes ☒ No

CURRENT
Notice of Intent No. D50510
Unique Ecology Well ID Tag No.
Water Right Permit No.
Property Owner Name Redmond Community Properties 1425 4th Av ~~Ste 608 Ent. Seattle, 98~~101
Well Street Address 15670 NE 85th St
City Redmond County: King
Location NE 1/4 - 1/4 SE 1/4 Sec 2 Twn 25N R 5E EWM or WWM *circle one*
Lat/Long: (s,t,r still REQUIRED) Lat Deg ____ Lat Min/Sec ____ Long Deg ____ Long Min/Sec ____
Tax Parcel No.

CONSTRUCTION OR DECOMMISSION PROCEDURE
Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. Indicate all water encountered. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Top soil	0	5'
Coarse Sand + Gravel	5'	30'

RECEIVED
NOV 29 2004
DEPARTMENT OF ECOLOGY
WELL DRILLING UNIT

DEPT. OF ECOLOGY FISCAL & BUDGET
NOV 23 PM 12:27

Start Date 10/21/04 Completed Date 10-22-04

WELL CONSTRUCTION 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. 4-056

☒ Driller ☐ Engineer ☐ Trainee Name (Print) William Hill
Driller/Engineer/Trainee Signature William D. Hill
Driller or Trainee License No. 1946

If trainee, licensed driller's Signature and License no.

Drilling Company Slead Construction, Inc.
Address 9021 Waller Rd E
City, State, Zip Tacoma, WA 98446-2531
Contractor's Registration No. SLEADC*325KO Date 11/19/04

Ecology is an Equal Opportunity Employer. ECY 050-1-20 (Rev 4/01)

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

ATTACHMENT 14

D1

HOLT DRILLING, INC.

211307

Resource Protection Well Report

25-5E.1P

Project Name AES - Redmond

Well Identification # EB-1

Drilling Method MR

Driller DUANE STEVENSON

License # 2795

Date 10-2-6

County KING SE ¼ SW ¼

Section 1 T. 25N R. 5E

Street Address 104th Ave NE Near NE 84th St

Start Card 531255

Consulting Firm AESI

AS-BUILT

WELL DATA

MONUMENT TYPE:

CONCRETE SURFACE SEAL ft.

PVC BLANK "X"

BACKFILL 60 ft.

TYPE BENT CHIPS

PVC SCREEN "X"

SLOT SIZE

TYPE:

GRAVEL PACK ft.

MATERIAL:

WELL DEPTH 60 ft.

FORMATION DESCRIPTION

RECEIVED

NOV 0 1 2006

DEPT. OF ECOLOGY

0 - 20 ft. DRY BRN DENSE SANDY SILT SOME ORG.

20 - 40 ft. MOIST DENSE GRY SILT SOME GRAVELS

40 - 60 ft. DAMP SILTY SAND, SOME GRAVEL LAYERS DENSE

- ft.

- ft.

REMARKS BACKFILL WITH BENT. CHIPS

Signature Duane

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

ATTACHMENT 14

D2

HOLT DRILLING, INC.

211310

Resource Protection Well Report

25-5E 1P

Project Name AES - Redmond

Well Identification # EB-2

Drilling Method MR

Driller DUANE STEVENSON

License # 2795

Date 10-3-6

County KING SE ¼ SW ¼

Section 1 T. 25N R. 5E

Street Address 109th Ave NE Near NE 8th St

Start Card S 31755

Consulting Firm AESI

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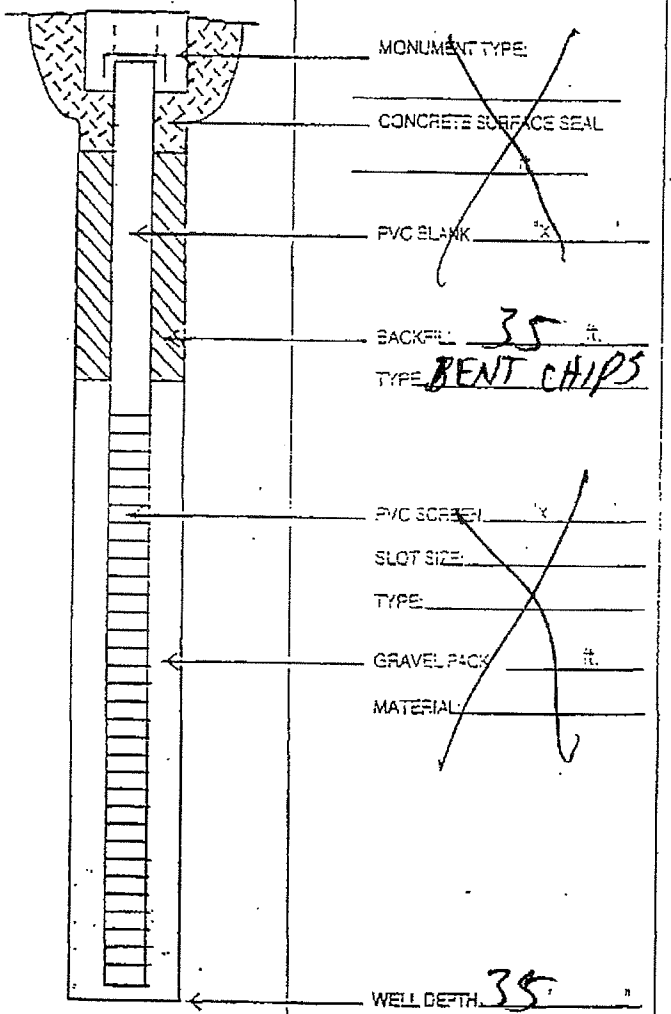
NOV 0 1 2006

DEPT. OF ECOLOGY

AS-BUILT | WELL DATA | FORMATION DESCRIPTION



MONUMENT TYPE:

CONCRETE SURFACE SEAL

PVC BLANK

BACKFILL 35 ft.

TYPE BENT CHIPS

PVC SCREEN

SLOT SIZE:

TYPE:

GRAVEL PACK ft.

MATERIAL:

WELL DEPTH 35'

0 - 12 ft. DRY BRN DENSE SANDY SILT SOME ORG.

12 - 20 ft. MOIST DENSE GRY SILT SOME GRAVELS

20 - 35 ft. DAMP SILTY SAND, SOME GRAVEL LAYERS DENSE

- ft.

- ft.

REMARKS BACKFILL WITH BENT. CHIPS

Signature

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

ATTACHMENT 14

E1

RESOURCE PROTECTION WELL REPORT

25/5E/1

START CARD NO. 28357

PROJECT NAME: Unocal
WELL IDENTIFICATION NO: MW-2
DRILLING METHOD: Open
DRILLER: Rodney Gilseth
FIRM: K&R Drilling
SIGNATURE: [signature]
CONSULTING FIRM: Sweet-Edwards
REPRESENTATIVE: Sean Courtland

LOCATION: T. 25 R. 5E SEC. 01
DISTANCE: 10 FT. FROM N/S SECTION LINE
5 FT. FROM E/W SECTION LINE
DATUM: Tank
WATER LEVEL ELEVATION: 19 FT
INSTALLED: 2" PVC
DEVELOPED: Bailer

AS-BUILT

WELL DATA

BORE HOLE CONSTRUCTION

Special Standards: Yes ☐ No ☒ Depth of completed well: 25 ft.

Land surface

Vault: 2 ft. TO 1 ft.
Water-tight cover
Surface flush vault
Drill to: Locking cap

Casing: diameter 2 in., material PVC
Welded ☐ Threaded ☒ Glued ☐

Seal: 1 ft. TO 13 ft.

Liner: diameter ____ in., material ____
Welded ☐ Threaded ☐ Glued ☐

Well seal: Material Bentonite, Amount 40 LBS

Borehole diameter: 6 in.

Bentonite plug at least 2 ft. thick

Filter pack: 13 ft. TO 25 ft.

Screen material PVC
Interval(s): From 25 To 15
From ____ To ____
Slot size .020 in.

Filter pack: Material Silica Sand

FORMATION DESCRIPTION

0	
6"	Asphalt
	Sand and Some Silts
	Gravel
10	
	med to Coarse Sand & Gravels
25	

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

ATTACHMENT 14

F1

25-5E-2H

RESOURCE PROTECTION WELL REPORT

Washington State Department of Ecology

20695D

Original and 1st copy – Ecology, 2nd Copy – owner, 3rd copy - driller

PROPOSED USE:
☒ Construction
☐ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____
Consulting Firm _____

DRILLING METHOD
☒ Hollow Stem Auger ☐ Air Rotary
☐ Mud Rotary ☐ Dual Rotary
☐ Core ☐ Other _____
Borehole Diameter 8

MONUMENT
☐ Above Ground Riser ☐ 6" x 5' ☐ 8" x 5' Stick up height _____ ft
☒ Flush Mount ☐ 8" ☐ 12" ☐ Other _____
Amount of Concrete used 2 Sacks

CASING INSTALLED
☐ PVC ☒ Sch 40 ☐ Sch 80 ☐ Inclinometer ☐ Other _____
☐ Threaded _____" Diameter from _____ ft to _____ ft
☒ Glued 4" Diameter from 0 ft to 20 ft
☐ Welded _____" Diameter from _____ ft to _____ ft

SCREEN
☐ PVC ☒ Sch 40 ☐ Sch 80 ☐ Other _____
Diameter 4 Slot Size .020 from _____ ft to _____ ft
☐ Pre Pack Type ☐ PVC ☐ Sch 40 ☐ Sch 80 ☐ Other _____
Diameter of inner screen _____" x Diameter of outer screen _____"
Slot Size _____ Installed from _____ ft to _____ ft
☐ Stainless Steel _____" Diameter from _____ ft to _____ ft
☐ Other _____ _____" Diameter from _____ ft to _____ ft

SEAL
Type of material used ☒ Bentonite Chips Amount 10 SACKS
☐ Bentonite Grout Amount _____
☐ Portland Cement Amount _____
☐ Other _____ Amount _____
Placed from 1 ft to 18 ft

SAND/GRAVEL PACK
Type of material used ☒ Silica Sand Size 10/20 ☐ Pea Gravel
☐ Other _____
Placed from 18 ft to 30 ft
Amount of material used 9 Sacks

Current Notice of Intent No. REO 1507

Type of Well ☒ Resource Protection
☐ Geotech Soil Boring
Unique Ecology Well ID Tag No. APP 715

WELL LOCATION
Project Name Redmond Reservoir Pump Station
Owner Redmond Public Works, City of
Well Address 16312 NE 95th St
City Redmond County King
Location SE 1/4 NE 1/4 Sec 2 Twn 25 R 5 ☒ E or W
Tax Parcel No. _____
Construction/Decommission Start Date 6-12-06
Construction/Decommission Completed Date 6-12-06
Static Level _____

CONSTRUCTION OR DECOMMISSION PROCEDURE

Material or Formation	From	To
Fill, Sand Brown Med Coarse, Small Gravels	0	4
Silty Sand Brown	4	11
Sandy Silt Brown	11	14
Silt Grey	14	21
Fine Sand Grey	21	24
Grey Sandy Silt	24	30

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OCT 09 2006
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RECEIVED
JUL 10 2006
DEPT. OF ECOLOGY

RECEIVED
OCT 23 2006
DEPT. OF ECOLOGY

WELL CONSTRUCTION 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.

☐ Driller ☒ Trainee Name (print) Cory M James
Driller / Trainee Signature Cory M James
Driller or Trainee License No. 2828T

Drilling Company Gregory Drilling, Inc.
If Trainee, licensed driller's Signature and License No. 2537

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

ATTACHMENT 14

G1

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. 524036

Construction/Decommission
197543 x4

☒ Construction
☐ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Type of Well
☒ Resource Protection
☐ Geotechnical Soil Boring

Property Owner City of Redmond
Site Address 7733 Leary Way NE
City Redmond County King

Consulting Firm GeoEngineers

Unique Ecology Well ID
Tag No. ~

Location 1/4 NE 1/4 NE Sec 11 Twn 25N R 5E ☐ EWM ☐ WWM

WELL CONSTRUCTION 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

Lat/Long (s,t,r still Required) Lat Deg _____ Lat Min/Sec _____
Long Deg _____ Long Min/Sec _____

☒ Driller ☐ Trainee Name (Print) Kasey Goble
Driller/Trainee Signature _____
Driller/Trainee License No. 2501

Tax Parcel No. ~

Cased or Uncased Diameter 2" Static Level 14'

If trainee, licesned drillers' Signature and License No. ~

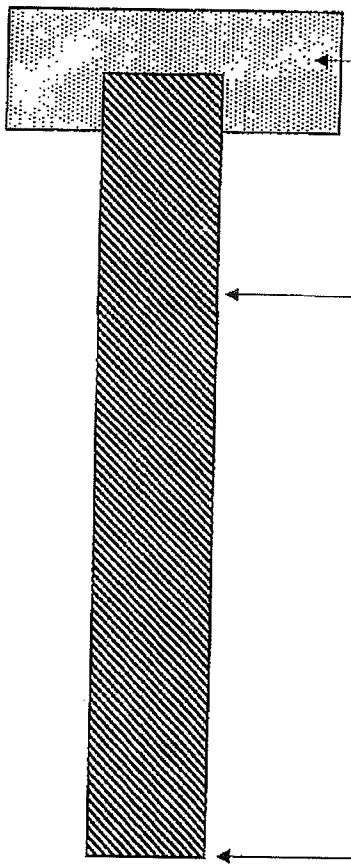
Work/Decommision Start Date 4/17/06

Work/Decommision Completed Date 4/18/06

Construction/Design

Well Data W069 - 243

Formation Description



CONCRETE SURFACE SEAL 1 FT — 0 - 6 FT: Light Brown Gravel with cobbles

BACKFILL 15 FT (Bentonite Chips) — 0 6 - 16 FT: Light Brown Sandy Gravel

0 - _____ FT

DEPTH OF BORING 16 FT

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MAY 22 2006
DEPT. OF ECOLOGY

Scale 1" = _____

ECY 050-12 (Rev 2/01)

ATTACHMENT 14

G2

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT Notice of Intent No. S 24836

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

Construction/Decommission 197547

[X] Construction

[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Type of Well

[X] Resource Protection

[ ] Geotechnical Soil Boring

Property Owner City of Redmond

Site Address 7733 Leary Way NE

Consulting Firm GeoEngineers

City Redmond County King

Unique Ecology Well ID

Tag No. ~

Location 1/4 NE 1/4 NE Sec 11 Twn 25N R 5E or EWM / WWM

WELL CONSTRUCTION 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

Lat/Long (s,t,r still Required) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

[X] Driller [ ] Trainee Name (Print) Kasey Goble

Driller/Trainee Signature _____

Driller/Trainee License No. 2501

Tax Parcel No. ~

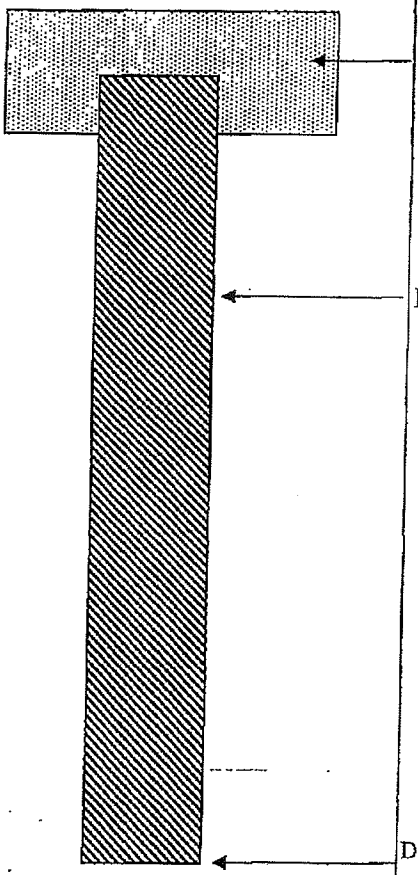
Cased or Uncased Diameter 2" Static Level 17'

If trainee, licesned drillers' Signature and License No. /

Work/Decommision Start Date 4/17/06

Work/Decommision Completed Date 4/18/06

Construction/Design



Well Data W06-243

Formation Description		
CONCRETE SURFACE SEAL	1 FT	0 - 20 FT Light Brown Sandy Gravels
BACKFILL	19 FT	0 - FT
Bentonite Chips		0 - FT
DEPTH OF BORING	20 FT	

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MAY 22 2006
DEPT. OF ECOLOGY

Scale 1" = _____

Page 1 of 4

ECY 050-12 (Rev=v 2/01)

ATTACHMENT 14

G3

25-5E-11A

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. E 003219

Construction/Decommission *("x" in circle)* 190400
(X) Construction
O Decommission *ORIGINAL INSTALLATION Notice of Intent Number*

(X2)

Type of Well *("x" in circle)*
(X) Resource Protection
O Geotech Soil Boring

Consulting Firm Farallon

Unique Ecology Well ID
Tag No:

Property Owner Cleveland Street Properties
Site Address 16318 Cleveland St
City Redmond County: King
Location NE 1/4 NE 1/4 Sec. 11 Twn 25N R 5E E/W *circle one* WWM
Lat/Long (s, t, r still REQUIRED) Lat Deg ____ Lat Min/Sec ____ Long Deg ____ Long Min/Sec ____
Tax Parcel No. ____

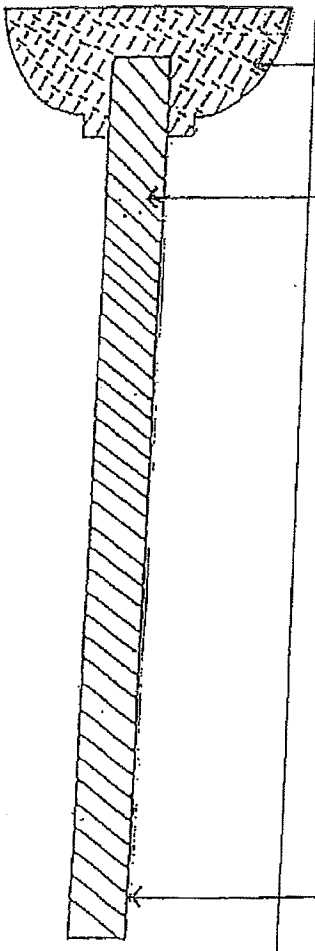
WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

(X) Driller ☐ Engineer ☐ Trainee Name (Print) Kasey Cobell
Driller/Engineer/Trainee Signature
Driller or Trainee License No. 2501

If trainee, licensed driller's Signature and License no.

Cased or Uncased Diameter 2" Static Level 13'
Work/Decommission Start Date 2/2/06
Work/Decommission Completed Date 2/2/06

Construction/Design — Well Data W06-0048 — Formation Description



CONCRETE SURFACE SEAL

BACKFILL Bentonite chips

DEPTH OF BORING 16.0 ft

0 - 16 ft. Light Brown Sandy Gravel with Cobbles

— ft.

— ft.

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FEB 13 2006
DEPT OF ECOLOGY

Scale 1"= ____

Page 1 of 2

ECY 050-12 (Rev 2/01)

ATTACHMENT 14

G4

121072

SOIL BORING REPORT

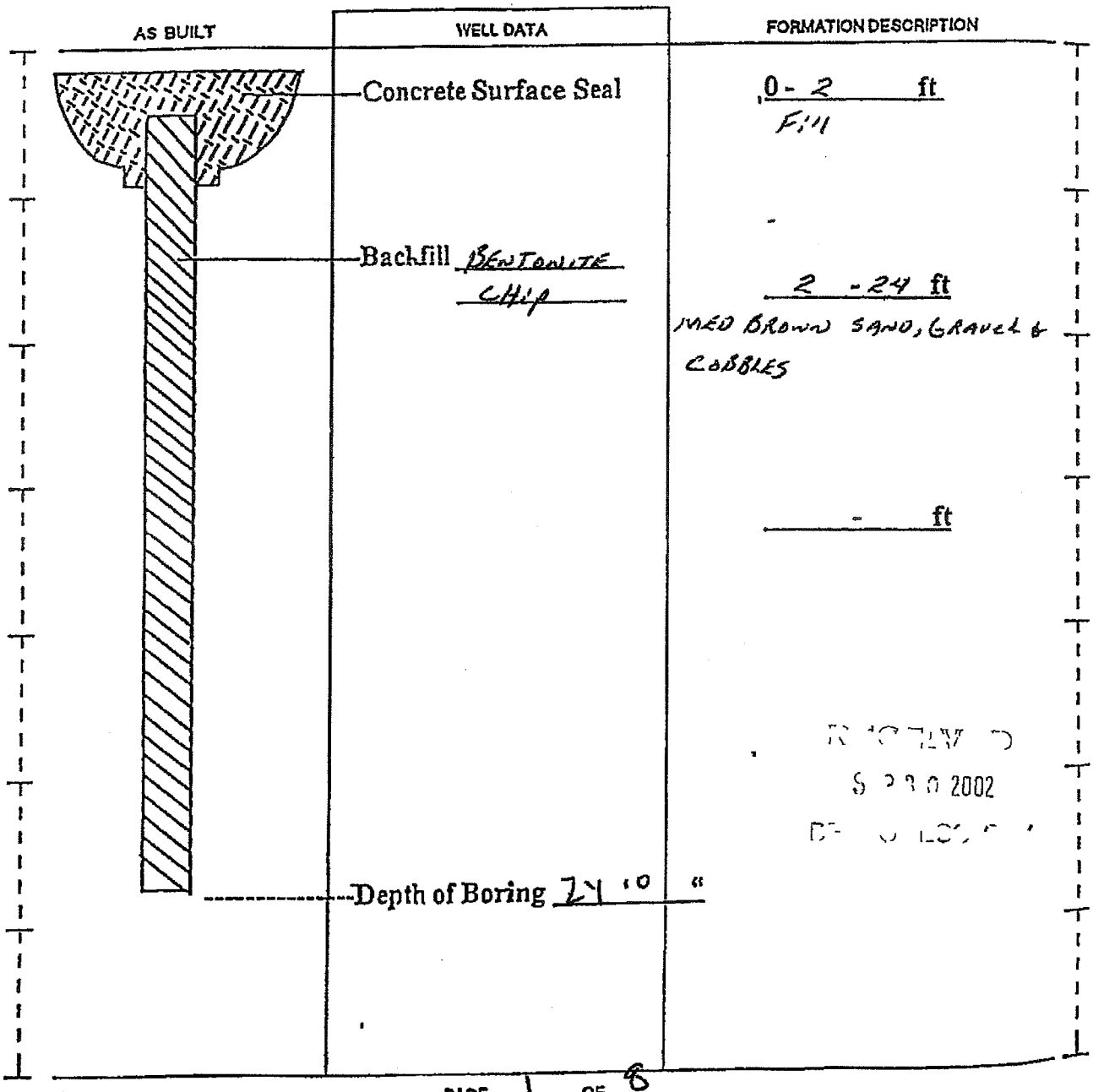
(8)

Notification # S 16190

Project Name: Fm Maintenance Facility
Drilling Method: Probe
Driller: Lynn Goble
Firm: Cascade Drilling, Inc.
Signature:
Consulting Firm: Farallon
Representative: John Schmidt

County: King 25-5E-11A
Location: NE1/4 NE1/4 Sec 11 T25N R5E
Street Address of Boring:
7735 Leary Way
Water Level Elevation: N/A
Ground Surface Elevation: N/A
Date of Drilling: 9/17/02

Invoice # 2524



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SEP 30 2002

SCALE 1" = _____ PAGE 1 OF 6

ECY 050 12 (Rev 11/89)

ATTACHMENT 14

G5

90208

RESOURCE PROTECTION WELL REPORT

25-SE-11A

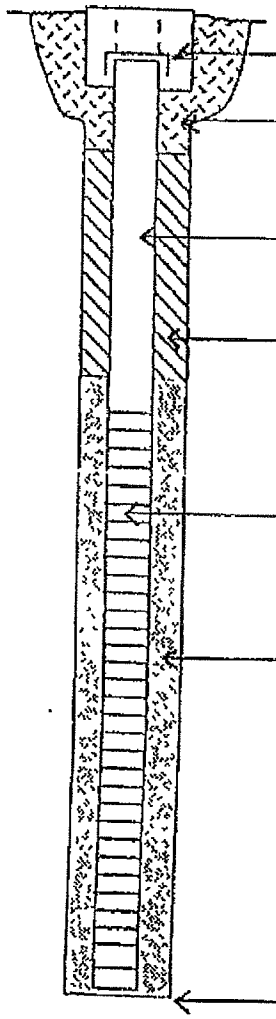
START CARD NO R46320

PROJECT NAME Putnam Building
WELL IDENTIFICATION NO AGJ 998
DRILLING METHOD HSA
DRILLER James M. Goble
FIRM Cascade Drilling, Inc.
SIGNATURE
CONSULTING FIRM Farallon
REPRESENTATIVE Tim Brown

COUNTY King
LOCATION NE ¼ NE ¼ Sec 11 Twn 25N R 5E
STREET ADDRESS OF WELL 7983 Leary St, Redmond
WATER LEVEL ELEVATION
GROUND SURFACE ELEVATION N/A
INSTALLED 1/18/01
DEVELOPED YES, 1/18/01

1028

AS-BUILT



WELL DATA

WELL COVER
CONCRETE SURFACE SEAL DEPTH = 1/ft
PVC BLANK 2"x 10'
BACKFILL 8' ft.
TYPE: Bent Chip
PVC SCREEN 2"x 15'
SLOT SIZE: 010
GRAVEL PACK 16' ft.
MATERIAL: 2/12 SAND
WELL DEPTH 25' "

FORMATION DESCRIPTION

0 - 4 ft.
Fill, Gravel

4 - 16 ft.
Sand, Gravel & med. to large cobble

16 - 25 ft.
Fine to med. Brown silty sand & small gravels

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FEB 09 2001
DEPT. OF ECOLOGY

SCALE 1" = PAGE OF

ECY 050 12 (Rev 11/99) 90208

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

ATTACHMENT 14

66

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. A 68538

Construction/Decommission *("x" in circle)*
O Construction
171240
⊠ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* E004863

Type of Well *("x" in circle)*
⊠ Resource Protection
O Geotech Soil Boring

Consulting Firm Environmental Associates

Property Owner Gary Shavey

Site Address 16151 Cleveland St.

Unique Ecology Well ID
Tag No: B1

City Redmond County: King

Location NE 1/4 NE 1/4 Sec 11 Twn 25N R 5 (E/W/WWM) circle one

WELL CONSTRUCTION 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.

Lat/Long (s, t, r still REQUIRED) Lat Deg ____ Lat Min/Sec ____
Long Deg ____ Long Min/Sec ____

⊠ Driller ☐ Engineer ☐ Trainee Name (Print) Kevin Vandehey

Driller/Engineer/Trainee Signature Kevin Vandehey

Driller or Trainee License No. 2642

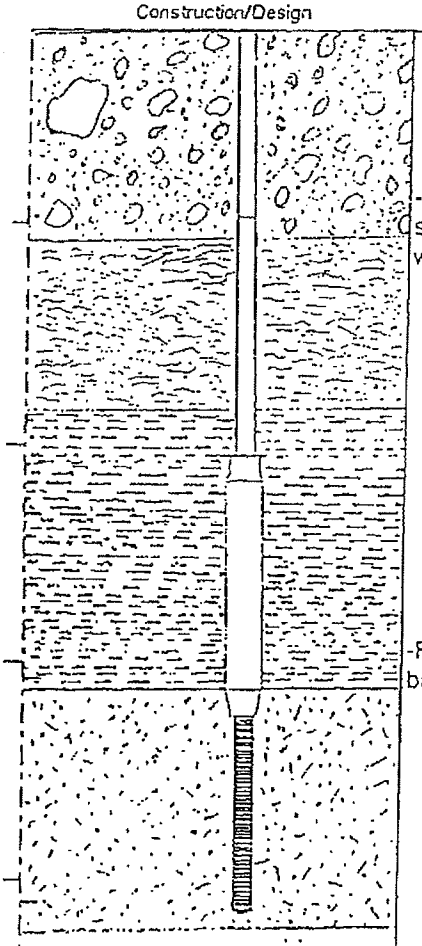
Tax Parcel No. ____

Cased or Uncased Diameter 2" Static Level 17'

Work/Decommission Start Date 8/22/03

Work/Decommission Completed Date 8/22/03

If trainee, licensed driller's Signature and License no. ____

Construction/Design	Well Data	Formation Description
	-Drove a retractable stainless steel screen down to depth and collected a water sample Boring depth: 19' Screened: 17'-19' -Removed all rods from boring and backfilled with bentonite	Cobbles, gravels, medium sand 0-8 medium sand with occassional gravel 8-16 Coarse sand, gravel 16-18

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APR 14 2003
DEPARTMENT OF ECOLOGY
WELL DRILLING UNIT

Scale 1"= ____ Page 1 of 4 ECY 050-12 (Rev 2/01)

ATTACHMENT 14

H1

25/SE/12 D

Geoboring & Development, Inc.

Resource Protection Well Report

Project Name Bedford Properties
Well Identification # B-1
Drilling Method 4¼ HSA
Driller Dale T Smith
License # 1229
Job # W9070

Date 5-8-89
County King, NW 1/4 NW 1/4
Section 12 T. 25N R. 5E
Start Card 024034
Consulting Firm Geoengineers

Soil Log — Depth of Components in Feet

0-20'
fine to coarse gravel w/sand

2.5'
5'
20'
20'

Stick up Flush on Monument Casing

Type of Surface Seal chips
Amount 2 ft

ID of Riser Pipe 2"
Type of Riser Pipe PVC
Amount
Type of Connection Thread

Type of Backfill around Riser chips
Amount

Diameter of Borehole 9"

Screen Size or Type .020
Type of Filter Material colorado 10/20
Amount

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MAY 23 1989
DEPARTMENT OF ECOLOGY
NORTHWEST REGION

Remarks:

Signature Dale T Smith

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

ATTACHMENT 14

H2 1

25/5E/12 D

Geoboring & Development, Inc.

Resource Protection Well Report

Project Name Bedford Properties
Well Identification # B-2
Drilling Method 4¼ HSA
Driller Dale L. Smith
License # 1229
Job # W2070

Date 6-8-89
County King NW 1/4 NW 1/4
Section 12 T. 25N R. 5E
Start Card 024054
Consulting Firm Geoengineers

Soil Log | Depth of Components In Feet

0-7' Fine to coarse sand w/ gravel

7-20' fine to coarse gravel w/ sand

2.5

5

20

20'

Stick up Flush on Monument Casing

Type of Surface Seal bentonite chips
Amount

ID of Riser Pipe [redacted] 2"
Type of Riser Pipe PVC
Amount
Type of Connection Thread

Type of Backfill around Riser chips
Amount

Diameter of Borehole 9"

Screen Size or Type .020
Type of Filter Material Colorado 10/20
Amount

Remarks:

Signature

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

ATTACHMENT 14

43

ENTERED

HOLT DRILLING, INC.

Resource Protection Well Report

Project Name Boston Chicken
Well Identification # MW-5
Drilling Method HSA
Driller Clyde Moore
License # 1939

Date 5-19-95 25-5E-12D
County King, NW ¼ NW ¼
Section 12 T. 25N R. 5E
Street Address 16760 N.E. Redmond Way
Start Card R18093
Consulting Firm Enviro 5

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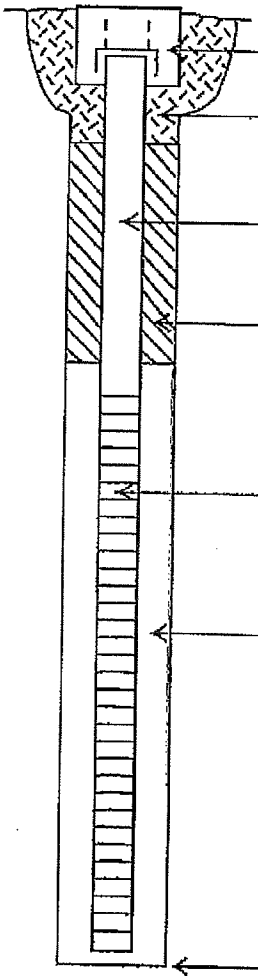
JUN 15 1995
DEPT. OF ECOLOGY

AS-BUILT



WELL DATA

MONUMENT TYPE: Flush
CONCRETE SURFACE SEAL 2' ft. 00
PVC BLANK 2 "x 20'
BACKFILL 15' ft. 00
TYPE: Bentonite Chips
PVC SCREEN 10 "x 00'
SLOT SIZE: 0.20
TYPE: PVC
GRAVEL PACK 13 ft. 00
MATERIAL: 10-20 Silica Sand
WELL DEPTH 30.00 "

FORMATION DESCRIPTION

0 - 20' ft. Cobbles with Course gravel + Sand
20' - 30' ft. Fine to Med Sand + gravel
- ft.
- ft.
- ft.

REMARKS

Signature Clyde Moore

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

D15332.FDB/D41029.EPS

ATTACHMENT 14

H4

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT Notice of Intent No. E004948

Construction/Decommission *("x" in circle)*

☒ Construction 171438

○ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* 1

Type of Well *("x" in circle)*

☒ Resource Protection

○ Geotech Soil Boring

Consulting Firm PBS

Property Owner Pacific NW Bank

Site Address 16424 NE 79th Street

Unique Ecology Well ID Tag No: S-3

City Redmond County: King

Location NW 1/4 NW 1/4 Sec 12 Twn 25N R 5 (E/W WM) circle one

Lat/Long (s, t, r still REQUIRED) Lat Deg ____ Lat Min/Sec ____ Long Deg ____ Long Min/Sec ____

WELL CONSTRUCTION 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.

☒ Driller ☐ Engineer ☐ Trainee Name (Print) Kevin Landsberg

Driller/Engineer/Trainee Signature [signature]

Driller or Trainee License No. 2642

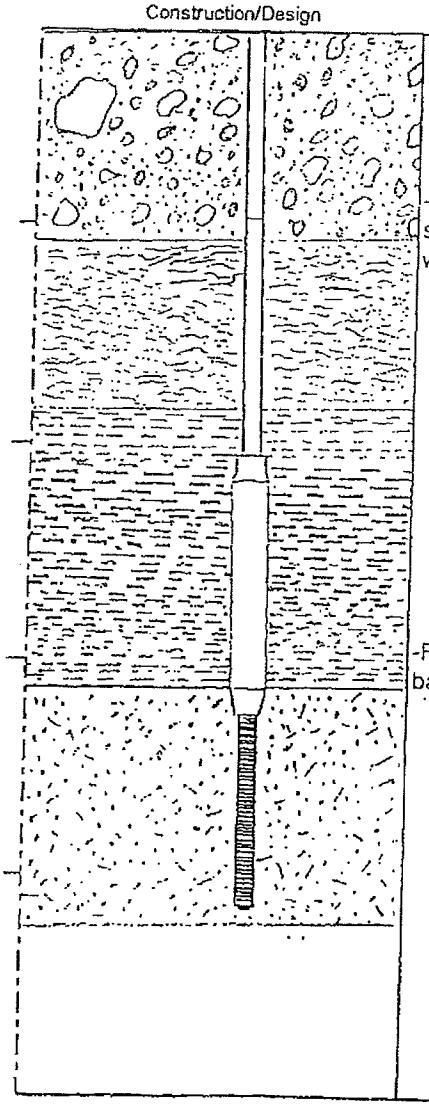
Tax Parcel No. ____

Cased or Uncased Diameter 2" Static Level ____

Work/Decommission Start Date 1/30/04

Work/Decommission Completed Date 1/30/04

If trainee, licensed driller's Signature and License no. ____

Construction/Design	Well Data	Formation Description
	-Drove a retractable stainless steel screen down to depth and collected a water sample Boring depth: 21' Screened: 18-21' -Removed all rods from boring and backfilled with bentonite	fine to medium sand with gravel 0-16'

RECEIVED
APR 1 4 2004
DEPARTMENT OF ECOLOGY

Scale 1"= ____

Page 1 of 1

ECY 050-12 (Rev 2/01)

ATTACHMENT 14

H5

RESOURCE PROTECTION WELL REPORT

CURRENT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Notice of Intent No. S 24763

Construction/Decommission ("x" in circle) 161834

X Construction

O Decommission *ORIGINAL INSTALLATION Notice of Intent Number*_____

Type of Well ("x" in circle)

X Resource Protection 25-SE 12 D

O Geotech Soil Boring

Consulting Firm Adapt

Unique Ecology Well ID ~

Tag No: _____

Property Owner Parking lot

Site Address 16701 Cleveland Street

City Redmond County: King

Location NW 1/4 NW 1/4 Sec. 12 Twn. 25N R 5E (WM) or WWM *circle one*

Lat/Long (s, t, r still REQUIRED) Lat Deg _____ Lat Min/Sec _____

Long Deg _____ Long Min/Sec _____

WELL CONSTRUCTION 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.

X Driller ☐ Engineer ☐ Trainee Name (Print) Brian Gose

Driller/Engineer/Trainee Signature _____

Driller or Trainee License No. 2330

If trainee, licensed driller's Signature and License no. _____

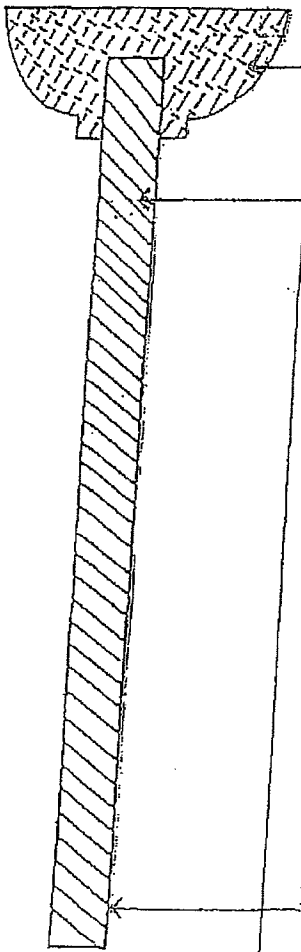
Tax Parcel No: ~

Cased or Uncased Diameter 8"/4 Static Level 15'

Work/Decommission Start Date 11/22/04

Work/Decommission Completed Date 11/22/04

Construction/Design — Well Data 4710-3 — Formation Description



CONCRETE SURFACE SEAL

BACKFILL bent chips

DEPTH OF BORING 30' ✓ "

0 - 30 ft. brown sand & gravel

— ft.

— ft.

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DEC 20 2004
DEPT OF ECOLOGY

Scale 1"=_____ Page_____ of _____ ECY 050-12 (Rev 2/01)

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

ATTACHMENT 14

H6

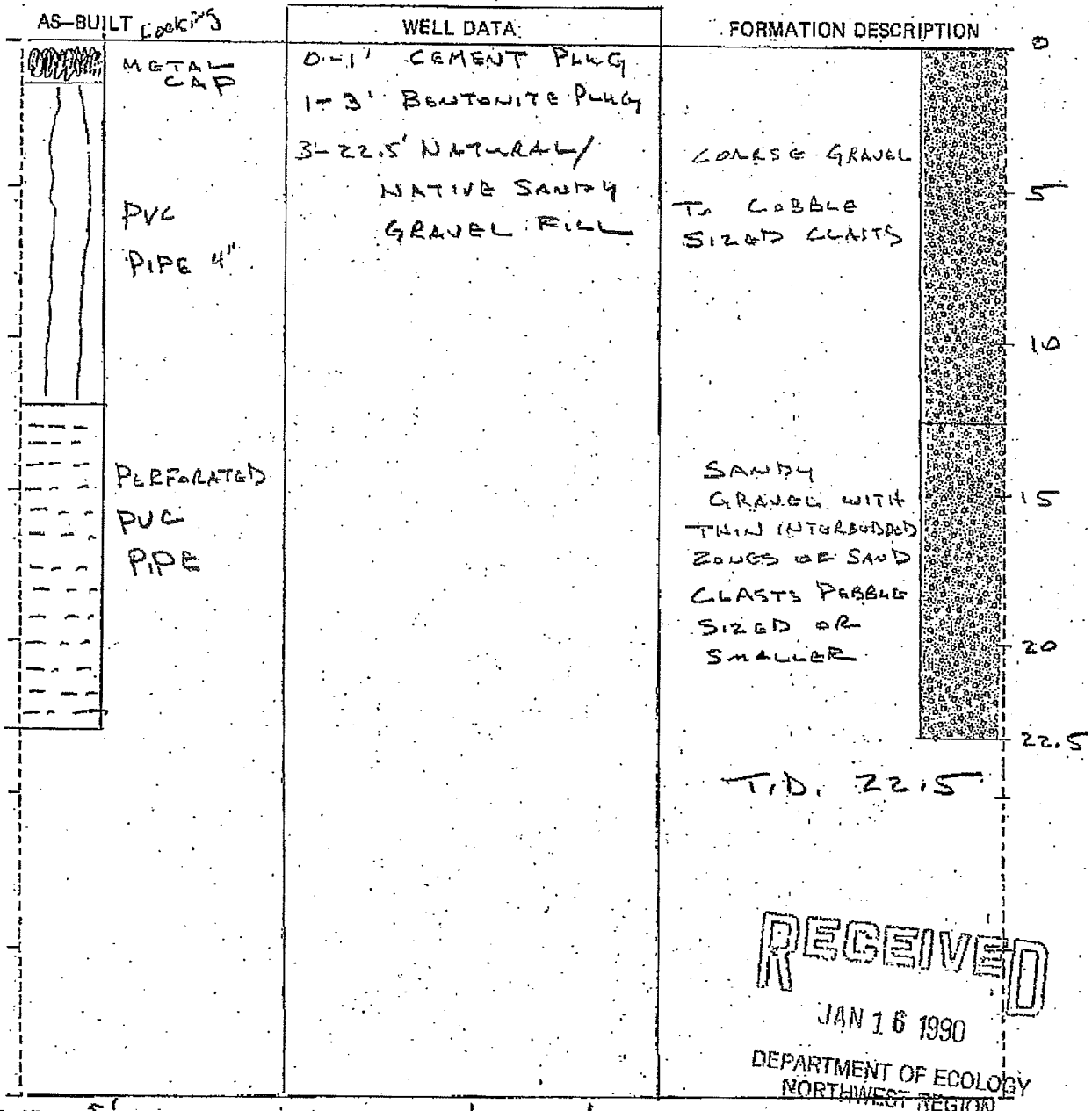
25/5E-12 D

RESOURCE PROTECTION WELL REPORT

START CARD NO. 93226

PROJECT NAME: REDMOND OIL CO
WELL INDENTIFICATION NO. #1
DRILLING METHOD: AUGER
DRILLER: HAROLD PRODZINSKI
FIRM: ASSOCIATED DRILL INC
SIGNATURE: Harold Prodzinski
CONSULTING FIRM: SITE ANALYSTS INC
REPRESENTATIVE: HENRY SEIPT

LOCATION: King CO NW/4, NW/4 T 25 N, R 5E, SEC. 12
DISTANCE: 850 FT. FROM N/S SECTION LINE
900 FT. FROM E/W SECTION LINE
DATUM: —
WATER LEVEL ELEVATION: 13 FT
INSTALLED: YES
DEVELOPED: NO



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JAN 16 1990
DEPARTMENT OF ECOLOGY
NORTHWEST REGION

SCALE: 1"= 5'

PAGE 1 OF 1

ECY 050-12

ATTACHMENT 14

H7

25N / 5E / 12D

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APR 2 1993
DEPT. OF ECOLOGY

BORETEC, INC.
Drilling & Sampling

RESOURCE PROTECTION WELL REPORT

START CARD NO. 053479

PROJECT NAME: SR 520 Wit Lands
WELL IDENTIFICATION NO. 053479 A
DRILLING METHOD: Hollow Stem Auger
DRILLER: Olson 1816
FIRM: Boretec
SIGNATURE:
CONSULTING FIRM: Hart West
REPRESENTATIVE: Chris

COUNTY: King
LOCATION: NW1/4 NW1/4 Sec 12 Twn 25N R 5E
STREET ADDRESS OF WELL:
SR 520 & E. Lake Sammamish Parkway
WATER LEVEL ELEVATION: 8'
GROUND SURFACE ELEVATION: 31'
INSTALLED: 15' 3-23-93
DEVELOPED: No

AS-BUILT WELL DATA

0'
Well Monument
0' to 2' — Cement
2' to 9' — Bentonite
3/4" PVC
9' to 15' — Sand (10-20)
3' Screen
15'
Piezometer Depth 15'

FORMATION DESCRIPTION

Gravel & Sand
0' to 15'

SCALE: 1" = 3'

PAGE _____ OF _____

ECY 050-12 (Rev. 11/89)

ATTACHMENT 14

I1

RESOURCE PROTECTION WELL REPORT

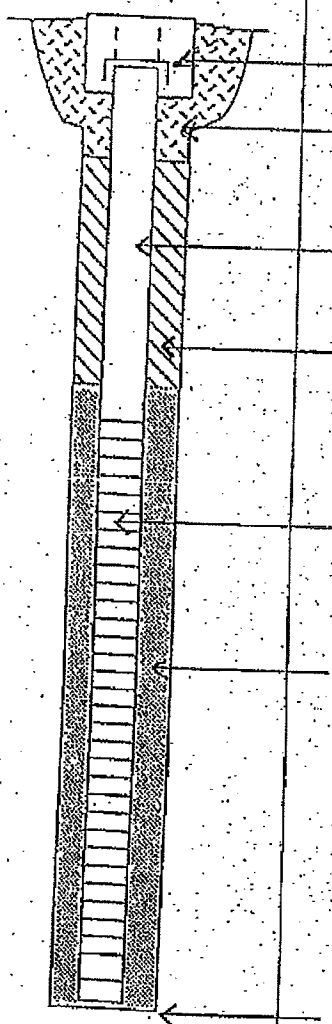
START CARD NO. R26128

PROJECT NAME: Arco
WELL IDENTIFICATION NO. ABJ-847/MW-4
DRILLING METHOD: H.S.A.
DRILLER: Rodney LaBrosse
FIRM: Cascade Drilling, Inc.
SIGNATURE: Rodney LaBrosse
CONSULTING FIRM: Geraghty & Miller
REPRESENTATIVE: John Sadler

COUNTY: King
LOCATION: NE¼ NW¼ Sec 12 Twn 25N R 5E
STREET ADDRESS OF WELL: 8009 164th Avenue Redmond WA
WATER LEVEL ELEVATION: 15.0
GROUND SURFACE ELEVATION: N/A
INSTALLED: 4-8-94
DEVELOPED: 4-8-94

4144

AS-BUILT



WELL DATA

WELL COVER
CONCRETE SURFACE SEAL DEPTH = ~~1 ft.~~ 1.5
PVC BLANK 2"x 10'd
BACKFILL 1 ft. 5
TYPE: Bent. chips
PVC SCREEN 2"x 15'd
SLOT SIZE: 020
GRAVEL PACK 7 ft. 5
MATERIAL: 8/12
WELL DEPTH 25' 0"

FORMATION DESCRIPTION

0 - 3 ft.
fill lt. brown sand and rocks

3 - 25 ft.
lt. brown med to fine sand w/some rock and gravel

- ft.

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MAY 12 1994
DEPT. OF ECOLOGY

SCALE: 1" = _____ PAGE _____ OF _____

ECY 050-12 (Rev. 11/89)

ATTACHMENT 14

- I2

16480

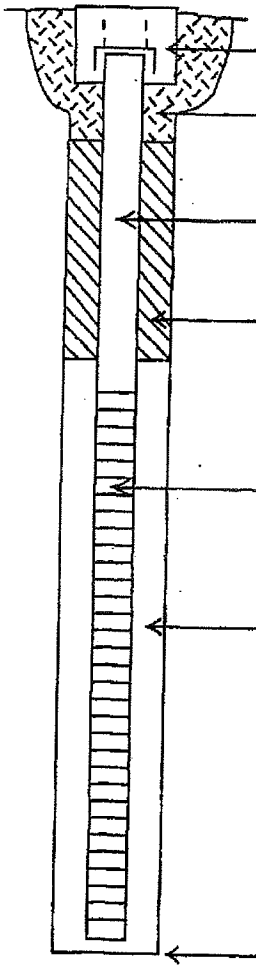
HOLT DRILLING, INC.

Resource Protection Well Report

Project Name Bear Creek Mall
Well Identification # MW-5 MW-7 MW-8 MW-11 MW-12
Drilling Method 4" HSA
Driller Clyde Moore
License # 1939

Date 10-30-9725-5E-12C
County King, NE ¼ NW ¼
Section 12 T. 25N R. 5E
Street Address 17260 Redmond Way
Start Card R036628
Consulting Firm Dames + Moore

AS-BUILT



WELL DATA

MONUMENT TYPE: Flush
CONCRETE SURFACE SEAL 3 ft. 00
PVC BLANK 2 "x 10'00
BACKFILL 5 ft. 00
TYPE: Bentonite Chips
PVC SCREEN 2 "x 15'00
SLOT SIZE: 020
TYPE: PVC
GRAVEL PACK 17 ft. 00
MATERIAL: 10-20 Silica Sand
WELL DEPTH 25'00 "

FORMATION DESCRIPTION

0 - 3 ft. Fill
3 - 20 ft. Interbedded Silt Sand + Gravel
- ft.
- ft.
- ft.

SEP 3 0 1999

REMARKS

Signature Clyde Moore

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

D15332.FDB/D41029.EPS

ATTACHMENT 14

I3

RESOURCE PROTECTION WELL REPORT

21596

START CARD NO. R44121

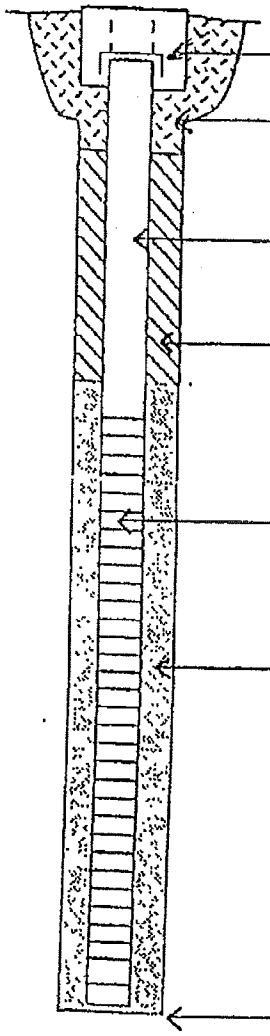
PROJECT NAME: Bear Creek Shopping Cntr.
WELL IDENTIFICATION NO. AER 781
DRILLING METHOD: HSA
DRILLER: Scott E. Krueger
FIRM: Cascade Drilling, Inc.
SIGNATURE:
CONSULTING FIRM: ATC
REPRESENTATIVE: Neil Gilham

ENTERED

COUNTY: King 25-5E-12C
LOCATION: NE¼ NW¼ Sec 12 Twn 25N R 5E
STREET ADDRESS OF WELL: 9726 Redmond Way, Redmond
WATER LEVEL ELEVATION: 12
GROUND SURFACE ELEVATION: N/A
INSTALLED: 6-10-99
DEVELOPED: yes

9301

AS-BUILT



WELL DATA

WELL COVER
CONCRETE SURFACE SEAL DEPTH = 1/ft
PVC BLANK 2 "x 10'
BACKFILL 7 ft.
TYPE: Bent chips
PVC SCREEN 2 "x 10'
SLOT SIZE: .020
GRAVEL PACK 12 ft.
MATERIAL: 2/12
WELL DEPTH 20 ' "

FORMATION DESCRIPTION

0 - 8 ft.
brown Sandy gravel

8 - 15 ft.
gray Silty Sand

15 - 20 ft.
gray fine Sand

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JUL 21 1999
DEPT OF ECOLOGY

SCALE: 1" = _____ PAGE _____ OF _____

ECY 050-12 (Rev. 11/99)

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

I4

93611

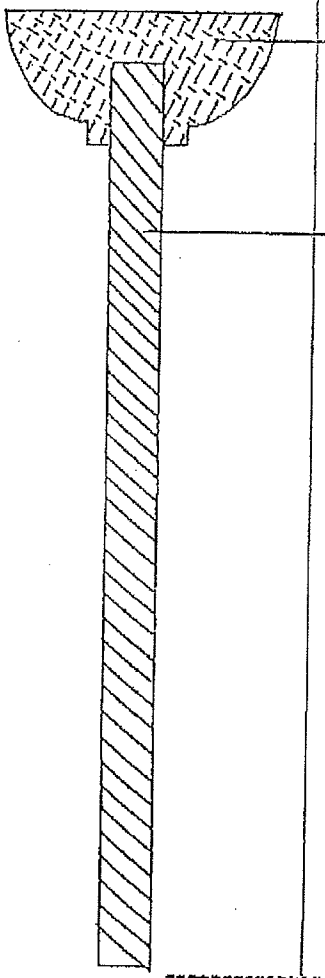
SOIL BORING REPORT

Notification # S 06752

Project Name: King County Airport
Drilling Method: Probe/Soil
Driller: Kasey S. Goble
Firm: Cascade Drilling, Inc.
Signature:
Consulting Firm: IT/Emcon
Representative: Erin McQuillan

County: King 24-4E-28Q
Location: SW1/4SE1/4 Sec 28 T 24N R 4E
Street Address of Boring: 7675 Perimeter Rd, Seattle
Water Level Elevation: N/A
Ground Surface Elevation: N/A
Date of Drilling: 9-26-00

Invoice # 0562



0 - 2 ft. Fill

2 - 20 ft Med Brown Silty Sand

- ft

RECEIVED
OCT 11 2000
DEPT OF ECOLOGY

SCALE 1" = _____

PAGE 4 OF 4

ECY 050-12 (Rev 11/89)

93611

ATTACHMENT 14

I5

RESOURCE PROTECTION WELL REPORT 25-5-12B

ENTERED

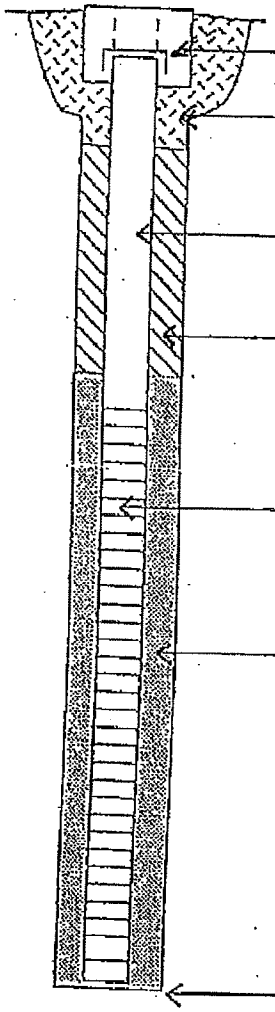
START CARD NO. R28486

PROJECT NAME: Overlake Cleaners
WELL IDENTIFICATION NO. ACS 710
DRILLING METHOD: HSA
DRILLER: Scott E. Krueger
FIRM: Cascade Drilling, Inc.
SIGNATURE: Scott Krueger
CONSULTING FIRM: ENSR
REPRESENTATIVE: Bob Wilson

COUNTY: King
LOCATION: NE¼ NW¼ Sec 12 Twn 25N R 5E
STREET ADDRESS OF WELL: 16940 NE 79th St. Redmond
WATER LEVEL ELEVATION: 22
GROUND SURFACE ELEVATION: N/A
INSTALLED: 8-25-97
DEVELOPED: yes

7393

AS-BUILT



WELL DATA

WELL COVER
CONCRETE SURFACE SEAL DEPTH = 1/ft
PVC BLANK 2 "x 20'
BACKFILL 17 ft.
TYPE: Bent chips
PVC SCREEN 2 "x 40'
SLOT SIZE: .020
GRAVEL PACK 42 ft.
MATERIAL: 2/12 Lonestar
WELL DEPTH 60' "

FORMATION DESCRIPTION

0 - 25 ft.
brown sandy gravel, cobbles

25 - 45 ft.
gray gravel

45 - 60 ft.
gray med sand

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SEP 02 1997
DEPT. OF ECOLOGY

SCALE: 1" = _____ PAGE _____ OF _____

ECY 050-12 (Rev. 11/89)

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

ATTACHMENT 14

I6

ENTERED

RESOURCE PROTECTION WELL REPORT 25-5-12B

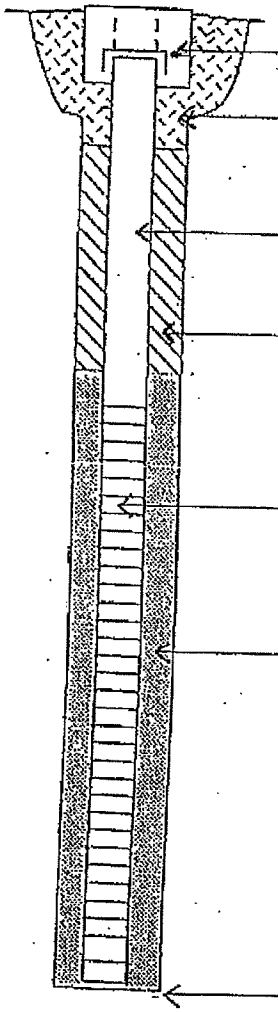
START CARD NO. R28497

PROJECT NAME: OVERLAKE CLEANERS
WELL IDENTIFICATION NO. ACS 750
DRILLING METHOD: HSA
DRILLER: BRIAN GOOSE
FIRM: Cascade Drilling, Inc.
SIGNATURE: Brian Goose
CONSULTING FIRM: AGI TECH
REPRESENTATIVE: REBECCA CLODFELTER

COUNTY: KING
LOCATION: NE¼ NW¼ Sec 12 Twn 25N R 5E
STREET ADDRESS OF WELL: 16940 - NE 79th - REDMOND
WATER LEVEL ELEVATION: 23'
GROUND SURFACE ELEVATION: N/A
INSTALLED: 9/2/97
DEVELOPED: No

7408

AS-BUILT



WELL DATA

WELL COVER
CONCRETE SURFACE SEAL DEPTH = 2 ft
PVC BLANK 2 "x 20'
BACKFILL 15 ft.
TYPE: bent. Chips
PVC SCREEN 2 "x 40'
SLOT SIZE: .020
GRAVEL PACK 43 ft.
MATERIAL: 2/12 sand
WELL DEPTH 60' "

FORMATION DESCRIPTION

0 - 23 ft.
brown sand, gravels + cobbles

23-45 ft.
brown sand & gravels

45-60 ft.
brown/grey sand

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OCT 17 1997
DEPT. OF ECOLOGY

SCALE: 1" = _____ PAGE _____ OF _____

ECY 050-12 (Rev. 11/89)

ATTACHMENT 14

I7

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LATION | | (feet) | (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)

Cobble stones, coarse gravel & coarse sand	19	19
Gravel & sand	8	27
Layer of hardpan	2	29
Coarse gravel & sand 2" minus	14	43
Smaller gravel	2	45
Small gravel & sand w/b	4	49
Light brown sand & gravel	6	56
Dark brown sand & gravel coarse	3	59
Blue sand & gravel w/b	9	68
Hard pan & some clay	4	72
PUMP TEST:		
Dim. 36"x19' dug & 12"x68' drilled		
SWL: 19 ft.		
DD: 39 ft.		
Yield: 420 g.p.m.		
Water Temp. 48°		

(over)

Turn up Sheet of sheets

WELL LOG—Continued No / -

Correlation	Material	Thickness (feet)	Depth (feet)
	Depth forward	——	
	Type & size of pump: vertical turbine - 500 g.p.m. capacity		
	Type & size of motor; 40 h.p. elec.		
	CASING:		
	36" diam. pouredconcrete from 0 to 19'		
	12" diam. steel casing plus 2 to 53 ft.		
	~~12" nominal Cook well screen from 53 to 68'.~~		
	PERFORATIONS:		
	5 ft. of #40 slot Cook screen from 53 to 58 ft.		
	10 ft. of #30 slot Cook screen from 58 to 68 ft.		
	Screen is wire wound		

S F No 7449—12-54—3M 40108

ATTACHMENT 14

I8

21595

RESOURCE PROTECTION WELL REPORT

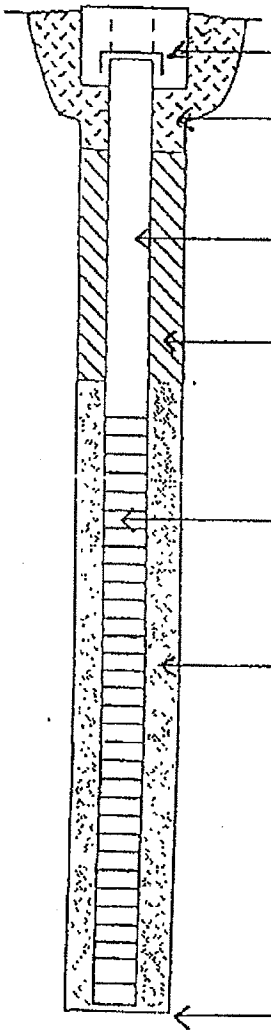
START CARD NO. R44121

PROJECT NAME: Bear Creek Shopping Ctr.
WELL IDENTIFICATION NO. AER 782
DRILLING METHOD. HSA
DRILLER: Brian G. Coger
FIRM: Cascade Drilling, Inc.
SIGNATURE:
CONSULTING FIRM: ATC
REPRESENTATIVE: Neil Gilham

ENTERED

COUNTY: King 25-5E-12C
LOCATION: NE¼ NW¼ Sec 12 Twn 25N R 5E
STREET ADDRESS OF WELL: 17246 Redmond Way, Redmond
WATER LEVEL ELEVATION: 11'
GROUND SURFACE ELEVATION: N/A
INSTALLED: 6/21/99
DEVELOPED: NS

9301

AS-BUILT	WELL DATA	FORMATION DESCRIPTION
	WELL COVER CONCRETE SURFACE SEAL DEPTH = 1/ft PVC BLANK 2 "x 10' BACKFILL 7 ft. TYPE: bent chips PVC SCREEN 2 "x 10' SLOT SIZE: .020 GRAVEL PACK 12 ft. MATERIAL: 2/12 WELL DEPTH 20' "	0 - 6 ft. brown sandy gravel 6 - 15 ft. grey silty sand 15 - 20 ft. gray sand

SCALE: 1" = _____ PAGE _____ OF _____

ECY 050-12 (Rev. 11/99)

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

ATTACHMENT 14

-I9

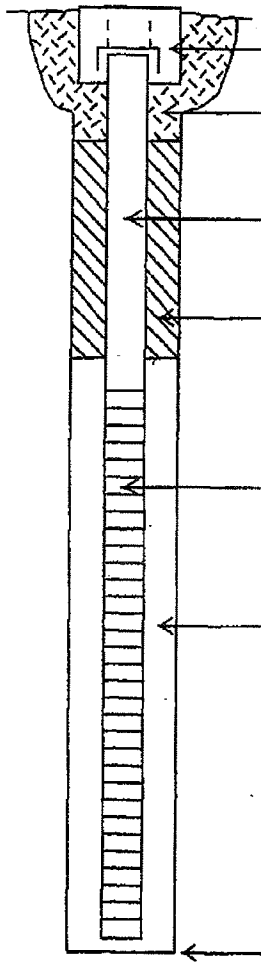
16479

HOLT DRILLING, INC.

Resource Protection Well Report

Project Name Bear Creek Mall
Date 10-30-9725-5E-12C
Well Identification # MW-5 MW-7 MW-8 MW-11 MW-12
County King, NE ¼ NW ¼
Drilling Method 4" HSA
Section 12 T. 25N R. 5E
Driller Clyde Moore
Street Address 17260 Redmond Way
License # 1939
Start Card R036628
Consulting Firm Dames + Moore

AS-BUILT



WELL DATA

MONUMENT TYPE: Flush
CONCRETE SURFACE SEAL 3 ft. 00
PVC BLANK 2 "x 10' 00
BACKFILL 5 ft. 00
TYPE: Bentonite Chips
PVC SCREEN 2 "x 15' 00
SLOT SIZE: 020
TYPE: PVC
GRAVEL PACK 17 ft. 00
MATERIAL: 10-20 Silica Sand
WELL DEPTH 25' 00 "

FORMATION DESCRIPTION

0 - 3 ft. Fill
3 - 20 ft. Interbedded Silt Sand + Gravel
- ft.
- ft.
- ft.

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SEP 30 1999
DEPT. OF ECOLOGY

REMARKS

Signature Clyde Moore

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

D15332.FDB/D41029.EPS

ATTACHMENT 14

ENTERED

I10

RESOURCE PROTECTION WELL REPORT 25-5-12C

START CARD NO. A28398

PROJECT NAME: Bear Creek Cleaners
WELL IDENTIFICATION NO. n/a
DRILLING METHOD: HSA
DRILLER: Scott E. Krueger
FIRM: Cascade Drilling, Inc.
SIGNATURE:
CONSULTING FIRM: Versar, Inc.
REPRESENTATIVE: Phil Cox

COUNTY: King
LOCATION: NE¼ NW¼ Sec 12 Twn 25N R 5E
STREET ADDRESS OF WELL: 17015 Redmond Way, Redmond
WATER LEVEL ELEVATION: NEAR ??
GROUND SURFACE ELEVATION: N/A
INSTALLED: 5-9-97
DEVELOPED: N/A

7187

AS-BUILT	WELL DATA	FORMATION DESCRIPTION
CONCRETE SURFACE SEAL		0 - 7 ft. brown Sandy Cobbles
BACKFILL Bent chips		7 - 17 ft. gray fine Silty Sand
		- ft.
DEPTH OF BORING 17'		

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MAY 30 1997
DEPT. OF ECOLOGY

SCALE: 1" = _____ PAGE _____ OF _____

ECY 050-12 (Rev. 11/89)

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

ATTACHMENT 14

III

of Ecology does NOT Warranty the Data and/or

(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.)

Loose gravel & top soil	0	1.5
Very coarse gravel with		
little sod	15.5	17
Loose gravel & sand, water	1.5	18.5
Hardpan soaked with water		
drilled open	5.5	24
Gravel, sand & water	1	25
Hardpan, water coming in		
at all times	6	31
Coarse gravel, sand & water	1	32
Hard pan	4	36
Clean gravel, sand & water		
Drove casing without		
drilling	4	40
Hardpan	1	41
Gravel & sand in med. cr.	5	46
material		

Turn up

Sheet____ of ____ sheets

WELL LOG —Continued

No. Appli. #2043
Cert. #1313-A

Correlation	Material	Thickness (feet)	Depth (feet)
	Depth forward	——	
	Very coarse gravel & sand. Some of the gravel up to 4" in diam.	10	56
	From 41' to 56' the casing was driven without drilling except to break up some of the larger rocks that would catch under the shoe. All material waterbearing.		
	Pump Test:		
	Dim.: 56' deep, 18" diam.		
	SWL: 15 - 17 ft.		
	DD: 2'		
	Yield: 200 g.p.m.		
	Casing: 36" (dug hole) from 0 to 18'; 18" diam. drilled from 18' to 46'; 18" casing goes from 18" above ground 46 ft.; 10" casing from 18" above ground to 50'; 5' of screen and 1' of fittings attached to bottom of 10" pipe.		
	Perfs.: 10" screen with 60 thousands opening from 51' to 56'		

S F 7449 46 REMINGTO J INC 20 20 745-2 16

ATTACHMENT 14

J1 - -

25.5E.1E

Geoboring & Development, Inc.

Resource Protection Well Report

Project Name PhantTam Lake AREA
Well Identification # A-1
Drilling Method 4" HSA
Driller John Ronish
License # 1805
Job # 92-36

Date 2-11-92
County King . SW 1/4 NW 1/4
Section 1 T. 25N R. 5E
Start Card 647636
Consulting Firm

Soil Log

0' Gravel Fill
3.5' Silty Sand
12.5' Black med Fine Sands
20.5'

Depth of Components in Feet

0'
2.5'
15.0'
20.5'
20.5'

Stick up Flush on Monument Casing

Type of Surface Seal Pre mix Concrete
Amount

ID of Riser Pipe 3/4"
Type of Riser Pipe PVC
Amount
Type of Connection Glue Bell Ends
Type of Backfill around Riser Bent. Chips
Amount
Diameter of Borehole 8 5/8"

Screen Size or Type .20 slot
Type of Filter Material 10/20 calo.
Amount

Remarks

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FEB 24 1992
DEPT. OF ECOLOGY

Signature John Ronish

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

ATTACHMENT 14

K1

25N/5E/2A.

GEOBORING & DEVELOPMENT, INC. 9415 S.R. 162 PUYALLUP, WA. 98372 (206) 845-6990

Resource Protection Well Report

Project Name Costco
Well Identification # B-1
Drilling Method 4" HSA.
Driller Pat Tervres
License # 1793
Job # 34

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MAY 10 1993
DEPT. OF ECOLOGY

Date 5-4-93
County King, NE 1/4 NE 1/4
Section 12 T. 25 N R. R5E
Start Card 216287
Consulting Firm Geoengineers

Soil Log | Depth of Components in Feet

0'
Sand / gravel
25'

29'
25'

Stick up N/A on Monument Casing

Type of Surface Seal
Amount N/A

ID of Riser Pipe
Type of Riser Pipe
Amount
Type of Connection

Type of Backfill around Riser Bentonite chips
Amount 29'

Diameter of Borehole 8"

Screen Size or Type
Type of Filter Material
Amount

Remarks:

Signature

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

ATTACHMENT 14

K2

25-SE-24

Please print, sign and return to the Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. S27995

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *("x" in circle)*
- (x) Construction
- ( ) Decommission *ORIGINAL INSTALLATION Notice of Intent Number* 186411

Type of Well *("x" in circle)*
- ( ) Resource Protection
- (x) Geotech Soil Boring

Consulting Firm GeoEngineers

Property Owner City of Redmond

Site Address

Unique Ecology Well ID
Tag No. N/A

City Redmond County King

Location NE 1/4-1/4 NE 1/4 Sec 2 Twn 25 R 5 (EWM or WWM) (circle one)

WELL CONSTRUCTION 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.

Lat/Long (s, t, r still REQUIRED) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

(x) Driller ( ) Engineer ( ) Trainee Name (Print) Jeffrey D. Davies

Driller/Engineer /Trainee Signature

Driller or Trainee License No. 1543

Tax Parcel No.

Cased or (Uncased) Diameter 7" Static Level

Work/Decommission Start Date 11-4-05

If trainee, licensed driller's Signature and License No.

Work/Decommission Completed Date 11-4-05

Construction/Design	Well Data	Formation Description
		top soil 0
	bentonite	silt (Gray) 5
		Peat 10
		Course Sand 15
		20

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NOV 10 2005
DEPT OF ECOLOGY

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

ECY 050-12 (Rev. 2/03) SCALE: 1"= __ PAGE 1 OF 4 Ecology is an Equal Opportunity Employer.

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ATTACHMENT 14

L1

25/05-01B

SOIL SAMPLING SERVICE, INC.

1415 MERIDIAN EAST, PUYALLUP, WA 98371-1399
FEDERAL ID #: 91-0762274 WA CONT. #SOILSS*344LO
(206) 927-3173
(206) 838-9494
TELEX: 466782
FAX: (206) 927-3478

Geotechnical, Engineering & Mineral Exploration Drilling • Instrumentation • Horizontal Drains
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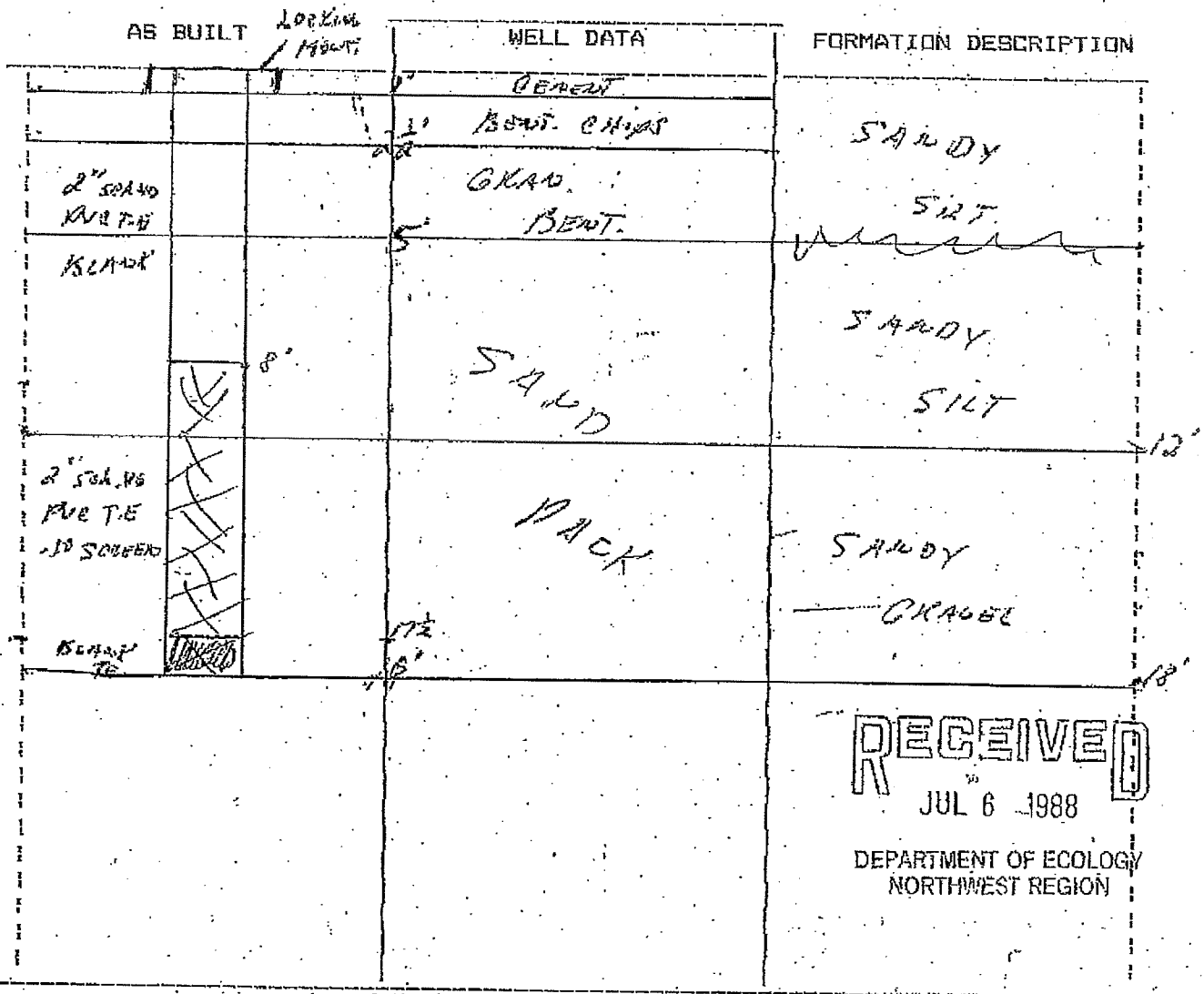
RESOURCE PROTECTION WELL REPORT

PROJECT NAME: Washington National Guard
WELL IDENTIFICATION NO: MW-1, MW-2, MW-3
DRILLING METHOD: HSA 4"
DRILLER: O. KETTENBACH
SIGNATURE: O. Kettenbach
CONSULTING FIRM: SSS Exp.
REPRESENTATIVE: Rick Alvord

JOB #: 42500 START CARD NO: 019259
LOCATION: ___ % NW % NE %
SEC: 1 TOWN: 25N RANGE: 5E
DATUM: 410'
WATER LEVEL ELEVATION: ___
INSTALLED: 6/7/88
DEVELOPED: ___



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DEPARTMENT OF ECOLOGY
NORTHWEST REGION

SCALE: 1" = 5'

PAGE 1 OF 1

APPENDIX C

GEOTECHNICAL REPORT

Zipper Zeman Associates, Inc.
Geotechnical and Environmental Consulting
A Terracon Company

Job No. 81065239
January 17, 2007

Redmond Town Center Condominiums, LLC
333 156th St. NE
Arlington, WA 98223

Attention: Mr. Todd Leabman

Subject: Geotechnical Report
Proposed Multi-Family Development
8502 166th Ave. NE and 16933 NE 85th St.
Redmond, Washington

Dear Mr. Leabman:

Zipper Zeman Associates, Inc. (ZZA) is pleased to present a copy of the above-referenced report. This report presents results of our geotechnical study of the proposed multi-family residential development on two lots located at 8502 166th Ave. NE and 16933 NE 85th St. Our work was completed in general accordance with the scope of services described in our Proposal (P-3597) dated December 4, 2006 and subsequently authorized Mr. Jesse Molnick on December 6, 2006. The purpose of our services was to complete subsurface explorations as a basis for providing geotechnical recommendations for the project. Our scope of services included completing subsurface explorations, laboratory testing, geotechnical analysis and preparation of this report.

PROJECT DESCRIPTION

Currently, plans have not been developed for the project. However, based on our conversations with you, we understand the project may consist of constructing a four story multi-family residential building with two levels of underground parking. The project will include additional improvements such as underground utilities and stormwater facilities. Detailed plans for the project have not been developed. Once they become available, ZZA should be provided an opportunity to review the plans and revised the recommendations provided in this report if necessary.

SITE CONDITIONS

Surface Conditions

Our observations of surface conditions are based on a site reconnaissance and review of a topographic survey of the properties completed by Harstad Consultants. The project site

consists of two parcels totaling approximately 26,000 square feet. Parcel A is located at 8502 166th Avenue NE and Parcel B, which abuts Parcel A to the east, is located at 16933 NE 85th Street Parcel A is currently developed with a two story multi-family residential building and associated parking. Parcel B is currently developed with a single-family residential home. The project site is bordered to the north and east by a residential development currently under construction. The site is bordered to the south by NE 85th Street and to the west by 166th Avenue NE.

A majority of the project site is generally level with ground surface elevations ranging from 80 to 84 feet (NGVD 1929 datum). However, near the west property line, the ground surface slopes downward to 166th Avenue NE. Near the south property line, the ground surface slopes downward to NE 85th Street. There is limited vegetation on Parcel A. However, the existing house on Parcel B is surrounded by deciduous and conifer trees. We did not observe surface water on the project site during our reconnaissance.

Subsurface Conditions

Subsurface soil conditions at the project site were evaluated by completing two geotechnical test borings at the locations shown on Figure 1, Site and Exploration Plan. The borings were completed to depths of approximately 18 feet below the existing ground surface at the exploration locations. The explorations were continuously monitored by a geotechnical engineer from our firm. Soils were visually classified in general accordance with the Unified Soil Classification System. Subsurface exploration procedures and logs for the explorations are enclosed in Appendix A of this report.

Soil and groundwater descriptions presented in this report are based on the subsurface conditions encountered at specific exploration locations on the site. Variations in subsurface conditions may exist between the exploration locations and the nature and extent of variations between the explorations may not become evident until construction. If variations then appear, it may be necessary to reevaluate the recommendations of this report. The descriptions of soil conditions provided below are generalized. The exploration logs provided in Appendix A should be referred to for detailed information regarding soil conditions observed at each boring location.

Boring B-1 was completed in the north parking lot area of Parcel A. Subsurface soil conditions observed in boring B-1 generally consisted of 3 inches of asphalt concrete pavement underlain by very dense, moist to wet, silty, gravelly sand. The silty, gravelly sand is interpreted to be glacial till. Boring B-1 was completed at approximately 18 feet below the existing ground surface within the glacial till soil unit.

Boring B-2 was completed at the south end of the driveway for the residence located on Parcel B. Subsurface soil conditions observed in boring B-2 generally consisted of 3 inches of asphalt concrete pavement underlain by loose, wet, silty, gravelly sand (fill) extending to about 4-½ feet below the existing ground surface. The fill was underlain by medium dense to dense, wet, silty,

gravelly, sand (weathered glacial till) extending to about 12 feet below the existing ground surface. The weathered glacial till was underlain by very dense, moist, silty, sandy, gravel with thin layers of sand with trace silt (unweathered glacial till). Boring B-2 was completed in the glacial till soil unit at approximately 18 feet below the existing ground surface.

Groundwater Conditions

Groundwater was observed in boring B-1 at about 16.5 feet below the existing ground surface at the time of drilling. Groundwater observed in this boring is interpreted to be thin, saturated sand zones within the glacial till.

Groundwater observed in boring B-2 at about 6 feet below the existing ground surface. Groundwater observed in this boring is interpreted to be perched groundwater. Perched groundwater conditions develop when the downward migration of surface water is impeded by a relatively impermeable soil layer such as the very dense glacial till soils observed in boring B-2. The thickness of saturated soil resulting from perched groundwater conditions is typically thin. Perched groundwater is recharged primarily by precipitation. As a result, the saturated zone will tend to be thicker during wet weather.

CONCLUSIONS AND RECOMMENDATIONS

General Summary

Based on the subsurface soil and groundwater conditions observed in our borings, it is our opinion that the new building can be adequately supported on conventional shallow foundations that bear on the dense to very dense glacial soils observed in our borings. Specific geotechnical recommendations and discussions are provided in subsequent sections of this report.

Stormwater Infiltration Feasibility Discussions

As part of our scope of services, we evaluated the feasibility of stormwater infiltration for the project. Stormwater infiltration is typically only feasible in soil conditions consisting of sands and gravels with a relatively low silt and clay content (soil finer than the U.S. No. 200 sieve). Soils observed in our explorations consisted of a highly compact mixture of sand, gravel, silt and clay. The soil encountered in our explorations is interpreted to be glacial till, or commonly referred to as hardpan. The infiltration rate of undisturbed glacial till is extremely slow, and for practical purposes, glacial till can be considered impermeable. As a result, it is our opinion that infiltration into the glacial till soils is not feasible.

It should be noted that glacial till soils are typically underlain by a soil unit referred to as advance outwash. The advance outwash typically consists of sand and gravel with a low fines content and is typically well suited for infiltration. However, our borings did not encounter the

advance outwash soil unit within the depths explored (approximately 18 feet below the existing ground surface at the exploration locations). One option to further evaluate the feasibility of stormwater infiltration would be to complete an additional boring deeper than the previously completed explorations in an effort to locate the elevation of the advance outwash soil unit. Prior to considering an additional boring, we recommend the project team consult with the City of Redmond regarding stormwater management code requirements and options. For certain types of projects, we understand that storm water requirements can be waived for a fee. Additionally, in some areas of Redmond, stormwater infiltration is not allowed in order to protect a drinking water aquifer located below Redmond.

Seismic Considerations

International Building Code 2003 requires a Site Class definition as well as other properties for development of the building general seismic design response spectrum. Based on soil conditions observed in our borings, we estimate that the average properties of the upper 100 feet of the site profile correspond to Site Class C. Site Class C consists of a "Very dense soil and soft rock" soil profile as defined by the 2003 IBC. A very dense soil and soft rock soil profile is characterized by an average standard penetration resistance (as defined by Section 1615.1.5 of 2003 IBC) greater than 50.

We evaluated the potential for seismic induced soil liquefaction at the site. Liquefaction typically occurs in loose to medium dense, granular soils located below the groundwater table. It is our opinion that the soils observed in our borings are not susceptible to liquefaction.

Site Preparation

Prior to site preparation, temporary erosion and sediment control measures (TESC) should be installed in accordance with the appropriate standards for the project. Once TESC measures have been installed, we expect that site preparation will continue with demolition of existing structures. All elements of existing buildings including concrete foundation elements should be demolished and removed from the site. All existing underground utilities should be properly abandoned by complete removal or capping and filling with cement grout. If existing underground utilities are excavated and removed, all excavations should be backfilled with structural fill as recommended in the **Structural Fill** section of this report.

Once existing structures have been removed, we expect site preparation will continue with clearing and stripping of existing vegetation in the undeveloped areas of the site. All tree stumps and roots larger than ½ inch diameter should be cleared and grubbed from building and pavement areas. All topsoil should be stripped from the site.

Soils observed in our explorations contain a significant fraction of fines (silt and clay sized soil particles). During wet weather, exposed site soils will quickly become unstable and soft. In order to limit subgrade stability problems and grading difficulties, adequate temporary and

permanent control of surface water runoff will be required. Excavation, filling, subgrade and grade preparation should be performed in a manner and sequence that will provide drainage at all times and proper control of erosion. Surface water should be pumped or drained to provide a suitable working platform. The site should be graded to prevent water from ponding in construction areas and/or flowing into excavations. Exposed grades should be crowned, sloped, and smooth-drum rolled at the end of each day to facilitate drainage. In order to protect the subgrade, a working surface of quarry spalls may be required. Additionally, temporary cut slopes should be protected from erosion through the use of anchored plastic sheeting.

All areas to receive new structural fill should be evaluate by Zipper Zeman Associates to asses the suitability of subgrade conditions. Any loose or otherwise unsuitable soils should be removed and replaced with structural fill as recommended in the **Structural Fill** section of this report. Additionally, sloping ground surfaces should be terraced prior to placing structural fill. Each terrace should penetrate the slope at least 5 feet and not be more than 5 feet high. The horizontal face of each terrace should slope outward at approximately 0.05 foot per foot.

Temporary and Permanent Cut and Fill Slopes

Temporary cut slopes may be required for various aspects of the project. Temporary slope stability is a function of many factors, including the following:

- The presence and abundance of groundwater;
- The type and density of the various soil strata;
- The depth of cut;
- Surcharge loadings adjacent to the excavation;
- The length of time the excavation remains open.

It is exceedingly difficult under the variable circumstances to pre-establish a safe and "maintenance-free" temporary cut slope angle. Therefore, it should be the responsibility of the contractor to maintain safe temporary slope configurations since the contractor is continuously at the job site, able to observe the nature and condition of the cut slopes, and able to monitor the subsurface materials and groundwater conditions encountered. It may be necessary to drape temporary slopes throughout the site with plastic sheeting or other means to protect the slopes from the elements and minimize sloughing and erosion. Unsupported vertical slopes or cuts deeper than 4 feet are not recommended if worker access is necessary. The cuts should be adequately sloped, shored, or supported to prevent injury to personnel from local sloughing and spalling. The excavation should conform to applicable federal, state, and local regulations.

For planning purposes, we recommend temporary cut slopes completed in the dense to very dense glacial soils be planned no steeper than 0.75H:1V (horizontal to vertical). Flatter temporary slopes may be required if groundwater seepage is encountered, or for temporary cuts made in fill or the weathered glacial till soils observed in our borings. All temporary cut slopes

should be constructed in general accordance with the Washington Administrative Code, Section 296-115; Part N, Excavation and Shoring.

We recommend that all new unsupported permanent cut or fill slopes be designed at a 2H:1V (Horizontal:Vertical) inclination or flatter. Cut or fill slopes in areas that will experience periodic wetting such as stormwater ponds or bio-swales should be designed at 3H:1V. All permanent slopes must be adequately protected from erosion.

Temporary Shoring

Temporary shoring may be required for various aspects of the project including underground utilities and possibly the building excavation depending on the desired levels of below grade parking. For underground utility excavations, we expect the use of trench boxes will be appropriate. However, it should be noted that the purpose of a trench box is to provide safety for workers inside the excavation, and not for excavation support. The side walls of temporary excavations must become stable prior to installation of a trench box. The upper fill and weathered glacial till soils may tend to cave prior to installation of trench boxes. Such caving may tend to destabilize adjacent existing facilities. In such situations, other methods of temporary shoring may be required.

Depending on the desired levels of below grade parking, temporary structural shoring may be required for the project. Several methods of shoring could be considered. However, based on soil and groundwater conditions observed in our borings, it is our opinion that soldier pile and lagging or soil nailing would best suite the project. Soil nailing is typically more economical compared to soldier pile and lagging.

Soldier pile shoring is constructed from the top down. Construction begins by installing vertical members consisting of steel I-beams in pre-augured holes typically spaced at about 5 to 10 feet on center. The holes are then backfilled with structural concrete extending up to the bottom of the proposed cut elevation at the face of the wall. The remaining depths of the holes are filled with lean mix concrete. Once the concrete has set, the excavation begins from the top down in lifts. As each lift is completed, timber lagging, typically consisting of 3" by 6" or 4" by 6" treated timbers, are installed between the flanges of the I-beams. Depending on the shored height of the wall, horizontal members, or tie-backs may be required. Typically, soldier pile shoring can be constructed to maximum shored heights of about 15 feet without tie-backs. However, if settlement sensitive facilities are located close to the shoring, tie-backs may be required.

Soil nail shoring is also constructed from the top down. Soil nail shoring consists of excavating soils in vertical lifts and installation of nearly horizontal elements called soil nails back through the soil cut face typically at a horizontal spacing of 5 to 6 feet. Once a lift is complete and the nails installed, reinforcing steel is placed on the cut face and a fascia consisting of pneumatically placed concrete, or shotcrete is placed on the cut face. The procedure is repeated until the bottom of the excavation is reached. Soil nailing is most applicable in soils

that exhibit a significant standup time when cut vertically. However, some methods can be used to stabilize soils with marginal standup times. Soil nailing is almost always more economical as compared to solider pile shoring.

As indicated above, the project is currently at a conceptual level. Once the project moves further into design, we can provide additional consultation, design parameters, and design services for temporary shoring upon request.

Structural Fill

All structural fill should be placed in accordance with the recommendations presented herein. Structural fill includes any fill material placed under footings, below pavement subgrades, and utility trench backfill. Prior to the placement of structural fill, all surfaces to receive fill should be prepared as previously recommended in the **Site Preparation** section of this report.

We expect structural fill will be required to backfill foundation excavations and for utility trench backfill. The suitability of soil for use as structural fill will depend on the time of year of construction, the moisture content of the soil, and the fines content (that portion passing the U.S. No. 200 sieve) of the soil. As the amount of fines increases, the soil becomes increasingly sensitive to small changes in moisture content. Soils containing more than about 5% fines cannot be consistently compacted to the appropriate levels when the moisture content is more than approximately 2% above or below the optimum moisture content (per ASTM D-1557). Optimum moisture content is that moisture which results in the greatest compacted dry density with a specified compactive effort.

The soils encountered in our explorations are estimated to contain between 20 to 30 percent fines. During wet weather, site soils may not be suitable for reuses as structural fill. During extended periods of dry, warm weather, we expect site soils to be suitable for reuses as structural fill. Site soils will not be suitable for backfill directly against subgrade foundation walls because the soil is not free draining. Additional recommendations for backfilling subgrade walls are presented in the **Subgrade Walls** section of this report.

If required, imported structural fill should consist of material meeting the requirements of WSDOT 9-03.04.14(1) Gravel Borrow during wet weather. During dry weather, a lesser quality material meeting the requirements of 9-03.14(3) Common Borrow could be used. However, the use of lesser quality imported fill should be based on site specific conditions during construction and recommendations provided by ZZA. Requirements regarding the recommended fill types can be found in the 2006 Washington State Department of Transportation Standard Specifications for Road, Bridge, and Municipal Construction.

Structural fill should be placed in lifts not exceeding 12 inches in loose thickness. Individual lifts should be compacted such that a minimum density of at least 95 percent of the modified Proctor (ASTM D1557) is achieved and the fill is firm and unyielding. We recommend that a

representative from ZZA be present during the placement of structural fill to observe the work and perform a representative number of in-place density tests. In this way, the adequacy of earthwork may be evaluated as grading progresses.

It should be noted that the effort required for successful placement of structural fill is weather-dependent and delays due to inclement weather are common even when using Gravel Borrow. Excess soils may require stockpiling for extended periods of time before they can be used. We recommend that all stockpiled soils intended for reuse as structural fill be protected with anchored polyethylene sheet plastic strong enough to withstand local wind conditions.

Building Foundations

Based on soil conditions observed in our explorations, it is our opinion that the proposed building could be supported on conventional spread footings founded on the dense to very dense glacial till soils observed in our explorations.

Spread footings founded on the dense to very dense glacial till soils observe in our explorations may be designed for an allowable bearing pressure of 4,000 pounds per square foot (psf). The allowable bearing values provided above apply to the sum of all dead and long-term live loads, excusive of the weight of the footing and any backfill above the footing. For total loads including wind or seismic, a one-third increase on the above-recommended allowable bearing value may be used. All footings should be embedded at least 1.5 feet below finished exterior grades for frost protection. We recommend that continuous and isolated pad footings have minimum widths of 18 and 24 inches, respectively. Provided that spread footings are founded as recommended in this report, we estimate that total foundation settlement will be on the order of 1 inch and differential settlements on the order of ½ inch in 50 feet.

The allowable bearing values and predicted settlements discussed above are based on an undisturbed subgrade. As discussed above, the native soils will easily become disturbed during wet weather, and also may become disturbed due to construction traffic. Any disturbance to footing subgrades should be repaired prior to placement of reinforcing steel by overexcavating the disturbed areas and replacing with crushed rock meeting the requirements of WSDOT 9-03.9(3) Crushed Surfacing Base Course. We recommend that footing subgrades be evaluated by ZZA prior to the placement of reinforcing steel.

Slab On Grade Floors

It is our opinion that slab-on-grade floors can be supported on site soils prepared in accordance with the **Subgrade Preparation** section of this report, or on structural fill placed in accordance with the recommendations of this report. We recommend that floor slabs be underlain by a minimum 6-inch thickness of ¾-inch washed crushed rock to serve as a working surface and a capillary break. This capillary break layer should be compacted to a firm and unyielding condition, and achieve a uniform compaction level of at least 95 percent of the maximum dry

density per the ASTM D-1557 test method. Placement of the capillary break material should be sequenced such that the potential for the material to become saturated by rainfall or other water sources can be limited.

Where transmission of water vapor through slabs is undesirable, we recommend a vapor retarder be installed. The vapor retarder should consist of polyethylene sheet plastic that is at least 10-mil thick or a suitable proprietary product approved by the owner. The slab designer and slab contractor should refer to ACI 302 for procedures and cautions regarding the use and placement of a vapor retarder. In addition, the moisture protection details should be reviewed by the architect and owner and additional, more stringent moisture protection details should be specified if required for protection of floor finishes. If the roof membrane will be in place prior to pouring the slab, the vapor barrier should be placed below the capillary break. If the roof membrane will not be in place, the vapor barrier should be placed directly below the slab. The following additional recommendations are provided for vapor barrier installation:

- All joints should be lapped and sealed.
- All penetrations through the vapor barrier should be sealed.
- The vapor barrier should be lapped over footings, sealed to foundation walls or both.
- Any damage to the vapor barrier should be repaired prior to pouring the slab

Lateral Resistance

Lateral loads can be resisted by a combination of passive pressures acting on the face of buried foundation elements and base friction on the bottom of foundation elements. The allowable passive pressures on the face of foundation elements at least 1.5 feet below finished grade and cast neat against site soils may be computed using and equivalent fluid density of 400 pounds per cubic foot (pcf) (triangular distribution) for a level ground surface. The above passive pressure value includes a factor of safety of 1.5. We recommend using an ultimate base friction coefficient of 0.40 for concrete in contact with the soils observed in the explorations or structural fill placed in accordance with this report.

Subgrade Foundation Walls

The lateral soil pressures acting on subgrade walls will depend on the nature and density of the soil behind the wall, and the amount of lateral wall movement that can occur as backfill is placed. For walls that are free to yield at the top at least one-thousandth of the height of the wall, soil pressures will be less than if movement is limited by such factors as wall stiffness or bracing. Assuming that walls are backfilled and drained as described in the following paragraphs, we recommend that yielding walls supporting horizontal backfill be designed using an equivalent fluid density of 35 pcf. Non-yielding walls should be designed using an equivalent fluid density of 50 pcf. Passive soil resistance and base friction values for design of subgrade foundation walls are provide above in the **Lateral Resistance** section of this report.

In addition to active or at-rest earth pressures as recommended above, permanent subgrade foundation walls should be designed to resist seismic lateral earth pressures. Figure 2 provides our recommendations for analysis of subgrade foundation walls subject to seismic earth pressures for both yielding and non-yielding walls.

The above-recommended lateral earth pressures do not include the effects of sloping backfill surfaces, surcharges such as traffic loads, other surface loading, or hydrostatic pressures. If such conditions exist, we should be consulted to provide revised earth pressure recommendations.

Adequate drainage measures must be installed to collect and direct subsurface water away from subgrade walls. The appropriate drainage system for subgrade foundation walls will depend on whether or not temporary shoring is required for the project. We can provide final recommendations regarding subgrade foundation wall drainage once the project moves further into design.

Wall backfill should be compacted to between 90 and 92 percent of the maximum dry density as determined by the ASTM D 1557 test method. Measures should be taken to prevent the buildup of excess lateral pressures due to overcompaction of the backfill behind the wall. This can be accomplished by placing the backfill within 24 inches of the wall in lifts not exceeding 6 inches in loose depth and compacting with hand-operated or self-propelled, light compaction equipment.

Use of the recommended reduced compaction levels for wall backfill may result in some backfill settlement with time. If sidewalks, planters, or other features are constructed above the backfill and cannot tolerate differential settlement in the range of 1 to 2 inches, higher compaction levels should be specified for the backfill below these features. Care should be taken where utilities penetrate through basement walls. Minor settlement of the backfill can put significant soil loading on utilities, and some form of flexible connection may be appropriate at backfilled wall penetrations.

CLOSURE

We have prepared this report for use by Redmond Town Center Condominiums, LLC for this project. The data and report should be provided to prospective contractors for bidding or estimating purposes, but our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

There are possible variations in subsurface conditions across the site and also with time. A contingency for unexpected conditions should be included in the project budget and schedule. Sufficient monitoring, testing and consultation should be provided by our firm during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed

during the work differ from those anticipated, and to evaluate whether or not construction activities comply with the contract plans and specifications.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in this area at the time the report was prepared. No warranty or other conditions express or implied should be understood.

Respectfully submitted,
ZIPPER ZEMAN ASSOCIATES, INC.

1/17/07

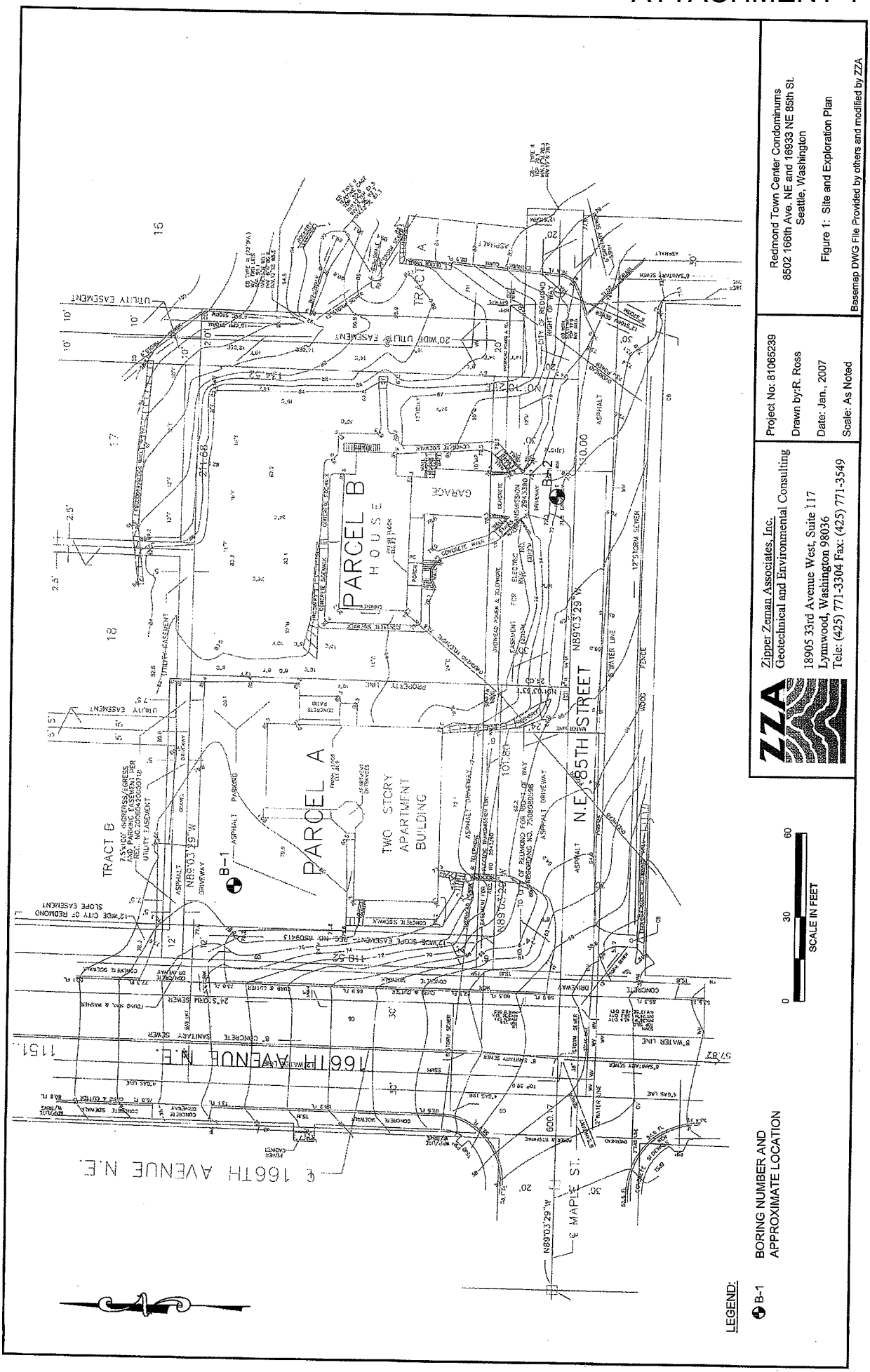
Robert A. Ross, P.E.
Senior Project Engineer

ROBERT A. ROSS
STATE OF WASHINGTON
38384
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES: 09/04/08

Enclosures: Figure 1 – Site and Exploration Plan
Figure 2 – Application of Seismic Earth Pressures
Appendix A – RZA Exploration Procedure and Logs
Appendix B – Laboratory Testing Procedures and Results

ATTACHMENT 14



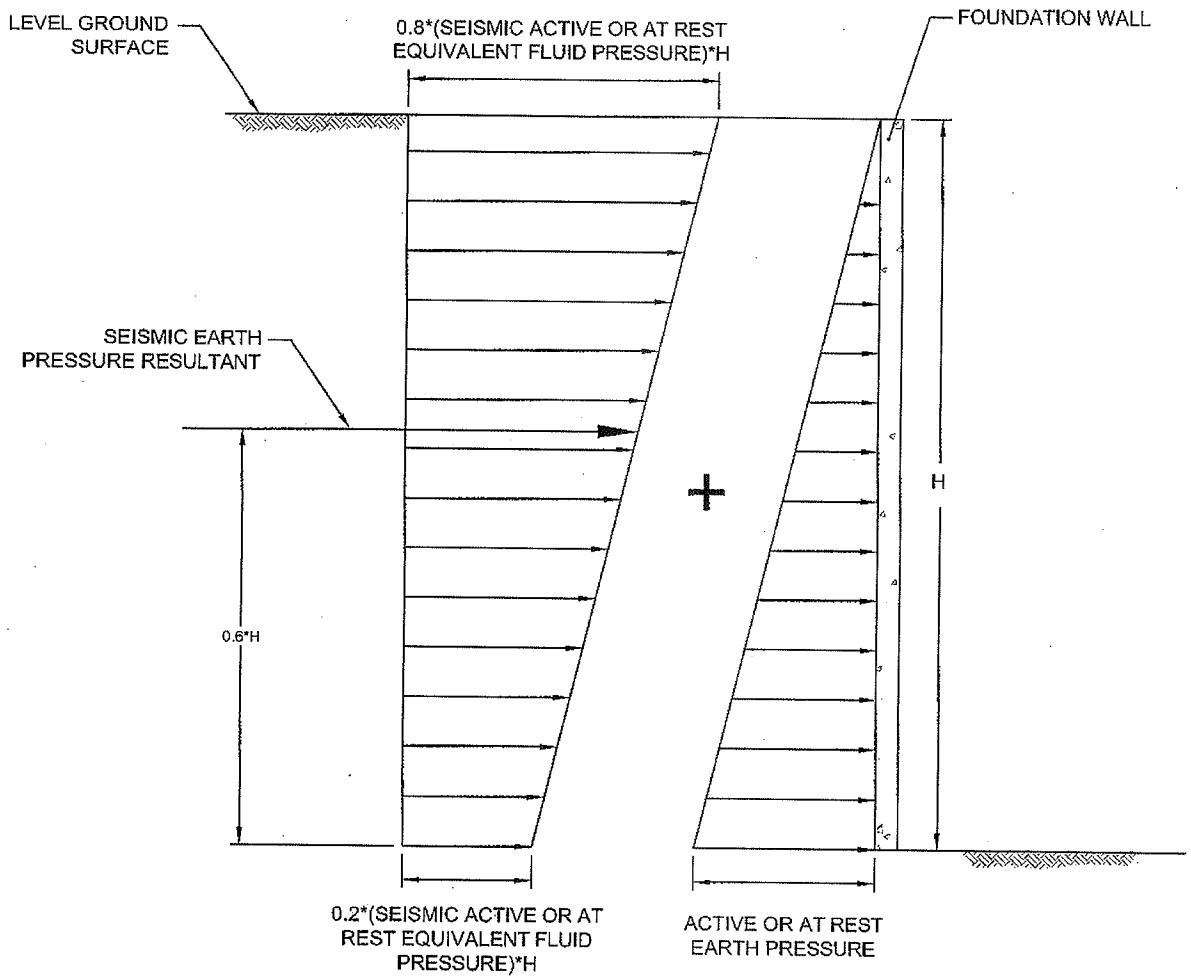
Zipper Zeman Associates, Inc.
Geotechnical and Environmental Consulting
18905 33rd Avenue West, Suite 117
Lynnwood, Washington 98036
Tele: (425) 771-3304 Fax: (425) 771-3549

Project No: 81065239
Drawn by:R. Ross
Date: Jan., 2007
Scale: As Noted

Redmond Town Center Condominums
8502 166th Ave. NE and 16933 NE 85th St.
Seattle, Washington

Figure 1: Site and Exploration Plan

Basemap DWG File Provided by others and modified by ZZA



NOTES:

1. ALL SURCHARGES SHOULD BE CONSIDERED AS APPROPRIATE. THIS FIGURE DOES NOT INCLUDE SURCHARGE AFFECTS.

2. RECOMMENDED EQUIVALENT FLUID EARTH PRESSURES ARE AS FOLLOWS:

   ACTIVE: 35 PCF
   AT REST: 50 PCF
   SEISMIC ACTIVE: 13.5 PCF
   SEISMIC AT REST: 39 PCF

Zipper Zeman Associates, Inc.
Geotechnical and Environmental Consulting

18905 33rd Avenue West, Suite 117
Lynnwood, Washington 98036
Tele: (425) 771-3304 Fax: (425) 771-3549

Project No. 81065239

Date: Jan. 2007

Drawn by: R.A.R.

Redmond Town Center Condominums
8502 166th Ave. NE and 16933 NE 85th St.
Seattle, Washington

Figure 2: Seismic Earth Pressures

ATTACHMENT 14

APPENDIX A
FIELD EXPLORATION PROCEDURES AND LOGS
81065239

Our field exploration for this project included 2 borings completed on December 19, 2006. Exploration locations are shown on the Site and Exploration Plan, Figure 1. Exploration locations were approximated in the field using a measuring wheel with reference to existing boundary and topographic survey provided by Redmond Town Center Condominiums, LLC. As such, the exploration locations should be considered accurate to the degree implied by the measurement method. The approximate ground surface elevation at each exploration location was estimated based on the boundary and topographic survey provided by Redmond Town Center Condominiums, LLC. The following sections describe our procedures associated with the exploration. Descriptive logs of the explorations are enclosed in this appendix.

Soil Boring Procedures

Our exploratory borings were advanced with a hollow stem auger, using a trailer-mounted portable drill rig operated by an independent drilling firm working under subcontract to our firm. A geotechnical engineer from our firm continuously observed the borings logged the subsurface conditions encountered, and obtained representative soil samples. All samples were stored in moisture-tight containers and transported to our laboratory for further visual classification and testing. After each boring was completed, the borehole was backfilled with soil cuttings, and the surface was patched with bentonite grout.

Throughout the drilling operation, soil samples were obtained at 2.5- to 5-foot depth intervals by means of the Standard Penetration Test (ASTM: D-1586). This testing and sampling procedure consists of driving a standard 2-inch outside diameter steel split spoon sampler 18 inches into the soil with a 140-pound hammer free falling 30 inches. The number of blows required to drive the sampler through each 6-inch interval is recorded, and the total number of blows struck during the final 12 inches is recorded as the Standard Penetration Resistance, or "blow count" (N value). If a total of 50 blows is struck within any 6-inch interval, the driving is stopped and the blow count is recorded as 50 blows for the actual penetration distance. The resulting Standard Penetration Resistance values indicate the relative density of granular soils and the relative consistency of cohesive soils.

The enclosed boring logs describe the vertical sequence of soils and materials encountered in each boring, based primarily upon our field classifications and supported by our subsequent laboratory examination and testing. Where a soil contact was observed to be gradational, our logs indicate the average contact depth. Where a soil type changed between sample intervals, we inferred the contact depth. Our logs also graphically indicate the blow count, sample type, sample number, and approximate depth of each soil sample obtained from the boring, as well as any laboratory tests performed on these soil samples. If any groundwater was encountered in a borehole, the approximate groundwater depth, and date of observation, is depicted on the log. Groundwater depth estimates are typically based on the moisture content of soil samples,

the wetted portion of the drilling rods, the water level measured in the borehole after the auger has been extracted, or through the use of an observation well.

The boring logs presented in this appendix are based upon the drilling action, observation of the samples secured, laboratory test results, and field logs. The various types of soils are indicated as well as the depth where the soils or characteristics of the soils changed. It should be noted that these changes may have been gradual, and if the changes occurred between samples intervals, they were inferred.

PROJECT: Redmond Condominiums **JOB NO.:** 81065239 **BORING:** B-1 **PAGE 1 OF 1**

Location: Redmond, WA **Approximate Surface Elevation: 79 feet**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (Standard ▲ / Other △; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
0	3 inches asphalt over moist, gray/brown, gravelly SAND with some silt						
	Very dense, moist, gray/brown, silty, gravelly SAND (Glacial Till)		S-1		50/5"		
5	(Blowcount overstated)		S-2		50/5"		
			S-3		50/5"		
10	Very dense, moist, gray/brown silty, sandy GRAVEL with thin layers of wet sand with trace silt (Glacial Till)		S-4		50/6"		
15	Becomes wet to saturated.		S-5	ATD	50/6"		
	Boring completed at 18 feet on 12/19/06. Groundwater observed at 16.5 feet at time of drilling.						
20							
25							

Explanation

- 2-inch O.D. split spoon sample
- 3-inch I.D Shelby tube sample
- No Recovery
- ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
200W = 200 Wash Analysis
Att. = Atterberg Limits
Consol. = Consolidation Test

ZZA **Zipper Zeman Associates, Inc.**
Geotechnical and Environmental Consulting

BORING LOG | **Figure A-1**
Date Drilled: 12/19/2006 | **Logged By: RWS**

PROJECT: Redmond Condominiums **JOB NO.:** 81065239 **BORING:** B-2 **PAGE 1 OF 1**

Location: Redmond, WA **Approximate Surface Elevation: 72 feet**

Depth (ft)	Soil Description	Sample Type	Sample Number	Ground Water	Penetration Resistance (▲ Standard, △ Other; Blows per foot: 0, 10, 20, 30, 40, 50)	N-values	Testing
0	3 inches asphalt over loose, wet, black/brown, silty, gravelly SAND (Fill)						
			S-1		▲ ●	9	
5	Medium dense to dense, wet, mottled gray/brown, silty, gravelly SAND (Weathered Till)		S-2	▼ ATD	● ▲	30	
			S-3		● ▲	36	
10	Very dense, moist, gray/brown silty, sandy GRAVEL with thin layers of wet, sand with trace silt (Glacial Till)		S-4		● ▲	100/5"	
15	Becomes wet to saturated.		S-5		● ▲	50/5"	
	Boring completed at 18 feet on 12/19/06. Groundwater observed at 6 feet at time of drilling.						
20							
25							

Explanation

- 2-inch O.D. split spoon sample
- 3-inch I.D Shelby tube sample
- ⊗ No Recovery
- ▼ ATD — Groundwater level at time of drilling or date of measurement

Monitoring Well Key

- Clean Sand
- Bentonite
- Grout/Concrete
- Screened Casing
- Blank Casing

Moisture Content

Plastic Limit — Natural — Liquid Limit

Testing Key

GSA = Grain Size Analysis
200W = 200 Wash Analysis
Att. = Atterberg Limits
Consol. = Consolidation Test

Zipper Zeman Associates, Inc. Geotechnical and Environmental Consulting	BORING LOG	A-2
	Date Drilled: 12/19/2006	Logged By: RWS

APPENDIX B
LABORATORY TESTING PROCEDURES AND RESULTS
81065239

A series of laboratory tests were performed during the course of this study to evaluate the index and geotechnical engineering properties of the subsurface soils. Descriptions of the types of tests performed are given below.

Visual Classification

Samples recovered from the exploration locations were visually classified in the field during the exploration program. Representative portions of the samples were carefully packaged in moisture tight containers and transported to our laboratory where the field classifications were verified or modified as required. Visual classification was generally done in accordance with the Unified Soil Classification system. Visual soil classification includes evaluation of color, relative moisture content, soil type based upon grain size, and accessory soil types included in the sample.

Moisture Content Determinations

Moisture content determinations were performed on representative samples obtained from the exploration in order to aid in identification and correlation of soil types. The determinations were made in general accordance with the test procedures described in ASTM: D-2216. Results of the moisture content determinations are shown on the boring logs provided in Appendix A.

Appendix G – Geotechnical Report

April 29, 2015

Triad/Fransen, LLC
2801 Alaskan Way, Suite 107
Seattle, Washington 98121

Attn: Mr. Jeff Fransen
P: (425) 344-8833

Re: Geotechnical Report Update Letter
166th Avenue Townhomes
8502 166th Ave NE & 16640 NE 85th St
Redmond, King County, Washington
Terracon Project No. 81155022

Dear Mr. Fransen:

Terracon Consultants, Inc. (Terracon) has completed our geotechnical services for the above referenced project in accordance with our Proposal No. P81150127, dated April 23, 2015. This letter is an addendum to, and should be used in conjunction with both our Geotechnical Report and subsequent Geotechnical Report Addendum that were submitted to Redmond Town Center Condominiums, LLC on January 17, 2007 and September 21, 2007, respectively (Terracon project number 81065239, formerly known as Zipper Zeman Associates). The purpose of this letter is to comment on and update our previous recommendations as they apply to the current development plans for the site. Our understanding of the current project scope is based upon our conversations with Mr. Erich Armbruster of Ashworth Homes, a review of preliminary layout plans (3 sheets, dated March 16, 2015) by Daniel Umbach, Architect, our previous Geotechnical Report and Addendum, and our recent visit to the site on April 28, 2015.

Project Information

Terracon conducted surface and subsurface investigations on the subject site on December 19, 2006 and August 3, 2007 to provide recommendations for the design and construction of a proposed multi-family development at the above listed site. Though development plans had not been completed at the time of our original report, the recommendations provided in the report were based on our understanding that the project construction would likely consist of a four story multi-family structure with 2 levels of below-grade parking. The September 21, 2007 report addendum was completed based on anticipated maximum proposed shoring heights of about 22 feet as shown on the preliminary shoring plans by CG Engineering.

We understand that current plans call for construction of four new townhome structures occupying a majority of the site supported by shallow foundations and consisting of two floors of living space above slab-on-grade garages. Two of the buildings would be comprised of 5

townhomes each and two of the buildings would be comprised of 4 townhomes each. The current planned scope of construction appears to be feasible from a geotechnical perspective based on the project description and site conditions as noted within this letter and our original report.

Surface and Subsurface Conditions

As discussed in our original report, the site is comprised of two parcels. Parcel A is located at the northeast corner of 166th Avenue NE and NE 85th Street and is currently developed with a two-story multi-family residential building (8500 through 8510 166th Ave NE). Parcel B is located immediately to the east of Parcel A and north of NE 85th Street (16640 NE 85th Street).

At the time of our original report, Parcel B was occupied by a single-family residential home and deciduous and conifer trees. During our recent site visit, we observed that the home has since been removed from the site. Based on a review of aerial photographs on the King County iMap interactive mapping tool, it appears that the home was demolished and removed from the site sometime between 2009 and 2012. Parcel B is currently vacant and covered with grass, weeds, and deciduous and conifer trees. Site grades on each parcel appear to roughly match the descriptions provided in our original report, with the exception of a 2 to 6 foot depression in the location of the former residence.

During our previous work on the site, Terracon performed a site reconnaissance and advanced three geotechnical borings (B-1 through B-3) in the northwest, southeast, and northeast corners of the site to aid in classification of subsurface soil conditions. The explorations disclosed between 0 and 4 feet of loose silty, gravelly sand fill soils over dense to very dense, native glacial till soils. In boring B-3, completed for the September 2007 report addendum, hard, gray sandy silt was observed below the glacial till soils from about 28½ feet below the ground surface to the full 51½ feet exploration depth.

Groundwater seepage was observed in borings B-1 and B-2 at depths of 16½ and 6 feet. The deeper groundwater seepage observed in B-1 was interpreted as thin, saturated sand zones within the glacial till. The shallower groundwater observed in B-2 was interpreted as perched groundwater above the very dense glacial till soils. Groundwater was not observed in Boring B-3.

A detailed description of both the surface and subsurface conditions may be found in our original Geotechnical Report and the September 2007 addendum.

Conclusions and Recommendations

Our previous report provided conclusions and recommendations related to stormwater infiltration feasibility, site preparation, temporary and permanent cut slopes, temporary shoring, structural fill, building foundations, slab-on-grade floors, lateral earth pressures, subgrade foundation walls, and seismic considerations. The September 2007 addendum included recommendations related to design, drainage, and construction monitoring of soldier pile

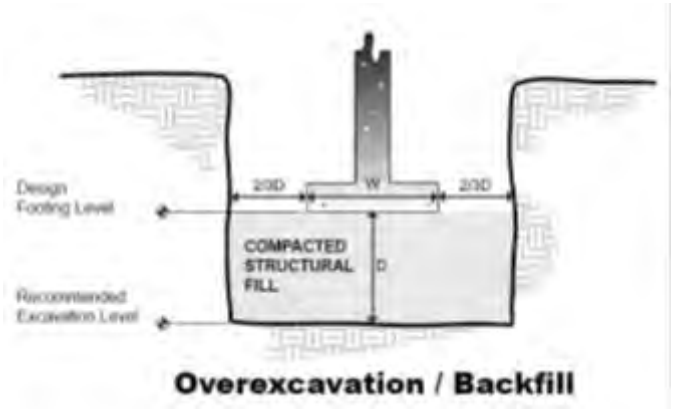
shoring. We understand that below grade construction is not a part of the current development plans and temporary soldier pile shoring will no longer be necessary.

In our opinion, the recommendations provided in our original Geotechnical Report and the September 2007 Geotechnical Report Addendum are still applicable to the current development plans, with minor clarifications and updates. These clarifications are discussed in the following sections.

Building Foundations and Slabs-on-Grade

Our original Geotechnical Report recommended an allowable bearing pressure of 4,000 pounds per square foot (psf) for shallow spread footings bearing on the dense to very dense, native glacial till soils. As discussed in the Surface and Subsurface Conditions section above, existing fill soils to depths of up to about 4 feet were observed in our explorations. Note that locations of deeper existing fill soils may be encountered during construction. We recommend complete removal of existing fill soils below the building footings and floor slabs. Foundations could then bear directly on the exposed native glacial till soils or on compacted structural fill placed atop at the dense to very dense glacial till in accordance with the recommendations provided in our original report. Allowable bearing capacities for conventional spread footings would be 4,000 psf for footings bearing on dense to very dense, native glacial till soils or for footings bearing on no more than 5 feet of compacted structural fill above the native glacial till soils.

If overexcavations are necessary below building footings, the excavations should extend laterally beyond all edges of the footings at least 8 inches per foot of overexcavation depth below footing base elevation. The overexcavation should then be backfilled up to the footing base elevation with structural fill placed in lifts of 8 inches or less in loose thickness and compacted to at least 95 percent of the material's maximum modified Proctor dry density (ASTM D-1557). The overexcavation and backfill procedure is described in the figure below.



Overexcavation / Backfill

NOTE: Excavation shown vertical for convenience; excavations should be sloped as necessary for safety.

Seismic Considerations

Our original report provided a Site Class definition and liquefaction potential evaluation based on the 2003 International Building Code (IBC) and the explorations completed on the site to a maximum depth of about 51½ feet. We understand the current project is being designed based on the 2012 IBC, which indicates that the seismic site classification is based on the average soil and bedrock properties in the top 100 feet. The current scope does not include a 100-foot soil profile determination. Based on the results of our explorations and mapped conditions, however, the 2012 IBC seismic site classification for this site is C. This seismic site class definition considers that soils encountered at depth in our borings continue below the termination depth. Additional exploration to deeper depths would be required to confirm the conditions below the current depth of exploration. Detailed site response spectra based on the 2012 IBC are provided on the attached USGS Design Maps Summary Report.

As noted in our original report, soil liquefaction typically occurs in loose to medium dense, granular soils located below the water table. Our original report concluded that the potential for soil liquefaction at the site is negligible based on the 2003 IBC. Even with the increased seismic ground motion design values between the 2003 and the 2012 IBC, in our opinion the potential for soil liquefaction at the site is still negligible.

It is our opinion that no additional engineering geology investigations or geologic hazard evaluations are necessary relative to seismic hazards for this project.

General Comments

Terracon should be retained to provide observation and testing services during grading, excavation, foundation construction and other earth-related construction phases of the project.

The analysis and recommendations presented in this letter are based upon the data obtained from the borings performed during our previous investigations and from other information discussed in this letter. This letter does not reflect variations that may occur between borings, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This letter has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety and excavation support are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this letter are planned, the conclusions and recommendations contained in this letter shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this letter in writing.

Conclusion

We appreciate the opportunity to perform these services for you. Please contact us if you have questions regarding this information or if we can provide any additional services.

Sincerely,
Terracon Consultants, Inc.

Ryan M. Scheffler, PE
Project Engineer

David A. Baska, PhD, PE
Geotechnical Department Manager