1/3 of the property. Perched groundwater seepage was encountered at approximately 6.5 feet on the western portion of the site.

Subsurface logs for test probes TP-1 through TP-5 are attached, soils encountered in all of the test probes consisted of soils interpreted to be of Vashon-age advance outwash deposits. No indication of historic landslide activity or increased risk to future landslide activity was observed.

Given the soil and groundwater conditions and the site topography, in our opinion, the potential for landslides or slope movement are very low. Based on the subsurface conditions, in our opinion the potential for liquefaction is low. Soils at the site are mapped as Alderwood gravelly sandy loam, 8 to 15 percent slopes. These soils may experience severe to very severe erosion hazard when they occur on slopes greater than 15 percent. RGI did not observe any signs of severe/very severe erosion at the site.

The site development can be undertaken safely as long as the measures and recommendations of this geotechnical report are incorporated into the project plans. Based on review of the plans prepared by Blueline dated April 16, 2020, the recommendations have been incorporated into the plans for the project including erosion control and retaining walls for grade changes.

5.0 Discussion and Recommendations

5.1 Geotechnical Considerations

Based on our study, the site is suitable for the proposed construction from a geotechnical standpoint. Foundations for the proposed residences can be supported on conventional spread footings bearing on medium dense to dense native soil or structural fill. Slab-on-grade floors and pavements can be similarly supported.

Detailed recommendations regarding the above issues and other geotechnical design considerations are provided in the following sections. Based on reviewing the plans prepared by Blueline dated April 16, 2020, these recommendations have been incorporated into the civil drawings for the project.

5.2 Earthwork

The earthwork is expected to include installation of erosion control measures, clearing the site areas, excavation and backfilling of the detention vault, installing underground utilities, grading the roadway, and constructing residences on the lots.

5.2.1 Erosion and Sediment Control

Potential sources or causes of erosion and sedimentation depend on construction methods, slope length and gradient, amount of soil exposed and/or disturbed, soil type,

construction sequencing and weather. The impacts on erosion-prone areas can be reduced by implementing an erosion and sedimentation control plan. The plan should be designed in accordance with applicable city and/or county standards.

RGI recommends the following erosion control Best Management Practices (BMPs):

- Scheduling site preparation and grading for the drier summer and early fall months and undertaking activities that expose soil during periods of little or no rainfall
- Retaining existing vegetation whenever feasible
- Establishing a quarry spall construction entrance
- Installing siltation control fencing or anchored straw or coir wattles on the downhill side of work areas
- Covering soil stockpiles with anchored plastic sheeting
- Revegetating or mulching exposed soils with a minimum 3-inch thickness of straw if surfaces will be left undisturbed for more than one day during wet weather or one week in dry weather
- Directing runoff away from exposed soils and slopes
- Minimizing the length and steepness of slopes with exposed soils and cover excavation surfaces with anchored plastic sheeting (Graded and disturbed slopes should be tracked in place with the equipment running perpendicular to the slope contours so that the track marks provide a texture to help resist erosion and channeling. Some sloughing and raveling of slopes with exposed or disturbed soil should be expected.)
- Decreasing runoff velocities with check dams, straw bales or coir wattles
- Confining sediment to the project site
- Inspecting and maintaining erosion and sediment control measures frequently (The contractor should be aware that inspection and maintenance of erosion control BMPs is critical toward their satisfactory performance. Repair and/or replacement of dysfunctional erosion control elements should be anticipated.)

Permanent erosion protection should be provided by reestablishing vegetation using hydroseeding and/or landscape planting. Until the permanent erosion protection is established, site monitoring should be performed by qualified personnel to evaluate the effectiveness of the erosion control measures. Provisions for modifications to the erosion control system based on monitoring observations should be included in the erosion and sedimentation control plan.

5.2.2 STRIPPING

Stripping efforts should include removal of pavements, vegetation, organic materials, and deleterious debris from areas slated for building, pavement, and utility construction. The test probes encountered 6-12 inches of topsoil and rootmass. Deeper areas of stripping may be required in forested or heavily vegetated areas of the site.

5.2.3 EXCAVATIONS

All temporary cut slopes associated with the site and utility excavations should be adequately inclined to prevent sloughing and collapse. The site soils consist mostly of medium to very dense silty gravely sand, though this does vary slightly over the site.

Accordingly, for excavations more than 4 feet but less than 20 feet in depth, the temporary side slopes should be laid back with a minimum slope inclination of 1H:1V (Horizontal:Vertical). If there is insufficient room to complete the excavations in this manner, or excavations greater than 20 feet in depth are planned, using temporary shoring to support the excavations should be considered. For open cuts at the site, RGI recommends:

- No traffic, construction equipment, stockpiles or building supplies are allowed at the top of cut slopes within a distance of at least five feet from the top of the cut
- Exposed soil along the slope is protected from surface erosion using waterproof tarps and/or plastic sheeting
- Construction activities are scheduled so that the length of time the temporary cut is left open is minimized
- Surface water is diverted away from the excavation
- The general condition of slopes should be observed periodically by a geotechnical engineer to confirm adequate stability and erosion control measures

In all cases, however, appropriate inclinations will depend on the actual soil and groundwater conditions encountered during earthwork. Ultimately, the site contractor must be responsible for maintaining safe excavation slopes that comply with applicable OSHA or WISHA guidelines.

5.2.4 SITE PREPARATION

RGI anticipates that some areas of loose or soft soil will be exposed upon completion of stripping and grubbing. Proofrolling and subgrade verification should be considered an essential step in site preparation. After stripping, grubbing, and prior to placement of structural fill, RGI recommends proofrolling building and pavement subgrades and areas to receive structural fill. These areas should moisture conditioned and compacted to a firm and unyielding condition in order to achieve a minimum compaction level of 95 percent of the modified proctor maximum dry density as determined by the American Society of Testing and Materials D1557-09 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (ASTM D1557).

Proofrolling and adequate subgrade compaction can only be achieved when the soils are within approximately ± 2 percent moisture content of the optimum moisture content. Soils which appear firm after stripping and grubbing may be proofrolled with a heavy compactor, loaded double-axle dump truck, or other heavy equipment under the observation of an RGI

representative. This observer will assess the subgrade conditions prior to filling. The need for or advisability of proofrolling due to soil moisture conditions should be determined at the time of construction. In wet areas it may be necessary to hand probe the exposed subgrades in lieu of proofrolling with mechanical equipment.

Subgrade soils that become disturbed due to elevated moisture conditions should be overexcavated to reveal firm, non-yielding, non-organic soils and backfilled with compacted structural fill. In order to maximize utilization of site soils as structural fill, RGI recommends that the earthwork portion of this project be completed during extended periods of warm and dry weather if possible. If earthwork is completed during the wet season (typically November through May) it will be necessary to take extra precautionary measures to protect subgrade soils. Wet season earthwork will require additional mitigative measures beyond that which would be expected during the drier summer and fall months.

5.2.5 STRUCTURAL FILL

Once stripping, clearing and other preparing operations are complete, cuts and fills can be made to establish desired lot and roadway grades. Prior to placing fill, RGI recommends proof-rolling as described above.

RGI recommends fill below the foundation and floor slab, behind retaining walls, and below pavement and hardscape surfaces be placed in accordance with the following recommendations for structural fill. The structural fill should be placed after completion of site preparation procedures as described above.

The suitability of excavated site soils and import soils for compacted structural fill use will depend on the gradation and moisture content of the soil when it is placed. As the amount of fines (that portion passing the U.S. No. 200 sieve) increases, soil becomes increasingly sensitive to small changes in moisture content and adequate compaction becomes more difficult or impossible to achieve. Soils containing more than about 5 percent fines cannot be consistently compacted to a dense, non-yielding condition when the moisture content is more than 2 percent above or below optimum. Optimum moisture content is that moisture that results in the greatest compacted dry density with a specified compactive effort.

Non-organic site soils are only considered suitable for structural fill provided that their moisture content is within about two percent of the optimum moisture level as determined by ASTM D1557. Excavated site soils may not be suitable for re-use as structural fill depending on the moisture content and weather conditions at the time of construction. If soils are stockpiled for future reuse and wet weather is anticipated, the stockpile should be protected with plastic sheeting that is securely anchored. Even during dry weather, moisture conditioning (such as, windrowing and drying) of site soils to be reused as structural fill may be required.

Even during the summer, delays in grading can occur due to excessively high moisture conditions of the soils or due to precipitation. If wet weather occurs, the upper wetted portion of the site soils may need to be scarified and allowed to dry prior to further earthwork, or may need to be wasted from the site.

The site soils are moisture sensitive and may require moisture conditioning prior to use as structural fill. If on-site soils are or become unusable, it may become necessary to import clean, granular soils to complete site work that meet the grading requirements listed in Table 2 to be used as structural fill.

Table 2 Structural Fill Gradation

U.S. Sieve Size	Percent Passing
4 inches	100
No. 4 sieve	22 to 100
No. 200 sieve	0 to 5*

*Based on minus 3/4 inch fraction.

Prior to use, an RGI representative should observe and test all materials imported to the site for use as structural fill. Structural fill materials should be placed in uniform loose layers not exceeding 12 inches and compacted as specified in Table 3. The soil's maximum density and optimum moisture should be determined by ASTM D1557.

Table 3 Structural Fill Compaction ASTM D1557

Location	Material Type	Minimum Compaction Percentage	Moisture Content Range	
Foundations	On-site granular or approved imported fill soils:	95	+2	-2
Retaining Wall Backfill	On-site granular or approved imported fill soils:	92	+2	-2
Slab-on-grade	On-site granular or approved imported fill soils:	95	+2	-2
General Fill (non-structural areas)	On-site soils or approved imported fill soils:	90	+3	-2
Pavement – Subgrade and Base Course	On-site granular or approved imported fill soils:	95	+2	-2

Placement and compaction of structural fill should be observed by RGI. A representative number of in-place density tests should be performed as the fill is being placed to confirm that the recommended level of compaction is achieved.

5.2.6 Cut and Fill Slopes

All permanent cut and fill slopes should be graded with a finished inclination no greater than 2H:1V. Upon completion of construction, the slope face should be trackwalked, compacted and vegetated, or provided with other physical means to guard against erosion. All fill placed for slope construction should meet the structural fill requirements as described in Section 5.2.5.

Final grades at the top of the slopes must promote surface drainage away from the slope crest. Water must not be allowed to flow in an uncontrolled fashion over the slope face. If it is necessary to direct surface runoff towards the slope, it should be controlled at the top of the slope, piped in a closed conduit installed on the slope face, and taken to an appropriate point of discharge beyond the toe of the slope.

5.2.7 Wet Weather Construction Considerations

RGI recommends that preparation for site grading and construction include procedures intended to drain ponded water, control surface water runoff, and to collect shallow subsurface seepage zones in excavations where encountered. It will not be possible to successfully compact the subgrade or utilize on-site soils as structural fill if accumulated water is not drained prior to grading or if drainage is not controlled during construction. Attempting to grade the site without adequate drainage control measures will reduce the amount of on-site soil effectively available for use, increase the amount of select import fill materials required, and ultimately increase the cost of the earthwork phases of the project. Free water should not be allowed to pond on the subgrade soils. RGI anticipates that the use of berms and shallow drainage ditches, with sumps and pumps in utility trenches, will be required for surface water control during wet weather and/or wet site conditions.

5.3 Foundations

Following site preparation and grading, the proposed residence foundations can be supported on conventional spread footings bearing on medium dense to dense native soil or structural fill. Loose, organic, or other unsuitable soils may be encountered in the proposed building footprint. If unsuitable soils are encountered, they should be overexcavated and backfilled with structural fill. If loose soils are encountered, the soils should be moisture conditioned and compacted to the requirements of structural fill.

Perimeter foundations exposed to weather should be at a minimum depth of 18 inches below final exterior grades. Interior foundations can be constructed at any convenient depth below the floor slab. Finished grade is defined as the lowest adjacent grade within 5 feet of the foundation for perimeter (or exterior) footings and finished floor level for interior footings.

Table 4 Foundation Design

Design Parameter	Value
Allowable Bearing Capacity	2,500 psf[1]
Friction Coefficient	0.30
Passive pressure (equivalent fluid pressure)	250 pcf[2]
Minimum foundation dimensions	Columns: 24 inches Walls: 16 inches

1. psf = pounds per square foot
2. pcf = pounds per cubic foot

The allowable foundation bearing pressures apply to dead loads plus design live load conditions. For short-term loads, such as wind and seismic, a 1/3 increase in this allowable capacity may be used. At perimeter locations, RGI recommends not including the upper 12 inches of soil in the computation of passive pressures because they can be affected by weather or disturbed by future grading activity. The passive pressure value assumes the foundation will be constructed neat against competent soil or backfilled with structural fill as described in Section 5.2.5. The recommended base friction and passive resistance value includes a safety factor of about 1.5.

With spread footing foundations designed in accordance with the recommendations in this section, maximum total and differential post-construction settlements of 1 inch and 1/2 inch, respectively, should be expected.

5.4 RETAINING WALLS

If retaining walls are needed for the residences or for the detention vault, RGI recommends cast-in-place concrete walls be used. Modular block wall may be used for grade changes outside of the proposed structures consisting either gravity or geogrid reinforced walls.

The magnitude of earth pressure development on cast in place retaining walls will partly depend on the quality of the wall backfill. RGI recommends placing and compacting wall backfill as structural fill. Wall drainage will be needed behind the wall face. A typical retaining wall drainage detail is shown in Figure 3.

With wall backfill placed and compacted as recommended, and drainage properly installed, RGI recommends using the values in the following table for cast in place retaining wall design. The subgrade for the detention vault is expected to consist of dense native soils and the higher bearing capacity may be used for the vault foundation deign. The vault drainage should be tied into the storm system downstream of the vault as shown on Sheet 7 of the plans.

Table 5 Retaining Wall Design

Design Parameter	Value
Allowable Bearing Capacity - Structural Fill Dense native soils	2,500 psf 4,000 psf
Active Earth Pressure (unrestrained walls)	35 pcf
At-rest Earth Pressure (restrained walls)	50 pcf

For seismic design, an additional uniform load of 7 times the wall height (H) for unrestrained walls and 14H in psf for restrained walls should be applied to the wall surface. Friction at the base of foundations and passive earth pressure will provide resistance to these lateral loads. Values for these parameters are provided in Section 5.3.

5.5 Slab-on-Grade Construction

Once site preparation has been completed as described in Section 5.2, suitable support for slab-on-grade construction should be provided. RGI recommends that the concrete slab be placed on top of medium dense native soil or structural fill. Immediately below the floor slab, RGI recommends placing a four-inch thick capillary break layer of clean, free-draining sand or gravel that has less than five percent passing the U.S. No. 200 sieve. This material will reduce the potential for upward capillary movement of water through the underlying soil and subsequent wetting of the floor slab. Where moisture by vapor transmission is undesirable, an 8- to 10-millimeter thick plastic membrane should be placed on a 4-inch thick layer of clean gravel.

For the anticipated floor slab loading, we estimate post-construction floor settlements of 1/4- to 1/2-inch. For thickness design of the slab subjected to point loading from storage racks and fork lift vehicle traffic, RGI recommends using a subgrade modulus (K_S) of 150 pounds per square inch per inch of deflection.

5.6 Drainage

5.6.1 Surface

Final exterior grades should promote free and positive drainage away from the building area. Water must not be allowed to pond or collect adjacent to foundations or within the immediate building area. For non-pavement locations, RGI recommends providing a minimum drainage gradient of 3 percent for a minimum distance of 10 feet from the building perimeter. In paved locations, a minimum gradient of 1 percent should be provided unless provisions are included for collection and disposal of surface water adjacent to the structure.

5.6.2 SUBSURFACE

RGI recommends installing perimeter foundation drains. A typical footing drain detail is shown on Figure 4. The foundation drains and roof downspouts should be tightlined separately to an approved discharge facility. Subsurface drains must be laid with a gradient sufficient to promote positive flow to a controlled point of approved discharge.

5.6.3 INFILTRATION

The site infiltration evaluation was provided under separate cover.

5.7 UTILITIES

Utility pipes should be bedded and backfilled in accordance with American Public Works Association (APWA) specifications. For site utilities located within the right-of-ways, bedding and backfill should be completed in accordance with City of Kirkland specifications. At a minimum, trench backfill should be placed and compacted as structural fill, as described in Section 5.2.5. Where utilities occur below unimproved areas, the degree of compaction can be reduced to a minimum of 90 percent of the soil's maximum density as determined by the referenced ASTM D1557. As noted, soils excavated on site will be suitable for use as backfill material proved the soils can be moisture conditioned. Imported structural fill meeting the gradation provided in Table 2 may be necessary for trench backfill if the native soils cannot be moisture conditioned or if the backfill take place in wet weather.

5.8 PAVEMENTS

Pavement subgrades should be prepared as described in Section 5.2 and as discussed below. Regardless of the relative compaction achieved, the subgrade must be firm and relatively unyielding before paving. The subgrade should be proof-rolled with heavy construction equipment to verify this condition.

5.8.1 FLEXIBLE PAVEMENTS

With the pavement subgrade prepared as described above, RGI recommends the following pavement sections for parking and drive areas paved with flexible asphalt concrete surfacing.

- **For access roadway areas**: 2 inches of Hot Mix Asphalt (HMA) over 4 inches of Asphalt Treated Base (ATB) over 4 inches of crushed rock base (CRB)

5.8.2 CONCRETE PAVEMENTS

With the pavement subgrade prepared as described above, RGI recommends the following pavement sections for parking and drive areas paved with concrete surfacing.

- **For concrete pavement areas**: 5 inches of concrete over 4 inches of CRB

The paving materials used should conform to the WSDOT specifications for HMA, ATB concrete paving, and CRB surfacing (9-03.9(3) Crushed Surfacing).

Long-term pavement performance will depend on surface drainage. A poorly-drained pavement section will be subject to premature failure as a result of surface water infiltrating into the subgrade soils and reducing their supporting capability.

For optimum pavement performance, surface drainage gradients of no less than 2 percent are recommended. Also, some degree of longitudinal and transverse cracking of the pavement surface should be expected over time. Regular maintenance should be planned to seal cracks when they occur.

6.0 Additional Services

RGI is available to provide further geotechnical consultation throughout the design phase of the project. RGI should review the final design and specifications in order to verify that earthwork and foundation recommendations have been properly interpreted and incorporated into project design and construction.

RGI is also available to provide geotechnical engineering and construction monitoring services during construction. The integrity of the earthwork and construction depends on proper site preparation and procedures. In addition, engineering decisions may arise in the field in the event that variations in subsurface conditions become apparent. Construction monitoring services are not part of this scope of work. If these services are desired, please let us know and we will prepare a cost proposal.

7.0 Limitations

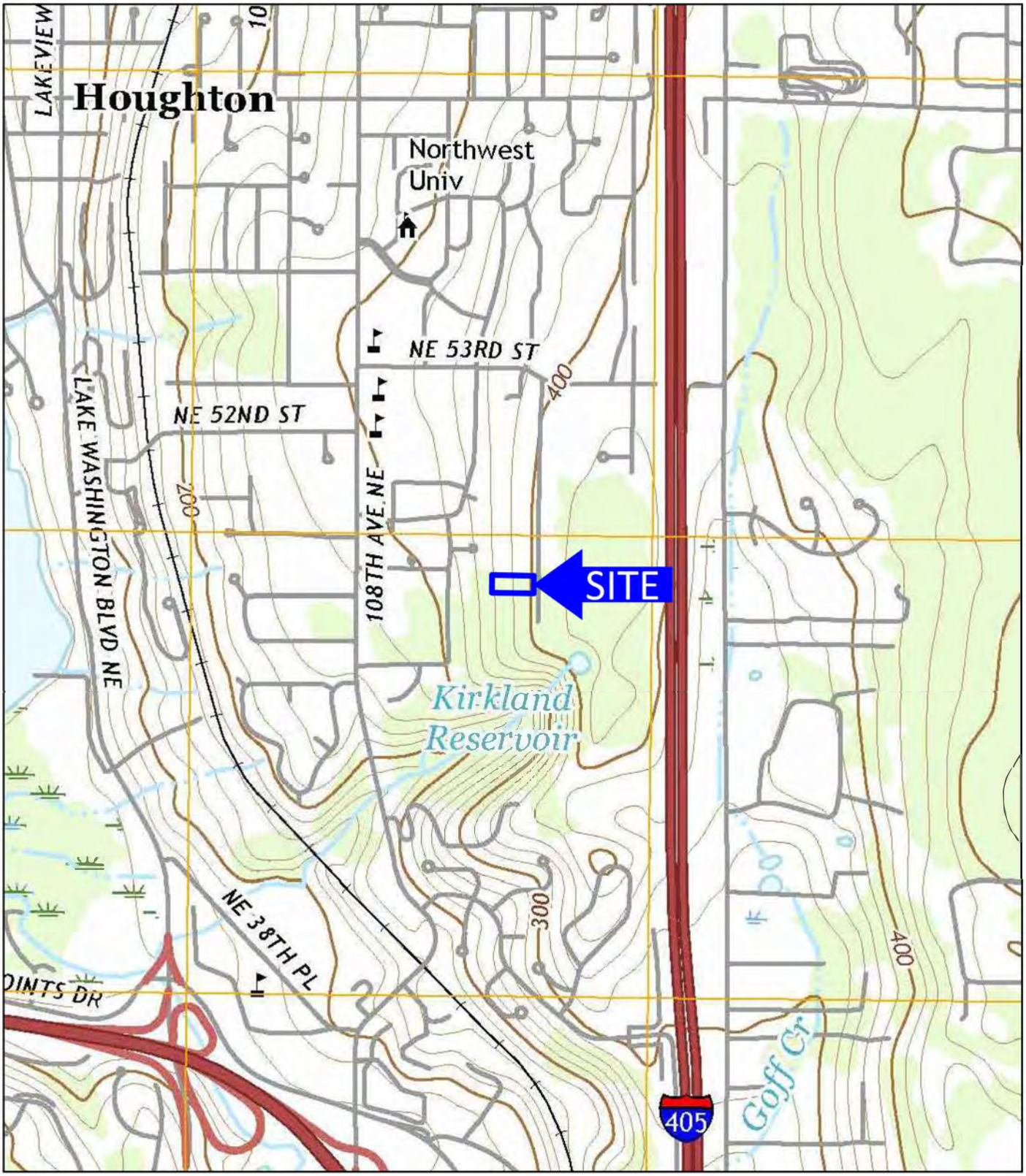
This GER is the property of RGI, DC Granger Homes, and its designated agents. Within the limits of the scope and budget, this GER was prepared in accordance with generally accepted geotechnical engineering practices in the area at the time this GER was issued. This GER is intended for specific application to the Gravity Rides Everything project in Kirkland, Washington, and for the exclusive use of DC Granger Homes and its authorized representatives. No other warranty, expressed or implied, is made. Site safety, excavation support, and dewatering requirements are the responsibility of others.

The scope of services for this project does not include either specifically or by implication any environmental or biological (for example, 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, we can provide a proposal for these services.

The analyses and recommendations presented in this GER are based upon data obtained from the explorations performed on site. Variations in soil conditions can occur, the nature

and extent of which may not become evident until construction. If variations appear evident, RGI should be requested to reevaluate the recommendations in this GER prior to proceeding with construction.

It is the client's responsibility to see that all parties to the project, including the designers, contractors, subcontractors, are made aware of this GER in its entirety. The use of information contained in this GER for bidding purposes should be done at the contractor's option and risk.



USGS, 2017, Kirkland, Washington
7.5-Minute Quadrangle

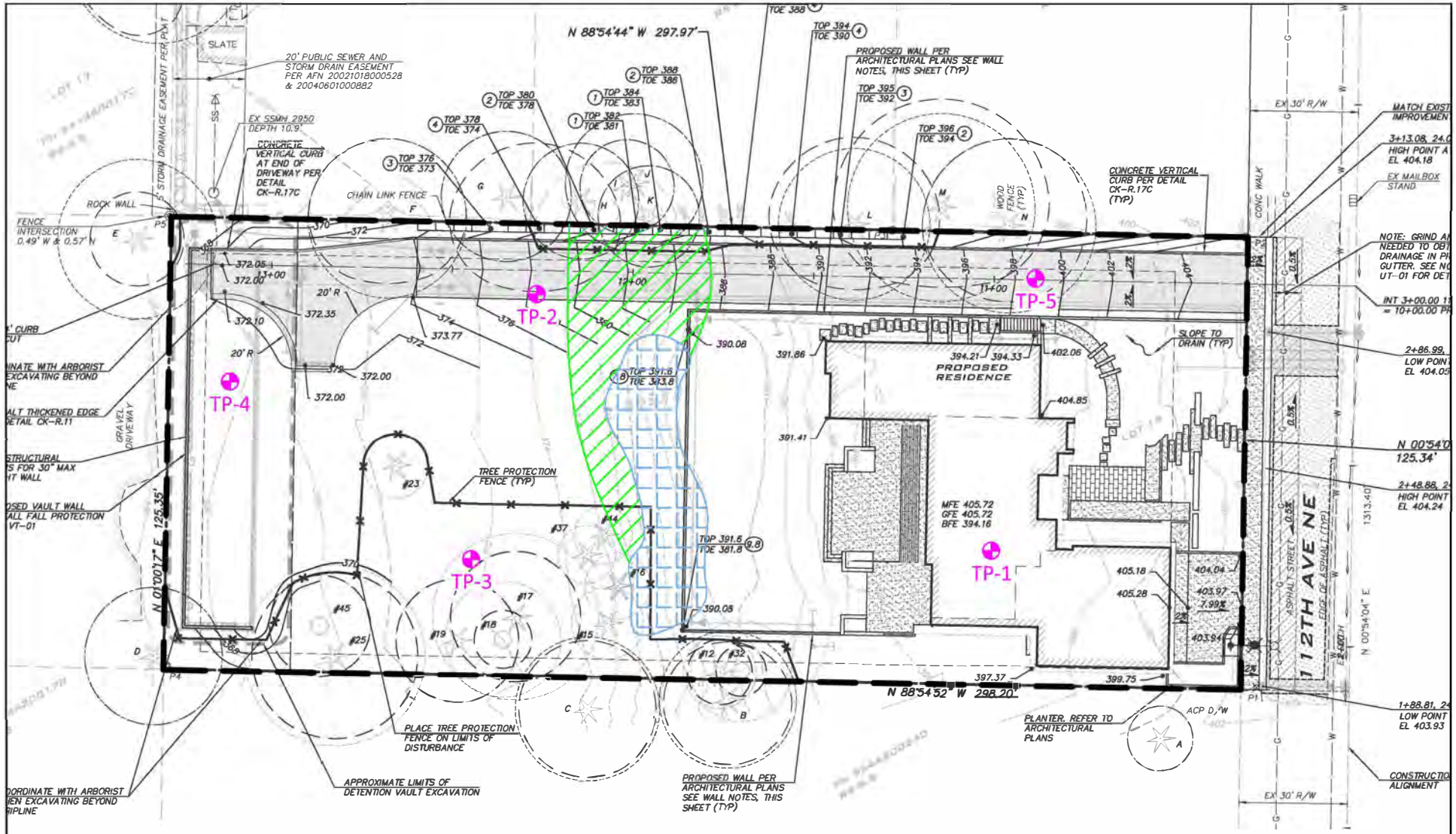
Approximate Scale: 1"=1000'

0 500 1000 2000

N

RILEYGROUP
Corporate Office
17522 Bothell Way Northeast
Bothell, Washington 98011
Phone: 425.415.0551
Fax: 425.415.0311

Blueprint 112th		Figure 1
RGI Project Number 2018-122	Site Vicinity Map	Date Drawn: 04/2020
Address: 4559 112th Avenue Northeast, Kirkland, Washington 98033		



= Slope > 40%

= Slope > 15%

= Test probe by RGI, 5/10/18

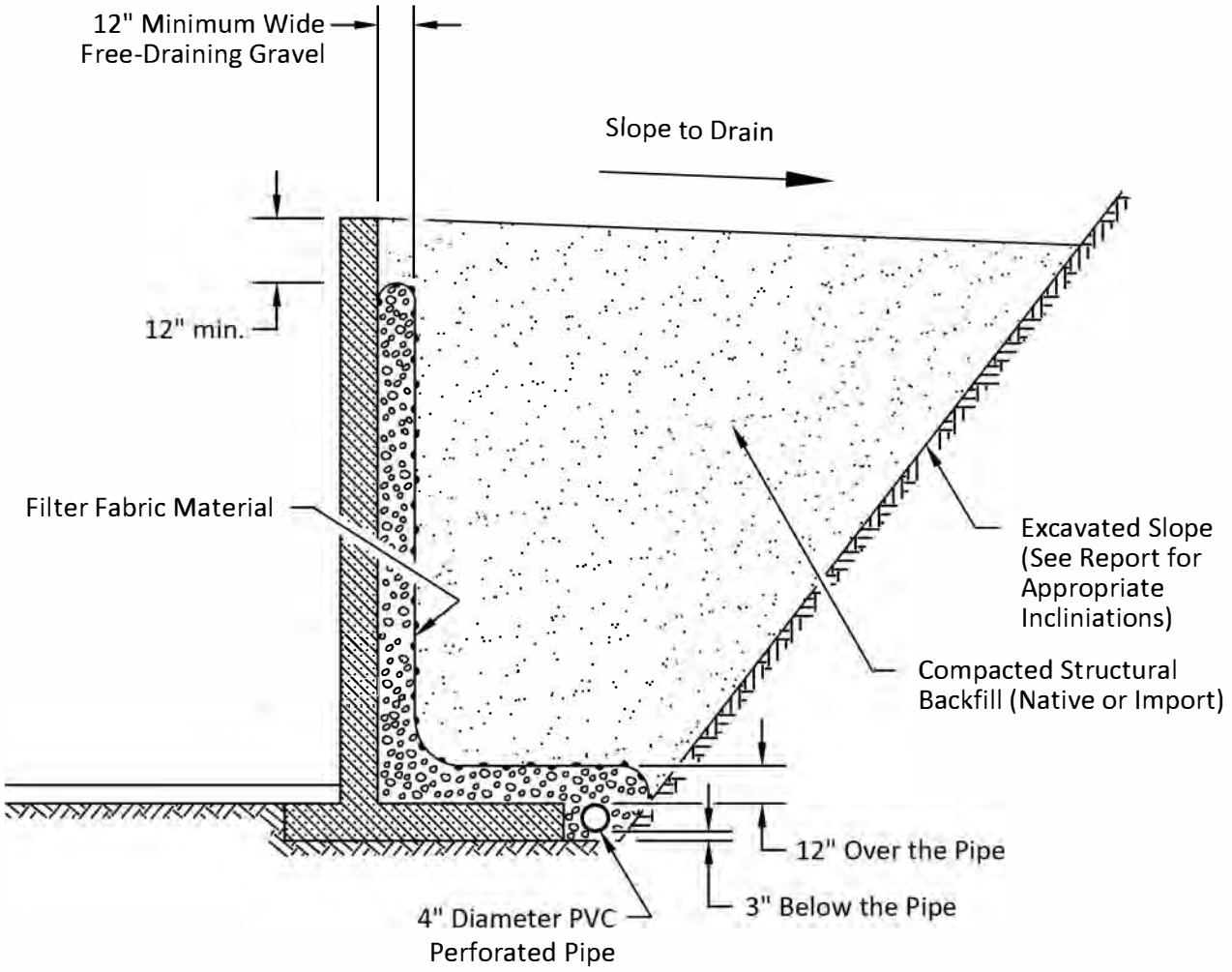
= Site boundary

Approximate Scale: 1"=40'

0 20 40 80

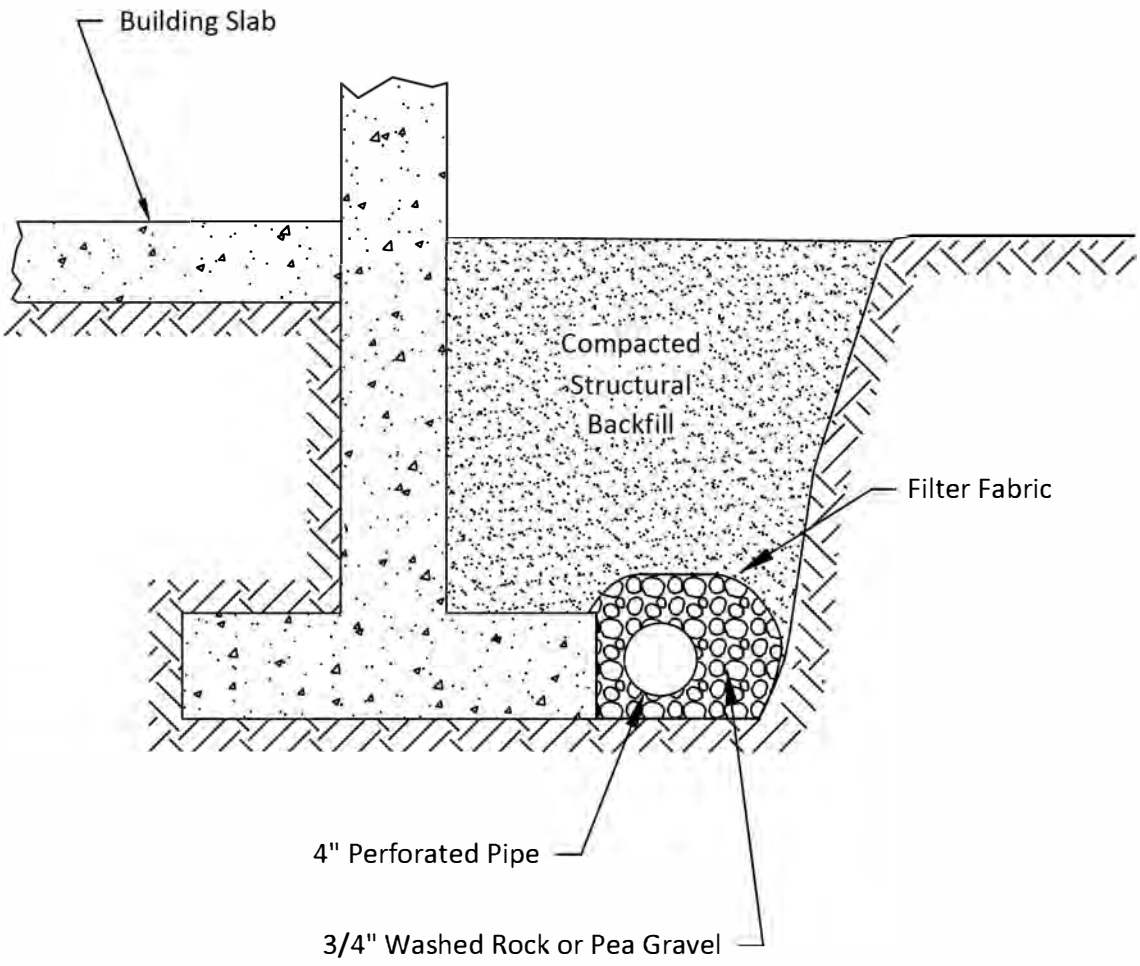
N

Corporate Office 17522 Bothell Way Northeast Bothell, Washington 98011 Phone: 425.415.0551 Fax: 425.415.0311	Blueprint 112th	Figure 2
	RGI Project Number 2018-122	Geotechnical Exploration Plan	Date Drawn: 04/2020
	Address: 4559 112th Avenue Northeast, Kirkland, Washington 98033		



Not to Scale

Corporate Office 17522 Bothell Way Northeast Bothell, Washington 98011 Phone: 425.415.0551 Fax: 425.415.0311	Blueprint 112th	Figure 3
	RGI Project Number 2018-122 / Retaining Wall Drainage Detail	Date Drawn: 04/2020
	Address: 4559 112th Avenue Northeast, Kirkland, Washington 98033	



Not to Scale

Corporate Office 17522 Bothell Way Northeast Bothell, Washington 98011 Phone: 425.415.0551 Fax: 425.415.0311	Blueprint 112th	Figure 4
	RGI Project Number 2018-122 / Typical Footing Drain Detail	Date Drawn: 04/2020
	Address: 4559 112th Avenue Northeast, Kirkland, Washington 98033	

APPENDIX A
FIELD EXPLORATION AND LABORATORY TESTING

On May 10, 2018, RGI performed field explorations using limited access equipment including a pneumatic jack-hammer to drive the steel soil probe rods. We explored subsurface soil conditions at the site by observing the boring of 5 test direct push test probes to a maximum depth of 12 feet below existing grade. The test probes locations are shown on Figure 2. The test probes locations were approximately determined by measurements from existing property lines and paved roads.

A geologist from our office conducted the field exploration and classified the soil conditions encountered, maintained a log of each test exploration, obtained representative soil samples, and observed pertinent site features. All soil samples were visually classified in accordance with the Unified Soil Classification System (USCS).

Representative soil samples obtained from the explorations were placed in closed containers and taken to our laboratory for further examination and testing. As a part of the laboratory testing program, the soil samples were classified in our in house laboratory based on visual observation, texture, plasticity, and the limited laboratory testing described below.

Moisture Content Determinations

Moisture content determinations were performed in accordance with ASTM D2216-10 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass (ASTM D2216) on representative samples obtained from the exploration in order to aid in identification and correlation of soil types. The moisture content of typical sample was measured and is reported on the test probes logs.

Grain Size Analysis

A grain size analysis indicates the range in diameter of soil particles included in a particular sample. Grain size analyses was determined using D6913-04(2009) Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis (ASTM D6913) on two of the samples.

Project Name: **Blueprint 112th** Project Number: **2018-122** Client: **Blueprint Capital Services, LLC**	RILEYGROUP Test Probe No.: **TP-1** **Sheet 1 of 1**

Date(s) Drilled: **05/10/18**	Logged By: **LC**	Surface Conditions: **Top Soil**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type:	Total Depth of Borehole: **12 feet bgs**
Drill Rig Type: **Geoprobe**	Drilling Contractor: **Standard Probe**	Approximate Surface Elevation: **n/a**
Groundwater Level: **Not encountered**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Native Soil**	Location: **4559 112th Avenue Northeast, Kirkland, Washington 98033**	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Brown, silty SAND with gravel and organics, medium dense, moist (fill)	
						Brown, silty SAND with some gravel, very dense, moist, heavily mottled	
					5		
						Brown, SILT with sand, stiff, moist	
					10		
						Test probe terminated 12 feet bgs	
						No groundwater encountered	
					15		

Project Name: **Blueprint 112th** Project Number: **2018-122** Client: **Blueprint Capital Services, LLC**	RILEYGROUP Test Probe No.: **TP-2** **Sheet 1 of 1**

Date(s) Drilled: **05/10/18**	Logged By: **LC**	Surface Conditions: **Top Soil**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type:	Total Depth of Borehole: **11 feet bgs**
Drill Rig Type: **Geoprobe**	Drilling Contractor: **Standard Probe**	Approximate Surface Elevation: **n/a**
Groundwater Level: **Not encountered**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Native Soil**	Location: **4559 112th Avenue Northeast, Kirkland, Washington 98033**	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Dark brown, silty SAND (top soil)	
						Brown, silty, gravelly SAND, medium dense, moist	
					5		
						Some mottling, density increases	
					10		
						Test probe terminated 11 feet bgs	
						No groundwater encountered	
					15		

Project Name: **Blueprint 112th** Project Number: **2018-122** Client: **Blueprint Capital Services, LLC**	RILEYGROUP Test Probe No.: **TP-3** **Sheet 1 of 1**

Date(s) Drilled: **05/10/18**	Logged By: **LC**	Surface Conditions: **Top Soil**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type:	Total Depth of Borehole: **11 feet bgs**
Drill Rig Type: **Geoprobe**	Drilling Contractor: **Standard Probe**	Approximate Surface Elevation: **n/a**
Groundwater Level: **6.7'**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Native Soil**	Location: **4559 112th Avenue Northeast, Kirkland, Washington 98033**	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Top soil	
						Brown, silty, gravelly SAND, loose to medium dense, moist	
					5		
				▽		Density increases	
					10		
						Test probe terminated 11 feet bgs	
						Groundwater encountered 6.7 feet bgs	
					15		

Project Name: **Blueprint 112th** Project Number: **2018-122** Client: **Blueprint Capital Services, LLC**	RILEYGROUP Test Probe No.: **TP-4** **Sheet 1 of 1**

Date(s) Drilled: **05/10/18**	Logged By: **LC**	Surface Conditions: **Top Soil**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type:	Total Depth of Borehole: **11 feet bgs**
Drill Rig Type: **Geoprobe**	Drilling Contractor: **Standard Probe**	Approximate Surface Elevation: **n/a**
Groundwater Level: **6.5'**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Native Soil**	Location: **4559 112th Avenue Northeast, Kirkland, Washington 98033**	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Top soil	
						Brown, silty, gravelly SAND, loose to medium dense, moist	
					5		
				▽			
						Density increases	
					10		
						Test probe terminated 11 feet bgs	
						Groundwater encountered 6.5 feet bgs	
					15		

Project Name: **Blueprint 112th** Project Number: **2018-122** Client: **Blueprint Capital Services, LLC**	RILEYGROUP Test Probe No.: **TP-5** **Sheet 1 of 1**

Date(s) Drilled: **05/10/18**	Logged By: **LC**	Surface Conditions: **Top Soil**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type:	Total Depth of Borehole: **6 feet bgs**
Drill Rig Type: **Geoprobe**	Drilling Contractor: **Standard Probe**	Approximate Surface Elevation: **n/a**
Groundwater Level: **6.5'**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Native Soil**	Location: **4559 112th Avenue Northeast, Kirkland, Washington 98033**	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Top soil	
						Brown, silty SAND with some gravel, dense to very dense, moist (lodgement till)	
					5		
						Test probe terminated 6 feet bgs	
						No groundwater encountered	
					10		
					15		

Project Name: **Blueprint 112th**

Project Number: **2018-122**

Client: **Blueprint Capital Services, LLC**

RILEYGROUP

Boring Log Key

Sheet 1 of 1

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
1	2	3	4	5	6	7	8

COLUMN DESCRIPTIONS

1 PID Reading, ppm: The reading from a photo-ionization detector, in parts per million.
2 Sample ID: Sample identification number.
3 Sample Type: Type of soil sample collected at the depth interval shown.
4 Recovery (percent): Percent Recovery
5 GW Depth: Groundwater depth in feet below the ground surface.
6 Depth (feet): Depth in feet below the ground surface.
7 MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
8 Graphic Log: Graphic depiction of the subsurface material encountered.

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
COMP: Compaction test
CONS: One-dimensional consolidation test
LL: Liquid Limit, percent
PI: Plasticity Index, percent
SA: Sieve analysis (percent passing No. 200 Sieve)
UC: Unconfined compressive strength test, Qu, in ksf
WA: Wash sieve (percent passing No. 200 Sieve)

MATERIAL GRAPHIC SYMBOLS

SILT, SILT w/SAND, SANDY SILT (ML)
Silty SAND (SM)
Poorly graded SAND with Silt (SP-SM)

TYPICAL SAMPLER GRAPHIC SYMBOLS

Auger sampler
Bulk Sample
3-inch-OD California w/ brass rings
CME Sampler
Grab Sample
2.5-inch-OD Modified California w/ brass liners
Pitcher Sample
2-inch-OD unlined split spoon (SPT)
Shelby Tube (Thin-walled, fixed head)

OTHER GRAPHIC SYMBOLS

Water level (at time of drilling, ATD)
Water level (after waiting)
Minor change in material properties within a stratum
Inferred/gradational contact between strata
Queried contact between strata

GENERAL NOTES

1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

THE RILEY GROUP, INC.
17522 Bothell Way NE
Bothell, WA 98011
PHONE: (425) 415-0551
FAX: (425) 415-0311

GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Blueprint 112th - Hydro	SAMPLE ID/TYPE	TP1 / Soil
PROJECT NO.	2018-122	SAMPLE DEPTH	3'
TECH/TEST DATE	LC 5/24	DATE RECEIVED	5/21/2018

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	620.1
Wt Dry Soil & Tare (gm)	(w2)	554.9
Weight of Tare (gm)	(w3)	15.7
Weight of Water (gm)	(w4=w1-w2)	65.2
Weight of Dry Soil (gm)	(w5=w2-w3)	539.2
Moisture Content (%)	(w4/w5)*100	12

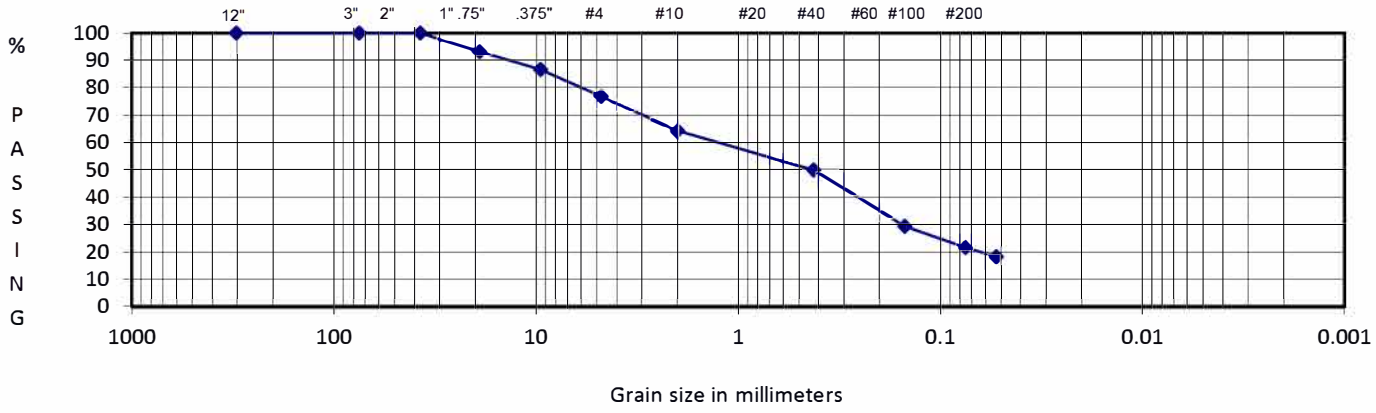
Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

	Weight Of Sample (gm)	554.9
	Tare Weight (gm)	15.7
(W6)	Total Dry Weight (gm)	539.2

% COBBLES	0.0
% C GRAVEL	6.8
% F GRAVEL	16.4
% C SAND	12.5
% M SAND	14.4
% F SAND	28.3
% FINES	21.6
% TOTAL	100.0
D10 (mm)	
D30 (mm)	
D60 (mm)	
Cu	
Cc	

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	15.7	0.00	0.00	100.00	cobbles
3.0"	15.7	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"	15.7	0.00	0.00	100.00	coarse gravel
1.5"	15.7	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	52.2	36.50	6.77	93.23	fine gravel
0.50"					fine gravel
0.375"	87.4	71.70	13.30	86.70	fine gravel
#4	140.5	124.80	23.15	76.85	coarse sand
#10	208.0	192.30	35.66	64.34	medium sand
#20					medium sand
#40	285.5	269.80	50.04	49.96	fine sand
#60					fine sand
#100	396.7	381.00	70.66	29.34	fine sand
#200	438.2	422.50	78.36	21.64	fine sand
#270	456.5	440.80	81.75	18.25	fine sand



DESCRIPTION	Silty SAND with some gravel.
USCS	SM

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THE RILEY GROUP, INC.
17522 Bothell Way NE
Bothell, WA 98011
PHONE: (425) 415-0551
FAX: (425) 415-0311

GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Blueprint 112th - Hydro	SAMPLE ID/TYPE	TP3 / Soil
PROJECT NO.	2018-122	SAMPLE DEPTH	3'
TECH/TEST DATE	LC 5/24	DATE RECEIVED	5/21/2018

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	854.0
Wt Dry Soil & Tare (gm)	(w2)	773.0
Weight of Tare (gm)	(w3)	15.7
Weight of Water (gm)	(w4=w1-w2)	81.0
Weight of Dry Soil (gm)	(w5=w2-w3)	757.3
Moisture Content (%)	(w4/w5)*100	11

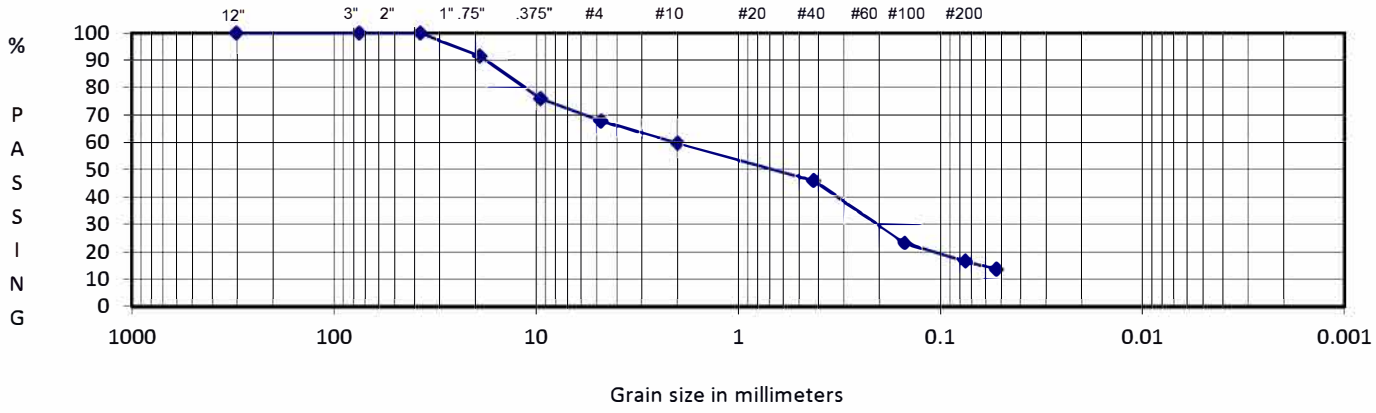
Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

	Weight Of Sample (gm)	773.0
	Tare Weight (gm)	15.7
(W6)	Total Dry Weight (gm)	757.3

% COBBLES	0.0
% C GRAVEL	8.5
% F GRAVEL	23.7
% C SAND	8.0
% M SAND	13.8
% F SAND	29.6
% FINES	16.4
% TOTAL	100.0
D10 (mm)	0.03
D30 (mm)	0.21
D60 (mm)	2
Cu	66.7
Cc	0.7

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	15.7	0.00	0.00	100.00	cobbles
3.0"	15.7	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"	15.7	0.00	0.00	100.00	coarse gravel
1.5"	15.7	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	79.9	64.20	8.48	91.52	fine gravel
0.50"					fine gravel
0.375"	197.4	181.70	23.99	76.01	fine gravel
#4	259.6	243.90	32.21	67.79	coarse sand
#10	320.5	304.80	40.25	59.75	medium sand
#20					medium sand
#40	424.7	409.00	54.01	45.99	fine sand
#60					fine sand
#100	597.1	581.40	76.77	23.23	fine sand
#200	648.6	632.90	83.57	16.43	fine sand
#270	670.1	654.40	86.41	13.59	fine sand



DESCRIPTION	Silty gravelly SAND.
USCS	SM

RILEYGROUP

RILEYGROUP

January 29, 2021

Dominique Ruybal
DGR Development
18323 Bothell-Everett Highway, suite 210
Bothell, Washington 98012

RE: Watershed Cottages
4559 112th Avenue Northeast
Kirkland, Washington
RGI Project No. 2018-122

References: Blueline, Watershed Cottages, Preliminary Plans Sheets CV-01, TR-01, UT-01, UP-01 dated December 23, 2020

The Riley Group, Inc., LID Infiltration Feasibility Study, dated June 5, 2018

The Riley Group, Inc., Geotechnical Engineering Report "Gravity Rides Everything" dated April 29, 2020

As requested, The Riley Group, Inc. (RGI) has reviewed the preliminary plans for the proposed Watershed Cottages development at 4559 112th Avenue Northeast. RGI previous completed a Geotechnical Engineering Report and Low Impact Development/ Infiltration Feasibility Study at the property in support of development of the site by the current owner.

We understand DGR Development is purchasing the property and plans to develop the site with eight detached cottage with a central access road extending from 112th Avenue Northeast westward. (see attached Figure). A stormwater vault is located on the western end of the property as was proposed in the previous site development plans. We understand the project is planning to use permeable pavers with underdrains and walls between the residences for grade changes.

Based on reviewing the preliminary Watershed Cottages plans and referenced reports, the recommendations in our Geotechnical Engineering Report and LID Infiltration Feasibility Study regarding earthwork, foundations, retaining walls, slab-on-grade construction, drainage, utilities, and pavements will support the proposed Watershed Cottages development.

RGI should complete a plan review of the final Watershed Cottages plan set when it is completed.

Respectfully submitted,

THE RILEY GROUP, INC.

KRISTINA MARIE WELLER
STATE OF WASHINGTON
33182
REGISTERED
PROFESSIONAL ENGINEER

1/29/2021

Kristina M. Weller, PE
Principal Geotechnical Engineer

Corporate Office
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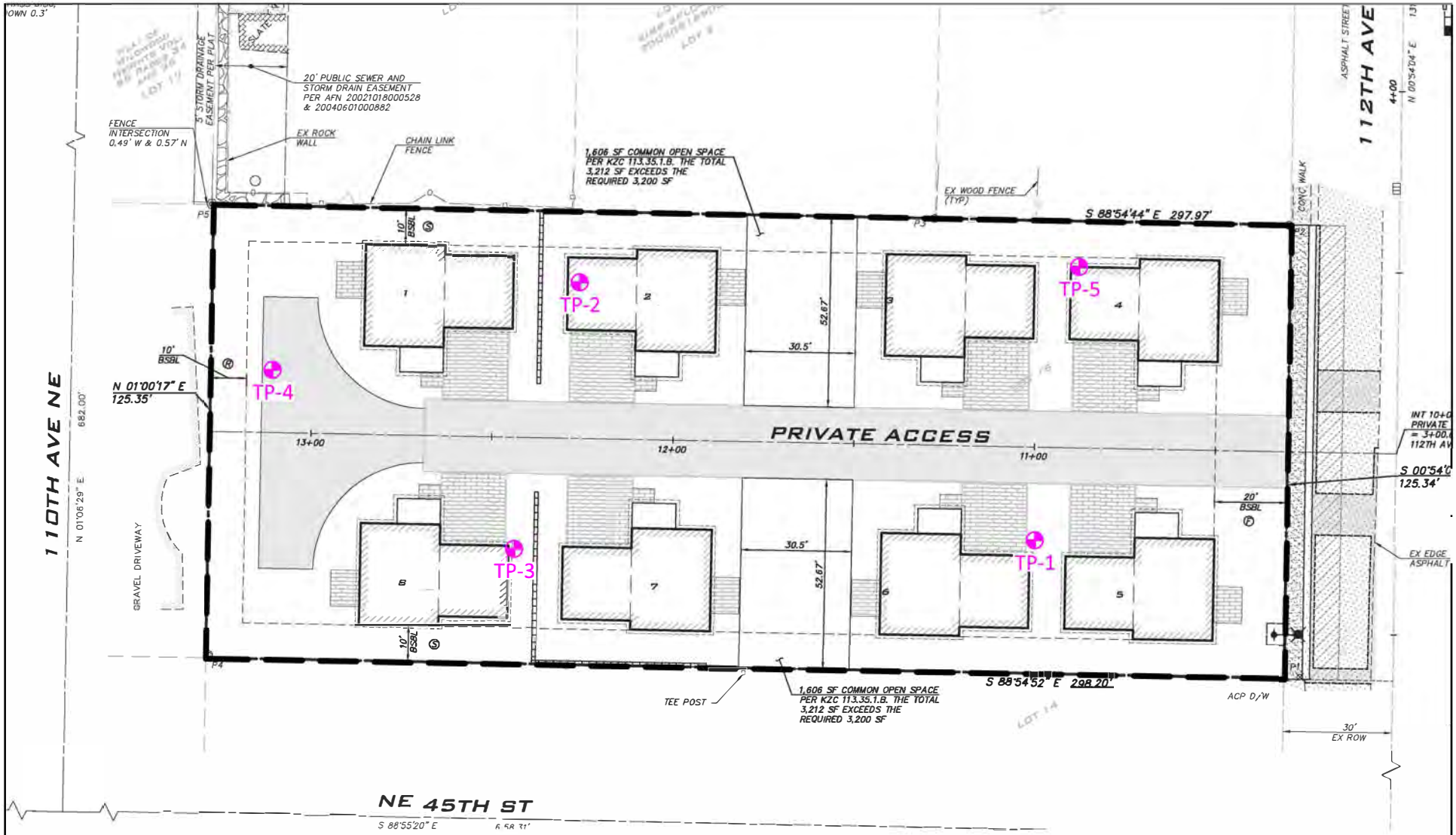

Approximate Scale: 1"=40'

0 20 40 80

N

= Test probe by RGI, 5/10/18

= Site boundary

RILEYGROUP Corporate Office 17522 Bothell Way Northeast Bothell, Washington 98011 Phone: 425.415.0551 Fax: 425.415.0311	Watershed Cottages		Figure 1
	RGI Project Number 2018-122-1	Geotechnical Exploration Plan	Date Drawn: 01/2021
	Address: 4559 112th Avenue Northeast, Kirkland, Washington 98033		

GEOTECHNICAL ENGINEERING REPORT

PREPARED BY:

THE RILEY GROUP, INC.
17522 BOTHELL WAY NORTHEAST
BOTHELL, WASHINGTON 98011

PREPARED FOR:

DC GRANGER HOMES
PO BOX 16438
SEATTLE, WASHINGTON 98116

RGI PROJECT NO. 2018-122

GRAVITY RIDES EVERYTHING
4559 112TH AVENUE NORTHEAST
KIRKLAND, WASHINGTON

APRIL 29, 2020

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RILEYGROUP

April 29, 2020

Mr. Darin Granger
DC Granger Homes
PO Box 16438
Seattle, Washington 98116

Subject: **Geotechnical Engineering Report**
Gravity Rides Everything
4559 112th Avenue Northeast
Kirkland, Washington
RGI Project No. 2018-122

Dear Mr. Granger:

As requested, The Riley Group, Inc. (RGI) has performed a Geotechnical Engineering Report (GER) for the Gravity Rides Everything located at 4559 112th Avenue Northeast, Kirkland, Washington. The information in this GER is based on our understanding of the proposed construction, and the soil and groundwater conditions encountered in the test probes completed by RGI at the site on May 10, 2018.

RGI reviewed the civil plans submitted for the project in preparing this report. RGI recommends that a representative of our firm be present on site during portions of the project construction to confirm that the soil and groundwater conditions are consistent with those that form the basis for the engineering recommendations in this GER.

If you have any questions or require additional information, please contact us.

Respectfully submitted,

THE RILEY GROUP, INC.

KRISTINA MARIE WELLER
STATE OF WASHINGTON
33182
REGISTERED
PROFESSIONAL ENGINEER
4/29/20

FOR:

Elizabeth Wratten, GIT
Project Geologist

Kristina M. Weller, PE
Principal Geotechnical Engineer

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TABLE OF CONTENTS

LIST OF FIGURES AND APPENDICES

Executive Summary

This Executive Summary should be used in conjunction with the entire Geotechnical Engineering Report (GER) for design and/or construction purposes. It should be recognized that specific details were not included or fully developed in this section, and the GER must be read in its entirety for a comprehensive understanding of the items contained herein. Section 7.0 should be read for an understanding of limitations.

RGI's geotechnical scope of work included the advancement of 5 test probes to approximate depths of 12 feet below existing site grades. RGI previously provided a report entitled LID Infiltration Feasibility Study dated June 5, 2018.

Based on the information obtained from our subsurface exploration, the site is suitable for development of the proposed project. The following geotechnical considerations were identified:

Soil Conditions: The soils encountered during field exploration include medium to very dense silty sand with some gravel grading to silty gravely sand (till), overlain by loose to medium dense silty sand with gravel and organics (fill). Underneath the very dense silty sand with gravel, stiff silt with sand was observed in test probe-1.

Groundwater: Light groundwater seepage was encountered at 6.5 feet below ground surface during our subsurface exploration.

Foundations: Foundations for the proposed building may be supported on conventional spread footings bearing on medium dense to dense native soil or structural fill.

Slab-on-grade: Slab-on-grade floors and slabs for the proposed building can be supported on medium dense to dense native soil or structural fill.

Pavements: The following pavement sections are recommended:

- **For the access roadway**: 2 inches of Hot Mix Asphalt (HMA) over 4 inches of Asphalt Treated Base (ATB) over 4 inches of crushed rock base (CRB)
- **For general parking areas**: 2 inches of HMA over 4 inches of CRB
- **For concrete pavement areas**: 5 inches of concrete over 4 inches of CRB

1.0 Introduction

This Geotechnical Engineering Report (GER) presents the results of the geotechnical engineering services provided for the Gravity Rides Everything in Kirkland, Washington. The purpose of this evaluation is to assess subsurface conditions and provide geotechnical recommendations for the construction of a single family residence with a detention vault, and access roadway. Our scope of services included field explorations, laboratory testing, engineering analyses, and preparation of this GER.

The recommendations in the following sections of this GER are based upon our current understanding of the proposed site development as outlined below. If actual features vary or changes are made, RGI should review them in order to modify our recommendations as required. In addition, RGI requests to review the site grading plan, final design drawings and specifications when available to verify that our project understanding is correct and that our recommendations have been properly interpreted and incorporated into the project design and construction.

2.0 Project description

The project site is located at 4559 112th Avenue Northeast in Kirkland, Washington. The approximate location of the site is shown on Figure 1.

The site currently consists of a single family residence with dense vegetation and trees surrounding the building and driveway. The single family residence on the site will be replaced by a new single family residence.

At the time of preparing this GER, building plans were not available for our review. Based on our experience with similar construction, RGI anticipates that the proposed building will be supported on perimeter walls with bearing loads of two to eight kips per linear foot, and a series of columns with a maximum load up to 30 kips. Slab-on-grade floor loading of 250 pounds per square foot (psf) are expected.

3.0 Field Exploration and Laboratory Testing

3.1 Field Exploration

On May 10, 2018, RGI observed the drilling of 5 test probes. The approximate exploration locations are shown on Figure 2.

Field logs of each exploration were prepared by the geotechnical engineer or geologist that continuously observed the drilling. These logs included visual classifications of the materials encountered during drilling as well as our interpretation of the subsurface conditions between samples. The test probes logs included in Appendix A represent an

interpretation of the field logs and include modifications based on laboratory observation and analysis of the samples.

3.2 LABORATORY TESTING

During the field exploration, a representative portion of each recovered sample was sealed in containers and transported to our laboratory for further visual and laboratory examination. Selected samples retrieved from the test probes were tested for moisture content and grain size analysis, to aid in soil classification and provide input for the recommendations provided in this GER. The results and descriptions of the laboratory tests are enclosed in Appendix A.

4.0 Site Conditions

4.1 SURFACE

The subject site is a rectangular-shaped parcel of land approximately 0.86 acres in size. The site is bound to the north, south and west by residential property, and to the east by 112th Avenue Northeast.

The existing site is a single family residence covered by trees and other vegetation. The site slopes down from the east to the west with a steep slope about half way through, the total elevation change is approximately 34 feet, with a third of the elevation change happening in the center of the site.

4.2 GEOLOGY

Review of the *Geologic Map of the Kirkland Quadrangle, Washington,* by J. P. Minard (1983) indicates that the soil in the project vicinity is mapped as Vashon outwash (Qva) which is a nonsorted mixture of dense sand with varying amount of silt, gravel, and cobbles. Vashon till (Qt), is also located nearby, which is light to dark gray, nonsorted, nonstratified mixture of clay, silt, sand, and gravel. The till deposit is generally very stiff and impermeable, often resulting in poorly drained bogs developing in relatively flat area. The deposit is usually 1 to 2 meters thick, but locally can be as much as 25 meters. These descriptions are generally similar to the findings in our field explorations. The soil conditions were variable across the site, to the east very dense silty sand interpreted as Vashon-age lodgement till, to the west dense silty sand and silty gravelly sand.

4.3 SOILS

The soils encountered during field exploration include medium to very dense silty sand with some gravel grading to silty gravely sand (till), overlain by loose to medium dense silty sand with gravel. Underneath the very dense silty sand with gravel, stiff silt with sand was observed in test probe-1.

More detailed descriptions of the subsurface conditions encountered are presented in the test probes included in Appendix A. Sieve analysis was performed on two selected soil samples. Grain size distribution curves are included in Appendix A.

4.4 GROUNDWATER

Light groundwater seepage was encountered 6.5 feet below the ground surface during our subsurface exploration. The groundwater appears to be perched over the top of the dense glacial till layer.

It should be recognized that fluctuations of the groundwater table will occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the explorations were performed. In addition, perched water can develop within seams and layers contained in fill soils or higher permeability soils overlying less permeable soils following periods of heavy or prolonged precipitation. Therefore, groundwater levels during construction or at other times in the future may be higher or lower than the levels indicated on the logs. Groundwater level fluctuations should be considered when developing the design and construction plans for the project.

4.5 SEISMIC CONSIDERATIONS

Based on the International Building Code (IBC), RGI recommends the follow seismic parameters for design.

Table 1 2015/2018 IBC

Parameter	2015 Value	2018 Value
Site Soil Class[1]	D[2]	
Site Latitude	47.6516417	
Site Longitude	-122.1915685	
Short Period Spectral Response Acceleration, S_S (g)	1.27	1.281
1-Second Period Spectral Response Acceleration, S_1 (g)	0.487	0.445
Adjusted Short Period Spectral Response Acceleration, S_{MS} (g)	1.27	1.281
Adjusted 1-Sec Period Spectral Response Acceleration, S_{M1} (g)	0.737	0.826[3]
Numeric seismic design value at 0.2 second; S_{DS}(g)	0.846	0.854
Numeric seismic design value at 1.0 second; S_{M1}(g)	0.492	0.551[3]

1. Note: In general accordance with Chapter 20 of ASCE 7-10 and 7-16, the Site Class is based on the average characteristics of the upper 100 feet of the subsurface profile.

2. Note: ASCE 7-10 and 7-16 require a site soil profile determination extending to a depth of 100 feet for seismic site classification. The current scope of our services does not include the required 100 foot soil profile determination. Test probes extended to a maximum depth of 12 feet, and this seismic site class definition considers that similar soil continues below the maximum depth of the subsurface exploration. Additional exploration to deeper depths would be required to confirm the conditions below the current depth of exploration.

3. Note: In accordance with ASCE 11.4.8, a ground motion hazard analysis is not required for the following cases:

- Structures on Site Class E sites with S_S greater than or equal to 1.0, provided the site coefficient Fa is taken as equal to that of Site Class C.
- Structures on Site Class D sites with S_1 greater than or equal to 0.2, provided that the value of the seismic response coefficient Cs is determined by Eq. 12.8-2 for values of T ≤ 1.5Ts and taken as equal to 1.5 times the value computed in accordance with either Eq. 12.8-3 for $T_L \geq T > 1.5T_s$ or Eq. 12.8-4 for T > TL.
- Structures on Site Class E sites with S_1 greater than or equal to 0.2, provided that T is less than or equal to T_s and the equivalent static force procedure is used for design.

The above exceptions do not apply to seismically isolated structures, structures with damping systems or structures designed using the response history procedures of Chapter 16.

Liquefaction is a phenomenon where there is a reduction or complete loss of soil strength due to an increase in water pressure induced by vibrations from a seismic event. Liquefaction mainly affects geologically recent deposits of fine-grained sands that are below the groundwater table. Soils of this nature derive their strength from intergranular friction. The generated water pressure or pore pressure essentially separates the soil grains and eliminates this intergranular friction, thus reducing or eliminating the soil's strength.

RGI reviewed the results of the field and laboratory testing and assessed the potential for liquefaction of the site's soil during an earthquake. Since the site is underlain by glacial till, RGI considers that the possibility of liquefaction during an earthquake is minimal.

4.6 GEOLOGIC HAZARD AREAS

Regulated geologically hazardous areas include erosion, landslide, earthquake, or other geological hazards. Based on the definition in the Kirkland Zoning Code and City of Kirkland GIS mapping, portions of the site meet the criteria of a landslide hazard area. In order to discuss all of the aspect of the Kirkland Code, the code section and our response to each item is provided in the following section or referenced to the appropriate section of this report.

KZC 85.15.1. A topographic survey of the subject property, or the portion of the subject property specified by the Planning Official, with two (2) foot contour intervals. This mapping shall contain the following information:

a. Delineation of areas containing slopes 15 percent or greater, and identification of slopes 40 percent or greater.
b. Wetlands, streams and lakes on or adjacent to the subject property.
c. The location of storm drainage facilities on the subject property.
d. Existing vegetation, including size and type of significant trees.

Response: The general site topography slopes from east to west, with a total grade change of 34 feet with an elevation of approximately 400 feet along 112th Avenue Northeast to an elevation of approximately 366 feet at the west property line. This overall grade change it equivalent to the slope of 12 percent. There is a steeper grade change in the middle of the site which separates the east and west portions of the site.

The areas of greater than 15 percent and greater than 40 percent slope areas are shown on Figure 2. This area will be regraded to a flat grade less than 15 percent and a retaining wall will be constructed as part of the first home construction as shown on Figure 2.

No wetlands, streams, or lakes are on or adjacent to the property. No storm drainage facilities are located on the slope. The site is wooded with mature trees which show no signs of slope movement.

KZC 85.15.2. A geotechnical investigation, prepared by a geotechnical engineer licensed in Washington State or engineering geologist licensed in Washington State, to determine if a landslide hazard area or seismic hazard area exists on the subject property.

Response: The slope on the central portion of the is mapped as Moderate Susceptibility on the City of Kirkland Landslide Susceptibility Map with small areas mapped as high due to the small area with over 40 percent slope. The majority of the mapped area is less than 15 percent with a small area as shown on Figure 2 with greater than 15 percent slopes and the small area of greater than 40 percent slopes. The greater than 40 percent slope area is general 10 feet in height or less and appears to have been modified to create a flat yard area for the existing house including a small wall. Based on the topography and the subsurface conditions, the potential for landslides on the site in the current condition is low.

The site is mapped as moderate or mixed liquefaction potential on the City of Kirkland Liquefaction Potential Map. Based on the subsurface conditions, in our opinion the potential for liquefaction is low.

KZC 85.15.3. A geotechnical report, prepared by a geotechnical engineer licensed in Washington State or engineering geologist licensed in Washington State, showing and including the following information:

a. A description of how the proposed development will or will not affect slope stability, surface and subsurface drainage, erosion, and seismic hazards on the subject property and other potentially impacted properties.
b. Evidence, if any, of holocene or recent landsliding, sloughing, or soil creep.
c. The location of springs, seeps, or any other surface expression of groundwater, and the location of surface water or evidence of seasonal runoff or groundwater.
d. Identification of existing fill areas.
e. Soil description in accordance with the Unified Soil Classification Systems.
f. Depth to groundwater and estimates of potential seasonal fluctuations, if applicable to the project.
g. Subsurface exploration logs that assess geologic hazards at the site, meaning that soil descriptions on the logs shall be in accordance with the Unified Soil Classification System. In addition, the logs shall also identify each of the geologic units encountered (e.g., fill, Vashon lodgement till, Vashon advance outwash).

h. If the subject property is located within 100 feet of a high landslide hazard area, then a current LiDAR-based shaded relief map of the project area and a discussion of the licensed geotechnical professional interpretation of this mapping must be provided.

i. Results of a quantitative slope stability analysis for any project involving development within a horizontal distance "H" of a high landslide hazard area where "H" is equal to the height of the slope within the high landslide hazard area or 50 feet, whichever is greater. The evaluation of slope stability under seismic conditions shall be based on a horizontal ground acceleration equal to one-half of the peak horizontal ground acceleration with a two (2) percent in 50-year probability of exceedance as defined in the current version of the International Building Code.

j. A discussion of the presence or absence of site features potentially indicative of historic landslide activity or increased risk of future landslide activity. Such features include, but are not limited to, tree trunk deformation, emergent seepage, landslide scarps, tension cracks, reversed slope benches, hummocky topography, vegetation patterns, and area stormwater management practices.

k. Estimate of the magnitude of seismically induced settlement that could occur during a seismic event for any project involving development within a seismic hazard area. Estimation of the magnitude of seismically induced settlement shall be based on a peak horizontal ground acceleration based on a seismic event with a two (2) percent in 50-year probability of exceedance as defined in the current version of the International Building Code. This requirement may be waived if it can be demonstrated that construction methods will mitigate the risk of seismically induced settlement such that there will be no significant impacts to life, health, safety and property.

l. A summary or abstract of the geotechnical report for the property where the development activity is proposed. The abstract shall at a minimum include the type of hazard, extent of the hazard, hazard analysis and geologic conditions.

m. The geotechnical report shall state that the project can be undertaken safely as long as the measures/recommendations of the geotechnical report are incorporated into the project plans.

Response: The central portion of the site where the slope is located will be modified to create a level yard area including a retaining wall for grade changes. The finished grades will be less than 15 percent in this area. This construction will remove the landslide potential area on the site.

There is no indication of landsliding, sloughing or soil creep. No springs, seeps, or any surface expression of groundwater were observed. No surface water was observed. No significant fill soils were observed at the site in our explorations. The soils encountered are interpreted to be Vashon-age advance outwash deposits. Soils at the site are predominantly silty gravelly sand (SM). Groundwater was not encountered on the eastern

1/3 of the property. Perched groundwater seepage was encountered at approximately 6.5 feet on the western portion of the site.

Subsurface logs for test probes TP-1 through TP-5 are attached, soils encountered in all of the test probes consisted of soils interpreted to be of Vashon-age advance outwash deposits. No indication of historic landslide activity or increased risk to future landslide activity was observed.

Given the soil and groundwater conditions and the site topography, in our opinion, the potential for landslides or slope movement are very low. Based on the subsurface conditions, in our opinion the potential for liquefaction is low. Soils at the site are mapped as Alderwood gravelly sandy loam, 8 to 15 percent slopes. These soils may experience severe to very severe erosion hazard when they occur on slopes greater than 15 percent. RGI did not observe any signs of severe/very severe erosion at the site.

The site development can be undertaken safely as long as the measures and recommendations of this geotechnical report are incorporated into the project plans. Based on review of the plans prepared by Blueline dated April 16, 2020, the recommendations have been incorporated into the plans for the project including erosion control and retaining walls for grade changes.

5.0 Discussion and Recommendations

5.1 Geotechnical Considerations

Based on our study, the site is suitable for the proposed construction from a geotechnical standpoint. Foundations for the proposed residences can be supported on conventional spread footings bearing on medium dense to dense native soil or structural fill. Slab-on-grade floors and pavements can be similarly supported.

Detailed recommendations regarding the above issues and other geotechnical design considerations are provided in the following sections. Based on reviewing the plans prepared by Blueline dated April 16, 2020, these recommendations have been incorporated into the civil drawings for the project.

5.2 Earthwork

The earthwork is expected to include installation of erosion control measures, clearing the site areas, excavation and backfilling of the detention vault, installing underground utilities, grading the roadway, and constructing residences on the lots.

5.2.1 Erosion and Sediment Control

Potential sources or causes of erosion and sedimentation depend on construction methods, slope length and gradient, amount of soil exposed and/or disturbed, soil type,

construction sequencing and weather. The impacts on erosion-prone areas can be reduced by implementing an erosion and sedimentation control plan. The plan should be designed in accordance with applicable city and/or county standards.

RGI recommends the following erosion control Best Management Practices (BMPs):

- Scheduling site preparation and grading for the drier summer and early fall months and undertaking activities that expose soil during periods of little or no rainfall
- Retaining existing vegetation whenever feasible
- Establishing a quarry spall construction entrance
- Installing siltation control fencing or anchored straw or coir wattles on the downhill side of work areas
- Covering soil stockpiles with anchored plastic sheeting
- Revegetating or mulching exposed soils with a minimum 3-inch thickness of straw if surfaces will be left undisturbed for more than one day during wet weather or one week in dry weather
- Directing runoff away from exposed soils and slopes
- Minimizing the length and steepness of slopes with exposed soils and cover excavation surfaces with anchored plastic sheeting (Graded and disturbed slopes should be tracked in place with the equipment running perpendicular to the slope contours so that the track marks provide a texture to help resist erosion and channeling. Some sloughing and raveling of slopes with exposed or disturbed soil should be expected.)
- Decreasing runoff velocities with check dams, straw bales or coir wattles
- Confining sediment to the project site
- Inspecting and maintaining erosion and sediment control measures frequently (The contractor should be aware that inspection and maintenance of erosion control BMPs is critical toward their satisfactory performance. Repair and/or replacement of dysfunctional erosion control elements should be anticipated.)

Permanent erosion protection should be provided by reestablishing vegetation using hydroseeding and/or landscape planting. Until the permanent erosion protection is established, site monitoring should be performed by qualified personnel to evaluate the effectiveness of the erosion control measures. Provisions for modifications to the erosion control system based on monitoring observations should be included in the erosion and sedimentation control plan.

5.2.2 Stripping

Stripping efforts should include removal of pavements, vegetation, organic materials, and deleterious debris from areas slated for building, pavement, and utility construction. The test probes encountered 6-12 inches of topsoil and rootmass. Deeper areas of stripping may be required in forested or heavily vegetated areas of the site.

5.2.3 EXCAVATIONS

All temporary cut slopes associated with the site and utility excavations should be adequately inclined to prevent sloughing and collapse. The site soils consist mostly of medium to very dense silty gravely sand, though this does vary slightly over the site.

Accordingly, for excavations more than 4 feet but less than 20 feet in depth, the temporary side slopes should be laid back with a minimum slope inclination of 1H:1V (Horizontal:Vertical). If there is insufficient room to complete the excavations in this manner, or excavations greater than 20 feet in depth are planned, using temporary shoring to support the excavations should be considered. For open cuts at the site, RGI recommends:

- No traffic, construction equipment, stockpiles or building supplies are allowed at the top of cut slopes within a distance of at least five feet from the top of the cut
- Exposed soil along the slope is protected from surface erosion using waterproof tarps and/or plastic sheeting
- Construction activities are scheduled so that the length of time the temporary cut is left open is minimized
- Surface water is diverted away from the excavation
- The general condition of slopes should be observed periodically by a geotechnical engineer to confirm adequate stability and erosion control measures

In all cases, however, appropriate inclinations will depend on the actual soil and groundwater conditions encountered during earthwork. Ultimately, the site contractor must be responsible for maintaining safe excavation slopes that comply with applicable OSHA or WISHA guidelines.

5.2.4 SITE PREPARATION

RGI anticipates that some areas of loose or soft soil will be exposed upon completion of stripping and grubbing. Proofrolling and subgrade verification should be considered an essential step in site preparation. After stripping, grubbing, and prior to placement of structural fill, RGI recommends proofrolling building and pavement subgrades and areas to receive structural fill. These areas should moisture conditioned and compacted to a firm and unyielding condition in order to achieve a minimum compaction level of 95 percent of the modified proctor maximum dry density as determined by the American Society of Testing and Materials D1557-09 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (ASTM D1557).

Proofrolling and adequate subgrade compaction can only be achieved when the soils are within approximately ± 2 percent moisture content of the optimum moisture content. Soils which appear firm after stripping and grubbing may be proofrolled with a heavy compactor, loaded double-axle dump truck, or other heavy equipment under the observation of an RGI

representative. This observer will assess the subgrade conditions prior to filling. The need for or advisability of proofrolling due to soil moisture conditions should be determined at the time of construction. In wet areas it may be necessary to hand probe the exposed subgrades in lieu of proofrolling with mechanical equipment.

Subgrade soils that become disturbed due to elevated moisture conditions should be overexcavated to reveal firm, non-yielding, non-organic soils and backfilled with compacted structural fill. In order to maximize utilization of site soils as structural fill, RGI recommends that the earthwork portion of this project be completed during extended periods of warm and dry weather if possible. If earthwork is completed during the wet season (typically November through May) it will be necessary to take extra precautionary measures to protect subgrade soils. Wet season earthwork will require additional mitigative measures beyond that which would be expected during the drier summer and fall months.

5.2.5 STRUCTURAL FILL

Once stripping, clearing and other preparing operations are complete, cuts and fills can be made to establish desired lot and roadway grades. Prior to placing fill, RGI recommends proof-rolling as described above.

RGI recommends fill below the foundation and floor slab, behind retaining walls, and below pavement and hardscape surfaces be placed in accordance with the following recommendations for structural fill. The structural fill should be placed after completion of site preparation procedures as described above.

The suitability of excavated site soils and import soils for compacted structural fill use will depend on the gradation and moisture content of the soil when it is placed. As the amount of fines (that portion passing the U.S. No. 200 sieve) increases, soil becomes increasingly sensitive to small changes in moisture content and adequate compaction becomes more difficult or impossible to achieve. Soils containing more than about 5 percent fines cannot be consistently compacted to a dense, non-yielding condition when the moisture content is more than 2 percent above or below optimum. Optimum moisture content is that moisture that results in the greatest compacted dry density with a specified compactive effort.

Non-organic site soils are only considered suitable for structural fill provided that their moisture content is within about two percent of the optimum moisture level as determined by ASTM D1557. Excavated site soils may not be suitable for re-use as structural fill depending on the moisture content and weather conditions at the time of construction. If soils are stockpiled for future reuse and wet weather is anticipated, the stockpile should be protected with plastic sheeting that is securely anchored. Even during dry weather, moisture conditioning (such as, windrowing and drying) of site soils to be reused as structural fill may be required.

Even during the summer, delays in grading can occur due to excessively high moisture conditions of the soils or due to precipitation. If wet weather occurs, the upper wetted portion of the site soils may need to be scarified and allowed to dry prior to further earthwork, or may need to be wasted from the site.

The site soils are moisture sensitive and may require moisture conditioning prior to use as structural fill. If on-site soils are or become unusable, it may become necessary to import clean, granular soils to complete site work that meet the grading requirements listed in Table 2 to be used as structural fill.

Table 2 Structural Fill Gradation

U.S. Sieve Size	Percent Passing
4 inches	100
No. 4 sieve	22 to 100
No. 200 sieve	0 to 5*

*Based on minus 3/4 inch fraction.

Prior to use, an RGI representative should observe and test all materials imported to the site for use as structural fill. Structural fill materials should be placed in uniform loose layers not exceeding 12 inches and compacted as specified in Table 3. The soil's maximum density and optimum moisture should be determined by ASTM D1557.

Table 3 Structural Fill Compaction ASTM D1557

Location	Material Type	Minimum Compaction Percentage	Moisture Content Range	
Foundations	On-site granular or approved imported fill soils:	95	+2	-2
Retaining Wall Backfill	On-site granular or approved imported fill soils:	92	+2	-2
Slab-on-grade	On-site granular or approved imported fill soils:	95	+2	-2
General Fill (non-structural areas)	On-site soils or approved imported fill soils:	90	+3	-2
Pavement – Subgrade and Base Course	On-site granular or approved imported fill soils:	95	+2	-2

Placement and compaction of structural fill should be observed by RGI. A representative number of in-place density tests should be performed as the fill is being placed to confirm that the recommended level of compaction is achieved.

5.2.6 Cut and Fill Slopes

All permanent cut and fill slopes should be graded with a finished inclination no greater than 2H:1V. Upon completion of construction, the slope face should be trackwalked, compacted and vegetated, or provided with other physical means to guard against erosion. All fill placed for slope construction should meet the structural fill requirements as described in Section 5.2.5.

Final grades at the top of the slopes must promote surface drainage away from the slope crest. Water must not be allowed to flow in an uncontrolled fashion over the slope face. If it is necessary to direct surface runoff towards the slope, it should be controlled at the top of the slope, piped in a closed conduit installed on the slope face, and taken to an appropriate point of discharge beyond the toe of the slope.

5.2.7 Wet Weather Construction Considerations

RGI recommends that preparation for site grading and construction include procedures intended to drain ponded water, control surface water runoff, and to collect shallow subsurface seepage zones in excavations where encountered. It will not be possible to successfully compact the subgrade or utilize on-site soils as structural fill if accumulated water is not drained prior to grading or if drainage is not controlled during construction. Attempting to grade the site without adequate drainage control measures will reduce the amount of on-site soil effectively available for use, increase the amount of select import fill materials required, and ultimately increase the cost of the earthwork phases of the project. Free water should not be allowed to pond on the subgrade soils. RGI anticipates that the use of berms and shallow drainage ditches, with sumps and pumps in utility trenches, will be required for surface water control during wet weather and/or wet site conditions.

5.3 Foundations

Following site preparation and grading, the proposed residence foundations can be supported on conventional spread footings bearing on medium dense to dense native soil or structural fill. Loose, organic, or other unsuitable soils may be encountered in the proposed building footprint. If unsuitable soils are encountered, they should be overexcavated and backfilled with structural fill. If loose soils are encountered, the soils should be moisture conditioned and compacted to the requirements of structural fill.

Perimeter foundations exposed to weather should be at a minimum depth of 18 inches below final exterior grades. Interior foundations can be constructed at any convenient depth below the floor slab. Finished grade is defined as the lowest adjacent grade within 5 feet of the foundation for perimeter (or exterior) footings and finished floor level for interior footings.

Table 4 Foundation Design

Design Parameter	Value
Allowable Bearing Capacity	2,500 psf[1]
Friction Coefficient	0.30
Passive pressure (equivalent fluid pressure)	250 pcf[2]
Minimum foundation dimensions	Columns: 24 inches Walls: 16 inches

1. psf = pounds per square foot
2. pcf = pounds per cubic foot

The allowable foundation bearing pressures apply to dead loads plus design live load conditions. For short-term loads, such as wind and seismic, a 1/3 increase in this allowable capacity may be used. At perimeter locations, RGI recommends not including the upper 12 inches of soil in the computation of passive pressures because they can be affected by weather or disturbed by future grading activity. The passive pressure value assumes the foundation will be constructed neat against competent soil or backfilled with structural fill as described in Section 5.2.5. The recommended base friction and passive resistance value includes a safety factor of about 1.5.

With spread footing foundations designed in accordance with the recommendations in this section, maximum total and differential post-construction settlements of 1 inch and 1/2 inch, respectively, should be expected.

5.4 RETAINING WALLS

If retaining walls are needed for the residences or for the detention vault, RGI recommends cast-in-place concrete walls be used. Modular block wall may be used for grade changes outside of the proposed structures consisting either gravity or geogrid reinforced walls.

The magnitude of earth pressure development on cast in place retaining walls will partly depend on the quality of the wall backfill. RGI recommends placing and compacting wall backfill as structural fill. Wall drainage will be needed behind the wall face. A typical retaining wall drainage detail is shown in Figure 3.

With wall backfill placed and compacted as recommended, and drainage properly installed, RGI recommends using the values in the following table for cast in place retaining wall design. The subgrade for the detention vault is expected to consist of dense native soils and the higher bearing capacity may be used for the vault foundation deign. The vault drainage should be tied into the storm system downstream of the vault as shown on Sheet 7 of the plans.

Table 5 Retaining Wall Design

Design Parameter	Value
Allowable Bearing Capacity - Structural Fill Dense native soils	2,500 psf 4,000 psf
Active Earth Pressure (unrestrained walls)	35 pcf
At-rest Earth Pressure (restrained walls)	50 pcf

For seismic design, an additional uniform load of 7 times the wall height (H) for unrestrained walls and 14H in psf for restrained walls should be applied to the wall surface. Friction at the base of foundations and passive earth pressure will provide resistance to these lateral loads. Values for these parameters are provided in Section 5.3.

5.5 Slab-on-Grade Construction

Once site preparation has been completed as described in Section 5.2, suitable support for slab-on-grade construction should be provided. RGI recommends that the concrete slab be placed on top of medium dense native soil or structural fill. Immediately below the floor slab, RGI recommends placing a four-inch thick capillary break layer of clean, free-draining sand or gravel that has less than five percent passing the U.S. No. 200 sieve. This material will reduce the potential for upward capillary movement of water through the underlying soil and subsequent wetting of the floor slab. Where moisture by vapor transmission is undesirable, an 8- to 10-millimeter thick plastic membrane should be placed on a 4-inch thick layer of clean gravel.

For the anticipated floor slab loading, we estimate post-construction floor settlements of 1/4- to 1/2-inch. For thickness design of the slab subjected to point loading from storage racks and fork lift vehicle traffic, RGI recommends using a subgrade modulus (K_S) of 150 pounds per square inch per inch of deflection.

5.6 Drainage

5.6.1 Surface

Final exterior grades should promote free and positive drainage away from the building area. Water must not be allowed to pond or collect adjacent to foundations or within the immediate building area. For non-pavement locations, RGI recommends providing a minimum drainage gradient of 3 percent for a minimum distance of 10 feet from the building perimeter. In paved locations, a minimum gradient of 1 percent should be provided unless provisions are included for collection and disposal of surface water adjacent to the structure.

5.6.2 SUBSURFACE

RGI recommends installing perimeter foundation drains. A typical footing drain detail is shown on Figure 4. The foundation drains and roof downspouts should be tightlined separately to an approved discharge facility. Subsurface drains must be laid with a gradient sufficient to promote positive flow to a controlled point of approved discharge.

5.6.3 INFILTRATION

The site infiltration evaluation was provided under separate cover.

5.7 UTILITIES

Utility pipes should be bedded and backfilled in accordance with American Public Works Association (APWA) specifications. For site utilities located within the right-of-ways, bedding and backfill should be completed in accordance with City of Kirkland specifications. At a minimum, trench backfill should be placed and compacted as structural fill, as described in Section 5.2.5. Where utilities occur below unimproved areas, the degree of compaction can be reduced to a minimum of 90 percent of the soil's maximum density as determined by the referenced ASTM D1557. As noted, soils excavated on site will be suitable for use as backfill material proved the soils can be moisture conditioned. Imported structural fill meeting the gradation provided in Table 2 may be necessary for trench backfill if the native soils cannot be moisture conditioned or if the backfill take place in wet weather.

5.8 PAVEMENTS

Pavement subgrades should be prepared as described in Section 5.2 and as discussed below. Regardless of the relative compaction achieved, the subgrade must be firm and relatively unyielding before paving. The subgrade should be proof-rolled with heavy construction equipment to verify this condition.

5.8.1 FLEXIBLE PAVEMENTS

With the pavement subgrade prepared as described above, RGI recommends the following pavement sections for parking and drive areas paved with flexible asphalt concrete surfacing.

- **For access roadway areas**: 2 inches of Hot Mix Asphalt (HMA) over 4 inches of Asphalt Treated Base (ATB) over 4 inches of crushed rock base (CRB)

5.8.2 CONCRETE PAVEMENTS

With the pavement subgrade prepared as described above, RGI recommends the following pavement sections for parking and drive areas paved with concrete surfacing.

- **For concrete pavement areas**: 5 inches of concrete over 4 inches of CRB

The paving materials used should conform to the WSDOT specifications for HMA, ATB concrete paving, and CRB surfacing (9-03.9(3) Crushed Surfacing).

Long-term pavement performance will depend on surface drainage. A poorly-drained pavement section will be subject to premature failure as a result of surface water infiltrating into the subgrade soils and reducing their supporting capability.

For optimum pavement performance, surface drainage gradients of no less than 2 percent are recommended. Also, some degree of longitudinal and transverse cracking of the pavement surface should be expected over time. Regular maintenance should be planned to seal cracks when they occur.

6.0 Additional Services

RGI is available to provide further geotechnical consultation throughout the design phase of the project. RGI should review the final design and specifications in order to verify that earthwork and foundation recommendations have been properly interpreted and incorporated into project design and construction.

RGI is also available to provide geotechnical engineering and construction monitoring services during construction. The integrity of the earthwork and construction depends on proper site preparation and procedures. In addition, engineering decisions may arise in the field in the event that variations in subsurface conditions become apparent. Construction monitoring services are not part of this scope of work. If these services are desired, please let us know and we will prepare a cost proposal.

7.0 Limitations

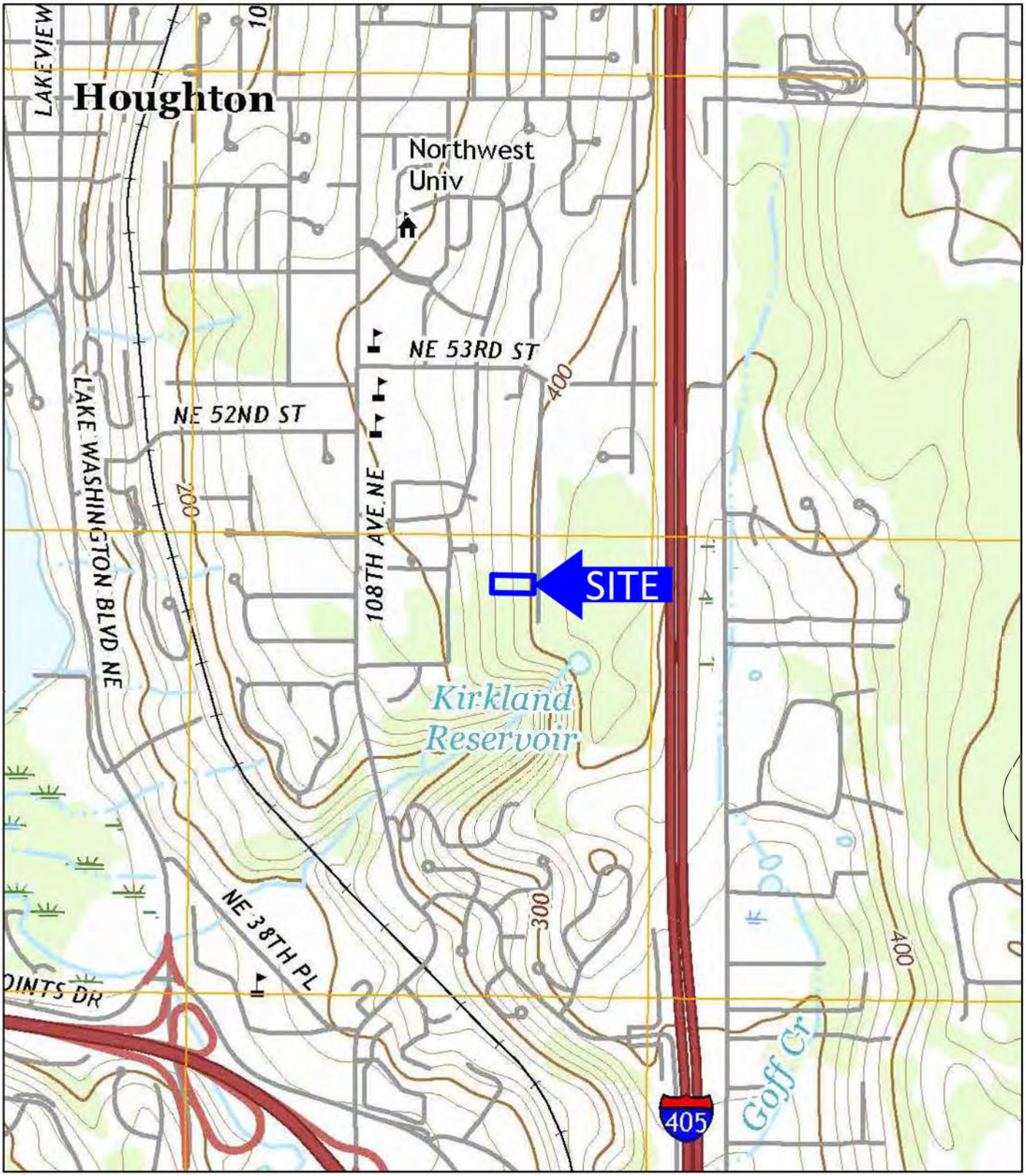
This GER is the property of RGI, DC Granger Homes, and its designated agents. Within the limits of the scope and budget, this GER was prepared in accordance with generally accepted geotechnical engineering practices in the area at the time this GER was issued. This GER is intended for specific application to the Gravity Rides Everything project in Kirkland, Washington, and for the exclusive use of DC Granger Homes and its authorized representatives. No other warranty, expressed or implied, is made. Site safety, excavation support, and dewatering requirements are the responsibility of others.

The scope of services for this project does not include either specifically or by implication any environmental or biological (for example, 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, we can provide a proposal for these services.

The analyses and recommendations presented in this GER are based upon data obtained from the explorations performed on site. Variations in soil conditions can occur, the nature

and extent of which may not become evident until construction. If variations appear evident, RGI should be requested to reevaluate the recommendations in this GER prior to proceeding with construction.

It is the client's responsibility to see that all parties to the project, including the designers, contractors, subcontractors, are made aware of this GER in its entirety. The use of information contained in this GER for bidding purposes should be done at the contractor's option and risk.



USGS, 2017, Kirkland, Washington
7.5-Minute Quadrangle

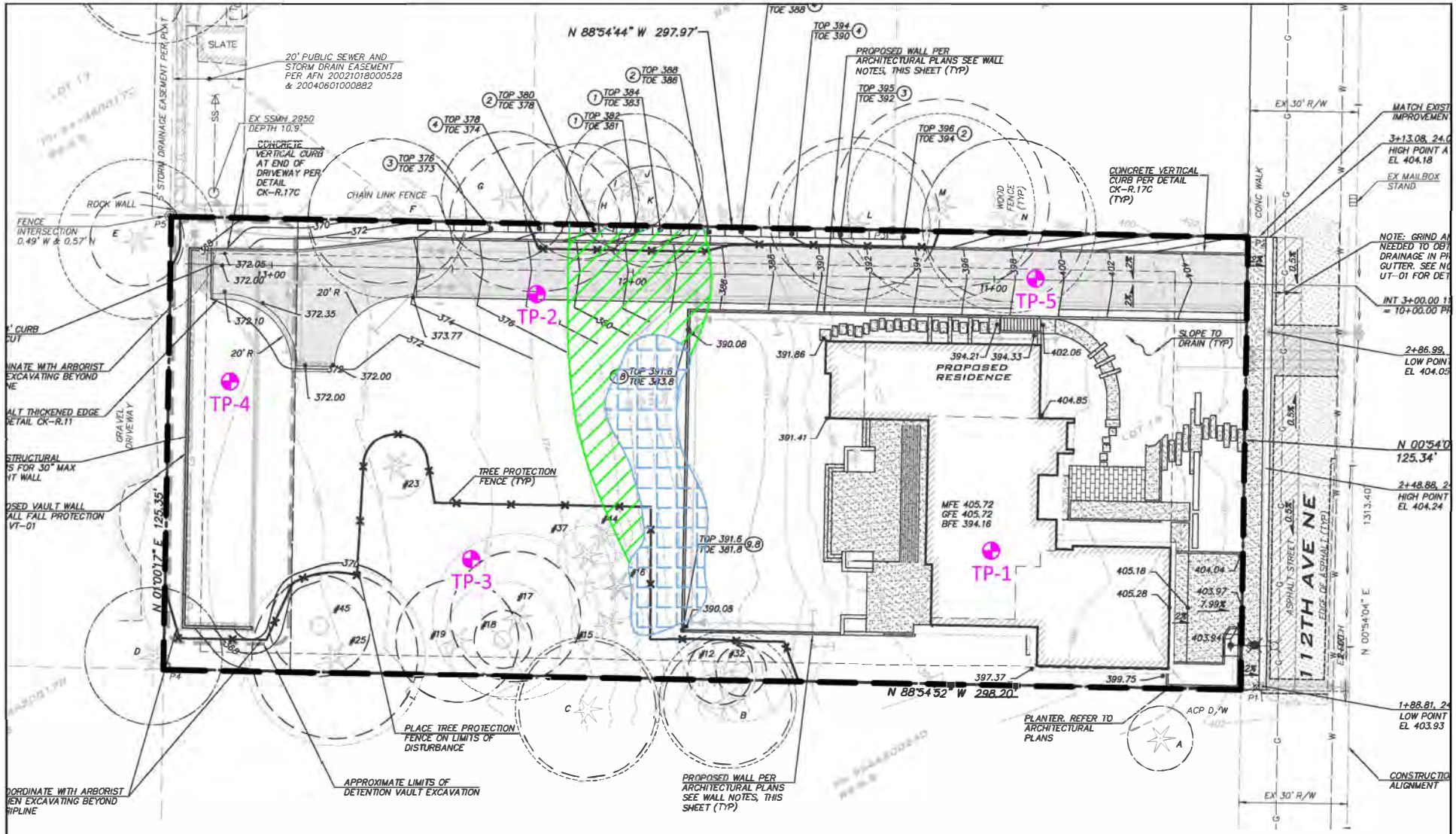
Approximate Scale: 1"=1000'

0 500 1000 2000

N

RILEYGROUP
Corporate Office
17522 Bothell Way Northeast
Bothell, Washington 98011
Phone: 425.415.0551
Fax: 425.415.0311

Blueprint 112th		Figure 1
RGI Project Number 2018-122	Site Vicinity Map	Date Drawn: 04/2020
Address: 4559 112th Avenue Northeast, Kirkland, Washington 98033		



= Slope > 40%

= Slope > 15%

= Test probe by RGI, 5/10/18

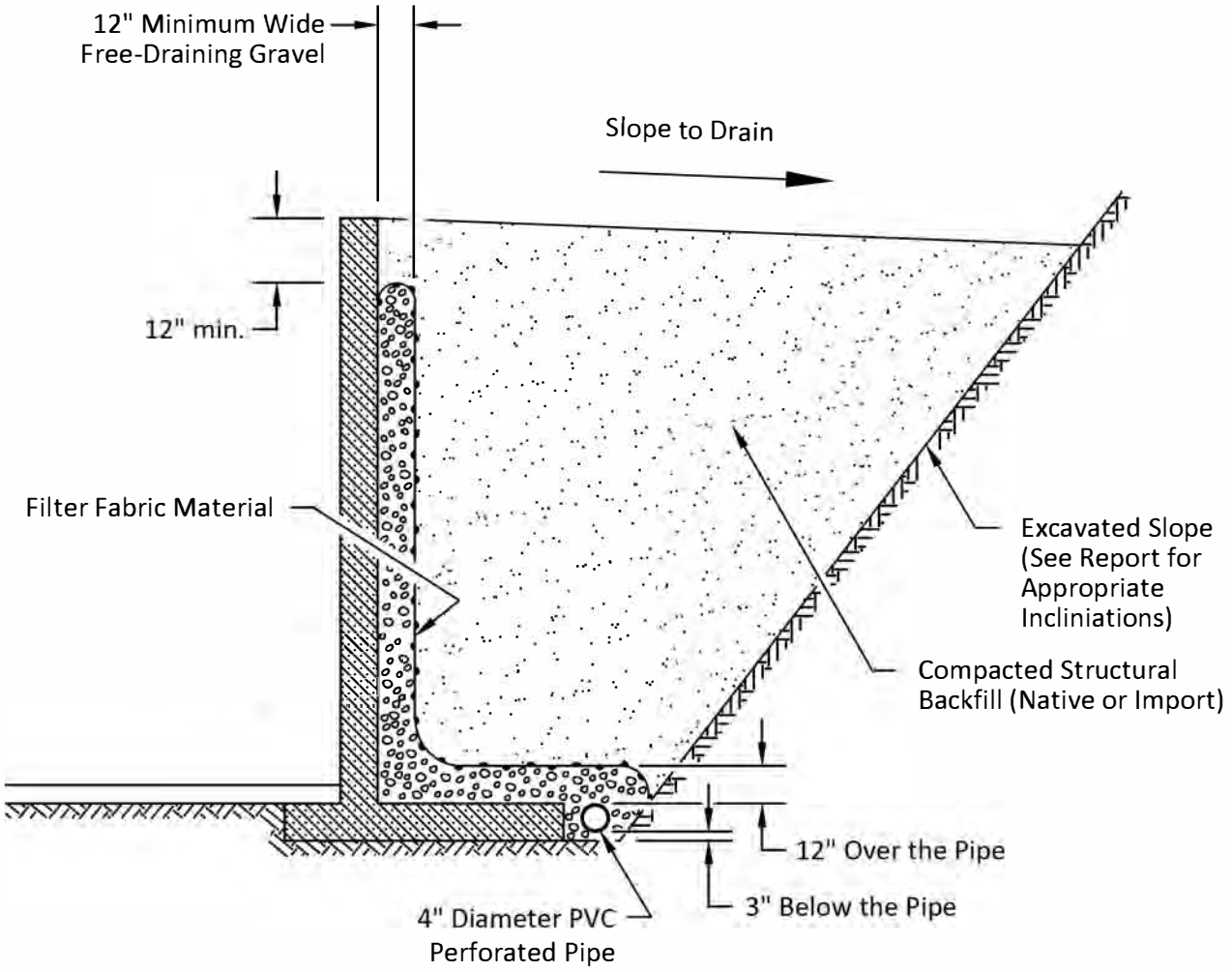
= Site boundary

Approximate Scale: 1"=40'

0 20 40 80

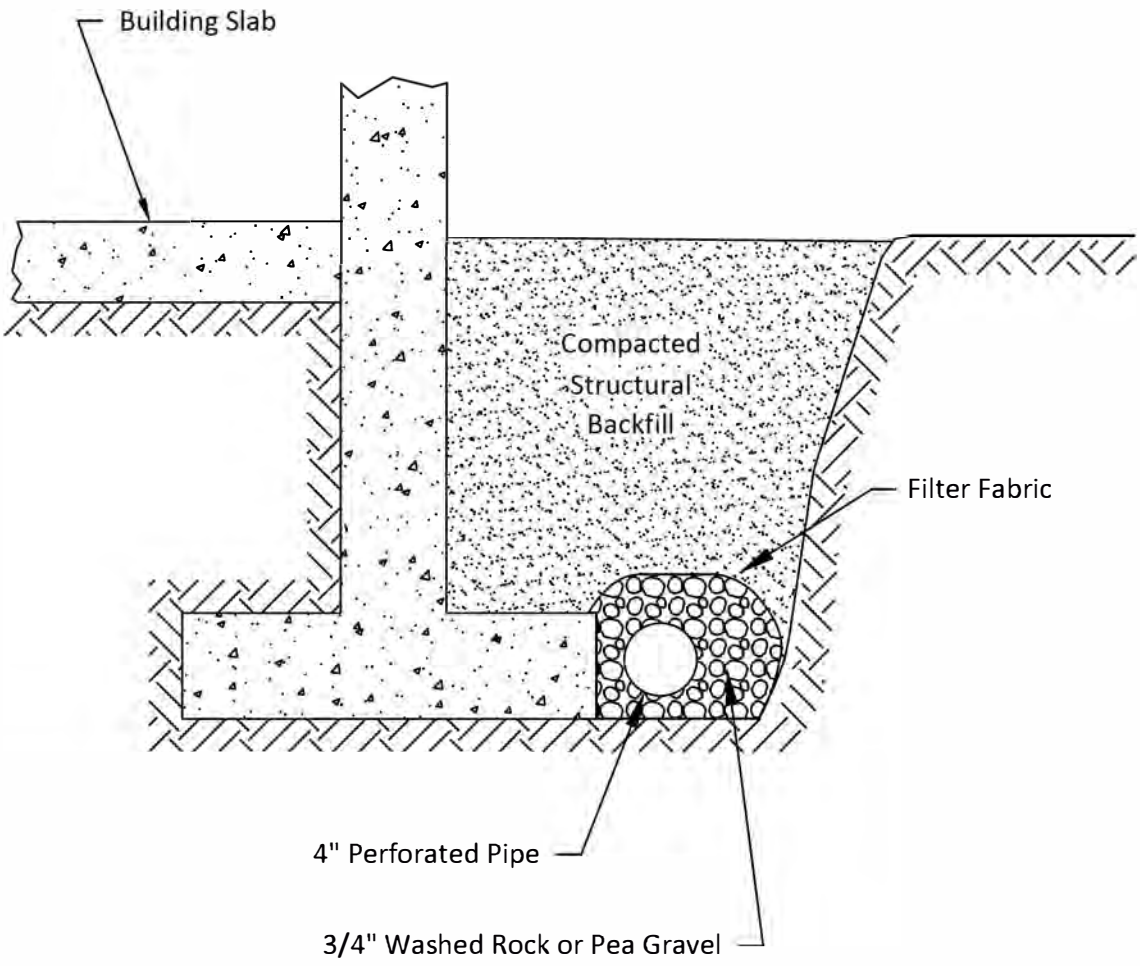
N

Corporate Office 17522 Bothell Way Northeast Bothell, Washington 98011 Phone: 425.415.0551 Fax: 425.415.0311	Blueprint 112th	Figure 2
	RGI Project Number 2018-122	Geotechnical Exploration Plan	Date Drawn: 04/2020
	Address: 4559 112th Avenue Northeast, Kirkland, Washington 98033		



Not to Scale

Corporate Office 17522 Bothell Way Northeast Bothell, Washington 98011 Phone: 425.415.0551 Fax: 425.415.0311	Blueprint 112th	Figure 3
	RGI Project Number 2018-122 / Retaining Wall Drainage Detail	Date Drawn: 04/2020
	Address: 4559 112th Avenue Northeast, Kirkland, Washington 98033	



Not to Scale

RILEYGROUP Corporate Office 17522 Bothell Way Northeast Bothell, Washington 98011 Phone: 425.415.0551 Fax: 425.415.0311	Blueprint 112th		Figure 4
	RGI Project Number 2018-122	Typical Footing Drain Detail	Date Drawn: 04/2020
	Address: 4559 112th Avenue Northeast, Kirkland, Washington 98033		

APPENDIX A
FIELD EXPLORATION AND LABORATORY TESTING

On May 10, 2018, RGI performed field explorations using limited access equipment including a pneumatic jack-hammer to drive the steel soil probe rods. We explored subsurface soil conditions at the site by observing the boring of 5 test direct push test probes to a maximum depth of 12 feet below existing grade. The test probes locations are shown on Figure 2. The test probes locations were approximately determined by measurements from existing property lines and paved roads.

A geologist from our office conducted the field exploration and classified the soil conditions encountered, maintained a log of each test exploration, obtained representative soil samples, and observed pertinent site features. All soil samples were visually classified in accordance with the Unified Soil Classification System (USCS).

Representative soil samples obtained from the explorations were placed in closed containers and taken to our laboratory for further examination and testing. As a part of the laboratory testing program, the soil samples were classified in our in house laboratory based on visual observation, texture, plasticity, and the limited laboratory testing described below.

Moisture Content Determinations

Moisture content determinations were performed in accordance with ASTM D2216-10 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass (ASTM D2216) on representative samples obtained from the exploration in order to aid in identification and correlation of soil types. The moisture content of typical sample was measured and is reported on the test probes logs.

Grain Size Analysis

A grain size analysis indicates the range in diameter of soil particles included in a particular sample. Grain size analyses was determined using D6913-04(2009) Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis (ASTM D6913) on two of the samples.

Project Name: **Blueprint 112th** Project Number: **2018-122** Client: **Blueprint Capital Services, LLC**	RILEYGROUP Test Probe No.: **TP-1** **Sheet 1 of 1**

Date(s) Drilled: **05/10/18**	Logged By: **LC**	Surface Conditions: **Top Soil**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type:	Total Depth of Borehole: **12 feet bgs**
Drill Rig Type: **Geoprobe**	Drilling Contractor: **Standard Probe**	Approximate Surface Elevation: **n/a**
Groundwater Level: **Not encountered**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Native Soil**	Location: **4559 112th Avenue Northeast, Kirkland, Washington 98033**	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Brown, silty SAND with gravel and organics, medium dense, moist (fill)	
						Brown, silty SAND with some gravel, very dense, moist, heavily mottled	
					5		
						Brown, SILT with sand, stiff, moist	
					10		
						Test probe terminated 12 feet bgs	
						No groundwater encountered	
					15		

Project Name: **Blueprint 112th** Project Number: **2018-122** Client: **Blueprint Capital Services, LLC**	RILEYGROUP Test Probe No.: **TP-2** **Sheet 1 of 1**

Date(s) Drilled: **05/10/18**	Logged By: **LC**	Surface Conditions: **Top Soil**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type:	Total Depth of Borehole: **11 feet bgs**
Drill Rig Type: **Geoprobe**	Drilling Contractor: **Standard Probe**	Approximate Surface Elevation: **n/a**
Groundwater Level: **Not encountered**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Native Soil**	Location: **4559 112th Avenue Northeast, Kirkland, Washington 98033**	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Dark brown, silty SAND (top soil)	
						Brown, silty, gravelly SAND, medium dense, moist	
					5		
						Some mottling, density increases	
					10		
						Test probe terminated 11 feet bgs	
						No groundwater encountered	
					15		

Project Name: **Blueprint 112th** Project Number: **2018-122** Client: **Blueprint Capital Services, LLC**	RILEYGROUP Test Probe No.: **TP-3** **Sheet 1 of 1**

Date(s) Drilled: **05/10/18**	Logged By: **LC**	Surface Conditions: **Top Soil**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type:	Total Depth of Borehole: **11 feet bgs**
Drill Rig Type: **Geoprobe**	Drilling Contractor: **Standard Probe**	Approximate Surface Elevation: **n/a**
Groundwater Level: **6.7'**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Native Soil**	Location: **4559 112th Avenue Northeast, Kirkland, Washington 98033**	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Top soil	
						Brown, silty, gravelly SAND, loose to medium dense, moist	
					5		
				▽		Density increases	
					10		
						Test probe terminated 11 feet bgs	
						Groundwater encountered 6.7 feet bgs	
					15		

Project Name: **Blueprint 112th** Project Number: **2018-122** Client: **Blueprint Capital Services, LLC**	RILEYGROUP Test Probe No.: **TP-4** **Sheet 1 of 1**

Date(s) Drilled: **05/10/18**	Logged By: **LC**	Surface Conditions: **Top Soil**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type:	Total Depth of Borehole: **11 feet bgs**
Drill Rig Type: **Geoprobe**	Drilling Contractor: **Standard Probe**	Approximate Surface Elevation: **n/a**
Groundwater Level: **6.5'**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Native Soil**	Location: **4559 112th Avenue Northeast, Kirkland, Washington 98033**	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Top soil	
						Brown, silty, gravelly SAND, loose to medium dense, moist	
					5		
				▽			
						Density increases	
					10		
						Test probe terminated 11 feet bgs	
						Groundwater encountered 6.5 feet bgs	
					15		

Project Name: **Blueprint 112th** Project Number: **2018-122** Client: **Blueprint Capital Services, LLC**	RILEYGROUP Test Probe No.: **TP-5** **Sheet 1 of 1**

Date(s) Drilled: **05/10/18**	Logged By: **LC**	Surface Conditions: **Top Soil**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type:	Total Depth of Borehole: **6 feet bgs**
Drill Rig Type: **Geoprobe**	Drilling Contractor: **Standard Probe**	Approximate Surface Elevation: **n/a**
Groundwater Level: **6.5'**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Native Soil**	Location: **4559 112th Avenue Northeast, Kirkland, Washington 98033**	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Top soil	
						Brown, silty SAND with some gravel, dense to very dense, moist (lodgement till)	
					5		
						Test probe terminated 6 feet bgs	
						No groundwater encountered	
					10		
					15		

Project Name: **Blueprint 112th**

Project Number: **2018-122**

Client: **Blueprint Capital Services, LLC**

RILEYGROUP

Boring Log Key

Sheet 1 of 1

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
1	2	3	4	5	6	7	8

COLUMN DESCRIPTIONS

1 PID Reading, ppm: The reading from a photo-ionization detector, in parts per million.
2 Sample ID: Sample identification number.
3 Sample Type: Type of soil sample collected at the depth interval shown.
4 Recovery (percent): Percent Recovery
5 GW Depth: Groundwater depth in feet below the ground surface.
6 Depth (feet): Depth in feet below the ground surface.
7 MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
8 Graphic Log: Graphic depiction of the subsurface material encountered.

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
COMP: Compaction test
CONS: One-dimensional consolidation test
LL: Liquid Limit, percent
PI: Plasticity Index, percent
SA: Sieve analysis (percent passing No. 200 Sieve)
UC: Unconfined compressive strength test, Qu, in ksf
WA: Wash sieve (percent passing No. 200 Sieve)

MATERIAL GRAPHIC SYMBOLS

SILT, SILT w/SAND, SANDY SILT (ML)
Silty SAND (SM)
Poorly graded SAND with Silt (SP-SM)

TYPICAL SAMPLER GRAPHIC SYMBOLS

Auger sampler
Bulk Sample
3-inch-OD California w/ brass rings
CME Sampler
Grab Sample
2.5-inch-OD Modified California w/ brass liners
Pitcher Sample
2-inch-OD unlined split spoon (SPT)
Shelby Tube (Thin-walled, fixed head)

OTHER GRAPHIC SYMBOLS

Water level (at time of drilling, ATD)
Water level (after waiting)
Minor change in material properties within a stratum
Inferred/gradational contact between strata
Queried contact between strata

GENERAL NOTES

1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

THE RILEY GROUP, INC.
17522 Bothell Way NE
Bothell, WA 98011
PHONE: (425) 415-0551
FAX: (425) 415-0311

GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Blueprint 112th - Hydro	SAMPLE ID/TYPE	TP1 / Soil
PROJECT NO.	2018-122	SAMPLE DEPTH	3'
TECH/TEST DATE	LC 5/24	DATE RECEIVED	5/21/2018

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	620.1
Wt Dry Soil & Tare (gm)	(w2)	554.9
Weight of Tare (gm)	(w3)	15.7
Weight of Water (gm)	(w4=w1-w2)	65.2
Weight of Dry Soil (gm)	(w5=w2-w3)	539.2
Moisture Content (%)	(w4/w5)*100	12

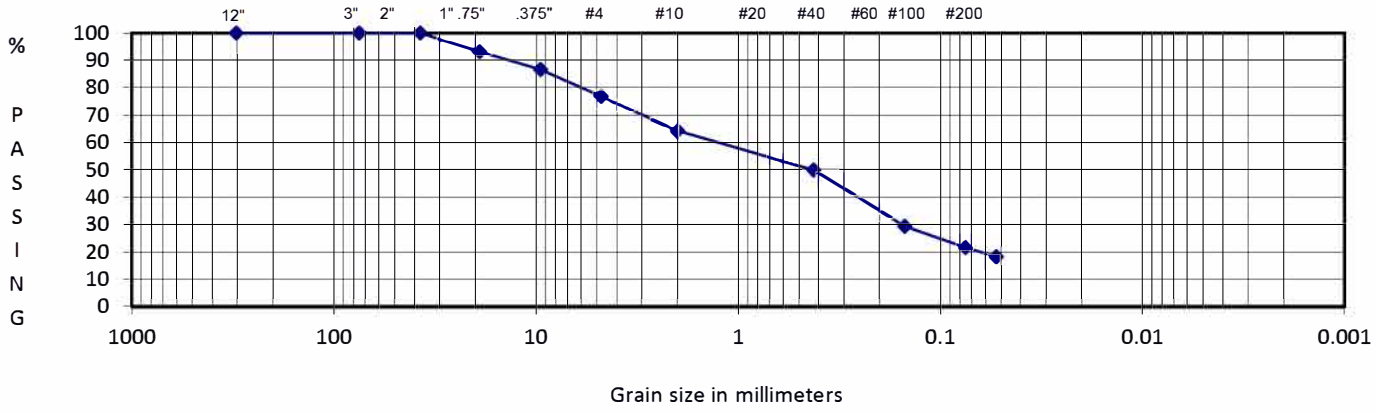
Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

	Weight Of Sample (gm)	554.9
	Tare Weight (gm)	15.7
(W6)	Total Dry Weight (gm)	539.2

% COBBLES	0.0
% C GRAVEL	6.8
% F GRAVEL	16.4
% C SAND	12.5
% M SAND	14.4
% F SAND	28.3
% FINES	21.6
% TOTAL	100.0
D10 (mm)	
D30 (mm)	
D60 (mm)	
Cu	
Cc	

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	15.7	0.00	0.00	100.00	cobbles
3.0"	15.7	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"	15.7	0.00	0.00	100.00	coarse gravel
1.5"	15.7	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	52.2	36.50	6.77	93.23	fine gravel
0.50"					fine gravel
0.375"	87.4	71.70	13.30	86.70	fine gravel
#4	140.5	124.80	23.15	76.85	coarse sand
#10	208.0	192.30	35.66	64.34	medium sand
#20					medium sand
#40	285.5	269.80	50.04	49.96	fine sand
#60					fine sand
#100	396.7	381.00	70.66	29.34	fine sand
#200	438.2	422.50	78.36	21.64	fine sand
#270	456.5	440.80	81.75	18.25	fine sand



DESCRIPTION	Silty SAND with some gravel.
USCS	SM

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GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Blueprint 112th - Hydro	SAMPLE ID/TYPE	TP3 / Soil
PROJECT NO.	2018-122	SAMPLE DEPTH	3'
TECH/TEST DATE	LC 5/24	DATE RECEIVED	5/21/2018

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	854.0
Wt Dry Soil & Tare (gm)	(w2)	773.0
Weight of Tare (gm)	(w3)	15.7
Weight of Water (gm)	(w4=w1-w2)	81.0
Weight of Dry Soil (gm)	(w5=w2-w3)	757.3
Moisture Content (%)	(w4/w5)*100	11

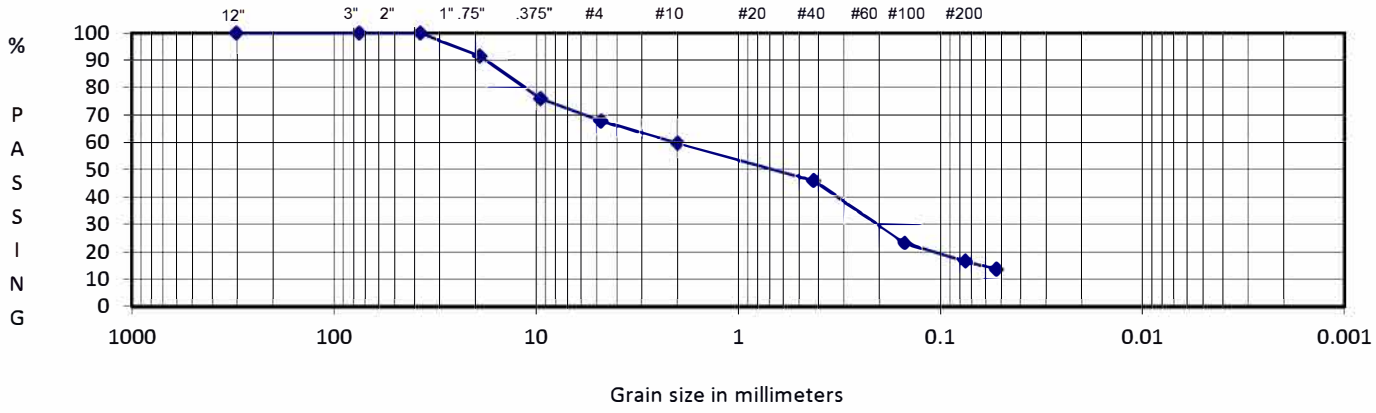
Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

	Weight Of Sample (gm)	773.0
	Tare Weight (gm)	15.7
(W6)	Total Dry Weight (gm)	757.3

% COBBLES	0.0
% C GRAVEL	8.5
% F GRAVEL	23.7
% C SAND	8.0
% M SAND	13.8
% F SAND	29.6
% FINES	16.4
% TOTAL	100.0
D10 (mm)	0.03
D30 (mm)	0.21
D60 (mm)	2
Cu	66.7
Cc	0.7

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	15.7	0.00	0.00	100.00	cobbles
3.0"	15.7	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"	15.7	0.00	0.00	100.00	coarse gravel
1.5"	15.7	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	79.9	64.20	8.48	91.52	fine gravel
0.50"					fine gravel
0.375"	197.4	181.70	23.99	76.01	fine gravel
#4	259.6	243.90	32.21	67.79	coarse sand
#10	320.5	304.80	40.25	59.75	medium sand
#20					medium sand
#40	424.7	409.00	54.01	45.99	fine sand
#60					fine sand
#100	597.1	581.40	76.77	23.23	fine sand
#200	648.6	632.90	83.57	16.43	fine sand
#270	670.1	654.40	86.41	13.59	fine sand



DESCRIPTION	Silty gravelly SAND.
USCS	SM

RILEYGROUP

RILEYGROUP

June 5, 2018

Darin Granger
Blueprint Capital Services, LLC
4147 California Avenue Southwest
Seattle, Washington 98116

Subject: **LID Infiltration Feasibility Study**
Blueprint 112th Avenue Northeast Site
4559 112th Avenue Northeast
Kirkland, Washington
RGI Project No. 2018-122

Dear Mr. Granger:

As requested, The Riley Group, Inc. (RGI) is pleased to provide the results of our recent subsurface characterization services at 4559 112th Ave Northeast in Kirkland, Washington (Figure 1).

Subsurface Conditions

RGI observed the completion of five direct push test probe borings (TP-1, TP-2, TP-3, TP-4, and TP-5) to assess shallow subsurface soil and groundwater conditions for potential infiltration of stormwater. The test probes were completed using subcontracted geoprobe services provided by Standard Probe. The test probes were completed using a limited access equipment including a pneumatic jack-hammer to drive the steel soil probe rods. The probe rods were extracted with pneumatic jacks and soil cores extruded. Temporary PVC casings with slotted screen were installed to determine if groundwater was present and at what depths below grade. The temporary casings were removed and the soil borings backfilled with bentonite upon completion. The location of the five test probe borings are shown on Figure 2. Soil samples were collected and returned to our office for grain size analyses.

Review of the *Geologic Map of Kirkland Quadrangle, Washington,* by James Minard (1983) indicates that the soil in the project vicinity is mapped as Vashon-age advance outwash (Qva), which is a nonsorted mixture of dense sand with varying amounts of silt, gravel and cobbles.

Soil conditions were variable across the Site. On the eastern portion of the Site soil conditions encountered in test probes TP-1 and TP-5 consists of very dense silty sand interpreted to be Vashon-age lodgment till to a depth of approximately 8 feet, a brown silt unit was encountered below the lodgment till in test probe TP-1.

On the western portion of the Site silty sand and silty gravelly sand were encountered. All there test probes completed on the western portion of the property (TP-2, TP-3, and TP-4) were completed to a depth of 11 feet below existing grade. The silty sand and silty gravelly sand unit extended to the depths explored. Groundwater was encountered at approximately 6.5 feet on

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www.riley-group.com

the western portion of the Site.

Infiltration Feasibility

Infiltration feasibility was evaluated under City of Kirkland Department of Public Works Pre-Approved Plans Policy: Policy D-8 "Soil Information for Stormwater Development to Meet Flow Control BMP Requirements". Site soil types were logged in the field per ASTM D-2487 soil description protocol. As described above lodgment till soils encountered on the eastern portion of the Site falls under the ASTM silty sand soil classification. Grain size analyses of the lodgment till falls under the USDA soil classification for loamy sand which meets the City of Kirkland soil textural requirement of Sand, Loam, Sandy Loam or Loamy Sand for stormwater Best Management Practices. However the very dense nature of the lodgment till soils will limit the infiltration potential.

The silty sand and silty gravelly sand encountered on the western portion of the Site fall under the the USDA soil classification for loamy sand which meets the City of Kirkland soil textural requirement of Sand, Loam, Sandy Loam or Loamy Sand for stormwater Best Management Practices.

Project Limitations

This report is the property of Blueprint Capital Services, LLC and their authorized representatives or affiliates and was prepared in a manner consistent with the level of skill and care ordinarily exercised by members of the profession currently practicing in the same locality and under similar conditions. This report is intended for specific application to the property located at 4559 112th Avenue Northeast, Kirkland, Washington. No other warranty, expressed or implied, is made. Please call us at (425) 415-0551 if you have any questions or need additional information.

Respectfully submitted,

THE RILEY GROUP, INC.

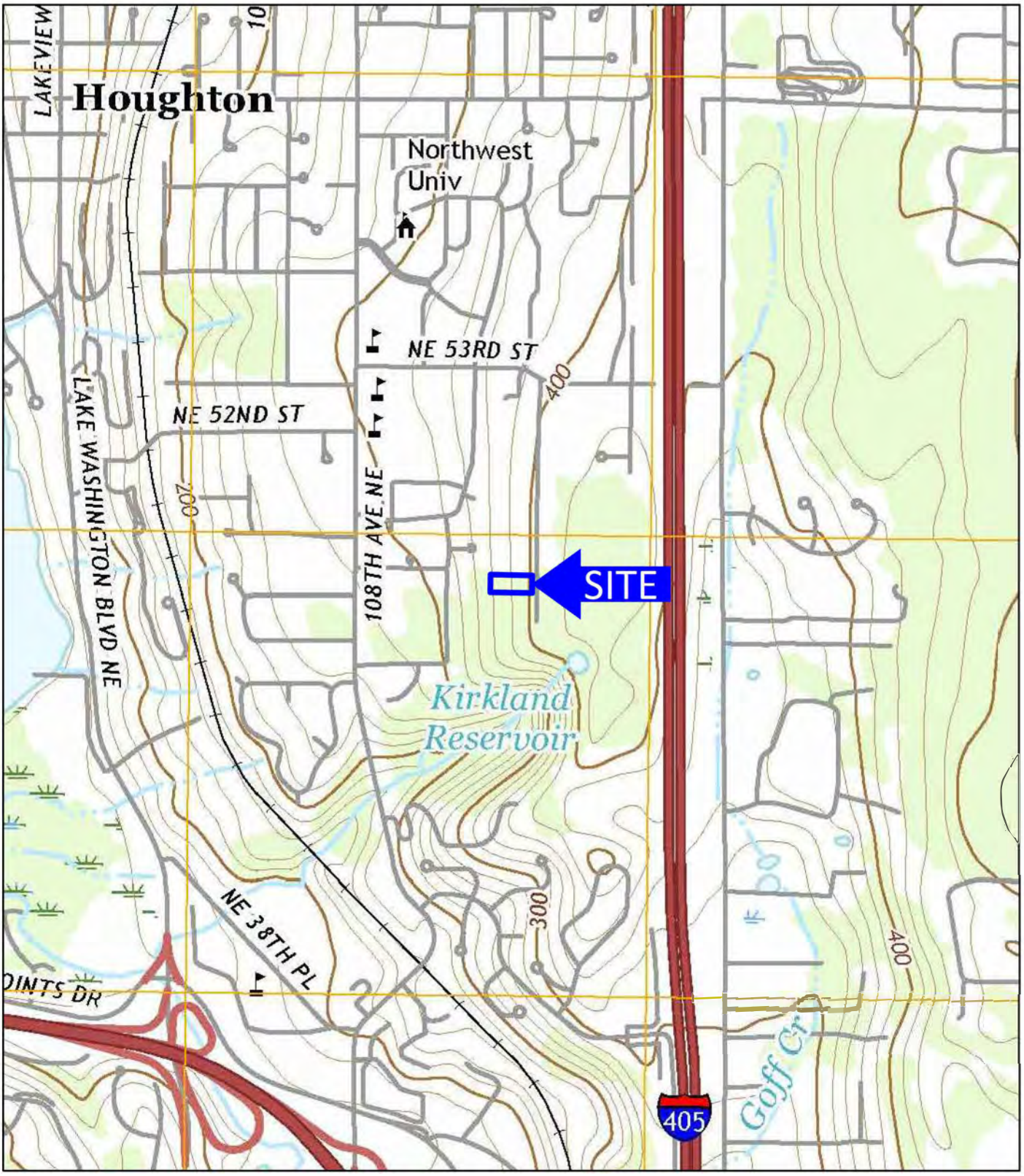
5/5/18

David J. Baumgarten

David J. Baumgarten, LHG
Hydrogeologist

Attachments: Figure 1, Site Vicinity Map
Figure 2, Site Plan with Test Probe Locations
Test Probe Logs
Grain Size Analysis

RILEYGROUP



USGS, 2017, Kirkland, Washington
7.5-Minute Quadrangle

Approximate Scale: 1"=1000'

0 500 1000 2000

N

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17522 Bothell Way Northeast
Bothell, Washington 98011
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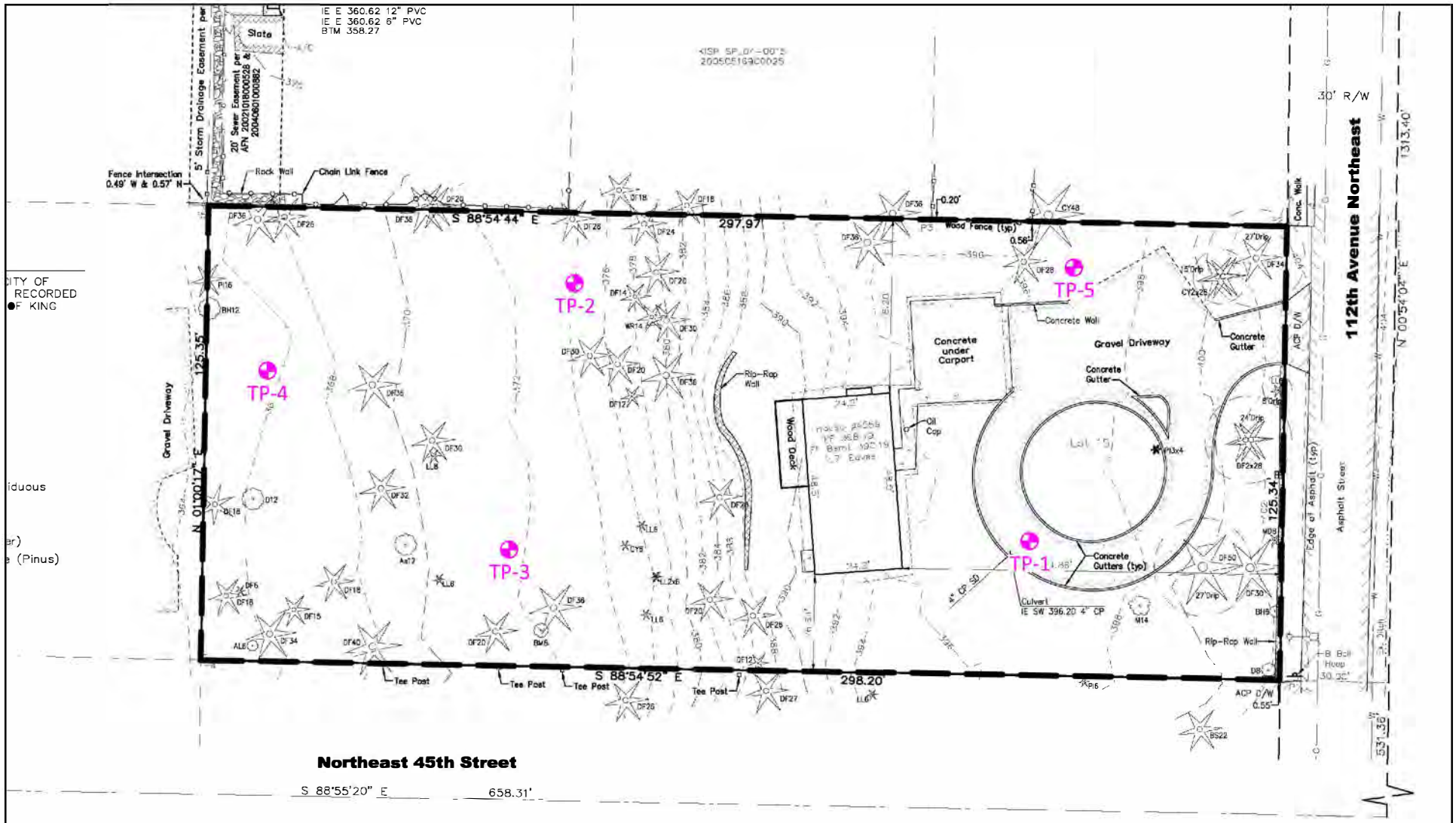
Fax: 425.415.0311

Blueprint 112th		Figure 1
RGI Project Number 2018-122	Site Vicinity Map	Date Drawn: 05/2018
Address: 4559 112th Avenue Northeast, Kirkland, Washington 98033		



= Test probe by RGI, 5/10/18

= Site boundary

Approximate Scale: 1"=40'

0 20 40 80

N

Corporate Office 17522 Bothell Way Northeast Bothell, Washington 98011 Phone: 425.415.0551 Fax: 425.415.0311	Blueprint 112th	Figure 2
	RGI Project Number 2018-122 — Site Plan with Test Probe Locations	Date Drawn: 05/2018
	Address: 4559 112th Avenue Northeast, Kirkland, Washington 98033	

Project Name: **Blueprint 112th** Project Number: **2018-122** Client: **Blueprint Capital Services, LLC**	RILEYGROUP Test Probe No.: **TP-1** **Sheet 1 of 1**

Date(s) Drilled: **05/10/18**	Logged By: **LC**	Surface Conditions: **Top Soil**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type:	Total Depth of Borehole: **12 feet bgs**
Drill Rig Type: **Geoprobe**	Drilling Contractor: **Standard Probe**	Approximate Surface Elevation: **n/a**
Groundwater Level: **Not encountered**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Native Soil**	Location: **4559 112th Avenue Northeast, Kirkland, Washington 98033**	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Brown, silty SAND with gravel and organics, medium dense, moist (fill)	
						Brown, silty SAND with some gravel, very dense, moist, heavily mottled	
					5		
						Brown, SILT with sand, stiff, moist	
					10		
						Test probe terminated 12 feet bgs	
						No groundwater encountered	
					15		

Project Name: **Blueprint 112th** Project Number: **2018-122** Client: **Blueprint Capital Services, LLC**	RILEYGROUP Test Probe No.: **TP-2** **Sheet 1 of 1**

Date(s) Drilled: **05/10/18**	Logged By: **LC**	Surface Conditions: **Top Soil**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type:	Total Depth of Borehole: **11 feet bgs**
Drill Rig Type: **Geoprobe**	Drilling Contractor: **Standard Probe**	Approximate Surface Elevation: **n/a**
Groundwater Level: **Not encountered**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Native Soil**	Location: **4559 112th Avenue Northeast, Kirkland, Washington 98033**	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Dark brown, silty SAND (top soil)	
						Brown, silty, gravelly SAND, medium dense, moist	
					5		
						Some mottling, density increases	
					10		
						Test probe terminated 11 feet bgs	
						No groundwater encountered	
					15		

Project Name: **Blueprint 112th** Project Number: **2018-122** Client: **Blueprint Capital Services, LLC**	RILEYGROUP Test Probe No.: **TP-3** **Sheet 1 of 1**

Date(s) Drilled: **05/10/18**	Logged By: **LC**	Surface Conditions: **Top Soil**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type:	Total Depth of Borehole: **11 feet bgs**
Drill Rig Type: **Geoprobe**	Drilling Contractor: **Standard Probe**	Approximate Surface Elevation: **n/a**
Groundwater Level: **6.7'**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Native Soil**	Location: **4559 112th Avenue Northeast, Kirkland, Washington 98033**	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Top soil	
						Brown, silty, gravelly SAND, loose to medium dense, moist	
					5		
				▽		Density increases	
					10		
						Test probe terminated 11 feet bgs	
						Groundwater encountered 6.7 feet bgs	
					15		

Project Name: **Blueprint 112th** Project Number: **2018-122** Client: **Blueprint Capital Services, LLC**	RILEYGROUP Test Probe No.: **TP-4** **Sheet 1 of 1**

Date(s) Drilled: **05/10/18**	Logged By: **LC**	Surface Conditions: **Top Soil**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type:	Total Depth of Borehole: **11 feet bgs**
Drill Rig Type: **Geoprobe**	Drilling Contractor: **Standard Probe**	Approximate Surface Elevation: **n/a**
Groundwater Level: **6.5'**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Native Soil**	Location: **4559 112th Avenue Northeast, Kirkland, Washington 98033**	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Top soil	
						Brown, silty, gravelly SAND, loose to medium dense, moist	
					5		
				▽			
						Density increases	
					10		
						Test probe terminated 11 feet bgs	
						Groundwater encountered 6.5 feet bgs	
					15		

Project Name: **Blueprint 112th** Project Number: **2018-122** Client: **Blueprint Capital Services, LLC**	RILEYGROUP Test Probe No.: **TP-5** **Sheet 1 of 1**

Date(s) Drilled: **05/10/18**	Logged By: **LC**	Surface Conditions: **Top Soil**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type:	Total Depth of Borehole: **6 feet bgs**
Drill Rig Type: **Geoprobe**	Drilling Contractor: **Standard Probe**	Approximate Surface Elevation: **n/a**
Groundwater Level: **6.5'**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Native Soil**	Location: **4559 112th Avenue Northeast, Kirkland, Washington 98033**	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Top soil	
						Brown, silty SAND with some gravel, dense to very dense, moist (lodgement till)	
					5		
						Test probe terminated 6 feet bgs	
						No groundwater encountered	
					10		
					15		

Project Name: **Blueprint 112th**

Project Number: **2018-122**

Client: **Blueprint Capital Services, LLC**

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Boring Log Key

Sheet 1 of 1

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
1	2	3	4	5	6	7	8

COLUMN DESCRIPTIONS

1 PID Reading, ppm: The reading from a photo-ionization detector, in parts per million.
2 Sample ID: Sample identification number.
3 Sample Type: Type of soil sample collected at the depth interval shown.
4 Recovery (percent): Percent Recovery
5 GW Depth: Groundwater depth in feet below the ground surface.
6 Depth (feet): Depth in feet below the ground surface.
7 MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
8 Graphic Log: Graphic depiction of the subsurface material encountered.

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
COMP: Compaction test
CONS: One-dimensional consolidation test
LL: Liquid Limit, percent
PI: Plasticity Index, percent
SA: Sieve analysis (percent passing No. 200 Sieve)
UC: Unconfined compressive strength test, Qu, in ksf
WA: Wash sieve (percent passing No. 200 Sieve)

MATERIAL GRAPHIC SYMBOLS

SILT, SILT w/SAND, SANDY SILT (ML)
Silty SAND (SM)
Poorly graded SAND with Silt (SP-SM)

TYPICAL SAMPLER GRAPHIC SYMBOLS

Auger sampler
Bulk Sample
3-inch-OD California w/ brass rings
CME Sampler
Grab Sample
2.5-inch-OD Modified California w/ brass liners
Pitcher Sample
2-inch-OD unlined split spoon (SPT)
Shelby Tube (Thin-walled, fixed head)

OTHER GRAPHIC SYMBOLS

Water level (at time of drilling, ATD)
Water level (after waiting)
Minor change in material properties within a stratum
Inferred/gradational contact between strata
Queried contact between strata

GENERAL NOTES

1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
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GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Blueprint 112th - Hydro	SAMPLE ID/TYPE	TP1 / Soil
PROJECT NO.	2018-122	SAMPLE DEPTH	3'
TECH/TEST DATE	LC 5/24	DATE RECEIVED	5/21/2018

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	620.1
Wt Dry Soil & Tare (gm)	(w2)	554.9
Weight of Tare (gm)	(w3)	15.7
Weight of Water (gm)	(w4=w1-w2)	65.2
Weight of Dry Soil (gm)	(w5=w2-w3)	539.2
Moisture Content (%)	(w4/w5)*100	12

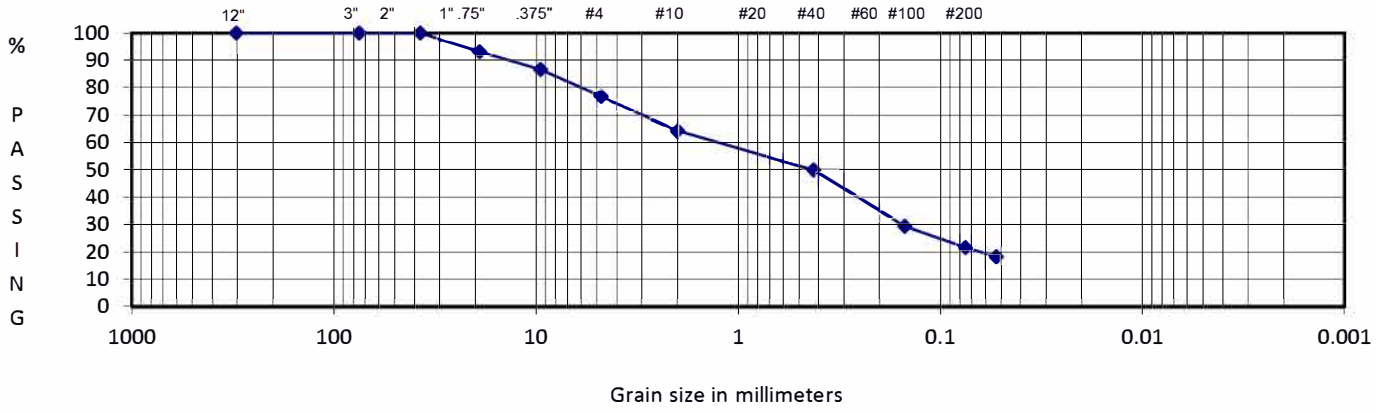
Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

	Weight Of Sample (gm)	554.9
	Tare Weight (gm)	15.7
(W6)	Total Dry Weight (gm)	539.2

% COBBLES	0.0
% C GRAVEL	6.8
% F GRAVEL	16.4
% C SAND	12.5
% M SAND	14.4
% F SAND	28.3
% FINES	21.6
% TOTAL	100.0
D10 (mm)	
D30 (mm)	
D60 (mm)	
Cu	
Cc	

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	15.7	0.00	0.00	100.00	cobbles
3.0"	15.7	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"	15.7	0.00	0.00	100.00	coarse gravel
1.5"	15.7	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	52.2	36.50	6.77	93.23	fine gravel
0.50"					fine gravel
0.375"	87.4	71.70	13.30	86.70	fine gravel
#4	140.5	124.80	23.15	76.85	coarse sand
#10	208.0	192.30	35.66	64.34	medium sand
#20					medium sand
#40	285.5	269.80	50.04	49.96	fine sand
#60					fine sand
#100	396.7	381.00	70.66	29.34	fine sand
#200	438.2	422.50	78.36	21.64	fine sand
#270	456.5	440.80	81.75	18.25	fine sand



DESCRIPTION	Silty SAND with some gravel.
USCS	SM

RILEYGROUP

THE RILEY GROUP, INC.
17522 Bothell Way NE
Bothell, WA 98011
PHONE: (425) 415-0551
FAX: (425) 415-0311

GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Blueprint 112th - Hydro	SAMPLE ID/TYPE	TP3 / Soil
PROJECT NO.	2018-122	SAMPLE DEPTH	3'
TECH/TEST DATE	LC 5/24	DATE RECEIVED	5/21/2018

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	854.0
Wt Dry Soil & Tare (gm)	(w2)	773.0
Weight of Tare (gm)	(w3)	15.7
Weight of Water (gm)	(w4=w1-w2)	81.0
Weight of Dry Soil (gm)	(w5=w2-w3)	757.3
Moisture Content (%)	(w4/w5)*100	11

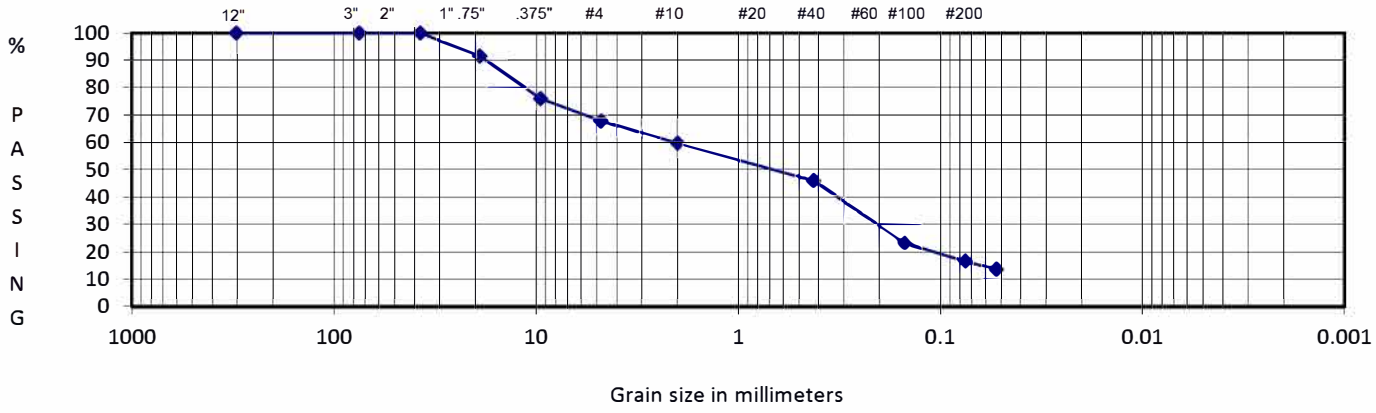
Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

	Weight Of Sample (gm)	773.0
	Tare Weight (gm)	15.7
(W6)	Total Dry Weight (gm)	757.3

% COBBLES	0.0
% C GRAVEL	8.5
% F GRAVEL	23.7
% C SAND	8.0
% M SAND	13.8
% F SAND	29.6
% FINES	16.4
% TOTAL	100.0
D10 (mm)	0.03
D30 (mm)	0.21
D60 (mm)	2
Cu	66.7
Cc	0.7

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	15.7	0.00	0.00	100.00	cobbles
3.0"	15.7	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"	15.7	0.00	0.00	100.00	coarse gravel
1.5"	15.7	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	79.9	64.20	8.48	91.52	fine gravel
0.50"					fine gravel
0.375"	197.4	181.70	23.99	76.01	fine gravel
#4	259.6	243.90	32.21	67.79	coarse sand
#10	320.5	304.80	40.25	59.75	medium sand
#20					medium sand
#40	424.7	409.00	54.01	45.99	fine sand
#60					fine sand
#100	597.1	581.40	76.77	23.23	fine sand
#200	648.6	632.90	83.57	16.43	fine sand
#270	670.1	654.40	86.41	13.59	fine sand

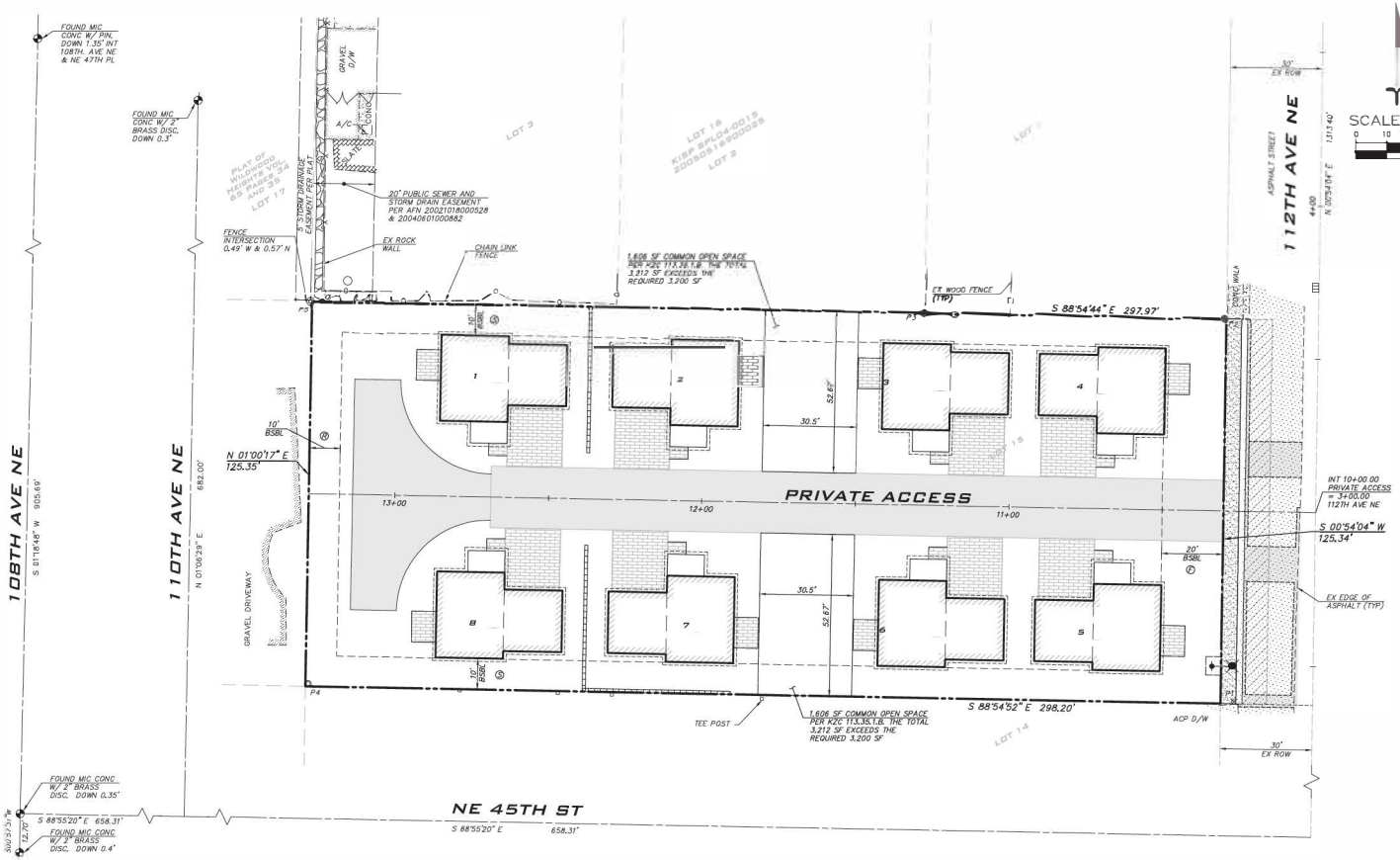


DESCRIPTION	Silty gravelly SAND.
USCS	SM

RILEYGROUP

NW 1/4, SE 1/4, SEC 17, TWP 25N, RGE 5E, W.M.

WATERSHED COTTAGES
PRELIMINARY PLANS



VICINITY MAP
NOT TO SCALE

PROJECT TEAM

OWNER / APPLICANT
DGR
18393 BOTHELL-EVERETT HIGHWAY, SUITE 10
BOTHELL, WA 98012
(425) 210-6367
CONTACT: DOMINIQUE RUYBAL

CIVIL ENGINEER
THE BLUELINE GROUP
25 CENTRAL WAY, SUITE 400
KIRKLAND, WA 98033
(425) 250-7247
CONTACT: BRETT K. PUDISTS, PE

ARCHITECT
NASH & ASSOCIATES ARCHITECTS
8033 118TH AVE NE
KIRKLAND, WA 98033
(425) 242-7490
CONTACT: MIKE JOHNSON, AIA

SURVEYOR
EMERALD LAND SURVEYING, INC.
PO BOX 136 94
MILL CREEK, WA 98082
(425) 359-7198
CONTACT: BRENT L. EBLE, PLS

ARBORIST
CREATIVE LANDSCAPE SOLUTIONS
17518 NE 119TH WAY
REDMOND, WA 98052
(425) 895-3808
CONTACT: SUSAN PRINCE

GEOTECH
THE RILEY GROUP, INC.
17522 BOTHELL WAY NE
BOTHELL, WA 98011
(425) 415-0551
CONTACT: DAVID BAUMGARTEN, LHG

LEGEND

PROPOSED FEATURES
- BOUNDARY
- FLOW & CURB
- SAWCUT
- BUILDING FOOTPRINT
- BUILDING ROOFLINE
- BUILDING SETBACK (BSBL)
- MAILBOX
- ASPHALT PAVEMENT
- SIDEWALK

GRADING AND TESC FEATURES
- 10' PROPOSED CONTOURS
- 2' PROPOSED CONTOURS
- FILTER FENCE
- TREE PROTECTION FENCE
- CLEARED AREA
- LIMITS OF CLEARING
- RETAINING WALL
- TEMPORARY CONSTRUCTION ENTRANCE
- CATCH BASIN INSERT

PROPOSED STORM DRAINAGE
- STORM DRAINPIPE
- ROOF & FOOTING DRAIN
- BLOCK WALL DRAIN
- CATCH BASIN, TYPE I
- CATCH BASIN, TYPE II
- PIPE FLOW
- CULVERT END
- STORM CLEANOUT
- YARD DRAIN
- SURFACE FLOW

PROPOSED SANITARY SEWER AND WATER
- SEWER SERVICE
- SEWER CLEANOUT
- WATER METER

EXISTING FEATURES
- ADJACENT PLAT/PARCEL LINE
- ADJACENT RIGHT-OF-WAY
- CENTERLINE
- EASEMENT
- SURFACE FEATURES
- BUILDING FOOTPRINT
- 10' CONTOURS
- 2' CONTOURS
- SD — STORM DRAIN PIPE
- SS — SEWER MAIN
- G — GAS MAIN
- BOARD FENCE
- RETAINING WALL
- CATCH BASIN, TYPE I
- CATCH BASIN, TYPE II
- SD PIPE FLOW
- SEWER MANHOLE
- SS PIPE FLOW
- FIRE HYDRANT
- WATER METER
- GATE VALVE
- POWER POLE
- POWER VAULT
- POWER METER
- GAS METER
- GAS VALVE
- MAIL BOX
- CONIFEROUS TREE TO REMAIN
- DECIDUOUS TREE TO REMAIN
- ASPHALT
- CONCRETE
- GRIND & OVERLAY
- NATURE GROWTH RETENTION AREA

SURVEY NOTES

INSTRUMENT USED: SOKKIA SET 5 EDM
METHOD USED: FIELD TRAVERSE

APPROXIMATE POINT ACCURACY: ±0.05'

SURVEY MEETS OR EXCEEDS STATE STANDARDS PER WAC 332-130-090

MONUMENTS SHOWN HEREON WERE VISITED ON JUNE 20, 2012

THE INFORMATION SHOWN ON THIS MAP REPRESENTS THE RESULTS OF A SURVEY MADE ON THE INDICATED DATE AND CAN ONLY BE CONSIDERED AS THE GENERAL EXISTING CONDITIONS AT THAT TIME.

NO EASEMENTS, RESTRICTIONS OR RESERVATION OF RECORD WHICH WOULD BE DISCLOSED BY A TITLE REPORT ARE SHOWN

REFERENCE SURVEY RECORDED UNDER KING COUNTY AUDITOR FILE NUMBER 20071026900034 FOR PLAT SUBDIVISION AND MONUMENT TIES

DATUM

VERTICAL DATUM – NAVD 88
CONTOUR INTERVAL – 2 FEET

BENCHMARK

CITY OF KIRKLAND POINT #433. TOP OF SOUTHWEST BOLT AT SIGNAL POLE BASE IN THE NORTHWEST CORNER OF INT. 108TH AVE NE AND NE 80TH ST. ELEV. 202.716.

LEGAL DESCRIPTION

LOT 15, BLOCK 3, WOODS ADDITION TO THE CITY OF KIRKLAND ACCORDING TO THE PLAT THEREOF, RECORDED IN VOLUME 6 OF PLATS, PAGE 24, RECORDS OF KING COUNTY, WASHINGTON

APN 954420-0250

PROPERTY CORNERS

P1 FOUND NAIL, 4.36' E & 0.64' N

P2 FOUND 2" OPEN IP, 0.64' W & 0.05' S

P3 FOUND REBAR & CAP, LS 13731, 0.03' S & 98.51' W

P4 FOUND 1 1/4" IP, 0.81' E & 0.87' N

P5 FOUND CONC. MON. W/PIN, 0.49' W & 0.17' N

PROJECT INFORMATION

SITE ADDRESS:	4559 112TH AVE NE
TAX ACCOUNT NUMBER:	9544200250
ZONING:	RS-8.5
GROSS SITE AREA:	0.84 ACRES (37,363 SF)
NUMBER OF COTTAGES PROPOSED:	8
PROPOSED USE:	LOW DENSITY RESIDENTIAL
MINIMUM LOT SIZE ALLOWED:	8,500 SF
SETBACKS:	FRONT 20' (P), REAR 10' (B), SIDE 10' (S)
LOT COVERAGE:	50% MAX
HEIGHT:	25' ABOVE ABE, WHERE MINIMUM ROOF SLOPE OF 6:12 FOR ALL PARTS OF THE ROOF ABOVE 18' ARE PROVIDED. OTHERWISE, 18' ABOVE ABE.
SEWAGE DISPOSAL:	CITY OF KIRKLAND
WATER SYSTEM:	CITY OF KIRKLAND

SHEET INDEX

UNDERGROUND UTILITY NOTE

UNDERGROUND UTILITIES ARE SHOWN IN THE APPROXIMATE LOCATION. THERE IS NO GUARANTEE THAT ALL UTILITY LINES ARE SHOWN, OR THAT THE LOCATION, SIZE AND MATERIAL IS ACCURATE. THE CONTRACTOR SHALL UNCOVER ALL INDICATED PIPING WHERE CROSSING, INTERFERENCES, OR CONNECTIONS OCCUR PRIOR TO TRENCHING OR EXCAVATION FOR ANY PIPE OR STRUCTURES, TO DETERMINE ACTUAL LOCATIONS, SIZE AND MATERIAL. THE CONTRACTOR SHALL MAKE THE APPROPRIATE PROVISION FOR PROTECTION OF SAID FACILITIES. THE CONTRACTOR SHALL NOTIFY ONE CALL AT 8-1-1 (WASHINGTON811.COM) AND ARRANGE FOR FIELD LOCATION OF EXISTING FACILITIES BEFORE CONSTRUCTION.

BLUELINE
25 CENTRAL WAY, SUITE 400
KIRKLAND, WA 98033
P: 425.216.8051 F: 425.216.8052
WWW.THEBLUELINEGROUP.COM

SCALE: AS NOTED
PROJECT MANAGER: BRETT K. PUDISTS, PE
PROJECT ENGINEER: LYNDSEY FEDAK, PE
DESIGNER: NADIA KROUMOVA
ISSUE DATE: 1/28/2021

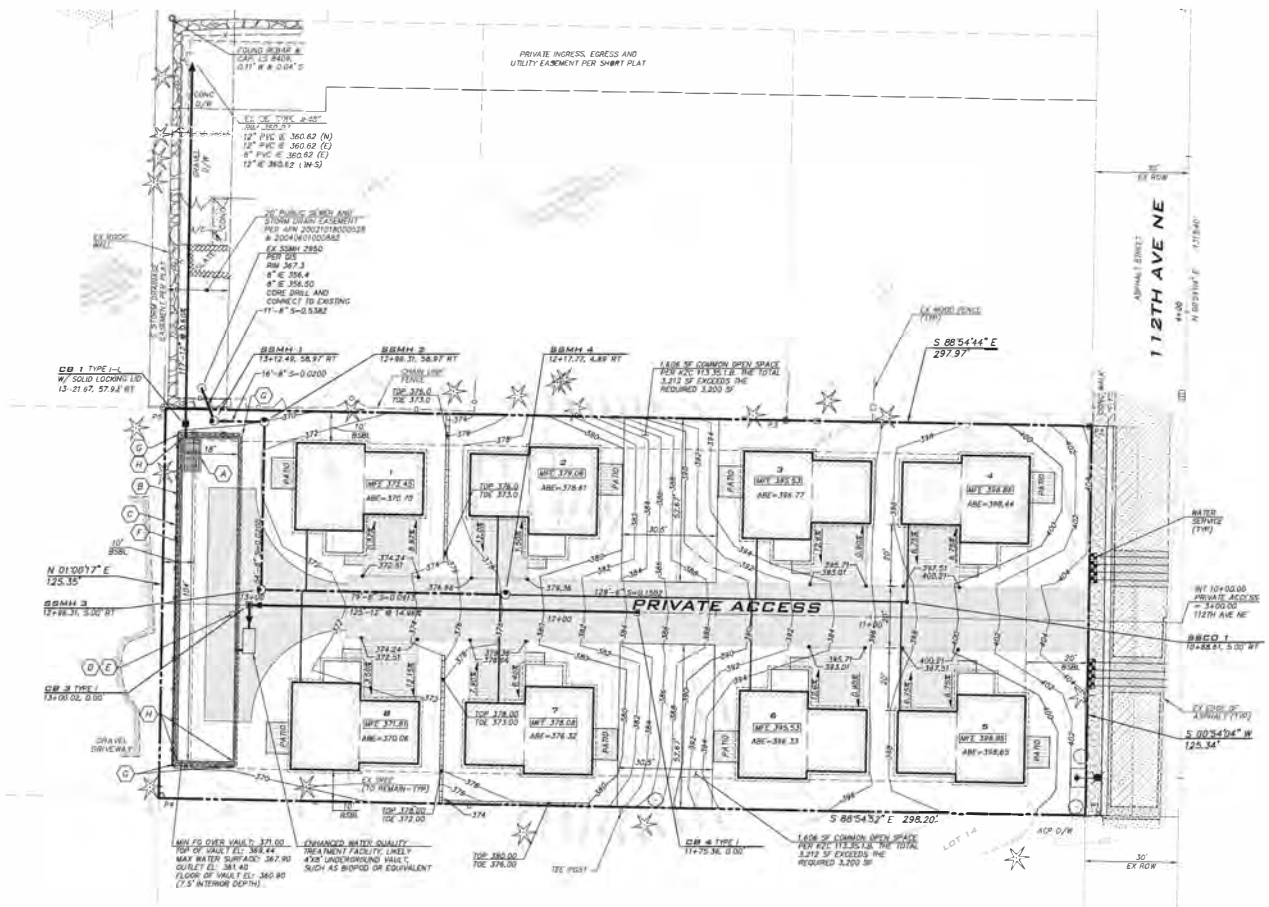
NO	DATE	BY	REVISIONS

COVER SHEET & SITE PLAN
4559 112TH AVE NE
PRELIMINARY COTTAGE PLANS
PARCEL #9544200250
CITY OF KIRKLAND WASHINGTON

1/28/21

JOB NUMBER: 18-084
SHEET NAME: CV-01
SHT 1 OF 4

NW 1/4, SE 1/4, SEC 17, TWP 25N, RGE 5E, W.M.



VAULT KEY NOTES

- (A) 5'x10' OPENING WITH HINGED LOCKING ACCESS.
- (B) 30" MAX WALL ALONG EXPOSED VAULT WALL WITH SLEEVES FOR FENCE.
- (C) 4' TALL VINYL COATED FENCE PER WSDOT STANDARD PLAN L-20.10-03 (TYPE 4) WHERE ADJACENT GRADE IS ≥ 30" LOWER OR AS SHOWN ON PLAN
- (D) 24" ACCESS WITH FRAME, GRATE AND LOCKING COVER MARKED "DRAIN" PER STD PLAN NO. CK-D.18
- (E) 24" ACCESS OPENING W/ 48" VAULT ACCESS PER COK STD PLAN NO. CK-D.35A. 36" OPENING THROUGH VAULT LID.
- (F) 4" PERFORATED PVC PIPE IN FRENCH DRAIN ADJACENT TO WALL ON TOP OF VAULT.
- (G) STORM DRAINAGE CLEANOUT.
- (H) 12"ø THROUGH WALL VENTILATION PIPE PER STRUCTURAL PLANS TO BE LOCATED IN 18"ø VERTICAL PIPE WITH RING AND COVER PER NOTES ON STD. PLAN NO. CK-D.05B. ADJUST RIM TO FINISHED GRADE (TYP).

LID NOTES

LID REQUIREMENTS ARE BEING MET BY:

- AMENDED SOILS FOR DISTURBED PERVIOUS AREAS

NOTE: SITE IS UNDERLAIN BY TILL AND INFILTRATION BMPS ARE NOT RECOMMENDED BY GEOTECH. PERMEABLE PAVERS WITH UNDERDRAIN ARE USED FOR LOT COVERAGE CREDIT, NOT TO MEET LID REQUIREMENTS.

UNDERGROUND UTILITY NOTE

UNDERGROUND UTILITIES ARE SHOWN IN THE APPROXIMATE LOCATION. THERE IS NO GUARANTEE THAT ALL UTILITY LINES ARE SHOWN, OR THAT THE LOCATION, SIZE AND MATERIAL IS ACCURATE. THE CONTRACTOR SHALL UNCOVER ALL INDICATED PIPING WHERE CROSSING, INTERFERENCES, OR CONNECTIONS OCCUR PRIOR TO TRENCHING OR EXCAVATION FOR ANY PIPE OR STRUCTURES, TO DETERMINE ACTUAL LOCATIONS, SIZE AND MATERIAL. THE CONTRACTOR SHALL MAKE THE APPROPRIATE PROVISION FOR PROTECTION OF SAID FACILITIES. THE CONTRACTOR SHALL NOTIFY ONE CALL AT 8-1-1 (WASHINGTON811.COM) AND ARRANGE FOR FIELD LOCATION OF EXISTING FACILITES BEFORE CONSTRUCTION.

BLUELINE
25 CENTRAL WAY, SUITE 408
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P: 425.216.4051 F: 425.216.4052
WWW.THEBLUELINEGROUP.COM

SCALE: AS NOTED
PROJECT MANAGER: BRETT K. PUDISTS, PE
PROJECT ENGINEER: LYNDSEY FEDAK, PE
DESIGNER: NADIA KROUMOVA
ISSUE DATE: 1/28/2021

NO	DATE	BY	REVISION

PRELIMINARY GRADING & UTILITY PLAN
4559 112TH AVE NE
PRELIMINARY COTTAGE PLANS
PARCEL #9544200250
CITY OF KIRKLAND WASHINGTON

1/28/21

JOB NUMBER: 18-084
SHEET NAME: UT-01
SHT 3 OF 4

RILEYGROUP

June 5, 2018

Darin Granger
Blueprint Capital Services, LLC
4147 California Avenue Southwest
Seattle, Washington 98116

Subject: **LID Infiltration Feasibility Study**
Blueprint 112th Avenue Northeast Site
4559 112th Avenue Northeast
Kirkland, Washington
RGI Project No. 2018-122

Dear Mr. Granger:

As requested, The Riley Group, Inc. (RGI) is pleased to provide the results of our recent subsurface characterization services at 4559 112th Ave Northeast in Kirkland, Washington (Figure 1).

Subsurface Conditions

RGI observed the completion of five direct push test probe borings (TP-1, TP-2, TP-3, TP-4, and TP-5) to assess shallow subsurface soil and groundwater conditions for potential infiltration of stormwater. The test probes were completed using subcontracted geoprobe services provided by Standard Probe. The test probes were completed using a limited access equipment including a pneumatic jack-hammer to drive the steel soil probe rods. The probe rods were extracted with pneumatic jacks and soil cores extruded. Temporary PVC casings with slotted screen were installed to determine if groundwater was present and at what depths below grade. The temporary casings were removed and the soil borings backfilled with bentonite upon completion. The location of the five test probe borings are shown on Figure 2. Soil samples were collected and returned to our office for grain size analyses.

Review of the *Geologic Map of Kirkland Quadrangle, Washington,* by James Minard (1983) indicates that the soil in the project vicinity is mapped as Vashon-age advance outwash (Qva), which is a nonsorted mixture of dense sand with varying amounts of silt, gravel and cobbles.

Soil conditions were variable across the Site. On the eastern portion of the Site soil conditions encountered in test probes TP-1 and TP-5 consists of very dense silty sand interpreted to be Vashon-age lodgment till to a depth of approximately 8 feet, a brown silt unit was encountered below the lodgment till in test probe TP-1.

On the western portion of the Site silty sand and silty gravelly sand were encountered. All there test probes completed on the western portion of the property (TP-2, TP-3, and TP-4) were completed to a depth of 11 feet below existing grade. The silty sand and silty gravelly sand unit extended to the depths explored. Groundwater was encountered at approximately 6.5 feet on

Corporate Office
17522 Bothell Way Northeast
Bothell, Washington 98011
Phone 425.415.0551 • Fax 425.415.0311

www.riley-group.com

the western portion of the Site.

Infiltration Feasibility

Infiltration feasibility was evaluated under City of Kirkland Department of Public Works Pre-Approved Plans Policy: Policy D-8 "Soil Information for Stormwater Development to Meet Flow Control BMP Requirements". Site soil types were logged in the field per ASTM D-2487 soil description protocol. As described above lodgment till soils encountered on the eastern portion of the Site falls under the ASTM silty sand soil classification. Grain size analyses of the lodgment till falls under the USDA soil classification for loamy sand which meets the City of Kirkland soil textural requirement of Sand, Loam, Sandy Loam or Loamy Sand for stormwater Best Management Practices. However the very dense nature of the lodgment till soils will limit the infiltration potential.

The silty sand and silty gravelly sand encountered on the western portion of the Site fall under the the USDA soil classification for loamy sand which meets the City of Kirkland soil textural requirement of Sand, Loam, Sandy Loam or Loamy Sand for stormwater Best Management Practices.

Project Limitations

This report is the property of Blueprint Capital Services, LLC and their authorized representatives or affiliates and was prepared in a manner consistent with the level of skill and care ordinarily exercised by members of the profession currently practicing in the same locality and under similar conditions. This report is intended for specific application to the property located at 4559 112th Avenue Northeast, Kirkland, Washington. No other warranty, expressed or implied, is made. Please call us at (425) 415-0551 if you have any questions or need additional information.

Respectfully submitted,

THE RILEY GROUP, INC.

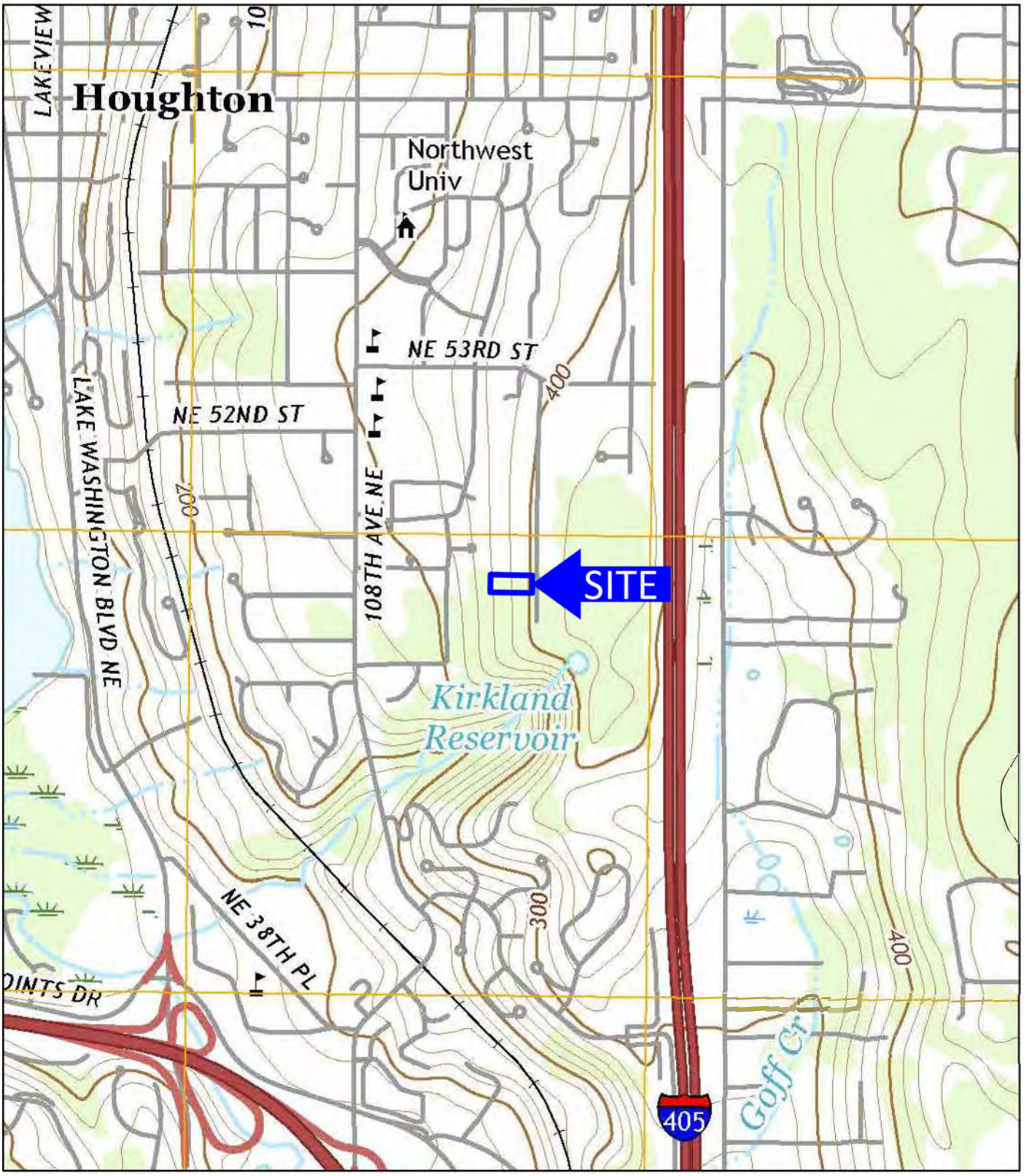
5/5/18

David J. Baumgarten

David J. Baumgarten, LHG
Hydrogeologist

Attachments: Figure 1, Site Vicinity Map
Figure 2, Site Plan with Test Probe Locations
Test Probe Logs
Grain Size Analysis

RILEYGROUP



USGS, 2017, Kirkland, Washington
7.5-Minute Quadrangle

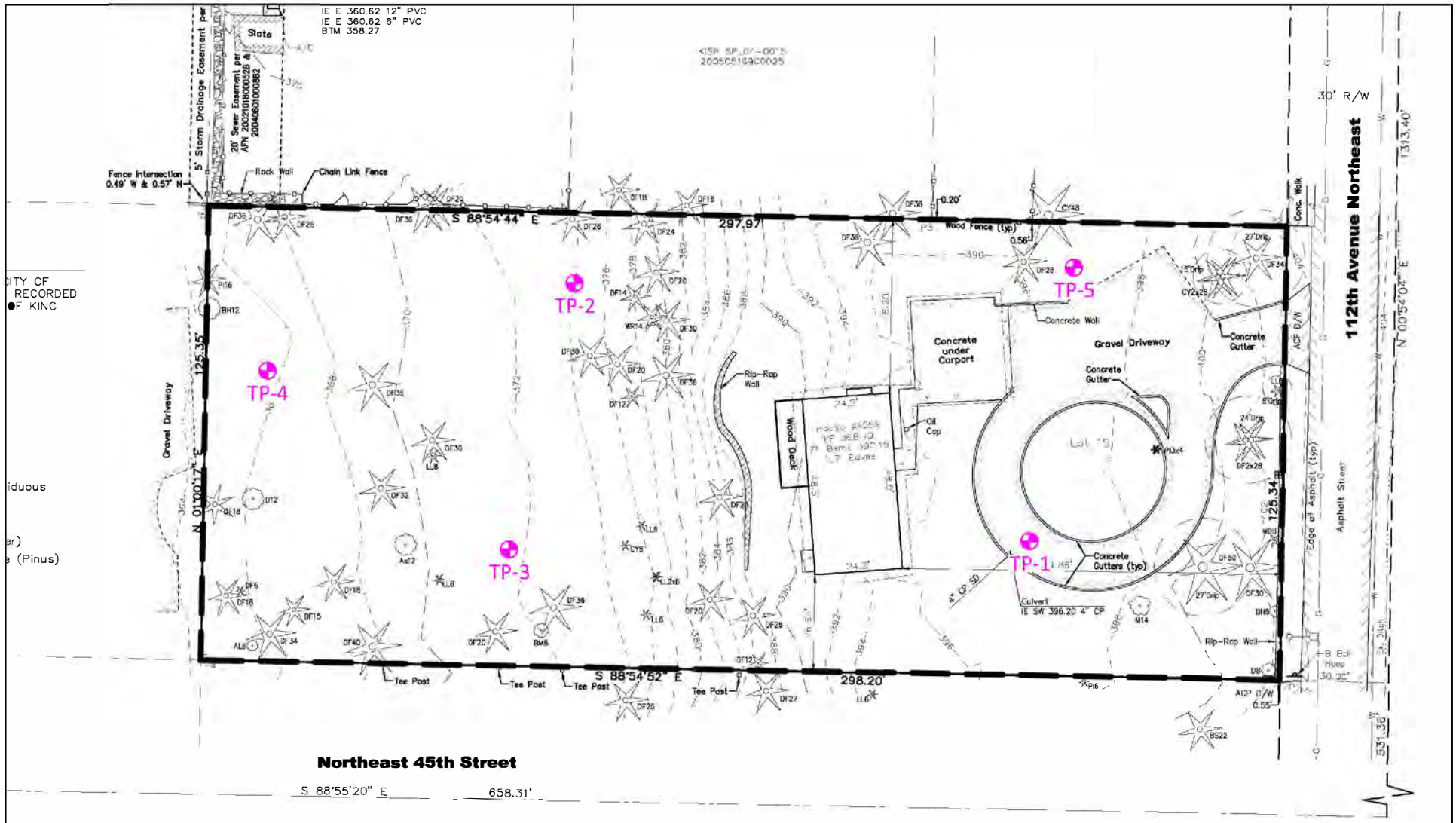
Approximate Scale: 1"=1000'

0 500 1000 2000

N

RILEYGROUP
Corporate Office
17522 Bothell Way Northeast
Bothell, Washington 98011
Phone: 425.415.0551
Fax: 425.415.0311

Blueprint 112th		Figure 1
RGI Project Number 2018-122	Site Vicinity Map	Date Drawn: 05/2018
Address: 4559 112th Avenue Northeast, Kirkland, Washington 98033		



= Test probe by RGI, 5/10/18

= Site boundary

Approximate Scale: 1"=40'

0 20 40 80

N

Corporate Office 17522 Bothell Way Northeast Bothell, Washington 98011 Phone: 425.415.0551 Fax: 425.415.0311	Blueprint 112th	Figure 2
	RGI Project Number 2018-122	Site Plan with Test Probe Locations	Date Drawn: 05/2018
	Address: 4559 112th Avenue Northeast, Kirkland, Washington 98033		

Project Name: **Blueprint 112th** Project Number: **2018-122** Client: **Blueprint Capital Services, LLC**	RILEYGROUP Test Probe No.: **TP-1** **Sheet 1 of 1**

Date(s) Drilled: **05/10/18**	Logged By: **LC**	Surface Conditions: **Top Soil**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type:	Total Depth of Borehole: **12 feet bgs**
Drill Rig Type: **Geoprobe**	Drilling Contractor: **Standard Probe**	Approximate Surface Elevation: **n/a**
Groundwater Level: **Not encountered**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Native Soil**	Location: **4559 112th Avenue Northeast, Kirkland, Washington 98033**	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Brown, silty SAND with gravel and organics, medium dense, moist (fill)	
						Brown, silty SAND with some gravel, very dense, moist, heavily mottled	
					5		
						Brown, SILT with sand, stiff, moist	
					10		
						Test probe terminated 12 feet bgs	
						No groundwater encountered	
					15		

Project Name: **Blueprint 112th** Project Number: **2018-122** Client: **Blueprint Capital Services, LLC**	RILEYGROUP Test Probe No.: **TP-2** **Sheet 1 of 1**

Date(s) Drilled: **05/10/18**	Logged By: **LC**	Surface Conditions: **Top Soil**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type:	Total Depth of Borehole: **11 feet bgs**
Drill Rig Type: **Geoprobe**	Drilling Contractor: **Standard Probe**	Approximate Surface Elevation: **n/a**
Groundwater Level: **Not encountered**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Native Soil**	Location: **4559 112th Avenue Northeast, Kirkland, Washington 98033**	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Dark brown, silty SAND (top soil)	
						Brown, silty, gravelly SAND, medium dense, moist	
					5		
						Some mottling, density increases	
					10		
						Test probe terminated 11 feet bgs	
						No groundwater encountered	
					15		

Project Name: **Blueprint 112th** Project Number: **2018-122** Client: **Blueprint Capital Services, LLC**	RILEYGROUP Test Probe No.: **TP-3** **Sheet 1 of 1**

Date(s) Drilled: **05/10/18**	Logged By: **LC**	Surface Conditions: **Top Soil**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type:	Total Depth of Borehole: **11 feet bgs**
Drill Rig Type: **Geoprobe**	Drilling Contractor: **Standard Probe**	Approximate Surface Elevation: **n/a**
Groundwater Level: **6.7'**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Native Soil**	Location: **4559 112th Avenue Northeast, Kirkland, Washington 98033**	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Top soil	
						Brown, silty, gravelly SAND, loose to medium dense, moist	
					5		
				▽		Density increases	
					10		
						Test probe terminated 11 feet bgs	
						Groundwater encountered 6.7 feet bgs	
					15		

Project Name: **Blueprint 112th** Project Number: **2018-122** Client: **Blueprint Capital Services, LLC**	RILEYGROUP Test Probe No.: **TP-4** **Sheet 1 of 1**

Date(s) Drilled: **05/10/18**	Logged By: **LC**	Surface Conditions: **Top Soil**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type:	Total Depth of Borehole: **11 feet bgs**
Drill Rig Type: **Geoprobe**	Drilling Contractor: **Standard Probe**	Approximate Surface Elevation: **n/a**
Groundwater Level: **6.5'**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Native Soil**	Location: **4559 112th Avenue Northeast, Kirkland, Washington 98033**	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Top soil	
						Brown, silty, gravelly SAND, loose to medium dense, moist	
					5		
				▽			
						Density increases	
					10		
						Test probe terminated 11 feet bgs	
						Groundwater encountered 6.5 feet bgs	
					15		

Project Name: **Blueprint 112th** Project Number: **2018-122** Client: **Blueprint Capital Services, LLC**	RILEYGROUP Test Probe No.: **TP-5** **Sheet 1 of 1**

Date(s) Drilled: **05/10/18**	Logged By: **LC**	Surface Conditions: **Top Soil**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type:	Total Depth of Borehole: **6 feet bgs**
Drill Rig Type: **Geoprobe**	Drilling Contractor: **Standard Probe**	Approximate Surface Elevation: **n/a**
Groundwater Level: **6.5'**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Native Soil**	Location: **4559 112th Avenue Northeast, Kirkland, Washington 98033**	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Top soil	
						Brown, silty SAND with some gravel, dense to very dense, moist (lodgement till)	
					5		
						Test probe terminated 6 feet bgs	
						No groundwater encountered	
					10		
					15		

Project Name: **Blueprint 112th**

Project Number: **2018-122**

Client: **Blueprint Capital Services, LLC**

RILEYGROUP

Boring Log Key

Sheet 1 of 1

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
1	2	3	4	5	6	7	8

COLUMN DESCRIPTIONS

1 PID Reading, ppm: The reading from a photo-ionization detector, in parts per million.
2 Sample ID: Sample identification number.
3 Sample Type: Type of soil sample collected at the depth interval shown.
4 Recovery (percent): Percent Recovery
5 GW Depth: Groundwater depth in feet below the ground surface.
6 Depth (feet): Depth in feet below the ground surface.
7 MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
8 Graphic Log: Graphic depiction of the subsurface material encountered.

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
COMP: Compaction test
CONS: One-dimensional consolidation test
LL: Liquid Limit, percent
PI: Plasticity Index, percent
SA: Sieve analysis (percent passing No. 200 Sieve)
UC: Unconfined compressive strength test, Qu, in ksf
WA: Wash sieve (percent passing No. 200 Sieve)

MATERIAL GRAPHIC SYMBOLS

SILT, SILT w/SAND, SANDY SILT (ML)
Silty SAND (SM)
Poorly graded SAND with Silt (SP-SM)

TYPICAL SAMPLER GRAPHIC SYMBOLS

Auger sampler
Bulk Sample
3-inch-OD California w/ brass rings
CME Sampler
Grab Sample
2.5-inch-OD Modified California w/ brass liners
Pitcher Sample
2-inch-OD unlined split spoon (SPT)
Shelby Tube (Thin-walled, fixed head)

OTHER GRAPHIC SYMBOLS

Water level (at time of drilling, ATD)
Water level (after waiting)
Minor change in material properties within a stratum
Inferred/gradational contact between strata
Queried contact between strata

GENERAL NOTES

1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

THE RILEY GROUP, INC.
17522 Bothell Way NE
Bothell, WA 98011
PHONE: (425) 415-0551
FAX: (425) 415-0311

GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Blueprint 112th - Hydro	SAMPLE ID/TYPE	TP1 / Soil
PROJECT NO.	2018-122	SAMPLE DEPTH	3'
TECH/TEST DATE	LC 5/24	DATE RECEIVED	5/21/2018

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	620.1
Wt Dry Soil & Tare (gm)	(w2)	554.9
Weight of Tare (gm)	(w3)	15.7
Weight of Water (gm)	(w4=w1-w2)	65.2
Weight of Dry Soil (gm)	(w5=w2-w3)	539.2
Moisture Content (%)	(w4/w5)*100	12

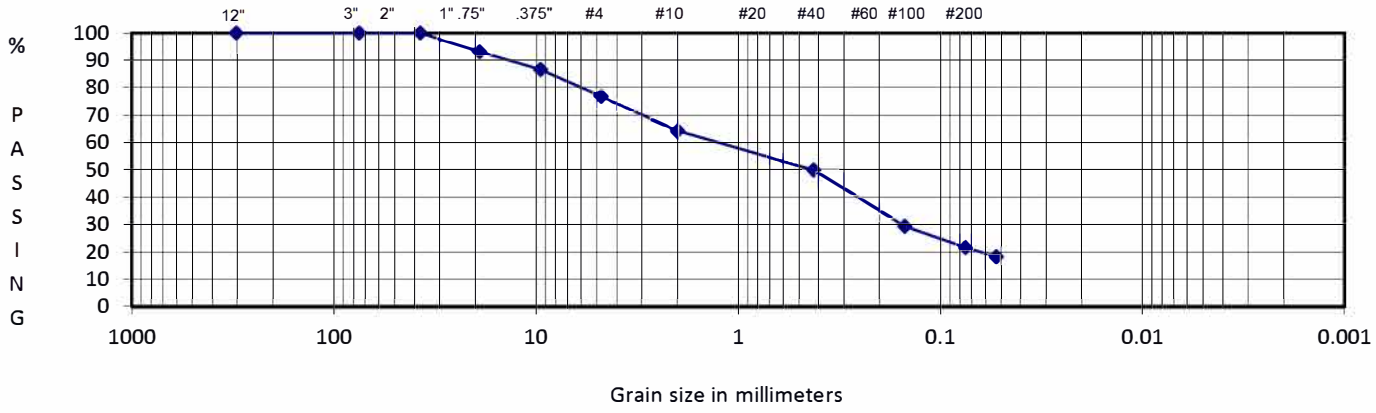
Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

	Weight Of Sample (gm)	554.9
	Tare Weight (gm)	15.7
(W6)	Total Dry Weight (gm)	539.2

% COBBLES	0.0
% C GRAVEL	6.8
% F GRAVEL	16.4
% C SAND	12.5
% M SAND	14.4
% F SAND	28.3
% FINES	21.6
% TOTAL	100.0
D10 (mm)	
D30 (mm)	
D60 (mm)	
Cu	
Cc	

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	15.7	0.00	0.00	100.00	cobbles
3.0"	15.7	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"	15.7	0.00	0.00	100.00	coarse gravel
1.5"	15.7	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	52.2	36.50	6.77	93.23	fine gravel
0.50"					fine gravel
0.375"	87.4	71.70	13.30	86.70	fine gravel
#4	140.5	124.80	23.15	76.85	coarse sand
#10	208.0	192.30	35.66	64.34	medium sand
#20					medium sand
#40	285.5	269.80	50.04	49.96	fine sand
#60					fine sand
#100	396.7	381.00	70.66	29.34	fine sand
#200	438.2	422.50	78.36	21.64	fine sand
#270	456.5	440.80	81.75	18.25	fine sand



DESCRIPTION	Silty SAND with some gravel.
USCS	SM

RILEYGROUP

THE RILEY GROUP, INC.
17522 Bothell Way NE
Bothell, WA 98011
PHONE: (425) 415-0551
FAX: (425) 415-0311

GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Blueprint 112th - Hydro	SAMPLE ID/TYPE	TP3 / Soil
PROJECT NO.	2018-122	SAMPLE DEPTH	3'
TECH/TEST DATE	LC 5/24	DATE RECEIVED	5/21/2018

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	854.0
Wt Dry Soil & Tare (gm)	(w2)	773.0
Weight of Tare (gm)	(w3)	15.7
Weight of Water (gm)	(w4=w1-w2)	81.0
Weight of Dry Soil (gm)	(w5=w2-w3)	757.3
Moisture Content (%)	(w4/w5)*100	11

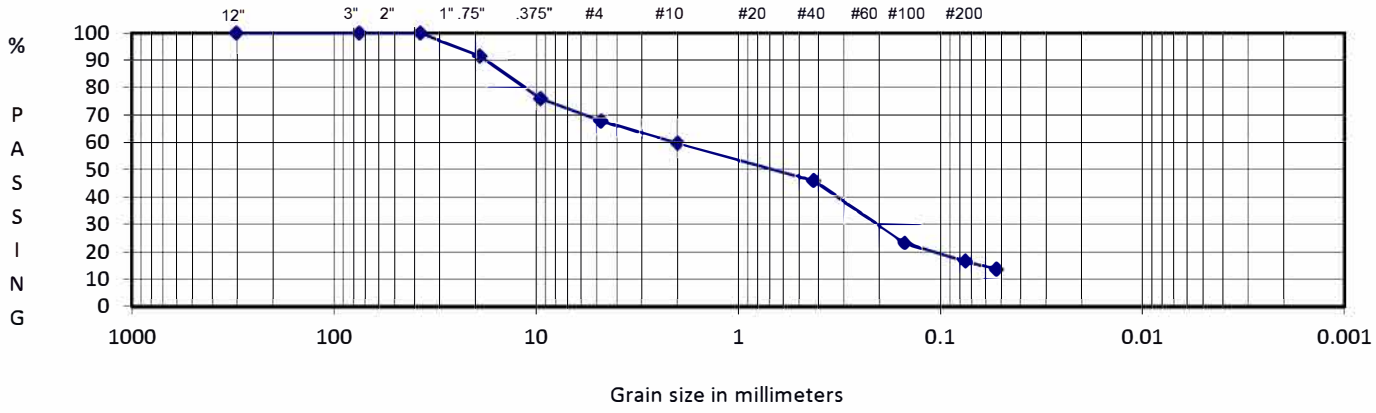
Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

	Weight Of Sample (gm)	773.0
	Tare Weight (gm)	15.7
(W6)	Total Dry Weight (gm)	757.3

% COBBLES	0.0
% C GRAVEL	8.5
% F GRAVEL	23.7
% C SAND	8.0
% M SAND	13.8
% F SAND	29.6
% FINES	16.4
% TOTAL	100.0
D10 (mm)	0.03
D30 (mm)	0.21
D60 (mm)	2
Cu	66.7
Cc	0.7

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	15.7	0.00	0.00	100.00	cobbles
3.0"	15.7	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"	15.7	0.00	0.00	100.00	coarse gravel
1.5"	15.7	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	79.9	64.20	8.48	91.52	fine gravel
0.50"					fine gravel
0.375"	197.4	181.70	23.99	76.01	fine gravel
#4	259.6	243.90	32.21	67.79	coarse sand
#10	320.5	304.80	40.25	59.75	medium sand
#20					medium sand
#40	424.7	409.00	54.01	45.99	fine sand
#60					fine sand
#100	597.1	581.40	76.77	23.23	fine sand
#200	648.6	632.90	83.57	16.43	fine sand
#270	670.1	654.40	86.41	13.59	fine sand



DESCRIPTION	Silty gravelly SAND.
USCS	SM

RILEYGROUP

associated earth sciences incorporated

August 11, 2021
Project No. 20210244E001

City of Kirkland
123 Fifth Avenue
Kirkland, Washington 98033

Attention: David Aldridge III, Planner

Subject: Geotechnical Peer Review
Watershed Cottages (ZON21-00113)
4559 112th Avenue NE
Parcel No. 9545200250
Kirkland, Washington

Dear Mr. Aldridge:

At your request, Associated Earth Sciences, Inc. (AESI) recently reviewed the geotechnical engineering report, prepared by The Riley Group, Inc. (RGI), for the proposed residential development. Specifically, we reviewed the following:

- RGI, "Watershed Cottages - 4559 112th Avenue Northeast," dated January 29, 2021.
- RGI, "Geotechnical Engineering Report - Gravity Rides Everything," dated April 29, 2020.
- RGI, "LID Infiltration Feasibility Study - Blueprint 112th Avenue Northeast Site," dated June 5, 2018.
- Project plans, including:
    - Civil and Landscape Sheets CV-01, TR-01, TR-02, UT-01, UP-01, LS-01, and LS-02, Blueline, dated February 11, 2021.
    - Architectural Sheets A1 and A2, Nash and Associates Architects, dated January 12, 2021.
- City of Kirkland GIS map showing geologically critical areas for the site and vicinity.

AESI was requested to provide third-party peer review of the project as detailed in Chapter 85 - "Critical Areas: Geologically Hazardous Areas," Subsection 85.20.2 of the *Kirkland Zoning Code* (KZC). The review was requested due to the location of the subject site containing moderate and high landslide hazard areas, as well as a medium or mixed liquefaction hazard area, as defined by Chapter 5 of the KZC.

The scope of our review was limited to an evaluation of the geotechnical report with respect to compliance with Subsections 85.15 and 85.22 of the KZC and our proposal, dated June 23, 2021.

SITE AND PROJECT DESCRIPTION

The site consists of a rectangular residential property, 0.86 acres in area, located at 4559 112th Avenue NE in Kirkland, Washington. A single-family residence is currently located at the subject site, and the currently proposed project includes the demolition of this structure and the construction of eight detached, single-family residential "cottage" units, with associated access, parking, and utilities. A stormwater detention vault is planned at the west end of the subject site. The site is bounded by 112th Avenue NE to the east and by residential properties on the remaining sides. Site grades, in general, slope gently to moderately downward to the west, with a steeply sloping area in the central portion of the site. Total elevation change across the site is roughly 40 feet.

RGI advanced five test probes, designated TP-1 through TP-5, to depths ranging from 6 to 12 feet below the ground surface. In summary, RGI encountered medium dense, with increased density with depth, silty sand with varying amounts gravel. In Test Probe TP-1, RGI encountered approximately 2 feet of fill overlying this material; TP-1 was terminated in stiff silt. The log of TP-5 indicates that the material encountered in that exploration was interpreted by RGI as "lodgement till." Groundwater seepage was encountered at 6.7 feet and 6.5 feet in TP-3 and TP-4, respectively. This groundwater was interpreted by RGI as being perched on dense glacial till. Riley stated that the portion of the slope at the central portion of the site greater than 40 percent in grade was not more than 10 feet in vertical elevation change, and RGI concluded that *"the potential for landslides on the site in the current condition is low."* and that *"Based on the subsurface conditions, in our opinion the potential for liquefaction is low."*

REVIEW COMMENTS

AESI reviewed the aforementioned geotechnical engineering report to determine if it meets the criteria specified within KZC Subsections 85.15.2, 85.15.3, and 85.15.4. These subsections detail the requirements for a geotechnical report to be submitted for proposed development in Geologically Hazardous Areas. In our opinion, the submitted geotechnical report generally meets the requirements of the KZC with the following request for clarification.

Report Requirements

The RGI report or associated documents do not fully comply with the report requirements outlined in Subsections 85.15.3 and 85.15.4:

1. In Section 4.4 of their April 19, 2020 report, RGI stated that the groundwater encountered in Test Probes TP-3 and TP-4 was perched on *"dense glacial till"*, and in Section 4.5 of that report, RGI states: *"Since the site is underlain by glacial till, RGI considers that the*

possibility of liquefaction during an earthquake is minimal." However, in Section 4.6, RGI then stated that the *"soils encountered in all of the test probes consisted of soils interpreted to be of Vashon-age advance outwash deposits."* The only geologic unit presented on the logs attached to the RGI documents is the above-mentioned "lodgement till" interpretation of the soils encountered in TP-5. We recommend that RGI review their exploration logs and add geologic units encountered to all the associated strata described in the logs, per KZC 85.15.3(g), and that their April 19, 2020 report be updated to reflect this interpretation, for clarification.

2. Review of the grading plan (Sheet UT-01) indicates proposed grades along the northern boundary of the subject site exceeding the maximum slope of 2H:1V (Horizontal:Vertical) recommended in Section 5.2.6 of the April 19, 2020 RGI report. We recommend that RGI review the project plans and comment on this apparent oversteepened proposed grade.

CLOSURE

Our scope of work for this letter was limited to a review of the documents supplied to us. Our scope did not include a site visit or exploration of actual subsurface conditions, nor does our review purport to verify the accuracy of exploration logs or geotechnical analysis results presented within the documents.

We trust this letter meets your current needs. Should you have any questions, please contact us at your convenience.

Sincerely,
ASSOCIATED EARTH SCIENCES, INC.
Kirkland, Washington

Jeffrey P. Laub, P.E., L.G., L.E.G.
Associate Engineer/Geologist

STEPHEN A. SIEBERT
STATE OF WASHINGTON
30329
REGISTERED
PROFESSIONAL ENGINEER

8/11/21

Bruce L. Blyton, P.E.
Senior Principal Engineer

Stephen A. Siebert, P.E.
Associate Geotechnical Engineer

RILEYGROUP

November 19, 2021

City of Kirkland
123 Fifth Avenue
Kirkland, Washington 98033

RE: Watershed Cottages (ZON21-00113)
4559 112th Avenue Northeast
Kirkland, Washington
RGI Project No. 2018-122

References: Blueline, Watershed Cottages, Preliminary Plans Sheets CV-01, TR-01, UT-01, UP-01 dated November 16, 2021

The Riley Group, Inc., LID Infiltration Feasibility Study, dated June 5, 2018 and Geotechnical Engineering Report "Gravity Rides Everything" dated April 29, 2020

Dear Reviewer,

As requested, The Riley Group, Inc. (RGI) has reviewed the peer review comments prepared by Associated Earth Sciences Inc. (AESI) for the proposed Watershed Cottages development at 4559 112th Avenue Northeast. RGI previously completed a Geotechnical Engineering Report and Low Impact Development/ Infiltration Feasibility Study at the property in support of development of the site.

This letter provides response to comments from The City of Kirkland regarding the peer review of the GER completed by AESI entitled Geotechnical Peer Review Watershed Cottages (ZON21-001113), 4559 112th Avenue NE, Parcel 9545200250, Kirkland, Washington, dated August 11, 2021.

Comment 1: In Section 4.4 of their April 19, 2020 report, RGI stated that the groundwater encountered in Test Probes TP-3 and TP-4 was perched on *"dense glacial till"*, and in Section 4.5 of that report, RGI states: *"Since the site is underlain by glacial till, RGI considers that the possibility of liquefaction during an earthquake is minimal."* However, in Section 4.6, RGI then stated that the *"soils encountered in all of the test probes consisted of soils interpreted to be of Vashon-age advance outwash deposits."* The only geologic unit presented on the logs attached to the RGI documents is the above-mentioned "lodgment till" interpretation of the soils encountered in TP-5. We recommend that RGI review their exploration logs and add geologic units encountered to all the associated strata described in the logs, per KZC 85.15.3(g), and that their April 19, 2020 report be updated to reflect this interpretation, for clarification.

Response: The attached test probe logs have been reviewed and an interpretation of geologic units per KZC 85.15.3(g) have been added, Given the dense glacially consolidated nature of both Vashon-age lodgment till and Vashon-age advance outwash deposits and the lack of a water table, RGI maintains our opinion the possibility of liquefaction during an earthquake is minimal.

Comment 2. Review of the grading plan (Sheet UT-01) indicates proposed grades along the northern boundary of the subject site exceeding the maximum slope of 2H:1V (Horizontal:Vertical)recommended in Section 5.2.6 of the April 19, 2020 RGI report. We

Corporate Office
17522 Bothell Way Northeast
Bothell, Washington 98011
Phone 425.415.0551 ♦ Fax 425.415.0311

www.riley-group.com

recommend that RGIreview the project plans and comment on this apparent oversteepened proposed grade.

Response: The grades have been modified to be less than the recommended 2H:1V. This modification resulted in additional height for some of the proposed retaining walls. The retaining walls that are over four feet in height will require a separate building permit.

Respectfully submitted,

THE RILEY GROUP, INC.

11/19/2021

Kristina M. Weller, PE
Principal Geotechnical Engineer

Attachment: Test Probe Logs

Project Name: **Blueprint 112th** Project Number: **2018-122** Client: **Blueprint Capital Services, LLC**	RILEYGROUP Test Probe No.: **TP-1** **Sheet 1 of 1**

Date(s) Drilled: **05/10/18**	Logged By: **LC**	Surface Conditions: **Top Soil**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type:	Total Depth of Borehole: **12 feet bgs**
Drill Rig Type: **Geoprobe**	Drilling Contractor: **Standard Probe**	Approximate Surface Elevation: **n/a**
Groundwater Level: **Not encountered**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Native Soil**	Location: **4559 112th Avenue Northeast, Kirkland, Washington 98033**	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Brown, silty SAND with gravel and organics, medium dense, moist (fill)	
					5	Brown, silty SAND with some gravel, very dense, moist, heavily mottled, (lodgment till)	
					10	Brown, SILT with sand, stiff, moist, (advance outwash)	
					15	Test probe terminated 12 feet bgs No groundwater encountered	
					20		

Project Name: **Blueprint 112th** Project Number: **2018-122** Client: **Blueprint Capital Services, LLC**	RILEYGROUP Test Probe No.: **TP-2** **Sheet 1 of 1**

Date(s) Drilled: **05/10/18**	Logged By: **LC**	Surface Conditions: **Top Soil**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type:	Total Depth of Borehole: **11 feet bgs**
Drill Rig Type: **Geoprobe**	Drilling Contractor: **Standard Probe**	Approximate Surface Elevation: **n/a**
Groundwater Level: **Not encountered**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Native Soil**	Location: **4559 112th Avenue Northeast, Kirkland, Washington 98033**	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Dark brown, silty SAND (top soil)	
						Brown, silty, gravelly SAND, medium dense, moist, (advance outwash)	
					5		
						Some mottling, density increases	
					10		
						Test probe terminated 11 feet bgs	
						No groundwater encountered	
					15		
					20		

Project Name: **Blueprint 112th** Project Number: **2018-122** Client: **Blueprint Capital Services, LLC**	RILEYGROUP Test Probe No.: **TP-3** **Sheet 1 of 1**

Date(s) Drilled: **05/10/18**	Logged By: **LC**	Surface Conditions: **Top Soil**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type:	Total Depth of Borehole: **11 feet bgs**
Drill Rig Type: **Geoprobe**	Drilling Contractor: **Standard Probe**	Approximate Surface Elevation: **n/a**
Groundwater Level: **6.7'**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Native Soil**	Location: **4559 112th Avenue Northeast, Kirkland, Washington 98033**	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Top soil	
						Brown, silty, gravelly SAND, loose to medium dense, moist, (advance outwash)	
					5		
				▽		Density increases	
					10		
						Test probe terminated 11 feet bgs	
						Groundwater encountered 6.7 feet bgs	
					15		
					20		

Project Name: **Blueprint 112th**
Project Number: **2018-122**
Client: **Blueprint Capital Services, LLC**

RILEYGROUP

Test Probe No.: **TP-4**

Sheet 1 of 1

Date(s) Drilled: **05/10/18**	Logged By: **LC**	Surface Conditions: **Top Soil**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type:	Total Depth of Borehole: **11 feet bgs**
Drill Rig Type: **Geoprobe**	Drilling Contractor: **Standard Probe**	Approximate Surface Elevation: **n/a**
Groundwater Level: **6.5'**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Native Soil**	Location: **4559 112th Avenue Northeast, Kirkland, Washington 98033**	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Top soil	
						Brown, silty, gravelly SAND, loose to medium dense, moist, (advance outwash)	
					5		
				▽		Density increases	
					10		
						Test probe terminated 11 feet bgs	
						Groundwater encountered 6.5 feet bgs	
					15		
					20		

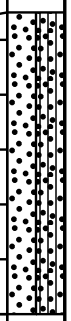
Project Name: **Blueprint 112th**
Project Number: **2018-122**
Client: **Blueprint Capital Services, LLC**

RILEYGROUP

Test Probe No.: **TP-5**

Sheet 1 of 1

Date(s) Drilled: **05/10/18**	Logged By: **LC**	Surface Conditions: **Top Soil**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type:	Total Depth of Borehole: **6 feet bgs**
Drill Rig Type: **Geoprobe**	Drilling Contractor: **Standard Probe**	Approximate Surface Elevation: **n/a**
Groundwater Level: **6.5'**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Native Soil**	Location: **4559 112th Avenue Northeast, Kirkland, Washington 98033**	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Top soil	
						Brown, silty SAND with some gravel, dense to very dense, moist, (lodgment till)	
					5		
						Test probe terminated 6 feet bgs	
						No groundwater encountered	
					10		
					15		
					20		

Project Name: **Blueprint 112th**
Project Number: **2018-122**
Client: **Blueprint Capital Services, LLC**

Boring Log Key

Sheet 1 of 1

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
1	2	3	4	5	6	7	8

COLUMN DESCRIPTIONS

1 PID Reading, ppm: The reading from a photo-ionization detector, in parts per million.
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MATERIAL GRAPHIC SYMBOLS

SILT, SILT w/SAND, SANDY SILT (ML)
Silty SAND (SM)
Poorly graded SAND with Silt (SP-SM)

TYPICAL SAMPLER GRAPHIC SYMBOLS

Auger sampler
Bulk Sample
3-inch-OD California w/ brass rings
CME Sampler
Continuous
Grab Sample
2.5-inch-OD Modified California w/ brass liners
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2-inch-OD unlined split spoon (SPT)
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Water level (at time of drilling, ATD)
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1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

David Aldridge III

From: Steve Siebert <ssiebert@aesgeo.com>
Sent: Wednesday, January 12, 2022 9:53 AM
To: David Aldridge III
Subject: RE: Kirkland Project No. 20210244E001 - ZON21-00113 - Watershed Cottages

Hi David,

The response is satisfactory.

Steve

Stephen A. Siebert, P.E. | Associate Geotechnical Engineer

AESI

Celebrating 40 years of excellent service

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O|425-827-7701 C| 425-786-3612

From: David Aldridge III <DAldridge@kirklandwa.gov>
Sent: Thursday, January 6, 2022 3:01 PM
To: Steve Siebert <ssiebert@aesgeo.com>
Subject: Kirkland Project No. 20210244E001 - ZON21-00113 - Watershed Cottages

Hi Steve,

The applicant submitted a response to the comments from peer review (attached). Can you review and verify they are satisfactory?

Thanks!

-DLA

--
David L. Aldridge III | Planner
City of Kirkland | Planning and Building
(425) 587-3256 | DAldridge@KirklandWA.gov

BLUELINE

MEMORANDUM

DATE: March 18, 2022

TO: City of Kirkland Public Works and Planning Departments

FROM: Brett Pudists, PE, The Blueline Group on behalf of DGR Development, Inc.

RE: Wall Height Modification Request – Watershed Cottages Retaining Walls
4559 112th Ave NE – Blueline Project #18-141

Description

This memo is provided as a modification request for the maximum height of retaining walls in a required yard and the maximum combined height of fences and retaining walls within five (5) feet of each other in a required yard, associated with the planned redevelopment of existing parcel 9544200250, located at 4559 112th Ave NE.

Maximum Height of Retaining Walls

Kirkland Zoning Code Chapter 115, Section 115.3.g allows for modifications:

KZC 115.115.3.g Rockeries and Retaining Walls

1) *Rockeries and retaining walls may be a maximum of four (4) feet high in a required yard. The Planning Official may approve a modification to that height limit if it is necessary because of the size, configuration, topography or location of the subject property, and either:*
   - *a. The design of the rockery or retaining wall includes terraces deep enough to incorporate vegetation, or other techniques that reduce the visual mass of the wall; or*
   - *b. The modification will not have any substantial detrimental effect on abutting properties or the City as a whole.*

We are proposing walls greater than 4' in required yards at two locations onsite – adjacent to the required common open space and at the downhill (west) end of the parcel to accommodate detention for the site. The other walls within required yards will not exceed the maximum allowed height.

Modification Request

The applicant is seeking approval of a modification to KZC chapter 115 section 115.3.g allowing retaining walls up to 6.5' in height, as depicted on the attached, which is necessary due to the topography of the subject property. The approved modification will not have substantial detrimental effect on abutting properties or the City as a whole.

Walls Adjacent to Common Open Space:

Our proposal is to use retaining walls in order to create a usable common open space within the planned cottage development as is required per KZC 113.35.b.1. To do so, we propose a deviation from the maximum retaining wall height set forth by the City. The proposed retaining walls adjacent to the common open space within the required yard range from 2' to 6' tall. Refer to the preliminary grading and utility plan included with this memo. In doing so, this would allow for a

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flatter open space, meeting the common open space requirements of KZC 113. The proposed walls meet the above requirements for modification in the height limit due to the steep topography of the site. The wall is located as needed to provide the required common open space area (400sf per unit) in a maximum of 2 separate areas per KZC 113, which may affect offsite trees. Work within the dripline of offsite trees will be supervised by an ISA certified arborist. The top of walls adjacent to common open space are set at a lower elevation than the neighboring properties, and therefore, will not be observable to neighbors. The modification is not anticipated to have a substantial detrimental effect on abutting properties or the City as a whole.

Exposed Vault Wall:

Our proposal is to install the detention vault at the downstream end of the site in order to capture and detain runoff from the developed site. The north, west and south sides of the vault will be exposed and greater than 4' due to constraints associated with the downstream storm connection and maximum slope of the private access road as allowed per COK's Roadway Plan Notes. The north and west walls and a portion of the south wall are located within required yards, and therefore, require a deviation from the maximum retaining wall height set forth by the City. The exposed vault walls within the required yard range from 4' to 6.5' tall. Refer to the preliminary grading and utility plan included with this memo. The proposed walls meet the above requirements for modification in the height limit due to the steep topography of the site. The area between the west property line and exposed vault wall will be landscaped, providing some amount of screening for the neighboring property. The modification is not anticipated to have a substantial detrimental effect on abutting properties or the City as a whole.

<u>Maximum Combined Height of Fences and Retaining Walls</u>

Kirkland Zoning Code Chapter 115, Section 115.3.g allows for modifications:
KZC 115.115.3.g Rockeries and Retaining Walls
2) The combined height of fences and retaining walls within five (5) feet of each other in a required yard may be a maximum of six (6) feet.

The Planning Official may approve a modification to the combined height limit for fences and retaining walls if:

a. An open guard railing is required by the Building Code and the height of the guard railing does not exceed the minimum required; or

b. The modification is necessary because of the size, configuration, topography or location of the subject property, and either:

i. The design of the rockery or retaining wall includes terraces deep enough to incorporate vegetation or other techniques that reduce the visual mass of the wall, and the fence is designed to be no more than 50 percent solid; or

ii. The modification will not have any substantial detrimental effect on abutting properties or the City as a whole.

Per Section R312.1 of the International Residential Code, guards shall be located along open-sided walking surfaces that are located more than 30 inches measured vertically to the floor or grade below at any point within 36 inches to the edge of the open side. Required guards at open-sided walking surfaces shall not be less than 36 inches in height as measured vertically above the adjacent walking surface. Based on a 36" tall fence, walls in excess of 3' tall would require a combined fence and wall height greater than 6'. Walls greater than 3' in required yards are needed in several locations due to

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topographic constraints. Additionally, a privacy fence is proposed to be installed where appropriate which includes up and down both the north and south property lines. Fences and railings may be located in required yards subject to the fence regulations contained within KZC 115.40.

Modification Request

The applicant is seeking approval of a modification to KZC chapter 115 section 115.3g(2) to allow the combined height of walls and fences within 5' of each other to be in excess of 6' and up to 9.5' (walls between 3 feet and 6.5 feet tall plus 36" of fence for fall protection results in combined wall/fence heights between 6 feet and 9.5' in height). The added wall height is needed to meet topographic constraints and the minimum 36" fall protection is needed on top of the wall to meet safety concerns. The modification will not have substantial detrimental effect on abutting properties or the City as a whole. This modified combined height occurs in the following locations:

- Walls taller than 3 feet in open space: As described above, walls are needed at the site to meet topographic constrains and fencing is needed for fall protection. These taller wall/fence combinations are necessary and will not have substantial detrimental effect on abutting properties or the City as a whole.
- Walls at the rear of unit 7: This wall is needed to create a suitable pad that meets building height calculations while providing useable driveway grades. Fencing is required along the top of this wall to meet safety concerns as well as provide privacy. The fence/wall combination is needed and will not have detrimental effect on abutting properties or the City as a whole.
- Vault Wall: The vault is buried however due to topographic constraints will require the west and portions off the north and south walls to be exposed at heights up to 6.5'. A fence is needed on top of this wall to address safety concerns. The wall/fence combination is necessary and will not have substantial detrimental effect on abutting properties or the City as a whole.

Regarding privacy fences: It is anticipated much of the privacy fencing along the north and south property lines will simply be a fence installed along the property line that is up to 6' in height however there are some locations where the privacy fencing will be provided as a combination of wall plus fall protection fencing as described above. Privacy fencing as contemplated will not have detrimental effect on abutting properties or the City as a whole.

Thank you for your time in reviewing and considering this modification request. If you have any questions or need any additional information, please contact me at (425) 250-7241.

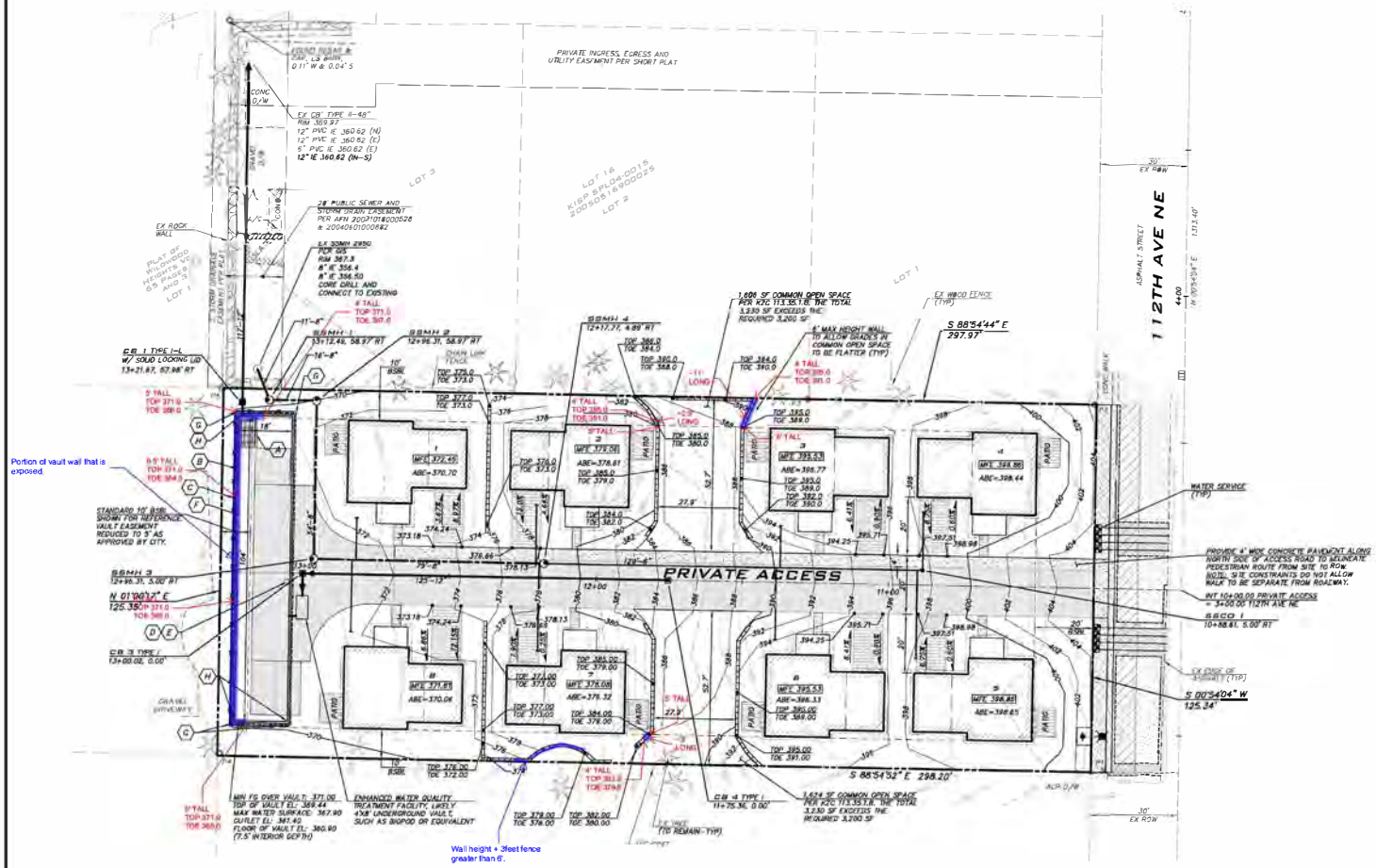
Sincerely,

THE BLUELINE GROUP

Brett Pudists, PE
Principal

CC: Dominque Ruybal, Aaron Cummings
Attachment: Preliminary Grading and Utility Plan showing Proposed Retention Walls

NW 1/4, SE 1/4, SEC 17, TWP 25N, RGE 5E, W.M.



N

SCALE: 1" = 20'

0 10 20 40

VAULT KEY NOTES

(A) 5'x10' OPENING WITH HINGED LOCKING ACCESS.

(B) 30" MAX WALL ALONG EXPOSED VAULT WALL WITH SLEEVES FOR FENCE.

(C) 3' TALL VINYL-COATED FENCE PER WSDOT STANDARD PLAN L-20.10-03 (TYPE 4) WHERE ADJACENT GRADE IS ≥ 30" LOWER OR AS SHOWN ON PLAN

(D) 24" ACCESS WITH FRAME, GRATE AND LOCKING COVER MARKED "DRAIN" PER STD PLAN NO. CK-0.18

(E) 24" ACCESS OPENING W/ 48" VAULT ACCESS PER COK STD PLAN NO. CK-0.35A. 36" OPENING THROUGH VAULT LID.

(F) 4" PERFORATED PVC PIPE IN FRENCH DRAIN ADJACENT TO WALL ON TOP OF VAULT.

(G) STORM DRAINAGE CLEANOUT.

(H) 12"ø THROUGH WALL VENTILATION PIPE PER STRUCTURAL PLANS TO BE LOCATED IN 18"ø VERTICAL PIPE WITH RING AND COVER PER NOTES ON STD. PLAN NO. CK-0.05B. ADJUST RIM TO FINISHED GRADE (TYP).

ROAD SECTIONS

FOR ROAD SECTIONS REFER TO SHEET UP-01.

LID NOTES

LID REQUIREMENTS ARE BEING MET BY:

- AMENDED SOILS FOR DISTURBED PERVIOUS AREAS

NOTE: SITE IS UNDERLAIN BY TILL AND INFILTRATION BMPS ARE NOT RECOMMENDED BY GEOTECH. PERMEABLE PAVERS WITH UNDERDRAIN ARE USED FOR LOT COVERAGE CREDIT, NOT TO MEET LID REQUIREMENTS.

UNDERGROUND UTILITY NOTE

UNDERGROUND UTILITIES ARE SHOWN IN THE APPROXIMATE LOCATION. THERE IS NO GUARANTEE THAT ALL UTILITY LINES ARE SHOWN, OR THAT THE LOCATION, SIZE AND MATERIAL IS ACCURATE. THE CONTRACTOR SHALL UNCOVER ALL INDICATED PIPING WHERE CROSSING, INTERFERENCES, OR CONNECTIONS OCCUR PRIOR TO TRENCHING OR EXCAVATION FOR ANY PIPE OR STRUCTURES, TO DETERMINE ACTUAL LOCATIONS, SIZE AND MATERIAL. THE CONTRACTOR SHALL MAKE THE APPROPRIATE PROVISION FOR PROTECTION OF SAID FACILITIES. THE CONTRACTOR SHALL NOTIFY ONE CALL AT 8-1-1 (WASHINGTON811.COM) AND ARRANGE FOR FIELD LOCATION OF EXISTING FACILITIES BEFORE CONSTRUCTION.

BLUELINE
25 CENTRAL WAY, SUITE 400
KIRKLAND, WA 98033
P: 425.219.8551 | F: 425.219.8008
WWW.THEBLUELINEGROUP.COM

SCALE: AS NOTED
PROJECT MANAGER: BRETT K. PUDISITS, PE
PROJECT ENGINEER: LYNDSEY FEDAK, PE
DESIGNER: NADIA KRIVONOVA
ISSUE DATE: 2/15/2022

NO	DATE	BY	REVISIONS
1	11/16/21	NKK	REVISED PER CITY COMMENTS
2	1/18/22	NKK	REVISED PER CITY COMMENTS
3	2/1/22	NKK	REVISED PER UPLIFT REPORT
4	2/15/22	NKK	REVISED PER CITY COMMENTS

PRELIMINARY GRADING & UTILITY PLAN
4559 112TH AVE NE
PRELIMINARY COTTAGE PLANS
PARCEL #9544200250
CITY OF KIRKLAND WASHINGTON

BRETT K. PUDISITS STATE OF WASHINGTON 37925 REGISTERED PROFESSIONAL ENGINEER

2/15/22

JOB NUMBER: 18-141
SHEET NAME: UT-01
SHT 4 OF 7

February 14, 2022

Dominique Ruybal
President
DGR Development, Inc.

Site: 4559 112th Ave NE
Kirkland, WA 98033
TPN: 9544200250
37,363 sq. ft. = .86 acre = 26 tree credits

RFI: Email from David Aldridge dated January 12th, 2022; changes Highlighted in green

Dear Dominique:

Thank you for requesting my services. At your request I performed a Level 2 Tree Risk Assessment (TRA) for all onsite trees and those offsite trees with driplines that overhang the property lines of the site on 112th Ave NE. The information obtained is required by the City of Kirkland to obtain a permit to plat the property into eight (8), cottage style SFR.

The existing site is constrained by a steep slope with a westerly aspect. Site grading, protection of offsite trees, installation of required frontage improvements, hammerhead turn around, the detention vault, and the request for a level common area, does not allow the required tree retention goal to be met.

In summary:

Tree Density Calculations	
Total number of onsite trees	38
Total number of non-viable trees	8
Total number of viable trees	30
Total number of trees removed for site improvements	29
Total number of tree credits	424
Total number of viable tree creds	363
Total number of required tree credits (.86 *30)	26
Total number of retained tree credits	2
Tree mitigation (26-2)	24

I have included a detailed report of my findings. If you have any questions, please call me. I can be reached on my cell phone: 425.890.3808 or by email: sprince202@aol.com.

Warm regards,

Susan Prince
Creative Landscape Solutions
ISA Certified Arborist: PN #1418A
TRACE Certified Arborist: #418
17518 NE 119th Way
Redmond, WA 98052

* Per city of Kirkland Municipal Code, a significant tree is one whose Diameter at Breast Height (DBH) is 6" or greater

Personal qualifications, scope of work and methodology
My examination was limited to a visual one, and did not involve any root excavation, trunk or limb coring, or any soil testing. To evaluate the trees and prepare the report, I drew on my formal college education in botany, preparation and training used to obtain my ISA certification in addition to my certification as a Tree Risk Assessor. I have worked in arboriculture since 1995, have been an ISA Certified Arborist since 1999 and have been TRAQ certified since 2009.

I followed protocol delineated by the International Society of Arboriculture (ISA) for Visual Tree Assessment (VTA). By doing so, I am examining each tree independently as well as collectively as groups or stands of trees provide stability and can lower risk of independent tree failure. This scientific process examines tree health (e.g. size, vigor, and insect and disease process) as well as site conditions (soil moisture and composition, quantity of impervious surfaces surrounding the tree etc.)

Site Observations:
The .83-acre property is located west of I405 and north of Watershed Park in a residential area of Houghton. There is an existing home that occupies the eastern portion of the lot. The lot descends with a westerly aspect toward Lake Washington and is largely vegetated with second growth Douglas firs; open areas devoid of trees are filled with Himalayan blackberries.

Method's used to determine tree location and tree health:
Trees were identified previously by numbered aluminum tags attached to the western side of the tree by Goldsmith Engineering. All the trees on site were examined using the Matheny and Clark[1] criteria for determining the potential hazard of trees in an urban environment as well as the Tree Risk Assessment in Urban Areas and The Urban/Rural Interface by Julian Dunster[2].

Tree diameters were measured at DSH (diameter standard height – 4.5' above ground) using a logger's tape. Tree driplines were measured using a PRO Laser Rangefinder™

Spreadsheet Legend:

1. #: Numerical count of trees
2. Tree tag #: Numbered aluminum tags attached to the trees in the field*[1]and referenced to the site plan
3. Species ID: Common and Botanical names or only Common names of trees which correspond to scientific names as follows:

- Apple: *Malus sp.*
- American sycamore: *Plantanus occidentalis*
- Austrian pine: *Pinus nigra*
- Bigleaf maple: *Acer macrophyllum*
- Birch: *Betula nigra*
- Bitter Cherry: *Prunus emarginata*
- Blue atlas cedar: *Cedrus atlantica 'Glauca'*
- Cedar: *Thuja plicata*
- Cherry: *Prunus sp.*
- Dawn redwood: *Chamaecyparis nootkatensis*
- Deodora cedar: *Cedrus deodara*
- Colorado blue spruce: *Picea pungens*
- Cottonwood*: Populus trichocarpa*
- Dogwood*: Cornus nuttallii*
- Douglas fir: *Pseudotsuga menziesii*
- English laurel: *Prunus laurocerasus*
- Filbert: *Corylus avellana var.*
- Grand fir: *Abies grandis*
- Hemlock: *Tsuga hetrophylla*
- Holly: *Ilex aquifolium*
- Japanese maple: *Acer palmatum*
- Leylandii cypress: *Cupressocyparis leylandii*
- Lodgepole pine*: Pinus contorta*
- Mountain ash: *Sorbus americana*
- Pear: *Pyrus sp.*
- Plum: *Prunus*
- Red Alder: *Alnus rubra*
- Red maple: *Acer rubrum*
- Walnut: *Juglans sp.*
- Western red cedar: *Thuja plicata*
- Weeping Alaska cedar*: Metasequoia glyptostrobides*
- White pine*: Pinus strobus*

4. DBH or DSH: Diameter of the tree measured at a standard height - 4' 6" above grade
5. Adjusted DBH: Mathematically derived DBH for multi-trunked trees (equation determined by municipality)
6. Dripline Radius: Measurement in feet of the tree canopy from tree trunk to outermost branch tip
7. Windfirm/OK in grove: In noted the tree may not be windfirm; or if noted "OK in Grove" a tree that is otherwise not suitable for retention as a stand-alone tree, may be able to be retained in a grove.
8. Health: A measurement of overall tree vigor and vitality rated as excellent, good, fair or poor based on an assessment of crown density, leaf color and size, active callusing, shoot growth rate, extent of crown dieback, cambium layer health, and tree age
    a. Excellent: Tree is an ideal specimen for the species with no obvious flaws
    b. Good: Tree has minimal structural or situational defects
    c. OK: Tree has minimal structural defects AND minimal environmental concerns
    d. Fair: Tree has structural or health issues that predispose it to failure if further stressed, it may be healthy enough to retain in a grove, but not healthy enough to remain unprotected.
    e. Poor: Tree has significant structural and/or health issues. It is exempt from total tree count.
9. Defects/Concerns: A list of specific visual structural features, e.g., decay, conks, co-dominant trunks, included bark, abnormal lean, one-sided canopy, history of failure, prior construction impact, pruning history, etc. seen on the tree at the time of assessment
10. Proposed action:
    a. Retain/Viable
    b. Non-viable
    c. Remove a viable tree for site improvements
11. LOD: Limits of disturbance/CRZ: Critical Root Zone/TPZ: Tree Protection Zone: The area surrounding the tree that defines the area that surrounds the trunk that cannot be encroached upon during construction. This may be a multiple of the trunk diameter (1 -1.5 times the trunk diameter converted to feet.) or it may be related to the width of the canopy. It is always determined by tree species and environment and is up to the discretion of the ISA Certified Arborist to determine Retention Value.
12. Value: The number of tree credits awarded a tree.

Onsite Trees:

1	2	3	4	5	6	7		8	9	10		11				12		
#	Tree Tag #	Species ID	DBH (in)	Adj. DBH (in)	Drip-line radius (ft)	Wind-firm	OK in Grove	Health	Defects/Comments	Proposed Action		CRZ/TPZ/LOD				Value	Healthy Tree Credits	Retained value
										Ret.	Rem	Radius in feet						
										Viable	Remove	N	W	E	S			
1	2	Western red cedar*	41	41	22			OK	Limbed to 30', co-dominant leaders with included bark x2 @ root crown, typical of species, candelabra		1	22	22	22	22	24.8	24.8	
2	3	Douglas fir*	21, 29	36	16			OK	Co-dominant leaders with included bark x2 @ root crown, calloused wound @ 10' towards west, thin canopy, dead wood, broken branches, dead twigs, typical of species		1	16	16	16	16	21	21	
3	5	Madrona	10	10	10		Y	Fair	Topped @ 20', candelabra, asymmetric canopy towards west, blight, typical of species, vertical crack @ root crown up to 12' towards north, lean towards east		1	10	10	10	10	1	1	
4	6	Douglas fir*	54	54	28			Fair	Abnormal bark, shedding bark, co-dominant leaders with included bark x3 @ 7', hanger, topped @ 50', weak leaders, woodpecker activity, carpenter ants bark only, bulge @ 4'		1	28	28	28	28	34.5		
5	9	Japanese maple	12	12	18			OK	Co-dominant leaders with included bark x5 @ root crown, moss and lichen, lean towards west, thin canopy		1	18	18	18	18	2	2	

1	2	3	4	5	6	7		8	9	10		11				12		
#	Tree Tag #	Species ID	DBH (in)	Adj. DBH (in)	Drip-line radius (ft)	Wind-firm	OK in Grove	Health	Defects/Comments	Proposed Action		CRZ/TPZ/LOD				Value	Healthy Tree Credits	Retained value
										Ret.	Rem	Radius in feet						
										Viable	Remove	N	W	E	S			
6	11	Japanese maple	8	8	14		Y	Fair	Vertical crack @ 2' up to 6' towards south, dead scaffolds, low live crown ratio <20%, moss and lichen		1	14	14	14	14	1	1	
7	12	Douglas fir*	11	11	10		Y	Fair	Lean to west, dead wood, broken branches, thin canopy, dead twigs, low live ccrown ratio <15%	1		10	10	10	10	2.25	2.25	2.25
8	13	Common Hawthorne	7	7	9		Y	Fair	Co-dominant leaders with included bark x3 @ 6', moss and lichen, typical of species		1	9	9	9	9	1	1	
9	14	Douglas fir*	22	22	22			OK	Elongated branches, previous top loss, low live crown ratio <30%, typical of species		1	22	22	22	22	10.5	10.5	
10	17	Douglas fir*	36	36	23		Y	Fair	Abnormal bark, shedding bark, carpenter ants, previous ivy @ root crown up to 60', dead wood, broken branches, low live crown ratio <30%, moss and lichen, dead twigs		1	23	23	23	23	21	21	
11	18	Bigleaf maple	8	8	12			Fair	Dead scaffolds, co-dominant leaders with included bark x2 reduced to 1 @ 2', vertical crack @ root crown up to 14'		1	12	12	12	12	1		
12	19	Douglas fir*	20	20	17			Poor	Abnormal bark, shedding bark, bulge @ 5', carpenter ants, slight self-corrected lean, dead wood, broken branches		1	17	17	17	17	9		

1	2	3	4	5	6	7		8	9	10		11				12		
#	Tree Tag #	Species ID	DBH (in)	Adj. DBH (in)	Drip-line radius (ft)	Wind-firm	OK in Grove	Health	Defects/Comments	Proposed Action		CRZ/TPZ/LOD				Value	Healthy Tree Credits	Retained value
										Ret.	Rem	Radius in feet						
										Viable	Remove	N	W	E	S			
13	20	Lodgepole pine	7	7	7			Poor	Co-dominant leaders with included bark x3 @ root crown, moss and lichen, asymmetric canopy towards west, dying		1	7	7	7	7	1		
14	21	Douglas fir*	31	31	23			OK	Thin canopy, dead wood, broken branches, typical of species		1	23	23	23	23	17.3	17.3	
15	22	Douglas fir*	31	31	26		Y	Fair	Skirted to 60', previous top loss, elongated branches, thin canopy, dead wood, broken branches		1	26	26	26	26	17.3	17.3	
16	24	Douglas fir*	36	36	20		Y	Fair	Previous top loss, elongated branches, low live crown ratio <30%, thin canopy, dead wood, broken branches, dead twigs		1	20	20	20	20	21	21	
17	25	Douglas fir*	40	40	25		Y	Fair	Low live crown ratio <20%, previous top loss? Elongated branches, abnormal bark, shedding bark, carpenter ants, exposed roots		1	25	25	25	25	24	24	
18	26	Douglas fir*	18	18	18		Y	Fair	Asymmetric canopy, thin canopy, dead wood, broken branches, dead twigs,		1	18	18	18	18	7.5	7.5	
19	27	Douglas fir*	12	12	16			Fair	No taper, abnormal bark, shedding bark, dead wood, broken branches, laminated root rot? Asymmetric canopy		1	16	16	16	16	3		

1	2	3	4	5	6	7		8	9	10		11				12		
#	Tree Tag #	Species ID	DBH (in)	Adj. DBH (in)	Drip-line radius (ft)	Wind-firm	OK in Grove	Health	Defects/Comments	Proposed Action		CRZ/TPZ/LOD				Value	Healthy Tree Credits	Retained value
										Ret.	Rem	Radius in feet						
										Viable	Remove	N	W	E	S			
									towards west, red ring root									
20	28	Douglas fir*	40	40	22			OK	Abnormal bark, shedding bark, carpenter ants bark only, low live crown ratio <30%, previous top loss? Elongated branches, dead wood, broken branches, typical of species		1	22	22	22	22	24	24	
21	29	Douglas fir*	6	6	16			Fair	Previous failure @ 60', previous top loss, elongated branches, low live crown ratio <20%, dead wood, broken branches, dead top		1	16	16	16	16	1.5		
22	30	Douglas fir*	21	21	22			OK	Low live crown ratio <30%, asymmetric canopy towards west, dead wood, broken branches, dead twigs, typical of species, previous top loss? Elongated branches		1	22	22	22	22	9.75	9.75	
23	31	Douglas fir*	21	21	21			OK	Moss and lichen, self-corrected lean towards west, previous top loss, elongated branches, dead wood, broken branches, typical of species, dead twigs		1	21	21	21	21	9.75	9.75	

1	2	3	4	5	6	7		8	9	10		11				12		
#	Tree Tag #	Species ID	DBH (in)	Adj. DBH (in)	Drip-line radius (ft)	Wind-firm	OK in Grove	Health	Defects/Comments	Proposed Action		CRZ/TPZ/LOD				Value	Healthy Tree Credits	Retained value
										Ret.	Rem	Radius in feet						
										Viable	Remove	N	W	E	S			
24	33	Common Hawthorne	10	10	17			Poor	Co-dominant leaders with included bark x2 @ 4', asymmetric canopy towards west, poor pruning with decay		1	17	17	17	17	1		
25	34	White pine	17	17	15			OK	Girdled by rope swing @ 6', moss and lichen, typical of species, remove straps		1	15	15	15	15	4.5	5.5	
26	35	Douglas fir*	35	35	24		Y	Fair	Bulge @ 4', abnormal bark, popping bark, previous top loss, elongated branches, low live crown ratio <20%, pin crack with free flowing sap		1	24	24	24	24	20.3	20.3	
27	36	Douglas fir*	27	27	20		Y	Fair	No taper, low live crown ratio <20%, previous top loss, elongated branches, flush cut, poor pruning with decay, laminated root rot? Calloused wound @ 3' towards south		1	20	20	20	20	14.3	14.3	
28	37	Western red cedar*	7	7	8			OK	Self-corrected lean towards east, typical of species		1	8	8	8	8	1.5	1.5	
29	38	Douglas fir*	32	32	18			OK	Low live crown ratio <30%, asymmetric canopy towards west, dead wood, broken branches, thin canopy, typical of species		1	18	18	18	18	18	18	

1	2	3	4	5	6	7		8	9	10		11				12		
#	Tree Tag #	Species ID	DBH (in)	Adj. DBH (in)	Drip-line radius (ft)	Wind-firm	OK in Grove	Health	Defects/Comments	Proposed Action		CRZ/TPZ/LOD				Value	Healthy Tree Credits	Retained value
										Ret.	Rem	Radius in feet						
										Viable	Remove	N	W	E	S			
30	39	Douglas fir*	26	26	18			OK	Previous top loss, elongated branches, dead wood, broken branches, asymmetric canopy towards west, typical of species		1	18	18	18	3	13.5	13.5	
31	40	Douglas fir*	20	20	16		Y	Fair	Previous top loss, elongated branches, thin canopy, typical of species		1	16	16	16	16	9	9	
32	41	Douglas fir*	14	14	9		Y	Fair	No taper, asymmetric canopy towards west, low live crown ratio <15%		1	9	9	9	9	4.5	4.5	
33	42	Douglas fir*	33	33	24		Y	Fair	Asymmetric canopy towards west, previous top loss? Elongated branches, low live crown ratio <25%, dead wood, broken branches		1	24	24	24	24	18.8	18.8	
34	43	Douglas fir*	24	24	11			Poor	Previous top loss, thin canopy, few branches on tree		1	11	11	11	11	12		
35	47	Western red cedar*	14	14	16			OK	Typical of species		1	16	16	16	16	4.5	4.5	
36	48	Bigleaf maple	8	8	16			OK	Co-dominant leaders with included bark x2 @ root crown, typical of species, suppressed canopy		1	16	16	16	16	1.5	2.5	
37	49	Douglas fir*	34	34	23			OK	Calloused wound @ 3' towards west, free flowing sap, laminated root rot? Bulge @ 4', moss and lichen, asymmetric canopy		1	23	23	23	23	19.5	19.5	

1	2	3	4	5	6	7		8	9	10		11				12		
#	Tree Tag #	Species ID	DBH (in)	Adj. DBH (in)	Drip-line radius (ft)	Wind-firm	OK in Grove	Health	Defects/Comments	Proposed Action		CRZ/TPZ/LOD				Value	Healthy Tree Credits	Retained value
										Ret.	Rem	Radius in feet						
										Viable	Remove	N	W	E	S			
									towards west, typical of species									
38	50	Douglas fir*	30	30	20			OK	Previous top loss, elongated branches, popping bark, asymmetric canopy towards south, hanger, typical of species		1	20	20	20	20	16.5	16.5	
* KZC 95.33.1b Native conifers receive 1.5X the number of tree credits										1	37					424	363	2.25

Offsite Trees:

1	2	3	4	5	6	7		8	9	10		11				12		
#	Tree Tag #	Species ID	DBH (in)	Adj. DBH (in)	Drip-line radius (ft)	Wind-firm	OK in Grove	Health	Defects/Comments	Proposed Action		CRZ/TPZ/LOD				Value	Healthy Tree Credits	Retained value
										Ret.	Rem	Radius in feet						
										Viable	Remove	N	W	E	S			
1	2	Western red cedar*	41	41	22			OK	Limbed to 30', co-dominant leaders with included bark x2 @ root crown, typical of species, candelabra		1	22	22	22	22	24.8	24.8	

1	2	3	4	5	6	7		8	9	10		11				12		
#	Tree Tag #	Species ID	DBH (in)	Adj. DBH (in)	Drip-line radius (ft)	Wind-firm	OK in Grove	Health	Defects/Comments	Proposed Action		CRZ/TPZ/LOD				Value	Healthy Tree Credits	Retained value
										Ret.	Rem	Radius in feet						
										Viable	Remove	N	W	E	S			
2	3	Douglas fir*	21, 29	36	16			OK	Co-dominant leaders with included bark x2 @ root crown, calloused wound @ 10' towards west, thin canopy, dead wood, broken branches, dead twigs, typical of species		1	16	16	16	16	21	21	
3	5	Madrona	10	10	10		Y	Fair	Topped @ 20', candelabra, asymmetric canopy towards west, blight, typical of species, vertical crack @ root crown up to 12' towards north, lean towards east		1	10	10	10	10	1	1	
4	6	Douglas fir*	54	54	28			Fair	Abnormal bark, shedding bark, co-dominant leaders with included bark x3 @ 7', hanger, topped @ 50', weak leaders, woodpecker activity, carpenter ants bark only, bulge @ 4'		1	28	28	28	28	34.5		
5	9	Japanese maple	12	12	18			OK	Co-dominant leaders with included bark x5 @ root crown, moss and lichen, lean towards west, thin canopy		1	18	18	18	18	2	2	
6	11	Japanese maple	8	8	14		Y	Fair	Vertical crack @ 2' up to 6' towards south, dead scaffolds, low live crown ratio <20%, moss and lichen		1	14	14	14	14	1	1	

1	2	3	4	5	6	7		8	9	10		11				12		
#	Tree Tag #	Species ID	DBH (in)	Adj. DBH (in)	Drip-line radius (ft)	Wind-firm	OK in Grove	Health	Defects/Comments	Proposed Action		CRZ/TPZ/LOD				Value	Healthy Tree Credits	Retained value
										Ret.	Rem	Radius in feet						
										Viable	Remove	N	W	E	S			
7	12	Douglas fir*	11	11	10		Y	Fair	Lean to west, dead wood, broken branches, thin canopy, dead twigs, low live crown ratio <15%	1		10	10	10	10	2.25	2.25	2.25
8	13	Common Hawthorne	7	7	9		Y	Fair	Co-dominant leaders with included bark x3 @ 6', moss and lichen, typical of species		1	9	9	9	9	1	1	
9	14	Douglas fir*	22	22	22			OK	Elongated branches, previous top loss, low live crown ratio <30%, typical of species		1	22	22	22	22	10.5	10.5	
10	17	Douglas fir*	36	36	23		Y	Fair	Abnormal bark, shedding bark, carpenter ants, previous ivy @ root crown up to 60', dead wood, broken branches, low live crown ratio <30%, moss and lichen, dead twigs		1	23	23	23	23	21	21	
11	18	Bigleaf maple	8	8	12			Fair	Dead scaffolds, co-dominant leaders with included bark x2 reduced to 1 @ 2', vertical crack @ root crown up to 14'		1	12	12	12	12	1		
12	19	Douglas fir*	20	20	17			Poor	Abnormal bark, shedding bark, bulge @ 5', carpenter ants, slight self-corrected lean, dead wood, broken branches		1	17	17	17	17	9		
13	20	Lodgepole pine	7	7	7			Poor	Co-dominant leaders with included bark x3 @ root crown, moss and lichen, asymmetric canopy towards west, dying		1	7	7	7	7	1		

1	2	3	4	5	6	7		8	9	10		11				12		
#	Tree Tag #	Species ID	DBH (in)	Adj. DBH (in)	Drip-line radius (ft)	Wind-firm	OK in Grove	Health	Defects/Comments	Proposed Action		CRZ/TPZ/LOD				Value	Healthy Tree Credits	Retained value
										Ret.	Rem	Radius in feet						
										Viable	Remove	N	W	E	S			
14	21	Douglas fir*	31	31	23			OK	Thin canopy, dead wood, broken branches, typical of species		1	23	23	23	23	17.3	17.3	
15	22	Douglas fir*	31	31	26		Y	Fair	Skirted to 60', previous top loss, elongated branches, thin canopy, dead wood, broken branches		1	26	26	26	26	17.3	17.3	
16	24	Douglas fir*	36	36	20		Y	Fair	Previous top loss, elongated branches, low live crown ratio <30%, thin canopy, dead wood, broken branches, dead twigs		1	20	20	20	20	21	21	
17	25	Douglas fir*	40	40	25		Y	Fair	Low live crown ratio <20%, previous top loss? Elongated branches, abnormal bark, shedding bark, carpenter ants, exposed roots		1	25	25	25	25	24	24	
18	26	Douglas fir*	18	18	18		Y	Fair	Asymmetric canopy, thin canopy, dead wood, broken branches, dead twigs,		1	18	18	18	18	7.5	7.5	
19	27	Douglas fir*	12	12	16			Fair	No taper, abnormal bark, shedding bark, dead wood, broken branches, laminated root rot? Asymmetric canopy towards west, red ring root		1	16	16	16	16	3		

1	2	3	4	5	6	7		8	9	10		11				12		
#	Tree Tag #	Species ID	DBH (in)	Adj. DBH (in)	Drip-line radius (ft)	Wind-firm	OK in Grove	Health	Defects/Comments	Proposed Action		CRZ/TPZ/LOD				Value	Healthy Tree Credits	Retained value
										Ret.	Rem	Radius in feet						
										Viable	Remove	N	W	E	S			
20	28	Douglas fir*	40	40	22			OK	Abnormal bark, shedding bark, carpenter ants bark only, low live crown ratio <30%, previous top loss? Elongated branches, dead wood, broken branches, typical of species		1	22	22	22	22	24	24	
21	29	Douglas fir*	6	6	16			Fair	Previous failure @ 60', previous top loss, elongated branches, low live crown ratio <20%, dead wood, broken branches, dead top		1	16	16	16	16	1.5		
22	30	Douglas fir*	21	21	22			OK	Low live crown ratio <30%, asymmetric canopy towards west, dead wood, broken branches, dead twigs, typical of species, previous top loss? Elongated branches		1	22	22	22	22	9.75	9.75	
23	31	Douglas fir*	21	21	21			OK	Moss and lichen, self-corrected lean towards west, previous top loss, elongated branches, dead wood, broken branches, typical of species, dead twigs		1	21	21	21	21	9.75	9.75	
24	33	Common Hawthorne	10	10	17			Poor	Co-dominant leaders with included bark x2 @ 4', asymmetric canopy towards west, poor pruning with decay		1	17	17	17	17	1		

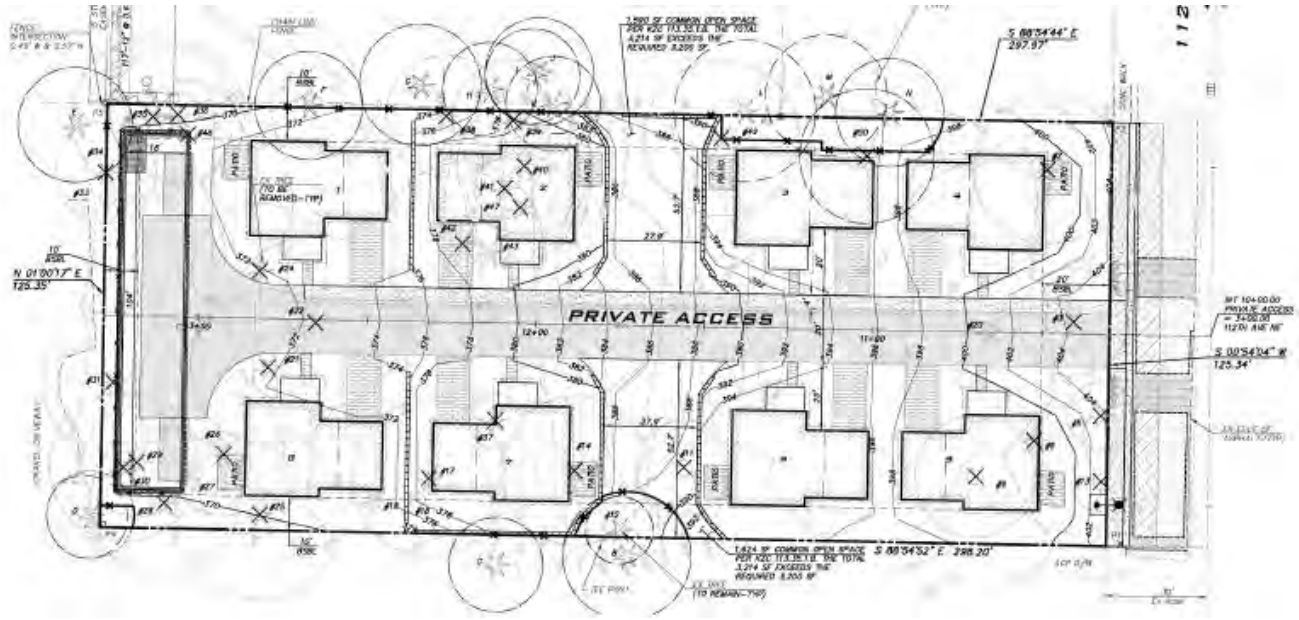
1	2	3	4	5	6	7		8	9	10		11				12		
#	Tree Tag #	Species ID	DBH (in)	Adj. DBH (in)	Drip-line radius (ft)	Wind-firm	OK in Grove	Health	Defects/Comments	Proposed Action		CRZ/TPZ/LOD				Value	Healthy Tree Credits	Retained value
										Ret.	Rem	Radius in feet						
										Viable	Remove	N	W	E	S			
25	34	White pine	17	17	15			OK	Girdled by rope swing @ 6', moss and lichen, typical of species, remove straps		1	15	15	15	15	4.5	5.5	
26	35	Douglas fir*	35	35	24		Y	Fair	Bulge @ 4', abnormal bark, popping bark, previous top loss, elongated branches, low live crown ratio <20%, pin crack with free flowing sap		1	24	24	24	24	20.3	20.3	
27	36	Douglas fir*	27	27	20		Y	Fair	No taper, low live crown ratio <20%, previous top loss, elongated branches, flush cut, poor pruning with decay, laminated root rot? Calloused wound @ 3' towards south		1	20	20	20	20	14.3	14.3	
28	37	Western red cedar*	7	7	8			OK	Self-corrected lean towards east, typical of species		1	8	8	8	8	1.5	1.5	
29	38	Douglas fir*	32	32	18			OK	Low live crown ratio <30%, asymmetric canopy towards west, dead wood, broken branches, thin canopy, typical of species		1	18	18	18	18	18	18	
30	39	Douglas fir*	26	26	18			OK	Previous top loss, elongated branches, dead wood, broken branches, asymmetric canopy towards west, typical of species		1	18	18	18	3	13.5	13.5	

1	2	3	4	5	6	7		8	9	10		11				12		
#	Tree Tag #	Species ID	DBH (in)	Adj. DBH (in)	Drip-line radius (ft)	Wind-firm	OK in Grove	Health	Defects/Comments	Proposed Action		CRZ/TPZ/LOD				Value	Healthy Tree Credits	Retained value
										Ret.	Rem	Radius in feet						
										Viable	Remove	N	W	E	S			
31	40	Douglas fir*	20	20	16		Y	Fair	Previous top loss, elongated branches, thin canopy, typical of species		1	16	16	16	16	9	9	
32	41	Douglas fir*	14	14	9		Y	Fair	No taper, asymmetric canopy towards west, low live crown ratio <15%		1	9	9	9	9	4.5	4.5	
33	42	Douglas fir*	33	33	24		Y	Fair	Asymmetric canopy towards west, previous top loss? Elongated branches, low live crown ratio <25%, dead wood, broken branches		1	24	24	24	24	18.8	18.8	
34	43	Douglas fir*	24	24	11			Poor	Previous top loss, thin canopy, few branches on tree		1	11	11	11	11	12		
35	47	Western red cedar*	14	14	16			OK	Typical of species		1	16	16	16	16	4.5	4.5	
36	48	Bigleaf maple	8	8	16			OK	Co-dominant leaders with included bark x2 @ root crown, typical of species, suppressed canopy		1	16	16	16	16	1.5	2.5	
37	49	Douglas fir*	34	34	23			OK	Calloused wound @ 3' towards west, free flowing sap, laminated root rot? Bulge @ 4', moss and lichen, asymmetric canopy towards west, typical of species		1	23	23	23	23	19.5	19.5	
38	50	Douglas fir*	30	30	20			OK	Previous top loss, elongated branches, popping bark, asymmetric canopy		1	20	20	20	20	16.5	16.5	

1	2	3	4	5	6	7		8	9	10		11				12		
#	Tree Tag #	Species ID	DBH (in)	Adj. DBH (in)	Drip-line radius (ft)	Wind-firm	OK in Grove	Health	Defects/Comments	Proposed Action		CRZ/TPZ/LOD				Value	Healthy Tree Credits	Retained value
										Ret.	Rem	Radius in feet						
										Viable	Remove	N	W	E	S			
									towards south, hanger, typical of species									
* KZC 95.33.1b Native conifers receive 1.5X the number of tree credits										1	37					424	363	2.25

Site:

Proposed Site improvements (for reference only) see civil plans for detail:



Discussion and conclusions:

Tree Density Calculations	
Total number of onsite trees	38
Total number of non-viable trees	8
Total number of viable trees	30
Total number of trees removed for site improvements	29
Total number of tree credits	424
Total number of viable tree creds	363
Total number of required tree credits (.86 *30)	26
Total number of retained tree credits	2
Tree mitigation (26-2)	24

The applicant proposes to divide this .83-acre parcel into eight (8) cottage SFR. The access to the site remains located off 112th Ave NE. There are four (4) lots on the north side of the site and four (4) lots on the south side. Both the north and the south cluster of homes are divided in half by a level common area.

The parcel has 38 trees with DBH's 6" and larger; thirty (30) trees are viable. The site slopes to the west, with the steepest portions of the site located approximately in the middle. Most of the viable trees are located on the western half of the site. As a team we worked to sift the lots north, to retain trees in the center of the site, however, the grading in the area would require the retained trees to have large, deep wells around their periphery that would create a hazard to the occupants in the area, and as they filled with rainwater, would have a reduced the chance of success for the trees long term viability.

As a result of the team's work, and feedback from COK planners I updated the tree retention plan to recommend this layout. The City of Kirkland requires that .86*30 = 26 tree density credits be retained.

Additional Onsite trees to be removed:

In reviewing each of the tree previously proposed to be retained, and speaking with the development team to determine as much as possible the grading and required site improvements (sidewalk and frontage improvements, detention vault, hammerhead turn around, and level common area I have removed the following trees from the list of retained trees:

1. #5, a 10" madrona – the species does poorly with any grading, cutting, or filling in the dripline of the tree, and due to required frontage improvements, 50% of the root zone would be impact.
2. #13 a 7" common hawthorn – the species is a short-lived one common to older developed sites, it is generally tolerant of root cutting, but not fill, nor changes in the overall site moisture. The moss on this tree indicates damp soil with low air circulation. Cutting the roots, and drying to site out be reclaiming the water, is likely to kill the tree in less than 5 years.
3. #39 is a 26" Douglas fir, the excavation for the foundation would be within 3' of the trunk along the southwest side of the tree where the roots for helping the tree withstand SW winter storms are located. I think with the grading in the area and 50% of the roots impacted so close to the trunk, it is unrealistic to believe the tree will remain healthy over then nest decade.

Specific complicated grading in dripline of offsite trees: ISA Certified arborist to supervise:

Tree B: 26" Douglas fir tree in average condition. I have reduced the LOD to 16' on the NW corner of the dripline to allow for installation of a 30" retaining wall, on the E side of the tree there will be less than 1' of grading occurring 11' from the tree to level the common area. The species and health of the tree enable this without anticipated negative consequences.

Tree D: 15" Douglas fir with some structural issues that include a low live crown ratio, and a lack of taper (probable cause – growth in a forested area) I have reduced the LOD of the tree on the NE side from 13' to 6' to enable the 1:1 excavation for the vault wall. I do not anticipate any negative impacts from the work based on species, and the location of the cut in the opposite direction of the SW winds.

Tree F: 40" Douglas fir located approximately 6" north of the property line. The tree is in average condition with a previous top loss and co-dominant leaders. The proposed improvements include cutting the roots of the tree 7' from the trunk for the building foundation, and 1'-2.5' of fill soil. 4' from the trunk on the north side. Severing the roots of the tree on its SW side may destabilize the tree. As a species Douglas firs are documented to be tolerant of fill up to 25% of the CRZ. However, the fill will be 50% of the tree inside the iCRZ. Tree is not likely to survive.

Tree G: 26: Douglas fir in average condition. The top of the tree was not viable however, I presumed there was a previous top loss after observing the elongated branches- a common occurrence after top loss. There is proposed to be approximately 4' of fill in the outer 25% of the SW dripline. I do not anticipate any long-term negative consequences to this work.

Tree H: a 20" Douglas fir in declining health. The proposed improvements include up to 2' of fill soil on the south side of the tree. Regardless of the work, the tree is dying. The tree is at increased risk of failure and is not likely to survive.

Tree K: is a 16" Douglas fir with a thin canopy and slight lean and asymmetric canopy to the east. The proposed site improvements include reducing the LOD from 14' to 9' – outside of the iCRZ, however, the cut will be on the opposite site of the lean and will likely increase the risk of a soil failure at the root crown. It is possible that this tree will be at greater risk of failure.

Tree L: is a 32" Douglas fir with a calloused vertical crack from 15-40', likely the result of a lightening strike, the tree has severe significant health issues, including free flowing sap. The LOD of the tree is proposed to be reduced from 21' to 7' on the south side for the excavation of the building foundation. Regardless of site development the tree is unlikely to survive for ten years.

Tree M: minimal impact from cut

Tree N: minimal impact from cut

All work on the north side of the site should be supervised by an ISA Certified or other qualified Arborist to:

- Confirm the location of the roots
- Confirm the impact to the adjacent trees
- Ensure that any encountered roots are property cut and maintained to BMP and ISA Standards.

Mitigation for the site is 26-2 = 24 trees.

Comments from David Aldridge January 12th, 2022:

5. Tree F is offsite and shouldn't be shown as removed on these plans, even though it is likely to die (see below).
    - I inadvertently included an incorrect spreadsheet of information for the offsite trees. Tree #F is a healthy 40" DBH Douglas fir, a species that is tolerant of construction in the dripline of the tree. The impact to this tree is 7' from the trunk of the tree. The iCRZ for this tree is 8', however, 75% of the tree dripline will not be impacted. My suggestion if to air-vac the root zone in this area to determine the location, and size of the roots. If there are roots with diameters larger than 6", discussing with the homeowner, the removal of the tree, if the roots are smaller, I recommend clearly cutting them and proceeding with excavation. Based on my field experience over 20 years, I think there is better than 75% chance the tree can be retained. Excavation and grading in the dripline of the offsite trees along the north side of the plat should be supervised by an ISA certified arborist.
5. The response letter indicates that the project arborist has stated that the grading within tree LODs is ok. Please have the arborist comment on the specific grading taking place in the LOD of each retained tree, and the rationale for their expected survival (e.g. tree #39 is greatly affected by grading and a structure, but is shown as retained; why is this tree expected to survive?)
    - Please see above, all grading within the dripline of retained offsite trees should be done by hand, and encountered roots cut cleanly per BMP and ANSI 300 standards. If it is not feasible to hand-grade, the work can be completed by a toothless bucket to avoid stretching the roots. Work should be supervised by an ISA Certified Arborists.
    - In reviewing the updated civil engineering site plan, I concur with the planner on tree #39, a 26" Douglas fir, although the tree is healthy, the impacts of grading, excavation and stormwater redirection, it is unlikely to survive long-term and I've updated my spreadsheet to show it as retained.

7. For offsite trees that are likely to be killed by proposed development, letters to neighbors will be required with relevant information from the project arborist. If at all feasible, explore options to move walls from the neighboring trees, including the northern open space even if it results in a portion of the space being less flat.
    - I do not believe that the proposed site development will kill any offsite trees, however, some of the grading and construction of retaining walls and excavation for building footings are complicated around offsite trees F, K, L, M and N. With judicious planning including air evacuation of roots at the proposed LOD prior to excavation and ensuring that the roots are cleanly cut per ISA standard recommendations, and BMP I think the trees can be retained.

9. Tree fencing stays up through construction. Its shown y to line up with the structures, which will not allow room to grade and build the cottages. Alter the fencing to show enough room for work to be completed and evaluate how this might affect retention.
    - Noted and corrected. Tree Protection Fencing is now shown approximately 2' off the site point of excavation.

Tree Protection Specifications:

Critical Root Zone and Fencing:
First, protect roots that lie in the path of construction. Approximately 90 to 95 percent of a tree's root system is in the top three feet of soil, and more than half is in the top one foot. Construction activities should be avoided in this area. Protect as much of the area beyond the tree's dripline as possible. Some healthy trees survive after losing half of their roots. However, other species are extremely sensitive to root damage even outside the dripline.
Do not disturb the Critical Root Zone (CRZ). The CRZ is defined by its "critical root radius." It is more accurate than the dripline for determining the CRZ of trees growing in forests or that have narrow growth habits. To calculate critical root radius, measure the tree's diameter (DBH) in inches, 4.5 feet above the ground. For each inch, allow for 1 to 1.5 feet of critical root radius. If a tree's DBH is ten inches, its critical root radius is 10 to 15 feet.
In addition to the CRZ, it is important to determine the Limits of Disturbance (LOD) for preserved trees. Generally, this is approximates the CRZ however in previously excavated areas around the dripline the LOD may be smaller, or in the case of a tree situated on a slope the LOD may be larger. The determination of LOD is also subject to the tree species. Some tree species do better than others after root disturbance.
Tree protection is advised throughout the duration of any construction activities whenever the critical root zone or leaf canopy many be encroached upon by such activities.

The Critical Root Zone (CRZ) or LOD should be protected with fencing adequate to hinder access to people vehicles and equipment. Fencing detail is provided. It should consist of continuous 4 ft. high temporary chain-link fencing with posts sec at 10' on center or polyethylene laminar safety fencing or similar. The fencing must contain fencing signage detailing that the tree protection area cannot be trespassed on.

Soil compaction is one of the most common killers of urban trees. Stockpiled materials, heavy machinery and excessive foot traffic damage soil structure and reduce soil pore space. The effected tree roots suffocate. When construction takes place close to the protected CRZ, cover the site with 4 inches of bark to reduce soil compaction

Tree Protection fencing must be erected prior to soil excavation, boring, grading or fill operations. It is erected at the LOD. If it is necessary to run utilities within the LOD, the utilities should be combined into one cut, as practical. Trenching is not allowed in the LOD. In these areas boring or tunneling techniques should be used. If roots greater than 1" diameter near the LOD are damaged or torn, it is necessary to hand trim them to a clean cut. Any roots that are exposed during construction should be covered with soil as soon as possible.

During drought conditions, trees must be adequately watered. Site should be visited regularly by a qualified ISA Certified Arborist to ensure the health of the trees. Tree protection fencing is the last item to be removed from the site after construction is completed.
After construction has been completed, evaluate the remaining trees. Look for signs and symptoms of damage or stress. It may take several years for severe problems to appear.
In the event that fencing around portions of the CRZ of a tree to be retained are not practical to erect due to construction or obstacles, tree protection fencing should be placed three feet laterally from the obstruction (ex. three feet back of a curb, building, or other existing or planned permanent infrastructure.

Tree trunk protection is required where CRZ fencing is not practical. Tree trunks should be wrapped in pine 2X4's and accessible critical structural root zones covered with wooden pallets.

Glossary:

ANSI A300: American National Standards Institute (ANSI) standards for tree care

Chlorotic: discoloration caused by lack of chlorophyll in the foliage

Conifer: A tree that bears cones and has evergreen needles or scales

Crown: the above ground portion of the tree comprised of branches and their foliage

Crown raise pruning: a pruning technique where the lower branches are removed, thus raising the overall height of the crown from the ground

DBH or DSH: diameter at breast or standard height; the diameter of the trunk measured 54 inches (4.5 feet) above grade

Deciduous: tree or other plant that loses its leaves annually and remains leafless generally during the cold season

Epicormic: arising from latent or adventitious buds

Evergreen: tree or plant that keeps its needles or leaves year-round; this means for more than one growing season

Increment: the amount of new wood fiber added to a tree in a given period, normally one year.

ISA: International Society of Arboriculture

Landscape function: the environmental, aesthetic, or architectural functions that a plant can have

Lateral: secondary or subordinate branch

Limits of disturbance: The boundary of minimum protection around a tree, the area that cannot be encroached upon without possible permanent damage to the tree. It is a distance determined by a qualified professional and is based on the age of the tree, its health, the tree species tolerance to disruption and the type of disturbance. It also considers soil and environmental condition and previous impacts. It is unique to each tree in its location.

Limited visual assessment: a visual assessment from a specified perspective such as foot, vehicle, or aerial (airborne) patrol of an individual tree or a population of trees near specified targets to identify specified conditions or obvious defects (ISA 2013)

Live crown ratio: the percentage of living tissue in the canopy versus the tree's height. It is a good indicator of overall tree health and the trees growing conditions. Trees with less than a 30% Crown ratio often lack the necessary quantity of photosynthetic material necessary to sustain the roots; consequently, the tree may exhibit low vigor and poor health.

Monitoring: keeping a close watch; performing regular checks or inspections

Owner/manager: the person or entity responsible for tree management or the controlling authority that regulates tree management

Pathogen: causal agent of disease

Phototropic growth: growth toward light source or stimulant

ROW: Right-of-way; generally referring to a tree that is located offsite on a city easement

Reaction wood: Specialized secondary xylem which develops in response to a lean or similar mechanical stress, it serves to help restore the stem to a vertical position

Self-corrected lean: a tree whose trunk is at an angle to the grade but whose trunk and canopy changes to become upright/vertical

Senescence: The condition or process of deterioration with age; loss of a cell's power of division and growth

Significant tree: a tree measuring a specific diameter determined by the municipality the tree grows in. Some municipalities deem that only healthy trees can be significant, other municipalities consider both healthy and unhealthy trees of a determined diameter to be significant

Snag: a tree left partially standing for the primary purpose of providing habitat for wildlife

Soil structure: the size of particles and their arrangement; considers the soil, water, and air space

Sounding: process of striking a tree with a mallet or other appropriate tool and listening for tones that indicate dead bark, a thin layer of wood outside a cavity, or cracks in wood

Structural defects: flaws, decay, or other faults in the trunk, branches, or root collar of a tree, which may lead to failure; may be genetic, or environmental

Tree credit: A number assigned to a tree by a municipality that may be equal to the diameter of the tree or a numerical count of the tree, or related to diameter by a factor conveyed in a table of the municipal code

Trunk area: the cross-sectional area of the trunk based upon measurement at 54 inches (4.5 ft.) above grade

Visual Tree Assessment (VTA): method of evaluating structural defects and stability in trees by noting the pattern of growth. Developed by Claus Mattheck (Harris, et al 1999) detailed visual inspection of a tree and surrounding site that may include the use of simple tools. It requires that a tree risk assessor walk completely around the tree trunk looking at the site, aboveground roots, trunk, and branches (ISA 2013)

References

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Assumptions and Limiting Conditions

1. Any legal description provided to the consultant/appraiser is assumed to be correct. Any titles and ownerships to any property are assumed to be good and marketable. No responsibility is assumed for matters legal in character. Any and all property is appraised or evaluated as thou free and clear, under responsible ownership and competent management.

2. It is assumed that any property is not in violation of any applicable codes, ordinances, statutes or other governmental regulations.

3. Care has been taken to obtain all information from reliable sources. All data has been verified insofar as possible; however, the consultant/appraiser can neither guarantee nor be responsible for the accuracy of information provided by others.

4. The consultant/appraiser shall not be required to give testimony or to attend court by reason of the report unless subsequent contractual arrangements are made including payment of an additional fee for such services as described in the fee schedule and contract of engagement.

5. Loss or alteration of any part of this report invalidates the entire report.

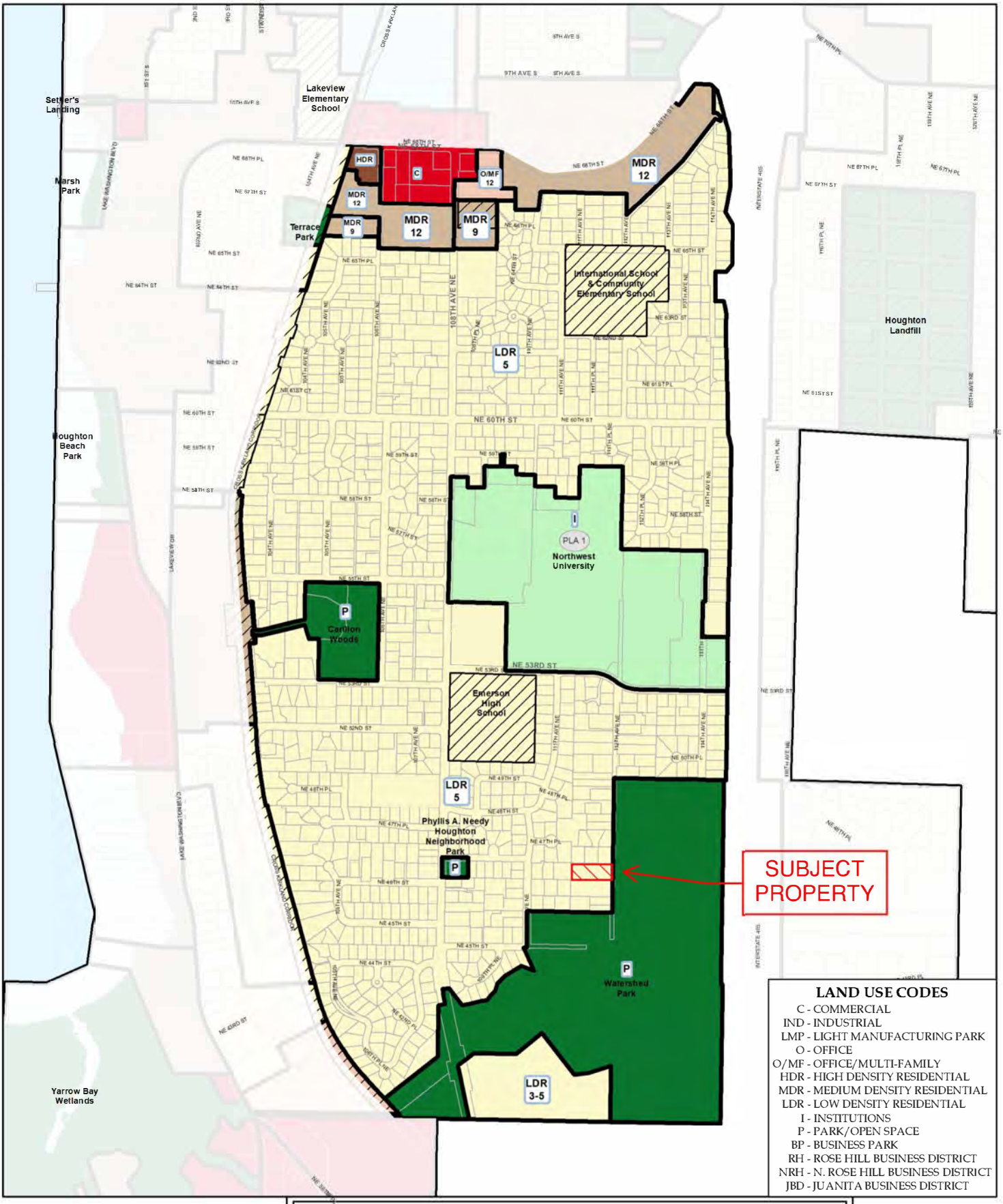
6. Possession of this report or a copy thereof does not imply right of publication or use for any purpose by any other than the person to whom it is addressed, without the prior expressed written or verbal consent of the consultant/appraiser.

7. Neither all nor any part of the contents of the report, nor copy thereof, shall be conveyed by anyone, including the client to the public through advertising, public relations, news, sales or other media, without the prior expressed written or verbal consent of the consultant/appraiser – particularly as to value conclusions, identity of the consultant/appraiser, or any reference to any professional society or instate or to any initialed designation conferred upon the consultant/appraiser as stated in her qualification.

8. The report and any values expressed herein represent the opinion of the consultant/appraiser, and the consultant's/appraiser's fee is in no way contingent upon the reporting of a specified value, a stipulated result, the occurrence of subsequent event, nor upon any finding to be reported.

9. Sketches, diagrams, graphs and photographs in this report, being intended as visual aid, are not necessarily to scale and should not be construed as engineering or architectural reports or survey.

10. Unless expressed otherwise: 1) information contained in this report covers only those items that were examined and reflects the condition of those items at the time of inspection; and 2: the inspection is limited to visual examination of accessible items without dissection, excavation, probing or coring. There is not warranty or guarantee, expressed or implied, that problems or deficiencies of the plants or property in question may not arise in the future.



LAND USE CODES

C - COMMERCIAL
IND - INDUSTRIAL
LMP - LIGHT MANUFACTURING PARK
O - OFFICE
O/MF - OFFICE/MULTI-FAMILY
HDR - HIGH DENSITY RESIDENTIAL
MDR - MEDIUM DENSITY RESIDENTIAL
LDR - LOW DENSITY RESIDENTIAL
I - INSTITUTIONS
P - PARK/OPEN SPACE
BP - BUSINESS PARK
RH - ROSE HILL BUSINESS DISTRICT
NRH - N. ROSE HILL BUSINESS DISTRICT
JBD - JUANITA BUSINESS DISTRICT

Central Houghton Neighborhood

Land Use Map

ORDINANCE NO. 4629
ADOPTED by the Kirkland City Council
December 12, 2017

LAND USE BOUNDARIES
PARCEL BOUNDARIES
SUBAREA BOUNDARY
PLA PLANNED AREA NUMBER
TOTEM CENTER
LDR *5 — LAND USE CODE / DENSITY (UNITS/ACRE)
PUBLIC FACILITIES

NOTE: WHERE NOT SHOWN, NO DENSITY SPECIFIED
** INDICATES CLUSTERED LOW DENSITY*

Maps produced January 11, 2018
Produced by the City of Kirkland. © 2018, the City of Kirkland, all rights reserved.
No warranties of any sort, including but not limited to accuracy, fitness or merchantability, accompany this product.

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May 25, 2022

To Whom It May Concern;

We are writing as we are formally submitting an appeal to the decision made surrounding the "Watershed Cottages" project ZON21-00113, a Development Proposed at 4559 112th Avenue NE.

Please see the additional documents attached to outline our concerns.

Thank you,

Elizabeth Lyons and Matthew Lyons

Nicole Desmul and Sam Ziemba

Aaron Bosworth and Jennifer Bosworth

Edward Sheets

Mary Rawson Foreman- Rorrer and Kirk Rorrer

This is a formal letter of appeal for City of Kirkland Decision on ZON21-00113, a Development Proposed at 4559 112th Avenue NE submitted by Elizabeth Lyons and Matthew Lyons, Aaron and Jennifer Bosworth, Nicole Desmul and Sam Ziemba, Edward Sheets, and Mary Rawson Foreman-Rorrer and Kirk Rorrer.

APPEAL OF CITY OF KIRKLAND DECISION ON ZON21-00113 WATERSHED COTTAGES

I. Procedural Issues

People who will be affected by the proposed development should have an opportunity to comment on a complete and accurate application. The city should require a new comment period for the following reasons:

1. **The original application used an out-of-date geotechnical report**. Comments from Edward Sheets pointed out:

   Geotechnical Report is not adequate: It is not appropriate to begin public review of this project with an inadequate Geotech report based on a completely different proposal.

   The Riley Group geotechnical report from April 2020 was based on a single house being built on the relatively flat portion of the parcel near the street (see page 23 of 96 in the PDF entitled Environmental Information or Report on the website). The detailed recommendations and analysis in the report are based on that project.

   On page 35, the Geotech firm said it reviewed a preliminary plan for eight houses. It concludes "RGI should complete a plan review of the final Watershed Cottages plan set when it is completed." The current "environmental information" is not based on the actual proposal.

   The City of Kirkland should require a detailed environmental plan to address this very sensitive site based on the proposal to build eight houses on a steep slope.

2. **The city decision is still based on this inadequate report**. The decision memo references the RGI report and two attachments (see issues 3.a on page 1 of decision memo). Reliance on an inadequate geotechnical report is arbitrary and capricious.

   The decision memo references Attachment 12, which is entitled Sensitive Areas Map and highlights the proposed site. There is no analysis.

   The decision memo also references Attachment 14, from Associated Earth Science, Incorporated. This is a peer review of the Riley reports. Is list several issues where

"The RGI report or associated documents do not fully comply with the report requirements outlined in Subsections 85.15.13 and 85.15.4". The issues that do not comply include concerns about the analysis of possible liquefaction, and a review of the grading plan.

Attachment 14 references a RGI analysis dated January 29, 2021 (Attachment 13). It has one page that shows the site with eight houses, and attaches the original report dated April 29, 2020. There was no new analysis of the geotechnical issues associated with siting eight houses instead of one.

3. **The notices posted on the parcel contained incorrect information**. Comments from Edward Sheets pointed out:

   The parcel notice stated, "Existing environmental documents that evaluate the proposal include: Geotechnical Report." As discussed above, this is not accurate. The Geotech report on the website is not based on the proposal to build eight houses.

4. **Many of the features in the proposal have changed**. People affected by the development should have an opportunity to comment on the changes, including the size of the proposed houses and the height of proposed retaining walls to address the extreme slope of the site.

5. **Attachment 5 does not include all of the public comments and the staff has not responded to all comments**. For example, the comments of Edward Sheets, emailed to Mr. Aldridge on April 27, 2021 addressed nine significant issues that have not been adequately addressed. Additionally Elizabeth Sheets addressed street safety concerns in her letter which weren't adequately addressed.

II. Substantive Issues

1. **The developer and the city review did not address the significant increase in impervious surfaces**. Comments from Edward Sheets stated:

   Significant increase in impervious surfaces: The Stormwater Analysis includes a plan to address water runoff from this site. The site is part of the Yarrow Creek Drainage Basin. The current site has one house and 38 trees. Adding eight houses, a steep access road and eight driveways, and removing the trees will have a significant effect on water runoff in the area.

   The analysis on pages 4.2 and 4.3 of the stormwater drainage analysis shows very significant increases in the flow (in cubic feet per second) associated with the development. For example, the two-year period analysis shows a 19-fold increase in the East Basin. The 100-year period shows a 22-fold increase. We know

climate change will increase the number of stronger storms with larger runoffs. Allowing this kind of development is short-sighted and will impose higher costs on the community in the long run.

2. **The city review did not adequately address the hazardous site**. The site is classified in an Erosion Hazard Area, a Landslide Hazard Area, and a Seismic Hazard Area. The site is not appropriate for intensive development.

3. **The city failed to give this site the same treatment as other similar sites in the city with hazardous topography**.

    a) There are two major areas of the City of Kirkland with this level of slope, in the Juanita/Finn Hill area, and the Watershed area of Houghton. (See City of Kirkland LIDAR mapping).

        i) The acreage of the Juanita/Finn Hill is larger, but the areas are similar in slope, natural resources, and hazard potential. The city has come up with policies to protect the slopes in these areas (Holmes Point Overlay, Kirkland Policy G-12: GOAT HILL – SPECIAL CONSTRUCTION REQUIREMENTS, Finn Hill Neighborhood Plan). Policy G-12 states "The Goat Hill area ("Goat Hill") poses some unique challenges for construction activity because of its topography, narrow roadways, and limited access". However the city has failed to come up with any similar consideration for the Watershed area with elevated hazard risks and should do so prior to approving any increases in density in this hazardous area. Failing to do so could put new residents at risk.

        ii) Goat Hill in Kirkland has many of the same features of the Watershed Park area including difficulty of access, narrow streets, and hazardous steep slopes. The city has required Special Construction Requirements for Goat Hill, which should also be required for the Watershed area. Goat hill may have narrower streets in some areas and some different issues, but a Policy should be developed and put in place that meets the unique needs of the Watershed area prior to approving any substantial increases in density on sloped lots.

4. **The city review did not adequately address the loss of trees.** the proposal would remove 25 of the 38 trees on the site. Other trees on the site are likely to die from the construction activity. The Plan set proposes construction and structures within the drip lines of trees on neighboring properties that would likely kill those trees and create dangerous conditions if they fall. The loss of all these trees is not consistent with City policies and will adversely affect the environment.

    The city review memo requires the developer to submit a tree retention plan (see page 2); however, there is no assurance that the plan will adequately address this important issue.

The city review memo requires the developer to submit a tree risk assessment for affected offsite trees (see page 2). There are no assurances that this will be effective in protecting the trees on private property next to the site. The city states that the development will likely cause damage to trees partially or fully on neighboring properties and has no plan to address concerns this beyond the risk assessment, "Work is proposed very close to neighboring trees. There is a high

likelihood that excavation will diminish the structural stability of neighboring trees." (Page 3 of Watershed Cottages Staff Report). A large percentage of trees of substantial size for several of the houses may be impacted, including those of 4705 and 4709 and 4715. This project should not be approved without a better plan in place to protect substantial and mature trees which help stabilize the slope on adjoining properties.

The city review memo requires the developer to obtain and submit written permission for all owners to remove any shared trees (see page 2). There are several shared trees currently in question. Additionally we're curious if the city is interested in protecting trees or allowing developments that significantly reduce trees. In this current plan there seems to be a departure from tree conservation efforts due to the amount of clear cutting that will be required.

5. **The city review did not adequately review the steep slope at the site:** The Topographic Survey shows areas with slopes of 15-40 percent and areas with slopes greater than 40 percent on the parcel. The site map shows that one part of the site drops from elevation 394 to 380 (a 14-foot drop) in approximately 30 feet.

   The Plan Set shows an access road to reach the eight houses with a proposed grade of 15 percent. There are parts of the site that are currently too steep to walk down, and the proposal does not indicate how grading will provide safe access. The proposed road has a very steep slope and appears to assume a great deal of fill or magical thinking regarding the connection with driveways.

6. **The proposal does not meet the many of the design standards and guidelines in the current policy (Section 113.35).**

   The proposal does not meet standard 1.a regarding orientation of dwelling units to promote a sense of community. The houses next to the open space do meet the standard that states, "each dwelling unit that abuts a common open space shall have a primary entry and/or covered porch oriented to the common open space." The sides of the houses border the so-called open space.

   The proposal does not meet standard 1.b regarding a required common open space. If you compare the site plan with the topographical map (page 3 on the PDF) you will see that the proposed open space is on the steepest portion of the property (some parts are a 40% grade). It will not provide a space for neighbors to meet and mingle unless they are roped up.

The proposal does not meet standard 1.d for low impact development, pursuant to the City of Kirkland Surface Water Manual. Removing the trees and building 8 houses and driveways means more impervious surfaces. The developers own consultant shows a 22-fold increase in stormwater runoff.

The proposal does not meet standard 1.f regarding a variation in unit size, building and site design. The proposed structures all appear to be the same size and design.

The proposal does not meet standard 1.h regarding pedestrian flow. The provision stating that "Pedestrian connections should link all buildings to the public right-of-way, common open space and parking areas." There are no sidewalks or pedestrian connections proposed in the development. People will have to walk up and down a very steep straight roadway

7. **The proposal does not address affordable housing**

   Section 113.40 requires one unit of housing for a ten-unit project. There are no requirements for affordable housing in this eight-unit proposal. We believe that affordable housing should be included when greatly increasing density in a neighborhood.

8. **The Policy in Chapter 113 should also include the following design standards and guidelines, and the city should consider these common-sense issues before allowing this project to proceed:**

   a) **Traffic safety**: The policy should ensure that traffic safety is enhanced or maintained. This project would result in a significant increase in traffic traveling down a narrow street. To get to 112th these additional cars will pass seven parks and schools in the immediate vicinity. Additionally according to the CDC in 2017 unintentional traffic accidents were the leading cause of death for children 5-14 years of age. Additionally, school aged children are most likely to be struck in the middle of the block on busy streets (per the CDC). The current plans have not addressed traffic safety improvement on 112th with the added plan for residents. This development will increase the adults living on the block by at least 10% thus increasing traffic, cars, delivery vehicles and others by at least that amount. The current plans have also not addressed parking concerns and street width. Before this proposal can go through the city needs to address these concerns for this vast increase in traffic for this street.

   b) **Pedestrian safety:** The policy should ensure that pedestrian safety is enhanced or maintained. Most of this part of 112th Street lacks sidewalks.

i) There are many walkers and joggers heading for Watershed Park. We are especially concerned about the safety of the many young children that play and ride their bikes on 112th. The photo below shows a typical scene.

ii) Due to the slope of the hill, during time when there is snow, residents of lots with a steep driveway must park on the street, so the city's argument that the residents of the new houses will never have to park on the street is unfounded for this and other reasons. The narrowness of the street plus the extra vehicles will make it difficult for pedestrians and emergency vehicles to have consistent, safe access.

iii) City of Kirkland's response to resident concerns regarding narrow roads is inadequate. The City feels that residents should deal with narrow streets by just pulling over to let each other pass, which is inadequate as the street is too narrow for this to work when larger vehicles are involved, or when there are a number of cars parked on the street, where the only solution is for moving vehicles to back up to find a free spot to pull over causing hazards for pedestrians.

c) **Steep Slopes:** The policy should not allow significant development on steep slopes. The Topographic Survey for this proposal shows areas with slopes of 15-40 percent.

d) **Preservation of trees:** The City's policies to preserve trees should apply to Chapter 113. Protection our remaining trees is even more important given the climate crisis. This project would remove 25 of the 38 trees on the site. Other trees on the site and on neighboring properties are likely to die or be damaged by the construction activity.

e) **Water quality:** The policy should include more safeguards for water quality and stormwater runoff. This proposal will cause major impacts when it rains according to the developer's own studies.

f) **Street parking and space for waste removal cans:** The policy should address the effects on the street scape. On our collection day, eight houses would put out 24 garbage, recycling, and compost cans. These cans would fill up more than three-quarters of the street in front of the property and leave very little room for cars to park. If cars park in front of the property on a regular basis, then there would not be enough room for all the cans, and they will spill over onto the adjacent properties. The photo below gives an indication of the effects on the street scape from 24 garbage and recycling containers.

g) Compatibility with the existing neighborhood: The policy should include detailed provisions to require a multi-house development to be compatible with the existing neighborhood. Given the impacts on traffic and pedestrian safety, trees, water quality and all the other problems we have raised, this project is clearly not compatible.

9. These additional design standards and guidelines should apply to this proposal

The additional design standards and guidelines we have proposed should apply to this proposal (Case Number ZON21-00113) because the developer has not submitted an adequate application. It should not be grandfathered.

III. Requests

We, the residents sending in this appeal, would like to ask for a reduction in the number of cottages proposed. We would suggest decreasing by 2-3 cottages at least in order to meet the standards to meet those goals that a cottage project should work towards; community safety, and building a design that promotes a useable community space for new residents, as well as keeping wildlife and topography and safety at top of mind. We would also recommend if such a reduction were to be done to adhere to the city's code and ensure proper walkways, and ensure alternative and diverse designs.

We are asking that the city's approval be reversed and that the city should require a new comment period to consider the issues raised in this appeal.

Respectfully submitted on May 25, 2022,

Elizabeth Lyons and Matthew Lyons

Party Representative: Elizabeth Lyons

4705 112th Ave NE, Kirkland, WA 98033

Email: Elizabeth.sheets@gmail.com

Phone: 503-422-6061

Aaron and Jennifer Bosworth

Nicole Desmul and Sam Ziemba

Aaron Bosworth and Jennifer Bosworth

Edward Sheets

Mary Rawson Foreman-Rorrer and Kirk Rorrer

BLUELINE

July 25, 2022

David Aldridge III
City of Kirkland
123 5th Ave
Kirkland WA 98033

RE: Watershed Cottages – ZON21-00113
Re: Response to Appeal
Blueline Job No. 18-141

Dear Mr. Aldridge,
This letter is provided in response to public comments contained in the May 25, 2022 appeal to the city of Kirkland decision on ZON21-00113 Watershed Cottages. We have coordinated with both the project geotechnical engineer as well as the project arborist and have included a response to each comment provided below in bold.

Procedural Issues
People who will be affected by the proposed development should have an opportunity to comment on a complete and accurate application. The city should require a new comment period for the following reasons:

1. The original application used an out-of-date geotechnical report. Comments from Edward Sheets pointed out:
   Geotechnical Report is not adequate: It is not appropriate to begin public review of this project with an inadequate Geotech report based on a completely different proposal.

   The Riley Group geotechnical report from April 2020 was based on a single house being built on the relatively flat portion of the parcel near the street (see page 23 of 96 in the PDF entitled Environmental Information or Report on the website). The detailed recommendations and analysis in the report are based on that project.

   On page 35, the Geotech firm said it reviewed a preliminary plan for eight houses. It concludes "RGI should complete a plan review of the final Watershed Cottages plan set when it is completed." The current "environmental information" is not based on the actual proposal.

   The City of Kirkland should require a detailed environmental plan to address this very sensitive site based on the proposal to build eight houses on a steep slope.

   Response: Refer to the attached letter from the Riley Group dated June 30, 2022.

2. The city decision is still based on this inadequate report. The decision memo references the RGI report and two attachments (see issues 3.a on page 1 of decision memo). Reliance on an inadequate geotechnical report is arbitrary and capricious.

   The decision memo references Attachment 12, which is entitled Sensitive Areas Map and highlights the proposed site. There is no analysis.
   The decision memo also references Attachment 14, from Associated Earth Science, Incorporated. This is a peer review of the Riley reports. Is list several issues where

   "The RGI report or associated documents do not fully comply with the report requirements outlined in Subsections 85.15.13 and 85. 15.4". The issues that do not comply include concerns about the analysis of possible liquefaction, and a review of the grading plan.

   Attachment 14 references a RGI analysis dated January 29, 2021 (Attachment 13). It has one page that shows the site with eight houses, and attaches the original report dated April 29, 2020. There was no new analysis of the geotechnical issues associated with siting eight houses instead of one.

   Response: Refer to the attached letter from the Riley Group dated June 30, 2022.

3. The notices posted on the parcel contained incorrect information. Comments from Edward Sheets pointed out:

   The parcel notice stated, "Existing environmental documents that evaluate the proposal include: Geotechnical Report." As discussed above, this is not accurate. The Geotech report on the website is not based on the proposal to build eight houses.

   Response: Refer to the attached letter from the Riley Group dated June 30, 2022.

4. Many of the features in the proposal have changed. People affected by the development should have an opportunity to comment on the changes, including the size of the proposed houses and the height of proposed retaining walls to address the extreme slope of the site.

   Response: The size of the proposed homes is consistent with city regulation. Proposed retaining walls are six feet in height or less which is appropriate for this type of development and allowed per city code.

5. Attachment 5 does not include all of the public comments and the staff has not responded to all comments. For example, the comments of Edward Sheets, emailed to Mr. Aldridge on April 27, 2021 addressed nine significant issues that have not been adequately addressed. Additionally Elizabeth Sheets addressed street safety concerns in her letter which weren't adequately addressed.

Response: N/A. City to respond to previously received public comments.

Substantive Issues

1. The developer and the city review did not address the significant increase in impervious surfaces. Comments from Edward Sheets stated:

   Significant increase in impervious surfaces: The Stormwater Analysis includes a plan to address water runoff from this site. The site is part of the Yarrow Creek Drainage Basin. The current site has one house and 38 trees. Adding eight houses, a steep access road and eight driveways, and removing the trees will have a significant effect on water runoff in the area.

   The analysis on pages 4.2 and 4.3 of the stormwater drainage analysis shows very significant increases in the flow (in cubic feet per second) associated with the development. For example, the two-year period analysis shows a 19-fold increase in the East Basin. The 100-year period shows a 22-fold increase. We know climate change will increase the number of stronger storms with larger runoffs. Allowing this kind of development is short-sighted and will impose higher costs on the community in the long run.

   Response: Impervious coverage at the site is consistent with city adopted code. The stormwater management system at the site was designed in accordance with city adopted code which includes provisions to mimic existing flow rates so as not to have an adverse impact on the downstream system.

2. The city review did not adequately address the hazardous site. The site is classified in an Erosion Hazard Area, a Landslide Hazard Area, and a Seismic Hazard Area. The site is not appropriate for intensive development.

   Response: The previously provided information by RGI included a detailed evaluation of each of these hazards including recommendations for development at the site in accordance with city code.

3. The city failed to give this site the same treatment as other similar sites in the city with hazardous topography.

   a. There are two major areas of the City of Kirkland with this level of slope, in the Juanita/Finn Hill area, and the Watershed area of Houghton. (See City of Kirkland LIDAR mapping).
      i. The acreage of the Juanita/Finn Hill is larger, but the areas are similar in slope, natural resources, and hazard potential. The city has come up with policies to protect the slopes in these areas (Holmes Point Overlay, Kirkland Policy G-12: GOAT HILL — SPECIAL CONSTRUCTION REQUIREMENTS, Finn Hill Neighborhood Plan). Policy G-12 states "The Goat Hill area ("Goat Hill") poses some unique

challenges for construction activity because of its topography, narrow roadways, and limited access". However the city has failed to come up with any similar consideration for the Watershed area with elevated hazard risks and should do so prior to approving any increases in density in this hazardous area. Failing to do so could put new residents at risk.

ii. Goat Hill in Kirkland has many of the same features of the Watershed Park area including difficulty of access, narrow streets, and hazardous steep slopes. The city has required Special Construction Requirements for Goat Hill, which should also be required for the Watershed area. Goat hill may have narrower streets in some areas and some different issues, but a Policy should be developed and put in place that meets the unique needs of the Watershed area prior to approving any substantial increases in density on sloped lots.

Response: N/A. This comment is not specific to the project and appears to be an opinion on city policy which is not appropriate as part of the appeal process.

4. The city review did not adequately address the loss of trees. The proposal would remove 25 of the 38 trees on the site. Other trees on the site are likely to die from the construction activity. The Plan set proposes construction and structures within the drip lines of trees on neighboring properties that would likely kill those trees and create dangerous conditions if they fall. The loss of all these trees is not consistent with City policies and will adversely affect the environment. The city review memo requires the developer to submit a tree retention plan (see page 2); however, there is no assurance that the plan will adequately address this important issue.

Response by Project Arborist: Per code, a tree retention plan was submitted and potential impacts were adequately addressed per ISA Standards, Best Management Practices and ANSI 300 standards. The city did review and make corrections to the tree preservation plan based on city adopted code and the city Urban Forester's opinion. Trees are living biological entities and there are not "Assurances" that ANY living entity will behave in a predictable way.

The city review memo requires the developer to submit a tree risk assessment for affected offsite trees (see page 2). **(Response by Project Arborist: This was submitted)** There are no assurances that this will be effective in protecting the trees on private property next to the site. **(Response by Project Arborist: See response above)** The city states that the development will likely cause damage to trees partially or fully on neighboring properties and has no plan to address concerns this beyond the risk assessment, "Work is proposed very close to neighboring trees. There is a high likelihood that excavation will diminish the structural stability of neighboring trees." (Page 3 of Watershed Cottages Staff Report). A large percentage of trees of substantial size for several of the houses may be impacted, including those of 4705 and 4709 and 4715. This project should not be approved without a better plan in place to protect substantial and mature trees which help stabilize the slope on adjoining properties.

The city review memo requires the developer to obtain and submit written permission for all owners to remove any shared trees (see page 2). There are several shared trees currently in question. Additionally we're curious if the city is interested in protecting trees or allowing developments that significantly reduce trees. In this current plan there seems to be a departure from tree conservation efforts due to the amount of clear cutting that will be required.

Response by Project Arborist: From a legal perspective, the developer CAN severe roots. See court of appeals ruling at the following link: https://www.helsell.com/2016/04/11/court-of-appeals-authorizes-tree-root-cutting-ruling-that-roots-trump-tree/

5. The city review did not adequately review the steep slope at the site: The Topographic Survey shows areas with slopes of 15-40 percent and areas with slopes greater than 40 percent on the parcel. The site map shows that one part of the site drops from elevation 394 to 380 (a 14-foot drop) in approximately 30 feet.

   The Plan Set shows an access road to reach the eight houses with a proposed grade of 15 percent. There are parts of the site that are currently too steep to walk down, and the proposal does not indicate how grading will provide safe access. The proposed road has a very steep slope and appears to assume a great deal of fill or magical thinking regarding the connection with driveways.

   Response: Steep slopes were evaluated in the geotechnical reports provided by RGI on file with the city and the site was found to be appropriate for development. The proposed road grade does not exceed 15% and meets city adopted standards for vehicular and pedestrian use.

6. The proposal does not meet the many of the design standards and guidelines in the current policy (Section 113.35).

   <u>The proposal does not meet standard 1.a regarding orientation of dwelling units to promote a sense of community.</u> The houses next to the open space do meet the standard that states, "each dwelling unit that abuts a common open space shall have a primary entry and/or covered porch oriented to the common open space." The sides of the houses border the so-called open space.

   Response: Covered porches oriented towards the common open space were provided on units 2,3,6 and 7 as consistent with the design standards and guidelines. Refer to information previously provided by the project architect Nash and Associates.

   <u>The proposal does not meet standard 1.b regarding a required common open space.</u> If you compare the site plan with the topographical map (page 3 on the PDF) you will see that the proposed open space is on the steepest portion of the property (some parts are a 40% grade). It will not provide a space for neighbors to meet and mingle unless they are roped up.

Response: Walls were used adjacent to the open space areas to provide flatter grades to be utilized by the residents.

The proposal does not meet standard 1.d for low impact development, pursuant to the City of Kirkland Surface Water Manual. Removing the trees and building 8 houses and driveways means more impervious surfaces. The developers own consultant shows a 22-fold increase in stormwater runoff.

Response: Storm water is being managed in accordance with city adopted codes. LID requirements are met through the use of amended soils.

The proposal does not meet standard 1.f regarding a variation in unit size, building and site design. The proposed structures all appear to be the same size and design.

Response: The units offered vary from 1,172 SF to 1,600 SF, offer differing floor plans and include variation in facades such as the covered porches on select units as mentioned above.

The proposal does not meet standard 1.h regarding pedestrian flow. The provision stating that "Pedestrian connections should link all buildings to the public right-of- way, common open space and parking areas." There are no sidewalks or pedestrian connections proposed in the development. People will have to walk up and down a very steep straight roadway

Response: A pedestrian route is provided along the drive aisle connecting the units to the public right of way. The type of pedestrian route provided is appropriate for this low volume, dead end access.

7. The proposal does not address affordable housing

   Section 113.40 requires one unit of housing for a ten-unit project. There are no requirements for affordable housing in this eight-unit proposal. We believe that affordable housing should be included when greatly increasing density in a neighborhood.

   Response: The project includes less than 10 units therefore affordable housing requirements do not apply.

8. The Policy in Chapter 113 should also include the following design standards and guidelines, and the city should consider these common-sense issues before allowing this project to proceed:

   a. Traffic safety: The policy should ensure that traffic safety is enhanced or maintained. This project would result in a significant increase in traffic traveling down a narrow street. To get to 112"' these additional cars will pass seven parks and schools in the

immediate vicinity. Additionally according to the CDC in 2017 unintentional traffic accidents were the leading cause of death for children 5-14 years of age. Additionally, school aged children are most likely to be struck in the middle of the block on busy streets (per the CDC). The current plans have not addressed traffic safety improvement on 112" with the added plan for residents. This development will increase the adults living on the block by at least 10% thus increasing traffic, cars, delivery vehicles and others by at least that amount. The current plans have also not addressed parking concerns and street width. Before this proposal can go through the city needs to address these concerns for this vast increase in traffic for this street.

b. Pedestrian safety: The policy should ensure that pedestrian safety is enhanced or maintained. Most of this part of 112th. Street lacks sidewalks.

    i. There are many walkers and joggers heading for Watershed Park. We are especially concerned about the safety of the many young children that play and ride their bikes on 112th. The photo below shows a typical scene.

    ii. Due to the slope of the hill, during time when there is snow, residents of lots with a steep driveway must park on the street, so the city's argument that the residents of the new houses will never have to park on the street is unfounded for this and other reasons. The narrowness of the street plus the extra vehicles will make it difficult for pedestrians and emergency vehicles to have consistent, safe access.

    iii. City of Kirkland's response to resident concerns regarding narrow roads is inadequate. The City feels that residents should deal with narrow streets by just pulling over to let each other pass, which is inadequate as the street is too narrow for this to work when larger vehicles are involved, or when there are a number of cars parked on the street, where the only solution is for moving vehicles to back up to find a free spot to pull over causing hazards for pedestrians.

c. Steep Slopes: The policy should not allow significant development on steep slopes. The Topographic Survey for this proposal shows areas with slopes of 15-40 percent.

d. Preservation of trees: The City's policies to preserve trees should apply to Chapter 113. Protection our remaining trees is even more important given the climate crisis. This project would remove 25 of the 38 trees on the site. Other trees on the site and on neighboring properties are likely to die or be damaged by the construction activity.

e. Water quality: The policy should include more safeguards for water quality and stormwater runoff. This proposal will cause major impacts when it rains according to the developer's own studies.

f. Street parking and space for waste removal cans: The policy should address the effects on the street scape. On our collection day, eight houses would put out 24 garbage, recycling, and compost cans. These cans would fill up more than three-quarters of the street in front of the property and leave very little room for cars to park. If cars park in front of the property on a regular basis, then there would not be enough room for all the cans, and they will spill over onto the adjacent properties. The photo below gives an indication of the effects on the street scape from 24 garbage and recycling containers.

g. Compatibility with the existing neighborhood: The policy should include detailed provisions to require a multi-house development to be compatible with the existing neighborhood. Given the impacts on traffic and pedestrian safety, trees, water quality and all the other problems we have raised, this project is clearly not compatible.

Response: The project was designed in accordance with city adopted codes and policies. Comment #8 is not specific to the project and appears to be an opinion on city policy which is not appropriate as part of the appeal process.

9. These additional design standards and guidelines should apply to this proposal

The additional design standards and guidelines we have proposed should apply to this proposal (Case Number ZON21-00113) because the developer has not submitted an adequate application. It should not be grandfathered.

Response: N/A. This comment is not specific to the project and appears to be an opinion on city policy which is not appropriate as part of the appeal process.

Requests

We, the residents sending in this appeal, would like to ask for a reduction in the number of cottages proposed. We would suggest decreasing by 2-3 cottages at least in order to meet the standards to meet those goals that a cottage project should work towards; community safety, and building a design that promotes a useable community space for new residents, as well as keeping wildlife and topography and safety at top of mind. We would also recommend if such a reduction were to be done to adhere to the city's code and ensure proper walkways, and ensure alternative and diverse designs.

We are asking that the city's approval be reversed and that the city should require a new comment period to consider the issues raised in this appeal.

Response: The city has reviewed and approved materials provided by the applicant that are consistent with city adopted codes and policies and therefore the appeal should be dismissed. The neighborhood group appealing the project is encouraged to engage in the city's public comment process as it relates to code updates so as to influence development regulations on future projects located in the city.

Please call or email me with any concerns at 425-250-7247 or bpudists@thebluelinegroup.com.

Sincerely,

Brett Pudists, PE
Principal

CC:
Dominique Ruybal, President, DGR Development Inc.
Kristina Weller PE, Principal Engineer, The Riley Group, Inc.
Susan Prince, ISA Certified Arborist, Creative Landscape Solutions

Enclosures:
The Riley Group, Inc., Letter to David Aldridge, dated June 30, 2022

David Aldridge III

From: Edward Sheets <ed@edsheets.com>
Sent: Tuesday, April 27, 2021 9:37 AM
To: David Aldridge III
Subject: Case Number ZON21-00113, proposal to build eight houses at 4559 112th Avenue NE.

Dear Mr. Aldridge:

I am providing comments opposing the proposal to build eight houses at 4559 112th Avenue NE in Kirkland. Please add me to the parties of record list. I want to be notified of any future activities on this proposal.

The proposed development is not appropriate for the neighborhood: The proposed site is on a quite dead-end street near one of the entrances to Watershed Park. Much of the street does not have sidewalks. It is used by young children and people walking to the park. Adding eight houses on the parcel is not consistent with the existing neighborhood. Based on the construction practices and the very high costs of other houses built by the developer, the proposal will not promote affordable housing. It will create traffic and safety issues and adverse impacts for neighboring homeowners and the environment.

Traffic and safety concerns: The proposal would significantly increase traffic in the area. The developer's map (Large Vicinity-Watershed Cottages.pdf) shows that the traffic driving to the site will pass:

- Phyllis Needy Park for young children
- Emerson High School
- Northwest University

The map omits the following schools for young children that are also on the route that traffic would take to get to the site:

- NorthStar Middle School
- Kirkland Children's School
- Kirkland Seventh Day Adventist School
- Puget Sound Adventist Academy

There has already been significant development on 112th avenue with many parcels subdivided to add one or two houses on existing parcels. This proposal to add eight houses on one parcel would cause a dramatic increase in traffic and create safety issues for the neighborhood.

Loss of Trees: the proposal would remove 25 of the 38 trees on the site. Other trees on the site are likely to die from the construction activity. The Plan set proposes construction and structures within the drip lines of trees on neighboring properties that would likely kill those trees and create dangerous conditions if they fall. The loss of all these trees is not consistent with City policies and will adversely affect the environment.

Steep Slope: The Topographic Survey shows areas with slopes of 15-40 percent and areas with slopes greater than 40 percent on the parcel. The site map shows that one part of the site drops from elevation 394 to 380 (a 14-foot drop) in approximately 30 feet.

The Plan Set shows an access road to reach the eight houses with a proposed grade of 15 percent. There are parts of the site that are currently too steep to walk down, and the proposal does not indicate how grading will

provide safe access. The proposed road has a very steep slope and appears to assume a great deal of fill or magical thinking regarding the connection with driveways.

Hazardous Site: The site is classified in an Erosion Hazard Area, a Landslide Hazard Area, and a Seismic Hazard Area. The site is not appropriate for intensive development.

Significant increase in impervious surfaces: The Stormwater Analysis includes a plan to address water runoff from this site. The site is part of the Yarrow Creek Drainage Basin. The current site has one house and 38 trees. Adding eight houses, a steep access road and eight driveways, and removing the trees will have a significant effect on water runoff in the area.

The analysis on pages 4.2 and 4.3 of the stormwater drainage analysis shows very significant increases in the flow (in cubic feet per second) associated with the development. For example, the two-year period analysis shows a 19-fold increase in the East Basin. The 100-year period shows a 22-fold increase. We know climate change will increase the number of stronger storms with larger runoffs. Allowing this kind of development is short-sighted and will impose higher costs on the community in the long run.

Geotechnical Report is not adequate: <u>It is not appropriate to begin public review of this project with an inadequate Geotech report based on a completely different proposal.</u>

The Riley Group geotech report from April 2020 was based on a single house being built on the relatively flat portion of the parcel near the street (see page 23 of 96 in the PDF entitled Environmental Information or Report on the website). The detailed recommendations and analysis in the report are based on that project.

On page 35, the Geotech firm said it reviewed a preliminary plan for eight houses. It concludes "RGI should complete a plan review of the final Watershed Cottages plan set when it is completed." The current "environmental information" is not based on the actual proposal.

The City of Kirkland should require a detailed environmental plan to address this very sensitive site based on the proposal to build eight houses on a steep slope.

This proposal will not provide moderate-cost housing: The proposed houses are three bedrooms and three baths totaling 1,750 square feet that are likely to be very expensive. The developer built similar sized houses on NE 63rd Street in Kirkland that each cost more than $2 million. The proposal will not contribute to the City Council goal for affordable housing. It will have a significant adverse impact on the neighborhood and the environment.

Process concerns: The notices posted on the parcel contains incorrect information.

First, it states, "Existing environmental documents that evaluate the proposal include: Geotechnical Report." As discussed above, this is not accurate. The Geotech report on the website is not based on the proposal to build eight houses.

Second, the proposal refers to "cottages". This may be a marketing ploy by the developer to make the houses seem small, low-cost, and charming when in fact they will be full-sized houses that are likely to be very expensive. Based on other projects by the developer, they are not likely to be charming.

Summary: I hope you will address each of these issues in your review and reject the proposal. It is not consistent with the adjacent properties. It will impose traffic and safety problems for the neighborhood. It would cause significant environmental damage. It would adversely affect the neighborhood. The project does not

promote affordable housing. The material provided by the developer are not accurate or adequate for a meaningful review.

Thank you for your attention on these comments.

Edward W. Sheets

CITY OF KIRKLAND
123 FIFTH AVENUE ● KIRKLAND, WASHINGTON 98033-6189 ● (425) 587-3800

DEPARTMENT OF PUBLIC WORKS
PRE-APPROVED PLANS POLICY

Policy G-12: GOAT HILL – SPECIAL CONSTRUCTION REQUIREMENTS

The Goat Hill area ("Goat Hill") poses some unique challenges for construction activity because of its topography, narrow roadways, and limited access. This policy establishes special guidelines and procedures for development and construction activity in Goat Hill to address those conditions.

Frontage Improvements:
The Zoning Code (KZC 110) requires new single-family home projects to construct frontage improvements along the abutting right-of-way: Type A curb, 4.5 ft. planter with street trees 30 ft. on-center, 5 ft. sidewalk, and widening the pavement width to 20 ft. But in Goat Hill, its steep topography coupled with narrow street widths makes the construction of these code-required improvements difficult. Further, KZC 110.70 allows the City to grant a modification to the improvements if unusual topographic or physical conditions preclude the construction of the improvements as required. Therefore, in Goat Hill, frontage improvements shall consist of widening the abutting street to 20 ft. in width only.

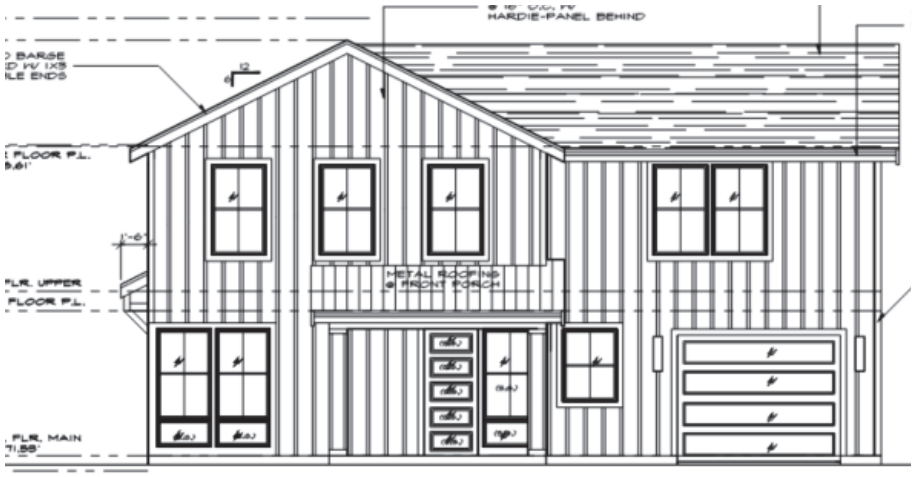
Construction Requirements:
Construction projects on Goat Hill shall comply with the following:

- **Pre-Construction Meeting:** The Owner/General Contractor (O/GC) for the project shall set up a pre-construction meeting prior to start of any work. Public Works staff will meet with the O/GC and their Utility Contractor to review the construction requirements of this policy: project sequencing, traffic control, work hours, and erosion control for the site.
- **Project Sequence**: Frontage improvements (street widening) shall be completed prior to start of the foundation work for the new home. The final lift of pavement may be placed at the end of the project after all utilities are installed to ensure a smooth mat of pavement free of utility patches.
- **Traffic Control**: The O/GC and/or Utility Contractor shall provide a Traffic Control Plan for each phase of work: frontage improvements, utility work, construction material deliveries, and other work as may be needed.
- **Work Hours**: Generally, standard work hours per the KZC apply to projects in Goat Hill. However, different work hours apply to the following activities: work related to the right-of-way, construction equipment delivery, construction material delivery, or any activity that might impede traffic or access to or within Goat Hill. For the aforementioned, work hours shall be limited to 9:00 a.m. to 3:00 p.m. Monday through Friday, and prohibited on weekends and federal holidays.
- **Erosion Control**: Erosion control for the site shall comply with all established City of Kirkland policies and procedures. In addition, the O/GC shall appoint a site CECSL as a single point of contact for addressing erosion control issues with City staff, and shall provide a performance bond in the amount of $50,000 to remedy unaddressed erosion control issues at the site, if needed. The performance bond shall remain in effect until the project is complete and given a final by all Departments.

- **Geotechnical Consultant**: The O/GC shall retain a geotechnical consultant to provide monthly reports to the City's Construction Inspector addressing erosion control and site stability. Any recommendations by the geotechnical engineer shall be implemented.

Goat Hill Area

UNIT 1



SOUTH ELEVATION

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WEST ELEVATION

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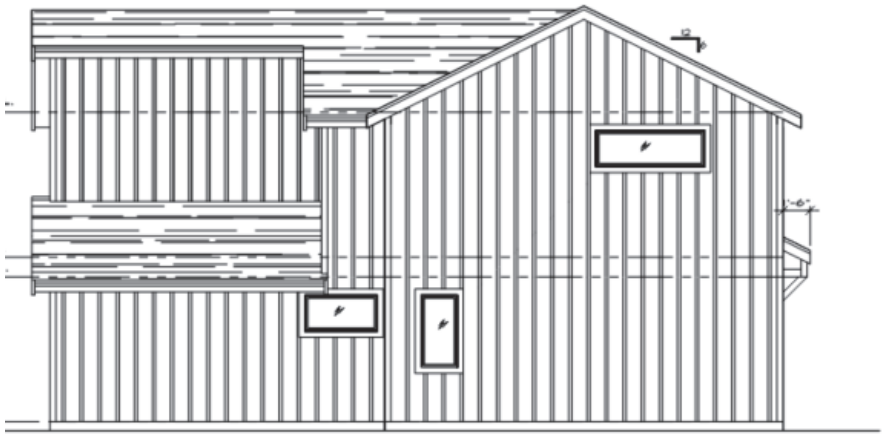

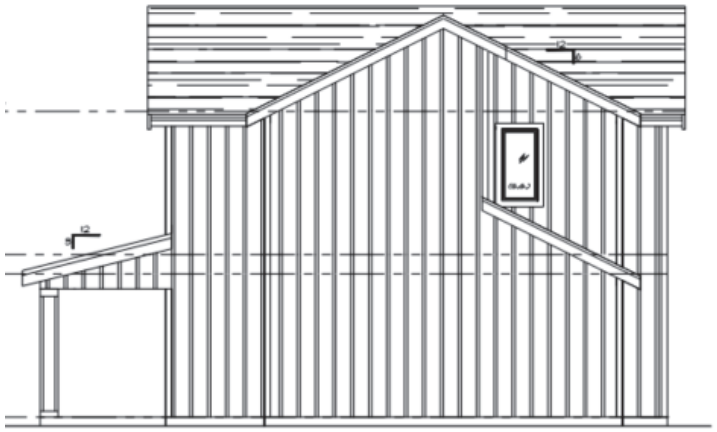

EAST ELEVATION

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UNIT 2

SOUTH ELEVATION
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EAST ELEVATION
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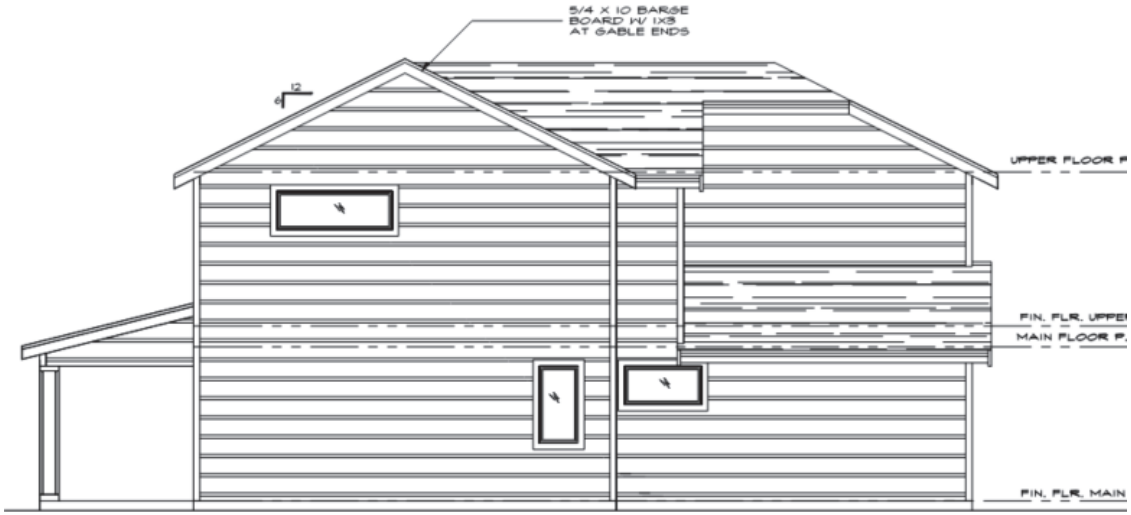

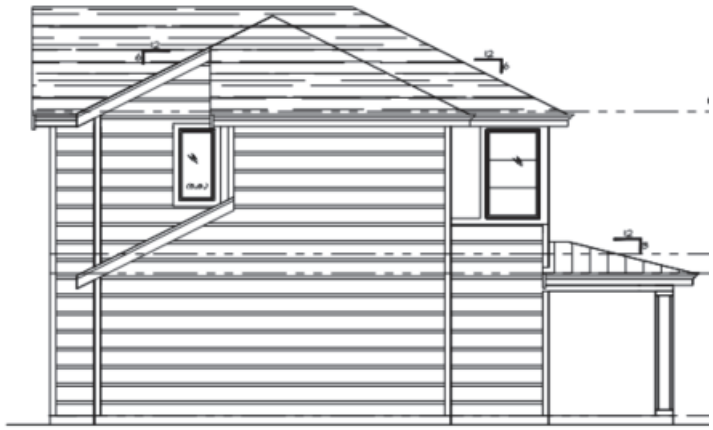

WEST ELEVATION
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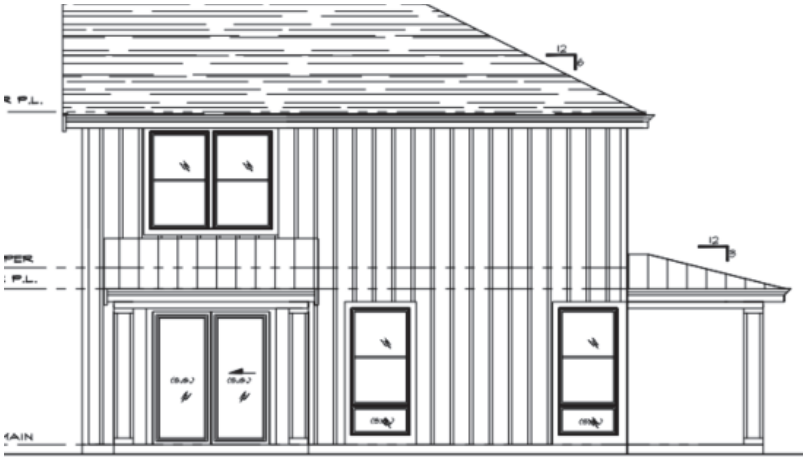
UNIT 3

SOUTH ELEVATION

SEE GENERAL NOTES SCALE: 1/4" = 1'-0"



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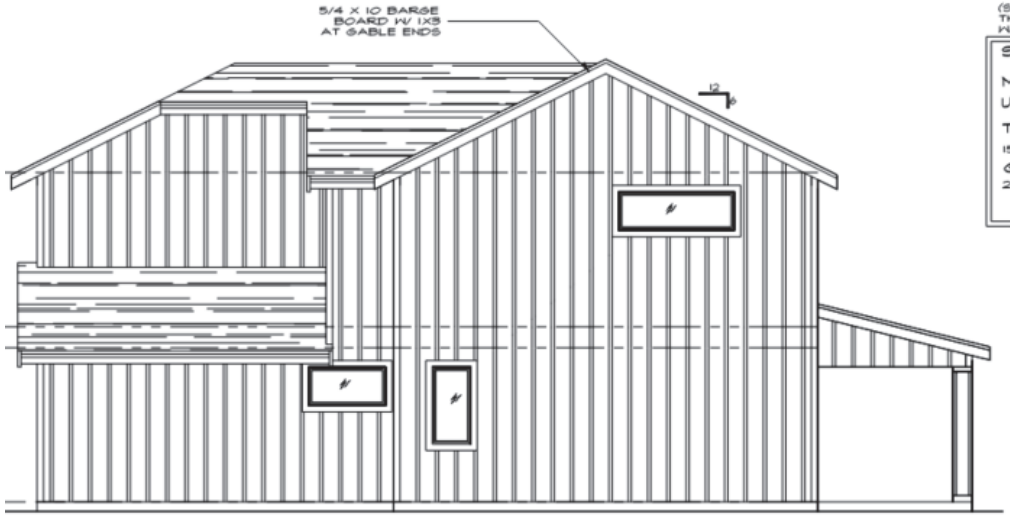

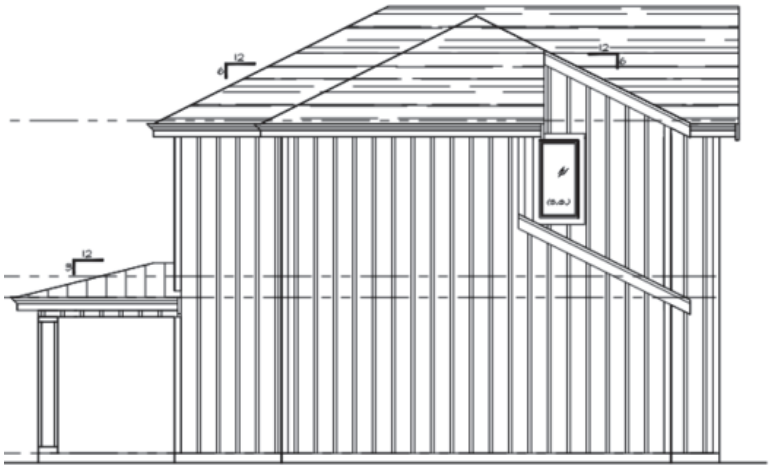

UNIT 4

SOUTH ELEVATION
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EAST ELEVATION
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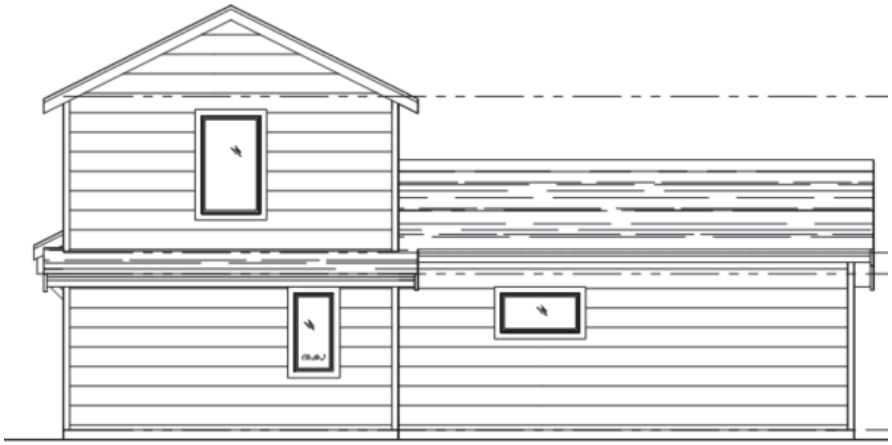

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UNIT 5

NORTH ELEVATION

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EAST ELEVATION

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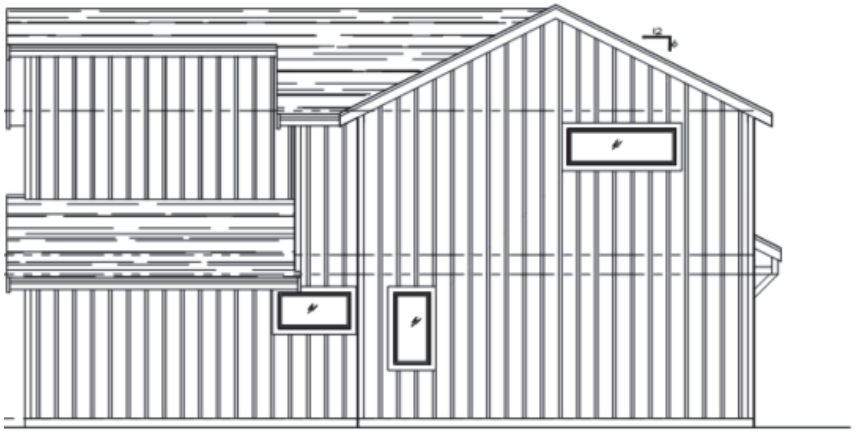

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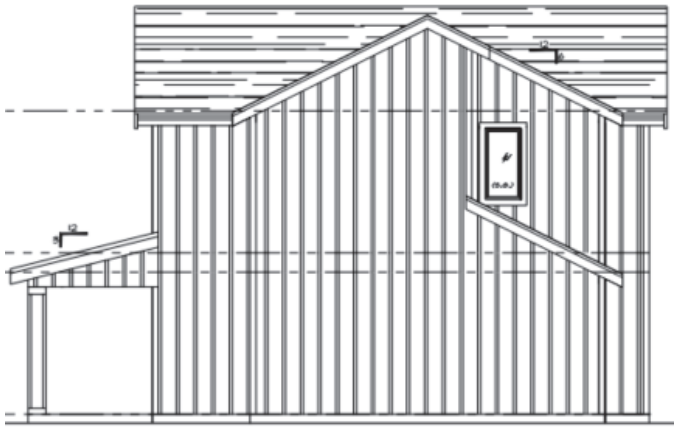

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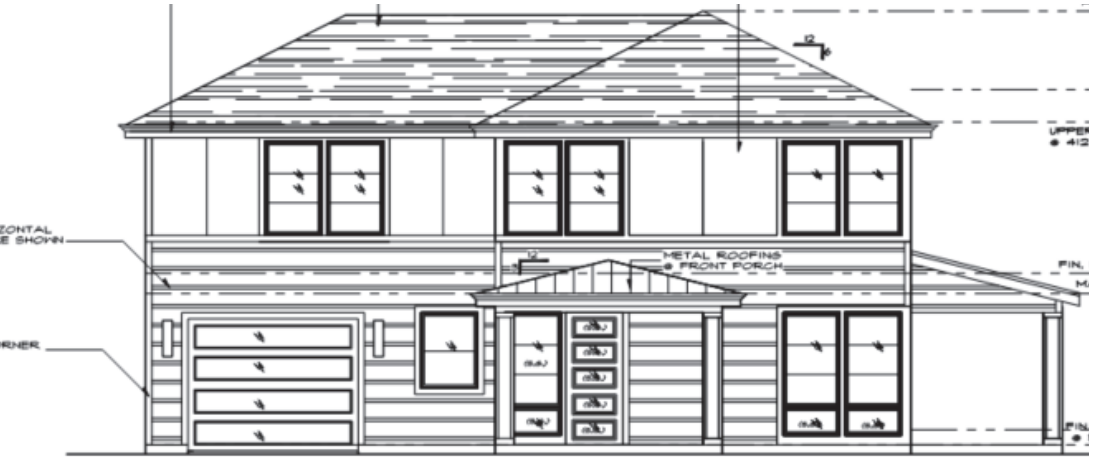
UNIT 6



NORTH ELEVATION
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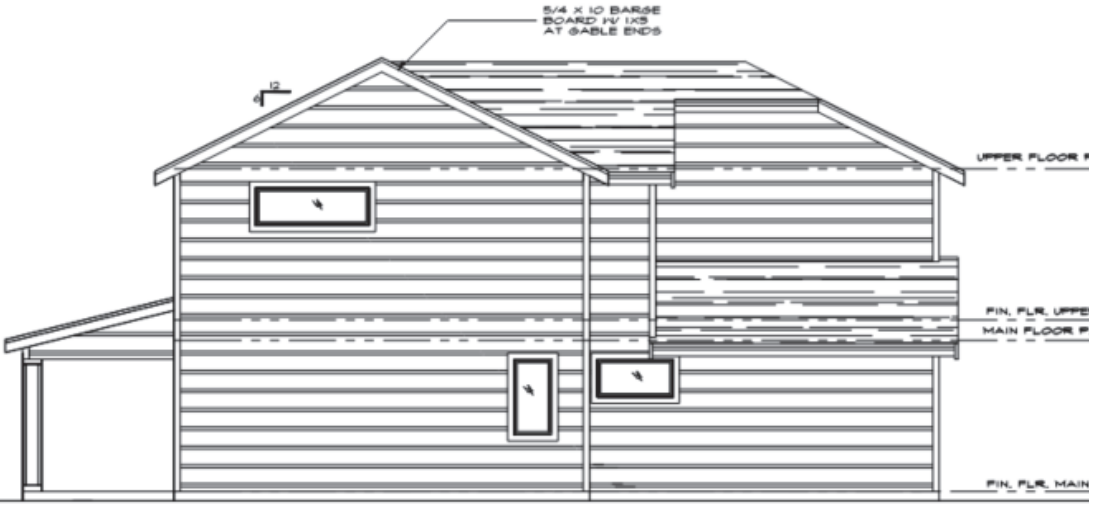

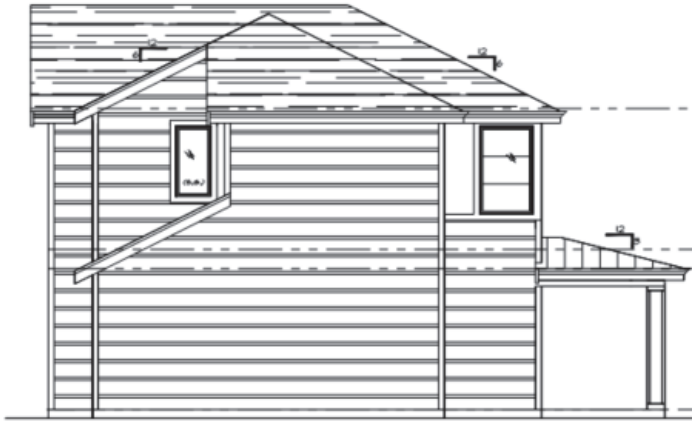

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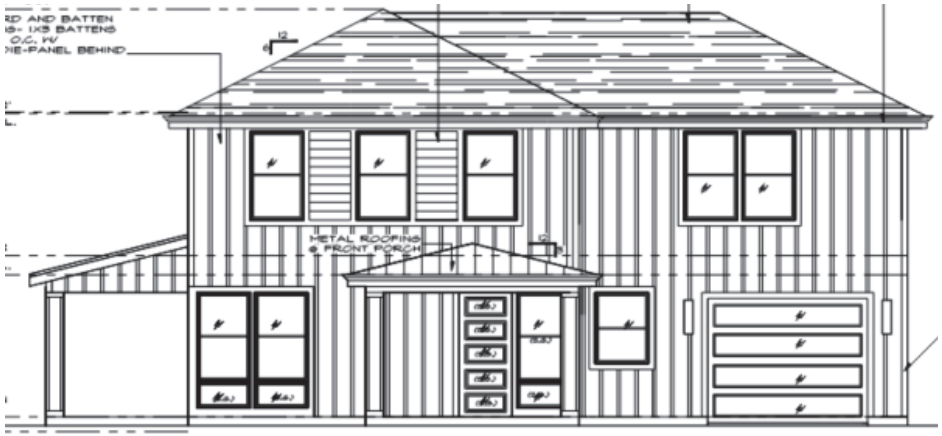
UNIT 7



NORTH ELEVATION

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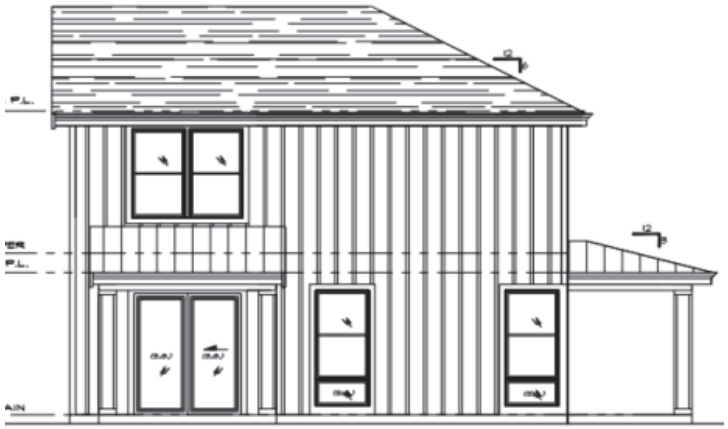

EAST ELEVATION

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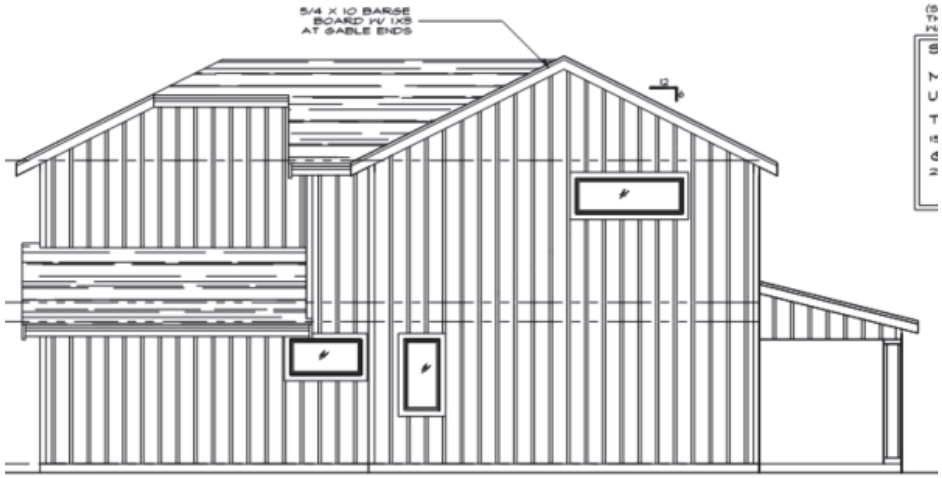

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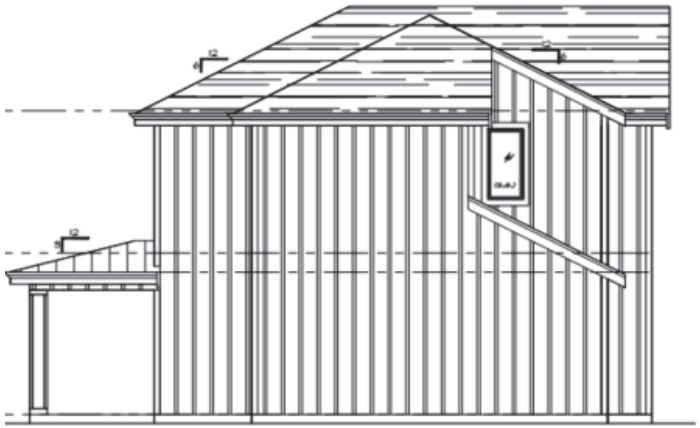

WEST ELEVATION

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UNIT 8

NORTH ELEVATION

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WEST ELEVATION

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SOUTH ELEVATION

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EAST ELEVATION

SEE GENERAL NOTES SCALE: 1/4" = 1'-0"

CITY OF KIRKLAND
Department of Public Works
123 Fifth Avenue, Kirkland, WA 98033 425.587.3800
www.kirklandwa.gov

MEMORANDUM

To: David Aldridge III, Planner

From: Thang Nguyen, Transportation Engineer

Date: July 19, 2022

Subject: Watershed Cottages, ZON21-00113

This memorandum provides the staff responses to the transportation concerns raised in the appeal of the proposed development.

Comment 8a) **Staff Response:** 112th Avenue NE has relatively low pedestrian activities and low traffic volumes. There is no congestion on this street that would delay residents from accessing the street. The additional eight cottages are estimated to generate 7 AM peak hour trips, and 8 PM peak hour trips; The number of trips generated by this development would have a negligible traffic impact on this street. It is not the responsibility of the developer to address the existing street width. The current width of the street is adequate to accommodate the addition of eight townhouse units. The width of the street is adequate for two-way traffic. However, when there is a vehicle parked on the west side of the street, drivers are required to give each other the courtesy right-of-way to pass through; this condition exists where the City has permitted streets with a 20-foot-wide travel lane, and it is a common condition in urban areas. Staff has visited the street at various times and observed that there were only a couple of vehicles parked on the street. Undoubtedly, there would be more vehicles parking near the park during the summer. Most residents park their vehicles on their properties. CDC reports on street safety only highlights nation-wide findings and is not a street specific. A street specific evaluation must be made for accuracy. Based on 6-years of crash data, there were no accidents on 112th Avenue NE between NE 53rd Street and the dead-end at the Watershed Park. Additional traffic does not in itself create crashes.

It is not a requirement for the developer to address existing on-street parking concerns if the applicant provides the parking supply required by the zoning code. The proposed project will provide adequate parking as required by code.

Comment 8b, 8i, and 8ii) Staff Response- Currently, the City has no plans to improve the street; Per City's policy, rolled curbs, gutters, and sidewalks will be constructed as part of the required frontage improvements for each property as they redevelop. Based on the City's development policies, the developer is not required to construct missing sidewalk sections beyond their frontage. There are no sight line obstructions that would create a safety hazard with the additional residents from the development project. As shown in the

picture provided by the appellant, there is open and direct sight line from the end of the block to the children in the picture.

There has not been an issue with emergency vehicle access to any properties along 112th Avenue NE, the road width and function of the 112th Avenue NE will remain the same with the proposed development. The grade into the proposed development is no worse than the grades into some of the existing homes along 112th Avenue NE. If new residents can park on the street as current residents can and do during few heavy snow days out of the year and the street is not blocked, then emergency vehicle will continue to have safe access. A 12-foot travel lane is adequate for fire truck movements and this width can be accommodated with car parked on one side of the street as they are now.

Existing traffic concern can be addressed through the City's Neighborhood Traffic Control Program.