

Preliminary Geotechnical Study

DRCC Property Master Plan
Mill Creek, Washington

for
Bruce Dees and Associates

May 18, 2023



GEOENGINEERS 
Earth Science + Technology

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File No. 6431-002-00

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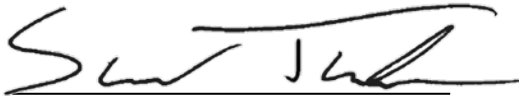
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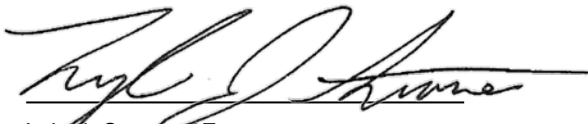
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1.0 INTRODUCTION AND PROJECT DESCRIPTION

GeoEngineers, Inc. (GeoEngineers) is pleased to present this preliminary geotechnical study for the City of Mill Creek (City) Dobson, Remillard, Cook and Church (DRCC) Property Master Plan project. The project site is located near 13903 North Creek Drive in Mill Creek, Washington. Our project understanding is based on review of the project documents and our discussions with Bruce Dees and Associates (project landscape architect).

The overall project consists of developing a master plan for City-owned property towards future development and use for public recreation activities. The project site consists of four parcels, referred to as the Dobson, Remillard, Cook and Church properties (DRCC) in reference to the former owners of each parcel. The parcels were partially developed with single-family residences and church buildings. The sites are currently largely undeveloped and vegetated. The master planning process will include a review and analysis of the existing sites, public engagement to gather input and feedback to proposed master plan concepts, cost estimates on the preferred and final master plans, and associated phasing and funding strategies. We envision geotechnical-related project elements could include: one to two story at-grade structures, site grading, new pavement areas, stormwater facilities and underground utility installation.

2.0 SCOPE OF SERVICES

As part of this study we reviewed existing information in the project vicinity and completed a visual site reconnaissance to develop an understanding of surface and subsurface conditions in the area. Based on this information we have prepared this report providing our preliminary opinion on the suitability of the considered parcels for future development with regards to geotechnical considerations. The results of our services are intended to support decisions regarding site selection, preliminary project engineering, and future planning. This is a preliminary geotechnical study and is not intended to support final design of site improvements. Additional geotechnical services, including site specific explorations and other engineering analysis for design will be required to support final design of future development.

Our services have been provided in accordance with our agreement with Bruce Dees and Associates dated April 18, 2023. Our services also include wetland assessment services which are being provided separately.

3.0 SITE CONDITIONS

3.1. Site Limits and Vicinity

The project site (site) consists of four parcels totaling approximately 19 acres. An overview of the site and surrounding area is shown in the Vicinity Map, Figure 1. A detailed view of the site and parcel areas are shown in the Site Plan, Figure 2. The site is generally bound by North Creek and undeveloped wooded areas (west), Bothell-Everett Highway (east), Mill Creek Sports Park (southeast), partially developed multi-family residential properties (north and south), and a WSDOT stormwater management pond (southwest). The project parcels are intersected by North Creek Drive, which is aligned north-south in the site area.

Surrounding properties in the project vicinity consist of urban development, including single- and multi-family residences, commercial businesses, and paved city streets. North Creek is generally aligned north-south and located immediately west of the site. Immediate surroundings to the creek are undeveloped and heavily vegetated with young to mature trees and dense undergrowth.

3.2. Historic Conditions

We reviewed historic aerial photographs of the project site available online from the Snohomish County Online Property Information website and Google Earth, which provide intermittent imagery of the site dating as early as July 9, 1990.

Review of the historic photographs indicates portions of the Dobson, Remillard, and Cook parcels were previously developed with single-family residential structures and vehicular driveways. The Church parcel was previously partially developed with a church building and associated driveway. A copy of the June 2002 aerial photograph, which shows previous site developments, is included as Figure 3. Subsequent images indicate structures were demolished and removed between about September 2009 and July 2020. No significant changes at the project site relative to current site conditions appear to have occurred after July 2020.

3.3. Site Topography

Elevations and ground surface contours referenced in this report were obtained through topographic survey maps prepared by Stantec and dated April 14, 2014. Elevations refer to North American Vertical Datum of 1988 (NAVD88) and should be considered approximate.

Overall surface grades decrease from east to west across the parcels. Ground surface varies between about Elevation 425 feet (Church parcel, adjacent to Bothell-Everett Highway), Elevation 405 feet (at North Creek Drive), and Elevation 370 feet (western boundary Cook parcel).

Local surface grades are generally undulating, with typical grade changes inclined on the order of 5 horizontal to 1 vertical (H:V) or flatter. Occasional steeper slopes, such as portions of roadway cuts created to construct North Creek Drive, are present at the site. These steeper slopes are typically inclined around 2H:1V and are less than about 6 feet in height.

3.4. Site Reconnaissance

We completed a visual site reconnaissance of the site on May 1, 2023. Current surface conditions typically consist of dense forested areas. Young to mature trees include fir, cedar, hemlock and alder. Undergrowth vegetation includes salmonberry, blackberry, and ferns. Where exposed (e.g., roadway cuts along North Creek Drive), near surface soils were observed to consist of silty sand with variable gravel and cobble content. North Creek Drive is an asphalt paved two-lane road with paved shoulders that crosses the site from north to south. North Creek Trail is an asphalt paved multi-use trail that crosses the Cook parcel from north to south.

Immediately to the southwest of the Remillard Parcel, a WSDOT stormwater management pond is present. We observed young trees and standing water present at the base of the pond during our visit.

Adjacent residential properties include occasional rockery and modular block walls to maintain grade. No outward rotations, displacements, or settlements of walls were immediately apparent.

Site Photographs, Figures 4 through 6, provide representative images of the site features discussed above.

3.5. Literature Review

3.5.1. Geologic Setting

Prior to about 14,000 years ago Puget Sound was covered by thick glacial ice. Soils present below glacial ice are glacially overridden (glacially consolidated) and typically dense to very dense; these soils are generally characterized by relatively high strength, high allowable bearing pressures, and low compressibility. Examples of glacially consolidated soils include glacial till, advance glacial outwash, and glacial drift. Soils deposited after glacial recession were not glacially overridden and are generally relatively less dense. Examples of post-glacial soils include alluvium (river and stream deposits) and recessional glacial outwash.

3.5.2. Geologic Mapping

We reviewed published geologic maps of the project vicinity including the 7.5-minute quadrangle maps for Everett and Bothell (Minard 1985) and the “100K Surface Geology” available online from the Washington Department of Natural Resources (DNR) Geologic Information Portal. For reference, a portion of the DNR geologic map is provided as Figure 7. According to the reviewed maps, the site is underlain by two primary geologic units:

- **Glacial Advance Outwash:** Mapped along the western portion of the site and extending generally north-south along the North Creek alignment. Advance outwash deposits are also mapped elsewhere in the vicinity, generally within lower lying elevations.
- **Glacial Till:** Mapped over the majority of the site footprint and extending to the north, east and south of the site.

Although not mapped, we anticipate fill placed during previous site development activities (i.e., establishing building pad elevations and grading for roadway and driveway surfaces) are present at the site.

3.5.3. Natural Resources Conservation Service Description

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey (WSS) includes soil data and information for general engineering and planning applications. Mapped WSS soil types in the project vicinity are shown on Figure 8. The majority of the soils mapped in the project area are derived from glacial outwash or glacial till. However, organic material is mapped in lower-elevation areas in the western portion of the site adjacent to North Creek. We interpret the soil survey mapping to be generally consistent with geologic mapping described above.

3.5.4. Previous Site Explorations

We reviewed the Shannon & Wilson, Inc. “Preliminary Geotechnical Engineering Evaluation, 13716 Bothell-Everett Highway” report dated October 30, 2019 that was provided in the project RFP. This report was prepared for the Church property and included two soil borings completed at the site to depths of about 15.5 and 16 feet below ground surface (bgs). Soils encountered in the borings generally consisted of 5 to 5.5 feet of fill underlain by glacially consolidated soils. Fill is described on the boring logs as loose silty sand with gravel. Glacially consolidated soils are described as medium dense to very dense silty sand with gravel. The upper few feet of the glacially consolidated soil layer was described as weathered and relatively less dense than the underlying intact soils on the reviewed logs. Indications of groundwater were not reported on the reviewed exploration logs.

We also reviewed our in-house files for existing subsurface information in the project vicinity. GeoEngineers prepared a geotechnical report for residential development immediately south of the project site and WSDOT stormwater ponds. As part of preparing this report, 15 test pits were excavated to depths between 5 and 15 feet bgs. Soils encountered in the test pits typically consisted of 0.5 to 5 feet of topsoil and weathered soils underlain by dense to very dense glacially consolidated soil. Perched groundwater was encountered in a majority of the excavations. The encountered groundwater appeared to be perched on top of less permeable glacially consolidated deposits, generally between 2 to 4.5 feet bgs.

3.5.5. Geologic Hazards and Critical Areas

A general discussion of geologic hazards and critical areas is provided in the sections below and should be reviewed in coordination with Snohomish County and other jurisdictional requirements as project design progresses.

3.5.5.1. Landslide Hazards

The Snohomish County Code considers landslide hazard areas to include slopes greater than 10 feet in vertical height, slopes steeper than 33 percent (3H:1V), and areas of historic earth movement. We did not observe slopes that meet the criteria for a landslide hazard area during our site reconnaissance.

We reviewed landslide mapping of the area, including the Snohomish County “Critical Areas” and DNR Interactive Natural Hazards Map available online. According to the maps, no known landslides or landslide hazard areas are mapped at the site.

3.5.5.2. Erosion Hazards

We reviewed the NRCS Web Soil Survey for erosion susceptibility of mapped soils at the site. The site and immediate surroundings are mapped as having a “slight erosion hazard.” We anticipate potential erosion hazards can be mitigated through engineering controls such as limiting ground disturbance, site grading, planting, and other erosion control measures.

3.5.5.3. Seismic Hazards

We reviewed liquefaction susceptibility maps of the area, including the Snohomish County “Critical Areas” and DNR Interactive Natural Hazards Map available online. According to the maps, the site is mapped very low to low potential for liquefaction. For reference, a portion of the published seismic hazard map is reproduced in this report as Figure 9. Based on the reviewed seismic mapping and anticipated soil conditions, it is our opinion the site has low potential for liquefaction. Based on our assessment of the potential for soil liquefaction and current site topography, in our opinion this site also has a low potential for lateral spreading.

According to the “Faults and Earthquakes in Washington State” map (Czajkowski and Bowman 2014) a portion of the Southern Whidbey Island fault zone crosses through the site (see Figure 9). This is an inferred fault trace from geophysical studies, there are no known surface expressions of the fault at the site. Based on our understanding of local geology and because bedrock at the site is covered by hundreds of feet of glacial soil deposits, in our opinion there is low potential for seismic surface rupture occurring at this site.

3.5.5.4. Wetland Areas

We understand that portions of the project area contain mapped wetlands. A preliminary wetland assessment is being completed by GeoEngineers and results will be provided in a separate report.

4.0 GEOTECHNICAL ENGINEERING EVALUATION

4.1. General

Based on our review of available subsurface information and our completed visual reconnaissance, it is our opinion the considered project site is generally suitable for development with regards to geotechnical considerations. We did not identify geotechnical related conditions that would prohibit or significantly constrain overall project design and construction. Regardless, the project layout and design will need to incorporate geotechnical considerations as discussed herein. In our opinion, these geotechnical considerations can be managed through appropriate site layout, engineering design and construction methods.

Preliminary recommendations provided in the sections below are intended to support initial design development, preliminary engineering, cost estimating and future site planning. These recommendations are not intended to support final project design. Ultimately, we recommend site and project specific geotechnical explorations and analysis be completed as a part of final design of future improvements.

Based on our review, we do not interpret significant variation between the four parcels (Dobson, Remillard, Cook, and Church) with respect to geotechnical considerations. We anticipate similar soil conditions are likely present at each parcel. Accordingly, our preliminary geotechnical considerations and recommendations provided below are appropriate for each of the considered parcels.

4.2. Anticipated Soil and Groundwater Conditions

Soil conditions at the site are expected to consist of a variable thickness of topsoil and fill underlain by glacially consolidated soils. Fill thickness are expected to be greatest in areas of past development or areas where prior grading activities were completed. Topsoil (and forest duff) thicknesses are expected to be greatest in undeveloped forested areas. We expect that, with the exception of isolated areas, topsoil and fill units will likely be less than a few feet thick at this site.

Underlying glacially consolidated soils at the site are expected to consist primarily of medium dense to very dense silty sand with a variable gravel and cobble content. Boulders are likely present within the glacially consolidated soils at the site. We expect that the upper few feet of the glacially consolidated soils could be weathered and relatively less dense than underlying intact soils.

We anticipate year-round static groundwater could be present along the western site boundary adjacent to North Creek. Static groundwater levels likely follow the water levels in North Creek.

Perched groundwater could be encountered at relatively shallow depths across the site. Perched groundwater is typically due to infiltration of surface water that slows or terminates atop underlying less permeable layers of soil (e.g., on top of glacial till deposits). The presence of fill, discontinuities, utilities, and other factors also influence the presence and volume of perched water.

4.3. Seismic Site Class

We assume improvements will be designed in accordance with the International Building Code (IBC). The 2018 and 2021 editions of the IBC state structures shall resist the effects of earthquake motions in accordance with American Society of Civil Engineers (ASCE) 7-16 "Minimum Design Loads and Associated

Criteria for Buildings and Other Structures". In accordance with IBC and ASCE 7-16, we recommend seismic Site Class D be considered for preliminary simplified code-based seismic design and analysis.

4.4. Foundation Support

We envision that structures at this site can be adequately supported on shallow foundations and slab-on-grade floors bearing on existing site soils. Recomposition or removal and replacement of existing fill beneath foundations may be required to provide adequate bearing support.

Ultimately, foundation support recommendations will depend on structure loads, foundation elevations and performance requirements and should be evaluated as part of future geotechnical studies.

For preliminary design, we estimate allowable soil bearing resistance of near surface soils (including existing fill and weathered glacially consolidated soils) will be on the order of 2,000 to 3,000 pounds per square foot (psf). Higher bearing resistances (3,000 to 5,000 psf) will likely be achievable if foundations are supported directly on undisturbed glacially consolidated soils at depth. Topsoil or soils with a high organic content will need to be completely removed from below foundations. For the bearing conditions and resistances presented above, we anticipate that total and differential foundations settlement can be limited to 1 inch and 0.5 inches, respectively.

Slab on grade floors can likely be adequately supported on existing fill and/or underlying glacially consolidated soils. Subgrades for slab on grade floors should be compacted to a uniform firm and unyielding condition. For preliminary design, floor slab loads should be limited to 500 psf.

4.5. Conventional Retaining Walls and Below-Grade Structures

We anticipate retaining walls may be required to maintain desired site grades and construct below grade elements. The specific retaining wall type used will depend in part on the application and wall height. For this site we expect that modular block walls, cast-in-place walls, structural earth walls, soil nail walls and soldier piles walls are all feasible for use. Modular block walls will likely be most effective for relatively short walls (less than about 6 feet tall) used in cut and fill grading applications. Cast-in place walls could be used in cut or fill applications and are typically most efficient for intermediate wall heights, (walls taller than about 5 feet but less than about 8 feet). Structural earth walls are best suited for use in fill applications and can be used to retain grade differentials in excess of 20 feet. Soil nail and soldier pile walls are best suited for cut wall applications and are most often used to retain or reinforce tall slopes or construct below grade building elements.

For preliminary planning purposes, we recommend evaluating walls using an active equivalent fluid density of 36 pounds per cubic foot (pcf) (triangular distribution). This assumes that the walls will not be restrained against rotation when backfill is placed and the backfill behind the wall is level. For sloping backfill conditions up to 2H:1V, this value should be increased by 50 percent. Lateral resistance of retaining walls can be evaluated assuming a passive equivalent fluid density of 300 pcf and an allowable frictional resistance of 0.4 (these values include a factor of safety of about 1.5). These values must be confirmed as part of final design.

Retaining walls should be designed with drainage system to prevent the buildup of hydrostatic pressures behind the wall.

4.6. Infiltration Feasibility Assessment

Glacially consolidated soils are mapped across the majority of the site. Glacial till, which is the specific geologic unit mapped at the site, typically has a relatively high fines content, is over consolidated and has a very low infiltration potential. We envision some infiltration is possible into near-surface fill or weathered deposits, however overall rates will likely be reduced due to soil layering and shallow depth to glacial till. Based on our experience in similar soil conditions, we recommend intact glacial till soils be considered relatively impermeable for preliminary planning. Accordingly, stormwater at the site will likely need to be detained and discharged to an appropriate stormwater collection system.

If infiltration is included in project design, we recommend field testing, such as Pilot Infiltration Tests (PITs), be completed to determine design infiltration rates. PITs should be completed within the footprint of proposed infiltration facilities and at the proposed infiltration depths. Therefore, PITs are best completed once preliminary site planning and layout has occurred.

4.7. Earthwork Considerations

4.7.1. Stripping, Clearing and Subgrade Preparation

Existing surfaces within proposed development areas should be cleared and stripped of all vegetation and organics prior to site development. In forested areas we expect that stripping depths could exceed 6 inches. In areas of prior development, stripping depths will likely be around 2 to 4 inches.

Subgrades that will support structural elements and pavements should be thoroughly compacted to a uniformly firm and unyielding condition on completion of stripping/excavation and before placing structural fill. If soft or otherwise unsuitable subgrade areas are observed and cannot be compacted to a stable and uniformly firm condition, we recommend that: (1) the unsuitable soils be scarified (e.g., with a ripper or farmer's disc), aerated and recompact, if practical; or (2) the unsuitable soils be removed and replaced with compacted structural fill, as needed

Existing structural improvements (e.g., pavements, hardscaping, and foundations) within proposed development areas should be demolished and removed prior to redeveloping the site. Recycling or incorporating old foundation or pavement elements into fill areas can be considered but must be evaluated on a case-by-case basis. All existing utilities should be removed or abandoned and left in place from within new building footprint(s) and rerouted, if needed.

4.7.2. Wet Weather Considerations

We expect that the majority of the soils at the site will contain a significant percentage of fines (materials smaller than the No. 200 U.S. sieve) and will be sensitive to small changes in moisture content. If these moisture sensitive soils become wet, they will be very difficult or impossible to work with and highly susceptible to disturbance.

We recommend that earthwork activities at this site be completed during periods of predominantly dry weather. During dry weather, site soils will be less susceptible to disturbance, provide better support for construction equipment and be more likely to meet the required compaction criteria.

If earthwork must occur during wet weather, we recommend that additional contingencies be added to account for over-excavation and replacement of saturated and disturbed soils. Additionally, if wet weather

construction is proposed or required, we recommend planning for a “net cut” site rather than a balanced cut and fill site. During wet weather, earthwork costs could be lower with a net cut site because disturbed and saturated soils that cannot be compacted can be removed and there is no need to replace them with import.

4.7.3. Cut and Fill Slopes

To maintain site grading and provide safe working conditions, we recommend temporary excavations and cut slopes be inclined no steeper than about 1.5H:1V. Flatter cut slopes will be necessary where seepage occurs or if surface surcharge loads are anticipated.

We recommend permanent slopes with maximum inclination of about 2H:1V be considered for preliminary planning purposes. Where 2H:1V permanent slopes are not feasible, protective facings and/or retaining structures should be considered. Where access for landscape maintenance is desired, we recommend a maximum inclination of 3H:1V. Flatter cut slopes or additional drainage measures could be necessary where seepage occurs or if surface surcharge loads are anticipated.

4.7.4. Groundwater Handling

The level of effort required for groundwater management during construction will depend to a great extent on the time of year during which construction is completed. Groundwater handling needs will typically be lower during the late summer and early fall months. We recommend earthwork be completed in the late summer or early autumn months when the groundwater level is typically at its lowest elevation and to take advantage of generally dry prevailing conditions.

Shallow perched groundwater should be expected to be present where more permeable layers are underlain by less permeable layers, specifically in areas where fill or weather zones are over undisturbed glacial till. Low to moderate groundwater seepage should be expected, particularly during the wet season. We anticipate that shallow perched groundwater, if encountered, can be handled adequately with sumps, pumps, and/or diversion ditches, as necessary .

Static groundwater could be encountered in lower elevation areas adjacent to North Creek. Deeper excavations extending near static groundwater levels could require dewatering systems, groundwater cut off elements or additional sumps in order to maintain dry conditions.

4.7.5. Fill Materials

4.7.5.1. Reuse of On-Site Soils as Structural Fill

We anticipate the majority of the site footprint is underlain by glacial till deposits, which typically consist of a mixture of silt, sand, gravel and cobbles. Glacial till soils can be considered for reuse as structural fill provided they can be adequately moisture conditioned, placed and compacted as recommended and do not contain organic or other deleterious material. Site soils will likely be very difficult or impossible to properly compact when wet and we recommend they be avoided for reuse if earthwork is planned during wet weather months.

In addition, it is possible that existing soils will be generated at moisture contents above what is optimum for compaction. In this case, the soils would need to be moisture conditioned prior to re-use. Space for drying out material during dryer weather or covering on-site materials generated during wet weather should be considered and incorporated into schedules and budgets. During wetter or even slightly colder times of

year, accommodations to cover stockpiled material generated on site that will be used as structural fill should be planned.

If earthwork occurs during a typical wet season, or if the soils are persistently wet and cannot be dried back due to prevailing wet weather conditions, we recommend project budgets include contingencies for using imported materials as structural fill.

4.7.5.2. Import Structural Fill

Imported structural fill should be free of debris, organic contaminants and rock fragments larger than 6 inches. For most applications, we recommend that structural fill consist of material similar to “Select Borrow” or “Gravel Borrow” as described in Section 9-03.14 of the Washington State Department of Transportation (WSDOT) Standard Specifications.

If imported fill is needed during wet weather conditions, we recommend using fill consisting of well-graded sand and gravel or crushed rock with a maximum particle size of 6 inches and less than 5 percent fines by weight based on the minus $\frac{3}{4}$ -inch fraction. In our opinion, material conforming to WSDOT Standard Specifications 9-03.9 (Aggregates for Ballast and Crushed Surfacing), 9-03.10 (Aggregate for Gravel Base) and 9-03.14 (Borrow) are suitable for use as imported fill material during wet weather with the exception that the fines content should be 5 percent or less.

4.7.5.3. Topsoil and Strippings

Topsoil and strippings (e.g., sod and forest duff) may be placed on site provided they are placed in non-structural areas that can tolerate some long-term total and differential settlements. Settlements of organic-rich soils are highly variable and difficult to quantify. Settlement could continue for several years after construction is completed as the organics break down and decompose. Alternatively, topsoil strippings can be hauled off site.

5.0 LIMITATIONS

We have prepared this report for the exclusive use of Bruce Dees and Associates and the City of Mill Creek (City) for the proposed Dobson, Remillard, Cook and Church (DRCC) Property Master Plan project in Mill Creek, Washington. Bruce Dees and the City may distribute copies of this report to authorized agents and regulatory agencies as may be required for the project.

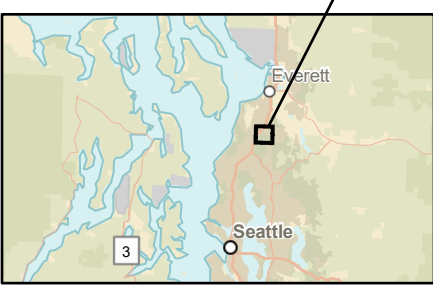
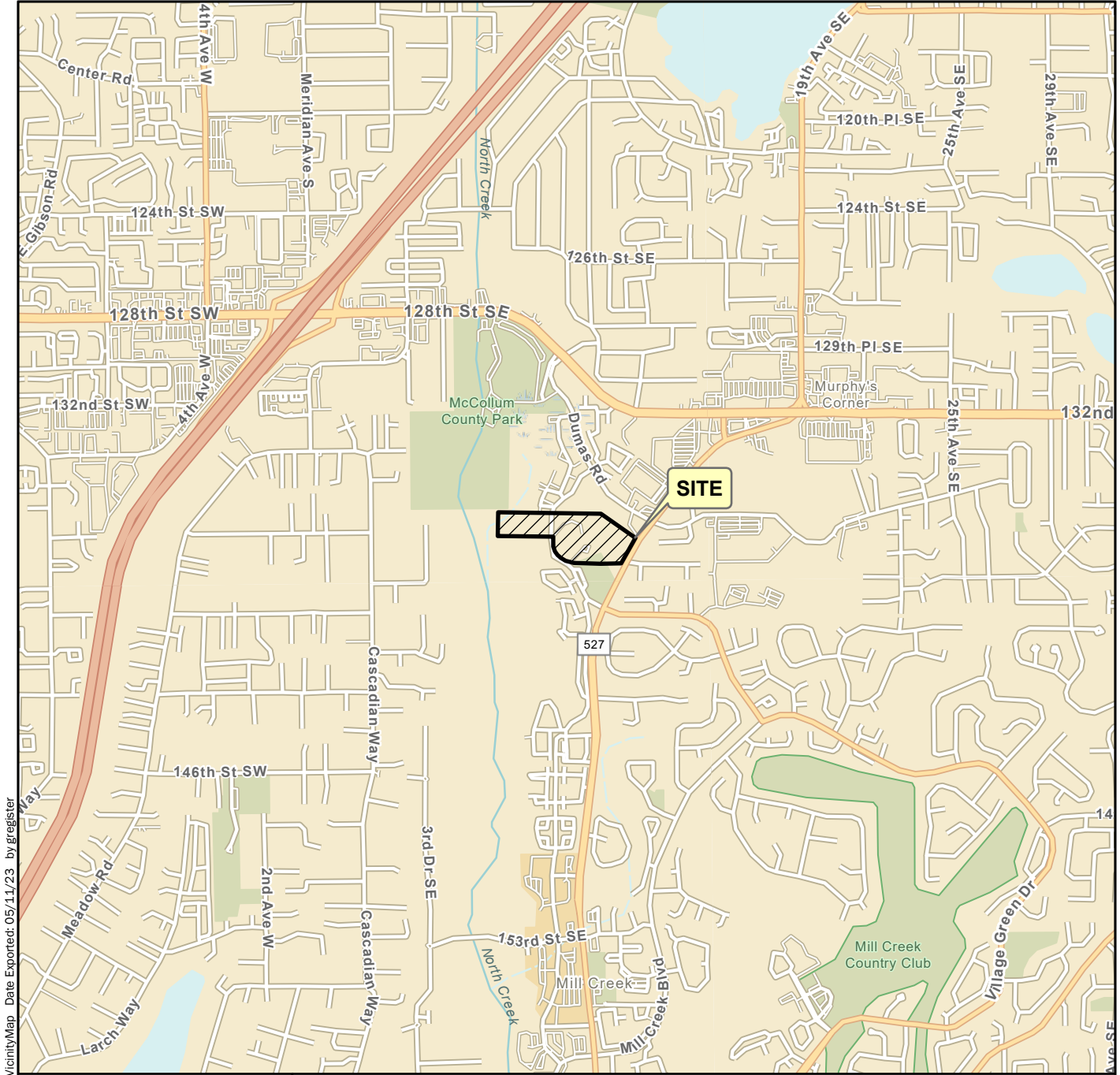
Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices for geotechnical engineering in this area at the time this report was prepared. The conclusions, recommendations, and opinions presented in this report are based on our professional knowledge, judgment, and experience. No warranty, express or implied, applies to the services or this report.

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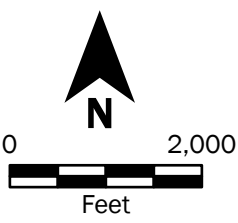
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Vicinity Map	
DRCC Property Master Plan Mill Creek, Washington	
GEOENGINEERS 	Figure 1

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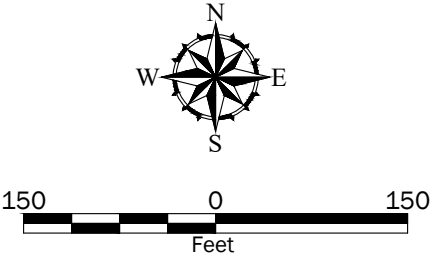
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- Notes:
1. The locations of all features shown are approximate.
 2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerial from Google Earth Pro dated 08/23/2022.

Projection: Washington State Plane, North Zone, NAD83, US Foot



Site Plan	
DRCC Property Master Plan Mill Creek, Washington	
	Figure 2

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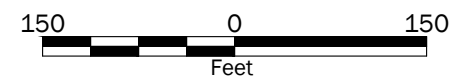
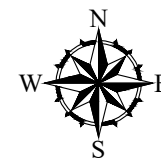


Notes:

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Data Source: Aerial from Google Earth Pro dated 05/31/2002.

Projection: Washington State Plane, North Zone, NAD83, US Foot



Historic Site Photo

DRCC Property Master Plan
Mill Creek, Washington



Figure 3



Dobson property, as seen from North Creek Drive looking generally southeast. Example of typical dense forestation in project area with mature trees and undergrowth vegetation. Also note existing slope and exposed soils at roadway grading cut.

Notes:

1. This photograph is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
- Data Source: GeoEngineers photograph taken during geologic site reconnaissance completed March 1, 2023.

Site Photograph	
DRCC Property Master Plan Mill Creek, Washington	
	Figure 4



WSDOT stormwater pond looking generally northwest. Note standing water and young trees at bottom of pond.

Notes:

1. This photograph is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
- Data Source: GeoEngineers photograph taken during geologic site reconnaissance completed March 1, 2023.

Site Photograph	
DRCC Property Master Plan Mill Creek, Washington	
	Figure 5



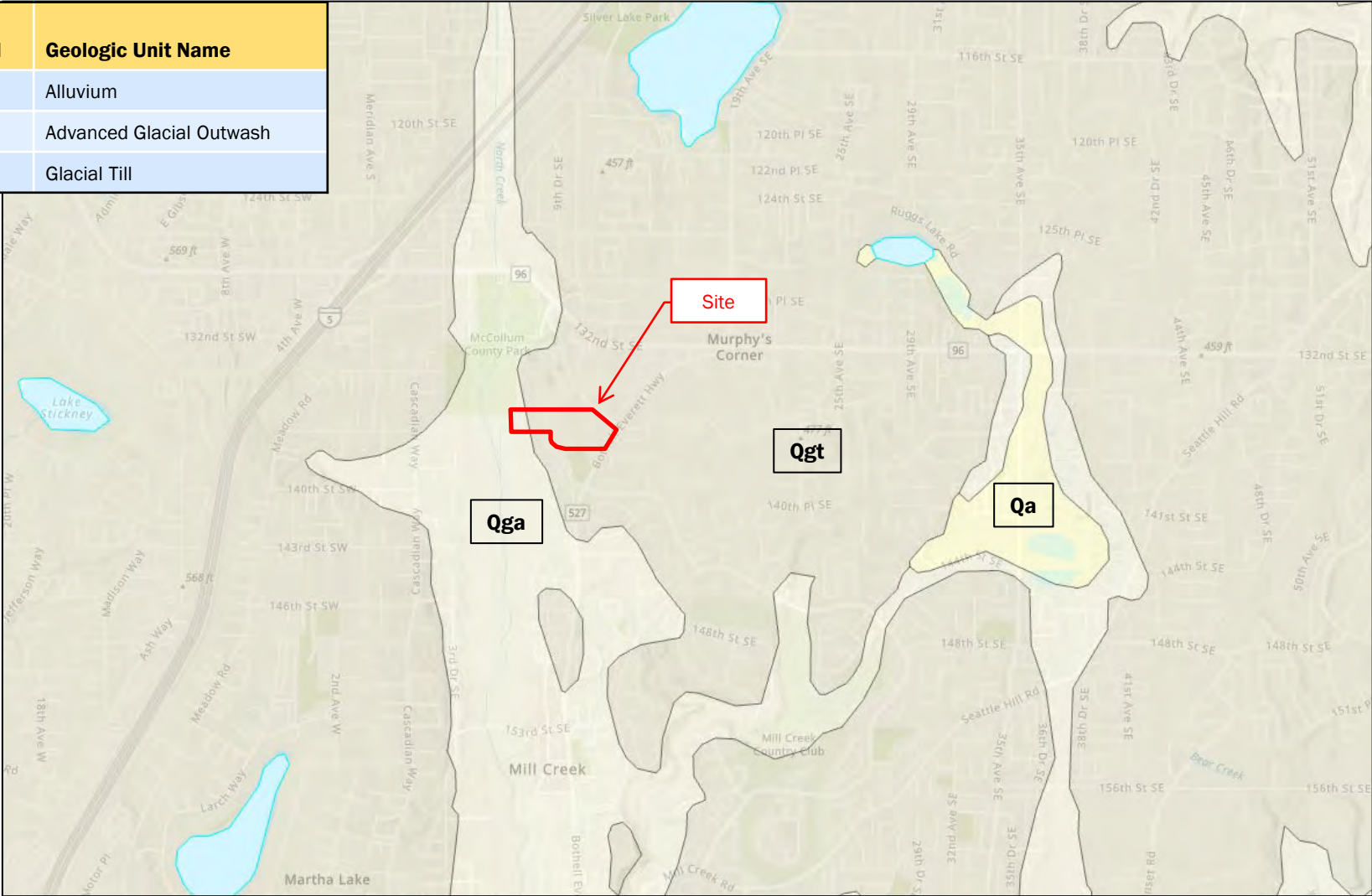
WSDOT stormwater pond looking generally southeast. Note rockery wall adjacent to North Creek Drive and young trees in bottom of pond.

Notes:

1. This photograph is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
- Data Source: GeoEngineers photograph taken during geologic site reconnaissance completed March 1, 2023.

Site Photograph	
DRCC Property Master Plan Mill Creek, Washington	
	Figure 6

Map Symbol	Geologic Unit Name
Qa	Alluvium
Qga	Advanced Glacial Outwash
Qgt	Glacial Till



Notes:

- 1. This drawing has been reproduced from mapping available online by the Washington State Department of Natural Resources. GeoEngineers cannot warrant or guarantee the accuracy or completeness of information provided or compiled by others.
- 2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

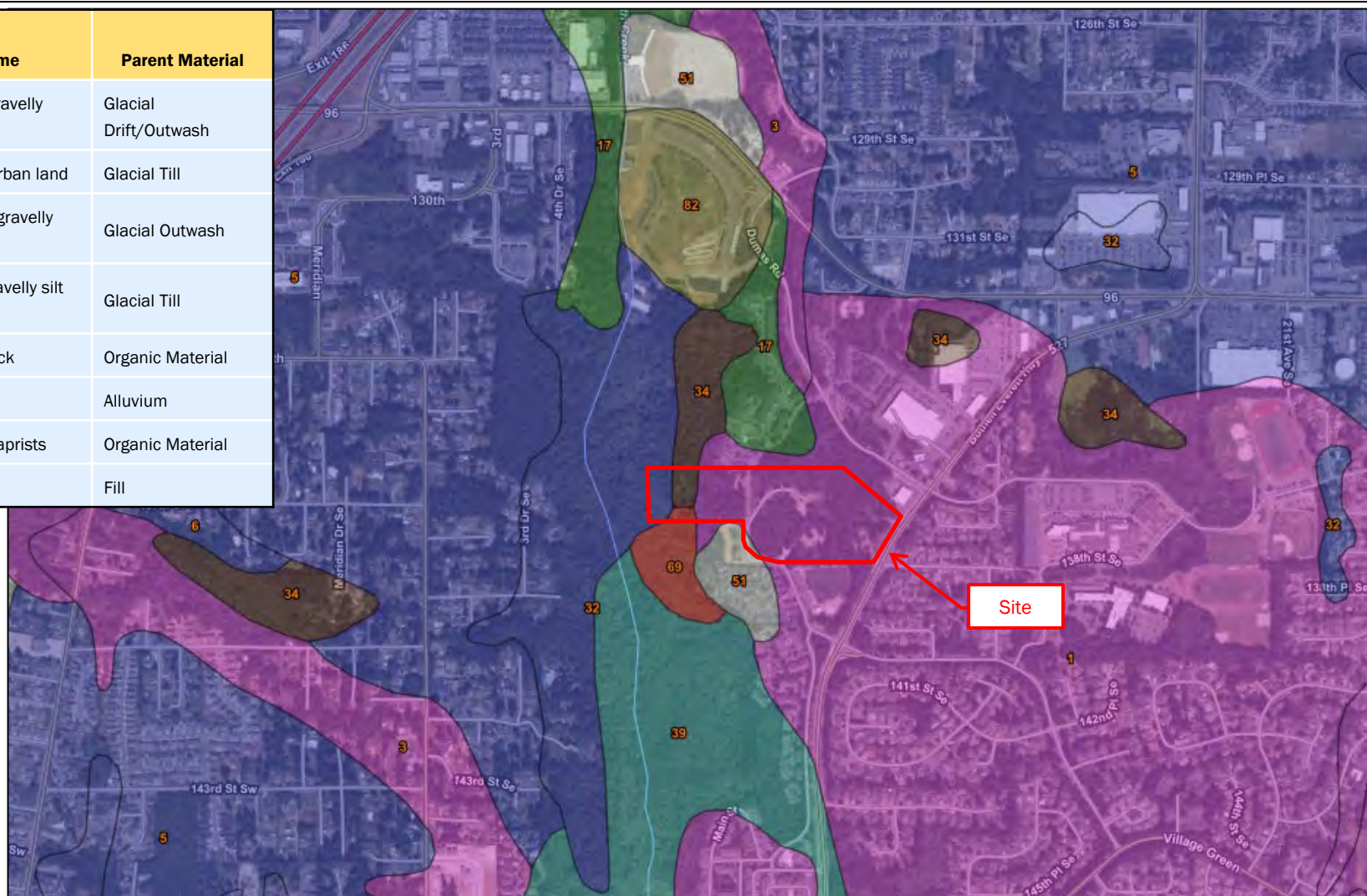
Data Source: 1:100,000-scale Geologic Map, Washington State Department of Natural Resources online Geologic Information Portal

Geologic Map

DRCC Property Master Plan
Mill Creek, Washington

GEOENGINEERS

Figure 7



Notes:

1. This drawing has been reproduced from the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey (WSS). GeoEngineers cannot warrant or guarantee the accuracy or completeness of information provided or compiled by others.
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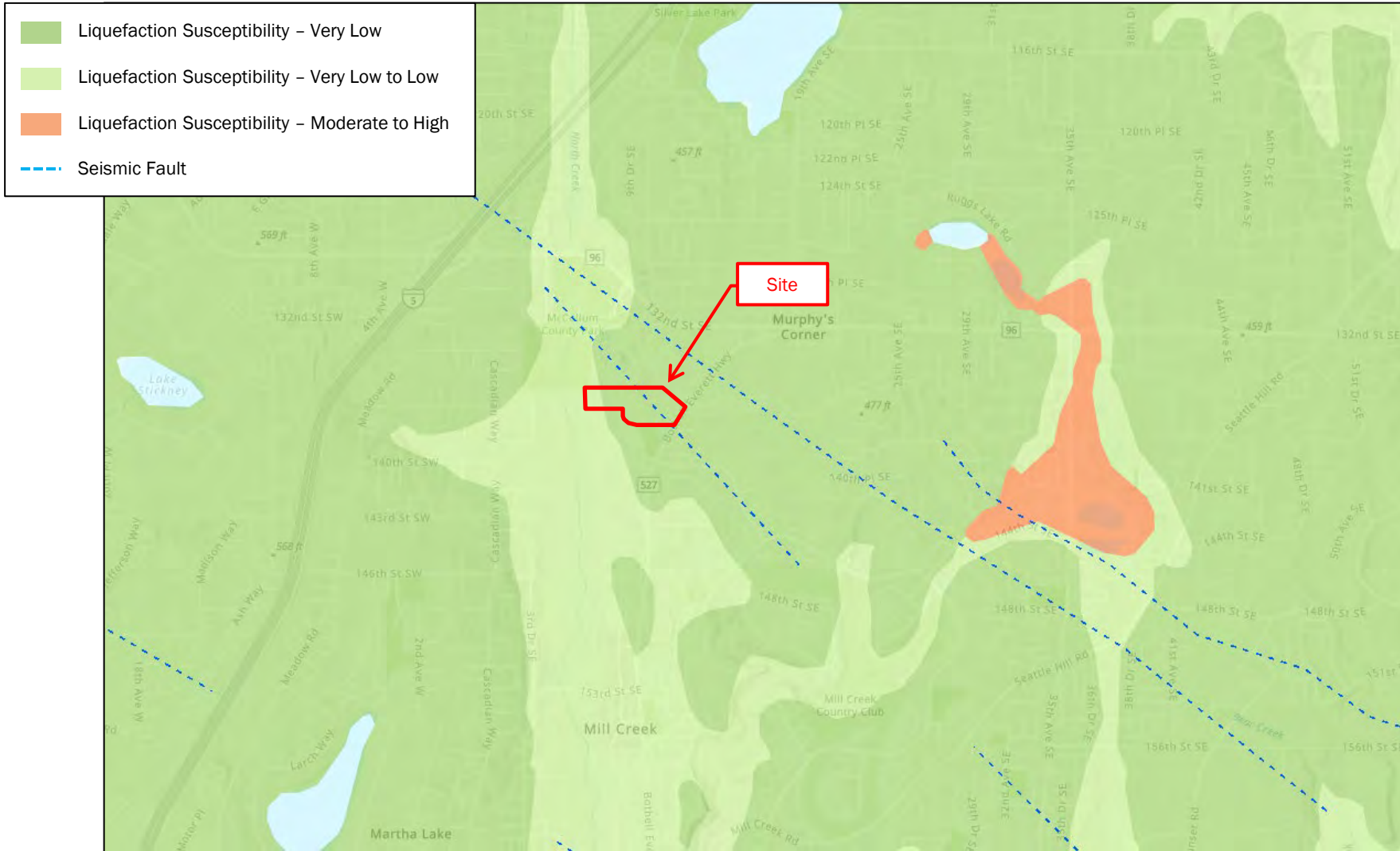
Data Source: Parent Material, USDA NRCS Web Soil Survey

Soil Survey Map

DRCC Property Master Plan
Mill Creek, Washington



Figure 8



Notes:

1. This drawing has been reproduced from seismic hazard mapping available online by the Washington State Department of Natural Resources. GeoEngineers cannot warrant or guarantee the accuracy or completeness of information provided or compiled by others.
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Data Source: Washington State Department of Natural Resources online Geologic Information Portal

Seismic Hazards Map

DRCC Property Master Plan
Mill Creek, Washington



Figure 9

APPENDIX A

Report Limitations and Guidelines for Use

APPENDIX A

REPORT LIMITATIONS AND GUIDELINES FOR USE¹

This appendix provides information to help you manage your risks with respect to the use of this report.

Read These Provisions Closely

It is important to recognize that the geoscience practices (geotechnical engineering, geology and environmental science) rely on professional judgment and opinion to a greater extent than other engineering and natural science disciplines, where more precise and/or readily observable data may exist. To help clients better understand how this difference pertains to our services, GeoEngineers includes the following explanatory “limitations” provisions in its reports. Please confer with GeoEngineers if you need to know more how these “Report Limitations and Guidelines for Use” apply to your project or site.

Geotechnical Services Are Performed for Specific Purposes, Persons and Projects

This report has been prepared for the exclusive use of Bruce Dees and Associates and the City of Mill Creek (City) for the proposed Dobson, Remillard, Cook and Church (DRCC) Property Master Plan project. Bruce Dees and Associates and the City may distribute copies of this report to authorized agents and regulatory agencies as may be required for the project. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, a geotechnical or geologic study conducted for a civil engineer or architect may not fulfill the needs of a construction contractor or even another civil engineer or architect that are involved in the same project. Because each geotechnical or geologic study is unique, each geotechnical engineering or geologic report is unique, prepared solely for the specific client and project site. Our report is prepared for the exclusive use of our Client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted geotechnical practices in this area at the time this report was prepared. This report should not be applied for any purpose or project except the one originally contemplated.

A Geotechnical Engineering or Geologic Report Is Based on a Unique Set of Project-specific Factors

This report has been prepared for the proposed DRCC Property Master Plan project in located in Mill Creek, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, it is important not to rely on this report if it was:

- Not prepared for you,
- Not prepared for your project,

¹ Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

- Not prepared for the specific site explored, or
- Completed before important project changes were made.

For example, changes that can affect the applicability of this report include those that affect:

- The function of the proposed structure;
- Elevation, configuration, location, orientation or weight of the proposed structure;
- Composition of the design team; or
- Project ownership.

If changes occur after the date of this report, GeoEngineers cannot be responsible for any consequences of such changes in relation to this report unless we have been given the opportunity to review our interpretations and recommendations. Based on that review, we can provide written modifications or confirmation, as appropriate.

Environmental Concerns are Not Covered

Unless environmental services were specifically included in our scope of services, this report does not provide any environmental findings, conclusions, or recommendations, including but not limited to, the likelihood of encountering underground storage tanks (USTs) or regulated contaminants.

Information Provided by Others

GeoEngineers has relied upon certain data or information provided or compiled by others in the performance of our services. Although we use sources that we reasonably believe to be trustworthy, GeoEngineers cannot warrant or guarantee the accuracy or completeness of information provided or compiled by others.

Subsurface Conditions Can Change

This geotechnical or geologic report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by man-made events such as construction on or adjacent to the site, new information or technology that becomes available subsequent to the report date, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. If more than a few months have passed since issuance of our report or work product, or if any of the described events may have occurred, please contact GeoEngineers before applying this report for its intended purpose so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Geotechnical and Geologic Findings are Professional Opinions

Our interpretations of subsurface conditions are based on field observations from widely spaced sampling locations at the site. Site exploration identifies the specific subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied its professional judgment to render an informed opinion about subsurface conditions at other locations. Actual subsurface conditions may differ, sometimes significantly, from the opinions

presented in this report. Our report, conclusions and interpretations are not a warranty of the actual subsurface conditions.

Geotechnical Engineering Report Recommendations are Not Final

We have developed the following recommendations based on data gathered from subsurface investigation(s). These investigations sample just a small percentage of a site to create a snapshot of the subsurface conditions elsewhere on the site. Such sampling on its own cannot provide a complete and accurate view of subsurface conditions for the entire site. Therefore, the recommendations included in this report are preliminary and should not be considered final. GeoEngineers' recommendations can be finalized only by observing actual subsurface conditions revealed during construction. GeoEngineers cannot assume responsibility or liability for the recommendations in this report if we do not perform construction observation.

We recommend that you allow sufficient monitoring, testing and consultation during construction by GeoEngineers to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes if the conditions revealed during the work differ from those anticipated, and to evaluate whether earthwork activities are completed in accordance with our recommendations. Retaining GeoEngineers for construction observation for this project is the most effective means of managing the risks associated with unanticipated conditions. If another party performs field observation and confirms our expectations, the other party must take full responsibility for both the observations and recommendations. Please note, however, that another party would lack our project-specific knowledge and resources.

A Geotechnical Engineering or Geologic Report Could Be Subject to Misinterpretation

Misinterpretation of this report by members of the design team or by contractors can result in costly problems. GeoEngineers can help reduce the risks of misinterpretation by conferring with appropriate members of the design team after submitting the report, reviewing pertinent elements of the design team's plans and specifications, participating in pre-bid and preconstruction conferences, and providing construction observation.

Give Contractors a Complete Report and Guidance

To help reduce the risk of problems associated with unanticipated subsurface conditions, GeoEngineers recommends giving contractors the complete geotechnical engineering or geologic report, including these "Report Limitations and Guidelines for Use." When providing the report, you should preface it with a clearly written letter of transmittal that:

- Advises contractors that the report was not prepared for purposes of bid development and that its accuracy is limited; and
- Encourages contractors to confer with GeoEngineers and/or to conduct additional study to obtain the specific types of information they need or prefer.

Contractors are Responsible for Site Safety on Their Own Construction Projects

Our geotechnical recommendations are not intended to direct the contractor's procedures, methods, schedule or management of the work site. The contractor is solely responsible for job site safety and for managing construction operations to minimize risks to on-site personnel and adjacent properties.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention or assessment of the presence of Biological Pollutants. Accordingly, this report does not include any interpretations, recommendations, findings or conclusions regarding the detecting, assessing, preventing or abating of Biological Pollutants, and no conclusions or inferences should be drawn regarding Biological Pollutants as they may relate to this project. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria and viruses, and/or any of their byproducts.

A Client that desires these specialized services is advised to obtain them from a consultant who offers services in this specialized field.

Geotechnical, Geologic and Environmental Reports Should Not Be Interchanged

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering USTs or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.