SGN 7: Explanatory notes and examples

Where roots have to be removed, they should be cut cleanly beyond the face of the excavation with secateurs or a saw.

Where large amounts of soil are excavated to expose roots, it should be temporarily stored on heavy duty plywood boards, or similar, to prevent ground compaction to the RPA beneath.

Excavation by machines is **not permitted** in RPAs.

SGN 7: Explanatory notes and examples

Technical reference

Due to copyright restrictions, the relevant British Standard clauses are summarised, not quoted, as follows:

1. ***BS 5837 (2012) Trees in relation to design, demolition and construction – Recommendations:*** *Clause 7.2 (Avoiding physical damage to the roots during demolition or construction) recommends:*
   - *7.2.1 Other than for piling, existing ground levels in RPAs should not be disturbed. However, limited manual excavation might be acceptable if it is done carefully, using hand-held tools and preferably by compressed air soil displacement, subject to justification.*
   - *7.2.2 Exposed roots should be protected to prevent desiccation and temperature changes, and the excavation backfilled as soon as possible after the protection has been removed.*
   - *7.2.3 Individual roots and clumps of less than 25mm width can be pruned without further consultation, if necessary, making a clean cut. Roots and clumps greater than 25mm in width should only be cut if agreed by the supervising arboriculturist.*
   - *7.2.4 Backfill around retained roots should be with topsoil or uncompacted sharp sand, or other loose inert granular fill.*

2. ***National Joint Utilities Group (NJUG) Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees – Issue 2*** *(www.njug.org.uk/wp-content/uploads/2016/09/V4-Trees-Issue-2-16-11-2007.pdf): Section 4.1 (How to avoid damage to trees – Below ground) advises:*

   "4.1.3 Realignment: Whenever possible apparatus should always be diverted or re-aligned outside the Prohibited or Precautionary Zones. Under no circumstances can machinery be used to excavate open trenches within the Prohibited Zone.

   Where works are required for the laying or maintenance of any apparatus within the Prohibited or Precautionary Zones there are various techniques available to minimise damage. Acceptable techniques in order of preference are;

   a) Trenchless: Wherever possible trenchless techniques should be used. The launch and reception pits should be located outside the Prohibited or Precautionary Zones. In order to avoid damage to roots by percussive boring techniques it is recommended that the depth of run should be below 600mm. Techniques involving external lubrication of the equipment with materials other than water (e.g. oil, bentonite, etc.) must not be used when working within the Prohibited Zone. Lubricating materials other than water may be used within the Precautionary Zone following consultation and by agreement.

SGN 7: Explanatory notes and examples

b) Broken Trench – Hand-dug: This technique combines hand dug trench sections with trenchless techniques if excavation is unavoidable. Excavation should be limited to where there is clear access around and below the roots. The trench is excavated by hand with precautions taken as for continuous trenching as in (c) below. Open sections of the trench should only be long enough to allow access for linking to the next section. The length of sections will be determined by local conditions, especially soil texture and cohesiveness, as well as the practical needs for access. In all cases the open sections should be kept as short as possible and outside of the Prohibited Zone.

c) Continuous Trench – Hand-dug: The use of this method must be considered only as a last resort if works are to be undertaken by agreement within the Prohibited Zone. The objective being to retain as many undamaged roots as possible."

SUB16-01774
ATTACHMENT 6
ARBORIST REPORT
ENCLOSURE 1

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Site Guidance Note 11: Installing services in root protection areas

This document is only a summary of its subject matter. You should not rely on this general guidance in isolation, and you should always seek detailed advice from an appropriate expert in relation to specific circumstances before any action is taken or refrained from. The content of these pages is protected by copyright © Barrell Treecare Ltd 2018. You may download and republish (in its full format) and print copies of the guidance – but you must not adapt any guidance.

SGN 11: Summary guidance for site operatives

Administration

1. Unauthorised damage to protected trees is a criminal offence and could lead to enforcement action.

2. Work under the normal site risk assessment procedures and comply with the wider site safety rules.

3. Brief operatives entering root protection areas (RPAs) by the supervising arboriculturist before work starts.

Other relevant SGNs

4. Monitor works in RPAs by the supervising arboriculturist (See SGN 1 Monitoring tree protection).

5. Design access to avoid soil compaction (See SGN 3 Ground protection).

6. Minimise excavation into original undisturbed soil (See SGN 7 Excavation in root protection areas).

Important reminders

7. Trenchless installation will be preferred. The fall-back approaches of hand-dug broken trench and then hand-dug continuous trench, will be acceptable if agreed by the supervising arboriculturist.

8. For trenchless installation, the starting and finishing pits will be outside RPAs.

SGN 11: Explanatory notes and examples

Purpose

SGN 11 describes the practical requirements for installing new services within RPAs, based on the recommendations in BS 5837 (7) and the guidance in NJUG (4.1).

General principles and clarifications

Excavation to upgrade existing services or install new services in RPAs may damage retained trees. Where possible, all services will be outside RPAs and installation in RPAs will only be chosen as a last resort. If installation within RPAs is being considered, as advised in 4.1.3 of the NJUG guidance, the decision will be made in consultation with the supervising arboriculturist before any work is carried out. If service installation is agreed within RPAs, the NJUG protocol as set out in 4.1.3 of its guidance will be used to decide the most appropriate method. In summary, this sets out that "Acceptable techniques in order of preference are; a) trenchless, … b) Broken trench – hand-dug … c) Continuous trench – hand-dug". If trenchless methods are to be used, the starting and finishing pits dug at each end of the service run will be outside RPAs. Where a hand-digging option is agreed, any roots discovered during the excavations will be dealt with as described in SGN 7 (Excavation in root protection areas). Backfilled material around excavated services will not be heavily compacted, observing the specific advice provided in 4.1.5 of the NJUG guidance.

SGN 11: Explanatory notes and examples

SGN 11-01

Conventional installation of services digging a trench with a machine is **not permitted** in RPAS.

SGN 11-02

Trenching with machines to install services close to trees can make them unsafe and cause their premature death.

SGN 11-03

Thrust boring is the preferred option for installing service routes through the RPAs of retained trees.

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ENCLOSURE 1

SGN 11: Explanatory notes and examples

The start and finish pits for thrust boring are substantial and must be outside of RPAs.

SGN 11-04

Alternatives to thrust boring are to hand-dig broken or continuous trenches, so that roots can be retained (with the service ducting threaded beneath). Note the ground protection boards with soil piled on top on the left.

SGN 11-05

Ducting services that have to be threaded through existing roots is good practice because it reduces the need to excavate in the future. Note the hessian protection over roots while they are temporarily exposed to prevent sunscorch and drying.

SGN 11-06

SGN 11: Explanatory notes and examples

Technical reference

Due to copyright restrictions, the relevant British Standard clauses are summarised, not quoted, as follows:

1. ***BS 5837 (2012) Trees in relation to design, demolition and construction – Recommendations:***
   Clause 7 (Demolition and construction in proximity to existing trees) recommends:
   - *7.1.3 The installation of underground utility apparatus using trenchless technology will be acceptable where entry and retrieval pits can be formed outside the RPA. Even if the utility installation does not require planning permission, the work should still be undertaken in accordance with the guidance in NJUG Volume 4, issue 2.*
   - *7.7.1 Care should be taken when routeing underground apparatus because the mechanical trenching can sever roots and change the local soil hydrology, both of which can adversely affect tree health. Wherever possible, underground services should be routed outside RPAs. If services are installed within RPAs, it is preferable to use common ducts, with inspection chambers sited outside the RPA.*
   - *7.7.2 Underground services within the RPAs should be shown on a plan prepared in conjunction with the project arboriculturist. Trenchless insertion methods should be the preferred option, with entry and retrieval pits outside RPAs, but if roots can be retained and protected, excavation using hand-held tools might be acceptable for shallow service runs.*

2. ***National Joint Utilities Group ("NJUG") Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees – Issue 2*** *(www.njug.org.uk/wp-content/uploads/2016/09/V4-Trees-Issue-2-16-11-2007.pdf): Section 4.1 (How to avoid damage to trees – Below ground) advises:*
   "4.1.3 Realignment: Whenever possible apparatus should always be diverted or re-aligned outside the Prohibited or Precautionary Zones. Under no circumstances can machinery be used to excavate open trenches within the Prohibited Zone.
   Where works are required for the laying or maintenance of any apparatus within the Prohibited or Precautionary Zones there are various techniques available to minimise damage. Acceptable techniques in order of preference are;
   a) Trenchless: Wherever possible trenchless techniques should be used. The launch and reception pits should be located outside the Prohibited or Precautionary Zones. In order to avoid damage to roots by percussive boring techniques it is recommended that the depth of run should be below 600mm. Techniques involving external lubrication of the equipment with materials other than water (e.g. oil, bentonite, etc.) must not be used when working within the Prohibited Zone. Lubricating materials other than water may be used within the Precautionary Zone following consultation and by agreement.

SGN 11: Explanatory notes and examples

b) Broken Trench – Hand-dug: This technique combines hand dug trench sections with trenchless techniques if excavation is unavoidable. Excavation should be limited to where there is clear access around and below the roots. The trench is excavated by hand with precautions taken as for continuous trenching as in (c) below. Open sections of the trench should only be long enough to allow access for linking to the next section. The length of sections will be determined by local conditions, especially soil texture and cohesiveness, as well as the practical needs for access. In all cases the open sections should be kept as short as possible and outside of the Prohibited Zone.

c) Continuous Trench – Hand-dug: The use of this method must be considered only as a last resort if works are to be undertaken by agreement within the Prohibited Zone. The objective being to retain as many undamaged roots as possible."

barrell TREE CONSULTANCY

Site Guidance Note 9: Installing/upgrading surfacing in root protection areas

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SGN 9: Summary guidance for site operatives

Administration

1. Unauthorised damage to protected trees is a criminal offence and could lead to enforcement action.
2. Work under the normal site risk assessment procedures and comply with the wider site safety rules.
3. Brief operatives entering root protection areas (RPAs) by the supervising arboriculturist before work starts.

Other relevant SGNs

4. Monitor works in RPAs by the supervising arboriculturist (See SGN 1 Monitoring tree protection).
5. Design access to avoid soil compaction (See SGN 3 Ground protection).
6. Follow the guidance in SGN 4 Pollution control, if concrete is poured within or near RPAs.
7. Minimise excavation into original undisturbed soil (See SGN 7 Excavation in root protection areas).
8. Follow the guidance in SGN 8 Removing surfacing and structures in root protection areas, if existing surfacing is to be removed before installing new surfacing.
9. Follow the guidance in SGN 10 Installing structures in root protection areas, if the surfacing is to be installed on supports, i.e. piles, pads, or posts.

SGN 9: Summary guidance for site operatives

Important Reminders

10. For ground without existing surfacing, remove any loose material at the soil surface by hand and do not excavate into existing soil levels unless approved by the supervising arboriculturist.

11. For ground with a vegetation layer, excavations may be appropriate to remove the turf layer and surface vegetation, but this must be agreed by the supervising arboriculturist.

12. All new surfacing must be set back from trunks and buttress roots by at least 50 cm, unless otherwise agreed by the supervising arboriculturist.

13. Fill low points on undulating surfaces to an even level with any high points using an agreed granular material such as sand or stone.

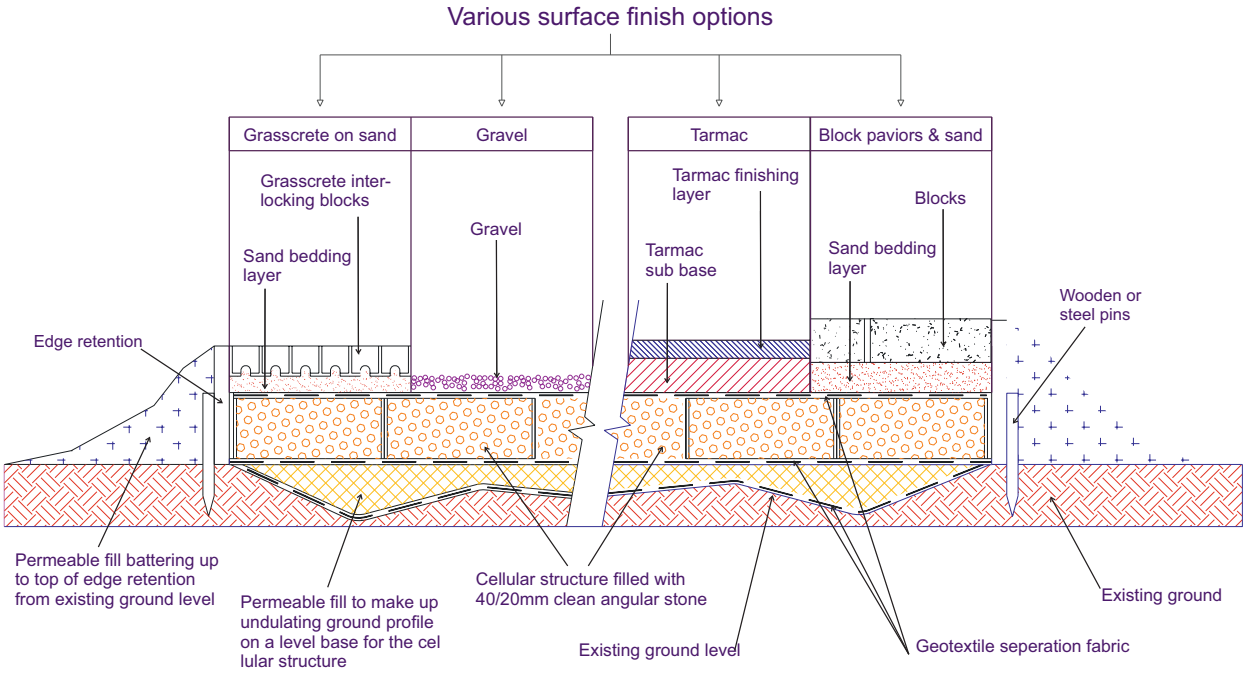
14. Do not mechanically compact new fill or existing soil.

15. If a three-dimensional cellular confinement system is used, install it according to the manufacturer's technical specification. Note: The cellular fill will be washed angular stone with no fines, as specified by the manufacturer.

SGN 9: Explanatory notes and examples

Purpose

SGN 9 describes the practical requirements for installing new surfacing and upgrading existing surfacing in RPAs, based on the recommendations in BS 5837 (7.4).



Illustrative specification for no-dig cellular confinement surfacing with examples of finishing options.
Note: The final design must be site specific and detailed by an appropriate specialist

BS 5837 recommends that three-dimensional cellular confinement systems are an appropriate sub-base for installing surfacing in RPAs. Most products are made from heavy-duty plastic that is pulled apart to open into cells. These are then filled with washed stone, after the product is spread over the ground and pinned in place. This forms a base layer that acts as a floating raft, spreading the load across the whole construction width. The base layer can be topped with a variety of finishes as illustrated in the cross-section.

Product suppliers: Protectaweb 3D cellular confinement product - https://wrekinproducts.com

SGN 9: Explanatory notes and examples

General principles and clarifications

Conventional surfacing installation based on excavating and compacting a supporting sub-base is unacceptable in RPAs because it can damage roots and the rooting environment. This harm is caused by killing roots, compacting soil structure, and impeding water/gaseous exchange through the soil. Adverse impact on trees will be reduced by minimising the extent of these changes in RPAs.

New surfacing solutions

Important elements of an effective design include protecting roots and the rooting environment during installation, a load spreading capability to prevent localised compaction, and providing adequate permeability for water and gasses to support living roots. The main approaches are:

- three-dimensional cellular confinement systems filled with washed stone laid directly onto the soil surface;
- concrete slabs cast directly onto the soil surface; and,
- surfacing supported above the soil surface on top of piles, pads, or posts.

The specific design of the chosen approach is an engineering issue that will take account of the bearing capacity of the soil, the intended loading, and the frequency of loading. The detail of product and specification are technical matters to be provided by an appropriate specialist.

Dealing with undulating surfaces and establishing a tolerable level of excavation

The precise location and depth of roots within the soil is unpredictable and will often only be known when careful digging starts on site. Ideally, all new surfacing in RPAs will be no-dig, i.e. requiring no excavation, but this can sometimes be difficult on undulating surfaces. New surfacing normally requires an evenly graded sub-base layer, which can be made up to any high points with granular, permeable fills such as crushed stone or sharp sand. This sub-base will not be compacted as would happen in conventional surface installation. Some limited excavation can be necessary to achieve this and need not be damaging if carried out carefully and large roots are not cut. Tree roots and grass roots rarely occupy the same soil volume at the top of the soil profile, so the removal of an established turf layer up to 5cm from the surface is unlikely to be damaging to trees. However, this may not be possible where there is no grass because tree roots may grow right up to the soil surface. In some situations, it may be possible to dig to a greater depth,

SGN 9: Explanatory notes and examples

depending on local conditions, but this will be assessed by the supervising arboriculturist if excavation deeper than 5cm is anticipated.

On undulating surfaces, finished gradients and levels will be planned with sufficient flexibility to allow on-site adjustment if excavation of any high points reveals large unexpected roots near the surface. If the roots are less than 2.5cm in diameter, they can be cut and the base for the surfacing formed with the preferred minimal excavation of up to 5cm. However, if roots over 2.5cm in diameter are exposed, cutting them may be too damaging and further excavation may not be possible. If that is the case, the surrounding levels will be adjusted to take account of these high points by filling with suitable material. If this is not practical, the situation will be discussed with the supervising arboriculturist before a final decision is made.

Edge retention

Conventional kerb edge retention set in concrete-filled excavated trenches can cause damage to roots and will be avoided. Edge retention in RPAs will be designed to avoid any significant excavation into existing soil levels, with several approaches that are fit for this purpose. For block paviours, the use of pre-formed edging secured by metal pins is effective and can be reinforced by concrete supports if there is no excavation into the soil. Railway sleepers pinned in place or wooden boards offer alternative options, depending on the expected loading of the surfacing. If the edge retention needs to be battered down to lower surrounding ground levels, a permeable soil fill will be used, as agreed with the supervising arboriculturist.

Footpaths and surfacing without a load-spreading base layer

In some situations, limited-width floating concrete rafts constructed directly onto the soil surface may be acceptable for both pedestrian and vehicular access, but the design will not include any strip-dug supports. If concrete is poured directly, precautions must be taken to ensure that no toxic fluids can contaminate the adjacent soil, e.g. confining the concrete in an impermeable liner. Alternatively, elevated paths supported on low impact frames or post supports allow a decking surface to cross sensitive areas. Where paths are installed very close to trunks, provision will be made for distortion from future root growth through using flexible components for the supporting frame and surfacing.

Specific considerations for upgrading existing surfacing

When upgrading existing surfacing, the preferred option will be to leave it in place and install the new surfacing on top of it. If the retained surfacing is impermeable, it may improve conditions for tree roots if it

SGN 9: Explanatory notes and examples

is punctured before the new surfacing is laid, but this is detail to be agreed with the supervising arboriculturist. If the existing surfacing is to be removed, it will be excavated down to the soil level beneath following the guidance set out in SGN 8 (Removing surfacing and structures in root protection areas). The new surfacing will then be installed on this surface, as described above.

New surfacing near trunks

All new surfacing should be set back from trunks and buttress roots by at least 50cm to allow space for future growth and minimise the risk of distortion.

The flat-packed three-dimensional cells are pulled apart, spread across the area to be surfaced, and pinned in place ready for the washed angular stone fill (with no fines).

SGN 9-01

The stone-filled cells spread the load of traffic to prevent localised compaction. The permeable geotextile membrane on the ground allows the movement of water and gasses, but prevents the migration of stone into the soil profile.

SGN 9-02

SGN 9: Explanatory notes and examples

SGN 9-03

Although BS 5837 recommends a minimum distance of 50cm between new surfacing and buttress roots, there may be scope for flexibility in this separation for mature trees with little potential for future growth, if agreed by the supervising arboriculturist.

SGN 9-04

A conventional concrete haunching can be used to retain new surfacing if it is not dug into a trench - here it is placed on top of the three-dimensional cellular confinement layer.

SGN 9-05

This preparation for a new residential access drive shows the base formation above the original ground level, with the permeable geotextile layer covering the ground. The wooden boards are pinned in place, creating an informal and rustic surface edging.

SGN 9: Explanatory notes and examples

The three-dimensional cells have been installed and filled with washed stone, ready for the finished surface to be laid above. The ground beyond the drive edges has been profiled with backfilled topsoil.

SGN 9-06

An alternative to the flexible three dimensional cells is rigid interlocking plastic cells, again filled with washed stone and retained by pinned wooden edges.

SGN 9-07

Another option for wooden edges at corner points that allows for vehicles to accidentally track over the edge of the formal surfacing.

SGN 9-08

SGN 9: Explanatory notes and examples

SGN 9-09

This temporary access for heavy construction traffic on the outer edge of a RPA is a concrete slab cast above ground level and will be removed when the project is completed. This approach is particularly suitable for slopes where a three-dimensional approach may be more prone to distortion when carrying heavy loads.

SGN 9-10

In some situations, it may be appropriate to cast a free-floating concrete surface directly onto the soil surface provided provision is made to prevent soil contamination while the concrete is being poured.

SGN 9-11

The RPA of this oak extended about 12m from its trunk and was previously covered in tarmac as parking. This original surfacing was removed and replaced with a new patio set above the ground level, with provision for water and air input into the covered RPA.

SGN 9: Explanatory notes and examples

Where new surfacing is to be installed over existing, sometimes it may assist the movement of gasses and water if the existing surfacing is punctured. In this situation, exploratory digging showed important roots directly beneath the existing tarmac, which would have been damaged if the tarmac was removed.

SGN 9-12

An option for installing surfacing close to mature trees is to use a light metal frame with rubberised surfacing to allow the path to distort without failing as the roots grow.

SGN 9-13

Board walks supported on posts or a light frame are another way of providing pedestrian access across sensitive RPAs (photo courtesy of Philip van Wassenaer).

SGN 9-14

SGN 9: Explanatory notes and examples

SGN 9-15

New surfacing such as decking can be supported above the ground on posts leaving the soil surface beneath undisturbed.

SGN 9-16

Although this is only a temporary surface, railway sleepers pinned into the ground can be used to retain the edges of new surfacing.

SGN 9-17

Where space is restricted it is possible to use metal edging.

SGN 9: Explanatory notes and examples

Technical reference

Due to copyright restrictions, the relevant British Standard clauses are summarised, not quoted, as follows:

1. ***BS 5837 (2012) Trees in relation to design, demolition and construction – Recommendations:***
   Clause 7.4 (Permanent hard surfacing within the RPA) recommends:
   - *7.4.2.1 New surface design should not require excavation other than the removal of the turf layer and surface vegetation. The design should be able to bear any anticipated loading, especially if it must carry construction traffic.*
   - *7.4.2.2 The design should evenly distribute the loading to avoid localised compaction.*
   - *7.4.2.7 The design should be resistant to or tolerant of deformation by tree roots, and should be set back from the stem and any root buttresses by a minimum of 50cm to allow for growth and movement. Levels can be made up using appropriate inert granular material.*

     NOTE *Piles, pads, elevated beams, and three-dimensional cellular confinement systems, can be used to support surfaces. If excavation is required, the location of roots greater than 2.5cm in diameter should be determined by exploratory investigations and retained if possible.*
   - *7.4.3 The conventional installation of kerbs, edgings, and haunchings, can damage tree roots and should be avoided either by using alternative methods of edge support or by not using supports at all.*

     NOTE *Examples of suitable edge supports include above-ground peg and board edging, sleepers, gabions, and other non-invasive ground-contact structures.*
   - *7.4.4.3 Ground levels should not be reduced to establish the new hard surface at the former ground level. Loose debris and turf should be removed carefully and the new surface should sit on top of the original soil.*
   - *7.4.4.4 Fill to raise levels should be a granular material which remains gas- and water-permeable throughout its design life.*
   - *7.4.4.5 Wet concrete should not be poured in the RPA unless an impermeable liner has been installed to prevent soil contamination from the toxic leachate.*

Allison Zike

From: Farley Bartelmes <evinrude131@frontier.com>
Sent: Sunday, March 17, 2019 4:15 PM
To: Allison Zike
Subject: Written comments on permit # SUB16-01774

Follow Up Flag: Follow up
Flag Status: Flagged

Dear Alison Zike,
I'm writing to express my concern regarding permit #SUB16-01774 and the proposed five homes intended for the site. I'm sure you're aware the City of Kirkland Planning Commission has been working on amendments to raise the zoning numbers in this area along with a tree canopy/retention plan to preserve the characteristics of the neighborhood. There are several significant fir trees on that property, the removal of which could jeopardize the surrounding properties. We have severe winds on the top of Juanita Drive, often from the south.
Further I am also very concerned about the ravine slope on the southern edge of the property and the potential for slides. The McDonald property currently under development across the ravine had a slide issue that has halted the progress of the development until a resolution can be found.
I would hope that a thorough environmental impact study would be enforced prior to any permits for development being issued and that any permit would be in compliance with the newest zoning and tree canopy ordinances rather than skating under the wire prior to their enactment.
I have been in this house for over 50 years so am not new to this neighborhood. I grew up riding horses in these woods. The woodlands are home to Barred Owls, Eagles, plus many bird species, deer and coyote, to name a few. Their habitat is shrinking. That is a shame for future generations.
Regards,
Farley Bartelmes
12810 Holiday Drive NE
Kirkland WA 98034
evinrude131@frontier.com

Sent from my iPhone

Allison Zike

From: Dave Bechtel <dave@bfmar.com>
Sent: Monday, March 11, 2019 6:45 PM
To: Allison Zike
Subject: SUB 16-01774

SUB 16-01774

Hi Alison,
Below is all of my contact information. I live adjacent to this Plat, I'm the flag lot to the West of SUB16-01744. The neighbor on the East side of this Plat showed me a
drawing similar to the one you have posted on the property which is raising some concerns:

1 My first concern is that I do not see any evidence of a recent survey on the property in the form of markers, tags, posts or nailed medallions on the street. Wouldn't those be evident?

2 It appears that the proposed driveways encroach on the flag pole portion of my property. Is this considered some type of easement to the developer? Do I have any property rights regarding infringement on this portion of the lot? It would seem that there could be times of use where I would be denied clear access to the property.

3 Due to the Previous Cease and Desist order from Kirkland to the property owner does this mean there will be added oversight during the construction process? The owner of the property strikes me as the kind of guy who thinks it is easier to ask for forgiveness rather than permission and the possibility of an "accidental" complete clear cut (or something) s seems possible.

4 The property line between my house and the new development is not clear. For example, the shared South corner line that runs N-S is not a continuous line.

5 It is my understanding that my driveway is an easement from the property to the West of me. Are all of these easements maintained the same following this development?

Would it be possible to get a pdf of the same drawing you have posted on the property? Since it is an AutoCad drawing it would be great if some of the extraneous layers are turned off in order to make a clearer presentation of property lines, existing dwellings, etc. Thanks, Dave Bechtel

Dave Bechtel (Owner of flag lot to West)
7429 NE 129th St
Kirkland
mobile 206 276 4087

e-mail dave@bfmar.com

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March 18, 2019

Allison Zike
Planning and Building Department
City of Kirkland
123 5th Ave, Kirkland, WA 98033

Re: KS OASIS SHORT PLAT, CASE NO. SUB16-01774 at 7435 NE 129th St, Kirkland WA.

Dear Allison,

We are writing to strenuously object to the planned short plat subdivision and 5-home development referenced above. Our request is that the development application be denied. Short of that, we request the approval for the development be delayed. If your team declines to deny the application or delay it, we ask for the opportunity to request that reasonable modifications be made to the plans to minimalize the negative effects of development on the community. The reasons we object to the short plat subdivision and planned development of 5 homes are as follows:

- The prior actions of the applicant, Zelfira White, has given the community grave concern about her respect for the law, for Kirkland building codes and common decency. Shortly after acquiring the property Mrs. White had dump trucks full of dirt unload many thousands of pounds of non-compliant soil into the property. The dump trucks Mrs. White hired for this illegal act operated in the dark after 6pm trucks and filled in dirt around trees, damaging their health. In the process, the dump trucks backed into utility poles and trees, causing damage. I also understand Ms. White submitted many versions of development plans that were repeatedly rejected by your planning department and only finally submitted compete plans last month. Any reasonable person would be concerned about someone with such poor judgement building 5 houses right next door.

- Our street – 129th – is a vital neighborhood walkway that almost every neighbor uses to walk with their families including children, senior citizens and dogs. The construction of 5 new homes on this street will ruin this walkway during the length of construction and diminish the walkway after construction is complete.

- The subject property is currently a green belt with a canopy of many large trees – over 3 dozen – that protect neighboring homes from falling trees during windstorms. The removal of many of these trees will expose the remaining trees to the full force of wind during windstorms. The removal of trees and construction of 5 homes will also eliminate habitat that is now being used to support wildlife including owls and woodpeckers.

- The planned development does nothing to address the need for affordable housing in Kirkland. These homes will be listed for at least $800,000 (and likely over $1 million) each.

We are reviewing our options to apply political pressure and to pursue all the available legal options to stop, delay or modify this proposed development.

Regards,

Shelly Reid
12941 76th Ave NE
Kirkland, WA 98034

12825 Holiday Dr NE
Kirkland, WA 98034

12824 Holiday Dr NE
Kirkland, WA 98034

Allison Zike
Planning and Building Department
City of Kirkland
123 5th Ave, Kirkland, WA 98033

Re: KS OASIS SHORT PLAT, CASE NO. SUB16-01774 at 7435 NE 129th St, Kirkland WA.

Dear Allison,

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- The prior actions of the applicant, Zelfira White, has given the community grave concern about her respect for the law, for Kirkland building codes and common decency. Shortly after acquiring the property Mrs. White had dump trucks full of dirt unload many thousands of pounds of non-compliant soil into the property. The dump trucks Mrs. White hired for this illegal act operated in the dark after 6pm trucks and filled in dirt around trees, damaging their health. In the process, the dump trucks backed into utility poles and trees, causing damage. I also understand Ms. White submitted many versions of development plans that were repeatedly rejected by your planning department and only finally submitted compete plans last month. Any reasonable person would be concerned about someone with such poor judgement building 5 houses right next door.

- Our street – 129th – is a vital neighborhood walkway that almost every neighbor uses to walk with their families including children, senior citizens and dogs. The construction of 5 new homes on this street will ruin this walkway during the length of construction and diminish the walkway after construction is complete.

- The subject property is currently a green belt with a canopy of many large trees – over 3 dozen – that protect neighboring homes from falling trees during windstorms. The removal of many of these trees will expose the remaining trees to the full force of wind during windstorms. The removal of trees and construction of 5 homes will also eliminate habitat that is now being used to support wildlife including owls and woodpeckers.

- The planned development does nothing to address the need for affordable housing in Kirkland. These homes will be listed for at least $800,000 (and likely over $1 million) each.

We are reviewing our options to apply political pressure and to pursue all the available legal options to stop, delay or modify this proposed development.

Regards,

Warren Raven
12833 Holiday Dr NE
Kirkland WA 98034

12844 Holiday Dr NE
Kirkland, WA 98034

12832 Holiday DR NE
Kirkland, WA 98034

March 18, 2019

Allison Zike
Planning and Building Department
City of Kirkland
123 5th Ave, Kirkland, WA 98033

Re: KS OASIS SHORT PLAT, CASE NO. SUB16-01774 at 7435 NE 129th St, Kirkland WA.

Dear Allison,

We are writing to strenuously object to the planned short plat subdivision and 5-home development referenced above. Our request is that the development application be denied. Short of that, we request the approval for the development be delayed. If your team declines to deny the application or delay it, we ask for the opportunity to request that reasonable modifications be made to the plans to minimalize the negative effects of development on the community. The reasons we object to the short plat subdivision and planned development of 5 homes are as follows:

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Regards,

Christin Carter
12905 74th PL NE
Kirkland, WA
98034

Tim Ressler
12905 74th PL NE
Kirkland, WA
98034

March 18, 2019

Allison Zike
Planning and Building Department
City of Kirkland
123 5th Ave, Kirkland, WA 98033

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Regards,

Charles Coats
7428 NE 129th ST
KIRKLAND, WA 98034

Colleen J Lewis
12828-76th Ave NE
Kirkland WA
98034

Jan E. Sullivan
12828 76th Ave NE
KIRK
98034

March 18, 2019

Allison Zike
Planning and Building Department
City of Kirkland
123 5th Ave, Kirkland, WA 98033

Re: KS OASIS SHORT PLAT, CASE NO. SUB16-01774 at 7435 NE 129th St, Kirkland WA.

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We are reviewing our options to apply political pressure and to pursue all the available legal options to stop, delay or modify this proposed development.

Regards,

Emmett Lenihan
12824 Holiday
Kirkland

Kathy Bartelmus
12810 Holiday Dr
Kirkland WA 98034

Allison Zike

From: Stephanie Develle <stephanie.develle@gmail.com>
Sent: Monday, March 18, 2019 5:16 PM
To: Allison Zike
Subject: Fwd: SUB16-01774, 7435 NE 129th St, Comment

Follow Up Flag: Follow up
Flag Status: Flagged

-------- Forwarded message ---------

From: **Stephanie Develle** <stephanie.develle@gmail.com>
Date: Mon, Mar 18, 2019 at 2:55 PM
Subject: SUB16-01774, 7435 NE 129th St, Comment
To: <a.zike@kirklandwa.gov>
Cc: James Develle <jdevelle@hotmail.com>

Dear Ms. Zike,
Our property and home at 12815 - 76th Ave NE share part of the boundary with the lot at 7435 NE 129th St -- we are to the east. We have 3 comments.
1. How would storm water drain? We were approached by the owner about an easement for a drainage pipe under our backyard which we cannot do, because it would require taking out most of our beautiful big trees. Furthermore, the pipe would empty into a hollow which already is too wet in the winter for the trees that grow there.
2. Has the lot been surveyed? There were 2 men out in April 2016 who said they were surveyors, but I could not find any record of a surveying license under the names they gave me.
3. How would the subdivided lots be accessed by vehicles? We have heard there will be a road on the eastern side of the lot, which would have quite an impact on our property.
Thank you, Stephanie and James Develle

Allison Zike

From: Biff Lenihan <biff.lenihan@rescuevoice.com>
Sent: Sunday, March 17, 2019 5:37 PM
To: Allison Zike
Subject: Fwd: Sub16-01774.

Follow Up Flag: Follow up
Flag Status: Flagged

---------- Forwarded message ---------
From: **Biff Lenihan** <biff.lenihaniii@gmail.com>
Date: Sun, Mar 17, 2019 at 5:32 PM
Subject: Fwd: Sub16-01774.
To: Biff Lenihan <biff.lenihan@rescuevoice.com>

---------- Forwarded message ---------
From: **Biff Lenihan** <biff.lenihaniii@gmail.com>
Date: Sun, Mar 17, 2019, 5:30 PM
Subject: Fwd: Sub16-01774.
To: Biff Lenihan <biff.lenihan@rescuevoice.com>

---------- Forwarded message ---------
From: **Biff Lenihan** <biff.lenihaniii@gmail.com>
Date: Sun, Mar 17, 2019, 5:29 PM
Subject: Sub16-01774.
To: <azike@kirklandwa.gov>

When the application was received buy Kirkland in 2016 4 permits, the owner started clearing property immediately, as well as bringing in 25 dump trucks full of sub standard dirt. I got involved with Kirkland and they stopped the owner from developing the property in 2016. the problem I want to point out is the canopy lid here in Kirkland and what it would do with a storm with those trees taken out. Also I'm concerned with a slides that have been taking place with a ravine just west of us on the McDonald property Platt. It's not that I want to stop progress, but this particular property is the home of many animals. Owls, woodpeckers, deer, coyotes, squirrels, and many other small creatures. It is my opinion in order to build on this property, that thousands of yards a backfill would have to be brought in. There is also and easement that I grant for the property behind me. I believe that would impact the property line. I would hope that Kirkland would do more due diligence examining the property at this park like property. thanks. Biff and Sonja lenihan. 12824 holiday drive Northeast, Kirkland. Biff. Lenihan@rescuevoice.com

--
Biff Lenihan

1420 NW Gilman Blvd. #2653 Suite 2
Issaquah, WA 98027
Cell - (206) 255-0100
866-992-6569 Ext 803
www.rescuevoice.com

Allison Zike

From: Chris Whitmer <whitmec@gmail.com>
Sent: Monday, March 18, 2019 4:13 PM
To: Allison Zike
Subject: Comments to permit number SUB16-01774

Follow Up Flag: Follow up
Flag Status: Flagged

Ms. Zike;

I'd like to provide my comments for the subject permit for a five parcel shot plat off 129th in the Finn Hill neighborhood.

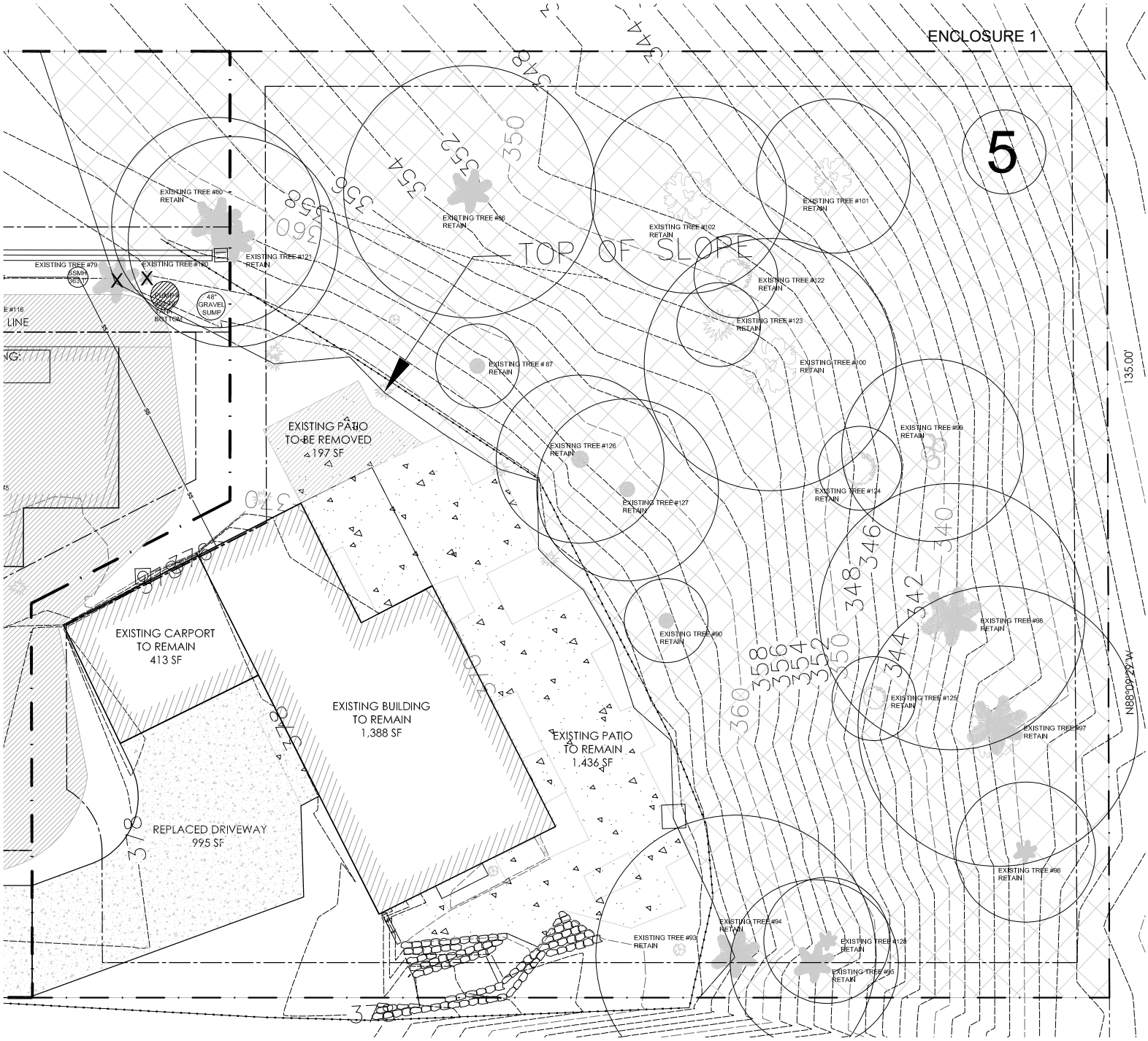
First I'd like to understand and remind that there was a cease and desist order on that property for a very long time due to a previous infraction. It's not clear when that judgment was cleared and this latest application to proceed because there appears to be no record of the clearing of that cease order. Are there further details on that judgement so this could proceed? I'd hate to think that cease and desist order was somehow forgotten.

- Clearly the property has significant old growth trees and appreciable vegetation. It's not clear by the drawings how the requestor could reasonably adhere to the Holmes Point Overlay and still have sufficient space to protect the trees and still get equipment and materials in and out of the site.
- With the added removal of the trees and vegetation, there is a significant topographical grade in the area that seems would require a significant amount of backfill to make the sites builtable. It seems that there is a direct potential to land slide for not only the site but the impacts to 129th. Having 129th rendered impassible due to the road bed failing due to slide would negatively impact those who live on 76th Ave NE. I don't think the current geotechnical report address what could impact a slide could have to 129th.
- There is currently no traffic impact study. Having four additional homes in that area would certainly require upgrades to the street and sewer system. Is there a plan to study that? This area of Finn hill has been under unprecedented development and with all other permits, a traffic impact was provided.

Finally, I just like to offer a personal observation about Kirkland as a whole. One of the keen aspects that brought me to this area was the low key, quiet, woodsy atmosphere of the area. I don't know if you have visited the site in person, but I think you'd reasonably say there is no room for four more houses. Like so many other developments up here on Finn Hill that are eating up the character and older growth tree cover, I doubt there is anything anyone can say that will make a difference. Kirkland will keep offering up its trees and green to developers who want to make a buck. But please consider what happens when the developers are long gone. Sure you will have your tax revenue, but you will go the way of Northgate or Renton and be completely covered with high density homes that offer none of the values that have brought many to Kirkland.

Thank you for your time and consideration.

Chris Whitmer
whitmec@gmail.com
425-503-5389



LOT 5:
LOT SIZE: 18,707 SF

PNA REQUIRED: 4,676.9 SF

FAR ALLOWED: 9,353.9 SF
EXISTING FAR: 2,776 SF
BASEMENT: 1388 SF
FIRST FLOOR:1388 SF

LOT COVERAGE ALLOWED: 4,270.8 SF
(3,300 SF + 10% OF LOT AREA OVER 9,000 SF)

LOT COVERAGE PROPOSED:

REPLACED DRIVEWAY:	995 SF
EXISTING CARPORT:	413 SF
EXISTING BUILDING:	1,388 SF
EXISTING PATIO TO REMAIN :	1,436 SF
	4,232 SF

EXISTING PATIO TO BE REMOVED:197 SF

7435 NE 129TH ST | LOT 5 ZONING COMPLIANCE EXHIBIT

SCALE: 1" = 20'

MEDICI ARCHITECTS

10-30-19

N

COBALT
GEOSCIENCES

Geotechnical Investigation
Proposed Five Lot Plat

7435 NE 129th Street
Kirkland, Washington

December 9, 2018

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COBALT GEOSCIENCES

GEOTECHNICAL INVESTIGATION
KIRKLAND, WASHINGTON

December 9, 2018

1.0 Introduction

In accordance with your authorization, Cobalt Geosciences, LLC (Cobalt) has completed a geotechnical investigation for the proposed five-lot residential plat located at 7435 NE 129th Street in Kirkland, Washington (Figure 1).

The purpose of the geotechnical investigation was to identify subsurface conditions and to provide geotechnical recommendations for foundation design, stormwater management, earthwork, soil compaction, and suitability of the on-site soils for use as fill.

The scope of work for the geotechnical evaluation consisted of a site investigation followed by engineering analyses to prepare this report. Recommendations presented herein pertain to various geotechnical aspects of the proposed development, including foundation support of the new buildings, slope stability, and pavement design.

2.0 Project Description

The project includes subdivision of the existing parcel followed by construction of four new multi-story residences, access roadways, utilities, and landscaped regions. An existing residence will remain in place. The new buildings will be situated in the northern portion of the property.

Anticipated building loads are expected to be light and site grading will include cuts and fills on the order of 6 feet or less. We should be provided with civil and structural plans as they become available for review so that we may update our recommendations, if necessary.

3.0 Site Description

The site is located at 7435 NE 129th Street in Kirkland, Washington (Figure 1). The property consists of one rectangular shaped parcel (No. 4055700810) with a total area of 61,855 square feet.

The southern portion of the property is developed with a single family residence with daylight basement (facing south) and several accessory buildings. A gravel access driveway extends onto the property from NE 129th Street along the west side of the property. The remainder of the property is undeveloped and vegetated with grasses, ferns, ivy, blackberry vines, along with Cedar, Alder, Maple, and Fir trees.

The site slopes gently to moderately downward from west to east with magnitudes ranging from 5 to 25 percent and relief of about 20 feet. There is a steep to very steep slope near the southern property line and extending downward to the south and southeast into a ravine system. The slope is about 180 feet in height and has magnitudes ranging from 40 to 80 percent. The existing residence is situated approximately 20 feet from the top of the steep slope.

The site is bordered to the north by NE 129th Street, to the east and west by residential properties, and to the south by a ravine.

PO Box 82243
Kenmore, WA 98028
cobaltgeo@gmail.com
206-331-1097

4.0 Field Investigation

4.1.1 Site Investigation Program

The geotechnical field investigation program was completed on November 23, 2018 and included drilling and sampling two hollow stem auger borings within the property for subsurface analysis.

Disturbed soil samples were obtained during drilling by using the Standard Penetration Test (SPT) as described in ASTM D-1586. The Standard Penetration Test and sampling method consists of driving a standard 2-inch outside-diameter, split barrel sampler into the subsoil with a 140-pound hammer free falling a vertical distance of 30 inches. The summation of hammer-blows required to drive the sampler the final 12-inches of an 18-inch sample interval is defined as the Standard Penetration Resistance, or N-value. The blow count is presented graphically on the boring logs in this appendix. The resistance, or "N" value, provides a measure of the relative density of granular soils or of the relative consistency of cohesive soils.

The soils encountered were logged in the field and are described in accordance with the Unified Soil Classification System (USCS).

A Cobalt Geosciences field representative conducted the explorations, collected disturbed soil samples, classified the encountered soils, kept a detailed log of the explorations, and observed and recorded pertinent site features.

The results of the boring sampling and laboratory analyses are presented in Appendix C.

5.0 Soil and Groundwater Conditions

5.1.1 Area Geology

The site lies within the Puget Lowland. The lowland is part of a regional north-south trending trough that extends from southwestern British Columbia to near Eugene, Oregon. North of Olympia, Washington, this lowland is glacially carved, with a depositional and erosional history including at least four separate glacial advances/retreats. The Puget Lowland is bounded to the west by the Olympic Mountains and to the east by the Cascade Range. The lowland is filled with glacial and non-glacial sediments consisting of interbedded gravel, sand, silt, till, and peat lenses.

The Geologic Map of King County, indicates that the site is near the contacts between Vashon Glacial Till and Vashon Advance Outwash.

Vashon Glacial Till is typically characterized by an unsorted, non-stratified mixture of clay, silt, sand, gravel, cobbles and boulders in variable quantities. These materials are typically dense and relatively impermeable. The poor sorting reflects the mixing of the materials as these sediments were overridden and incorporated by the glacial ice.

Vashon Advance Outwash consists of fine to medium grained sand with minor gravel and local interbeds of silt and clay. These materials are usually permeable and are typically dense to very dense. Vashon Advance Outwash typically underlies Vashon Glacial Till.

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Boring Explorations

Boring B-1 encountered an approximate 12-inch-thick layer of topsoil and vegetation underlain by approximately 11 feet of medium dense to very dense, silty-fine to medium grained sand with gravel (Glacial Till). This layer was underlain by dense to very dense, fine to medium grained sand trace gravel (Advance Outwash), which continued to the termination depth of the boring.

Boring B-2 encountered an approximately 12-inch-thick layer of topsoil and vegetation underlain by approximately 3 feet of medium dense to dense, silty-fine to medium grained sand with gravel (Glacial Till). This layer was underlain by medium dense to very dense, fine to medium grained sand trace gravel (Advance Outwash), which continued to the termination depth of the boring.

Overall Geologic Conditions

The site is situated near the top of a ravine system that extends downward toward the west (overall). As is fairly typical in the Puget Sound region, glacial till overlies advance outwash and in this case, the glacial till is relatively thin. We anticipate that Pre-Fraser Deposits underlie the Vashon Advance Outwash; however, the likely elevation of this contact is between 50 and 100 feet.

5.1.2 Groundwater

Groundwater was not encountered in either boring. Based on our observations, we do not anticipate that large volumes of groundwater will be encountered at the site. There is a slight chance that perched groundwater may develop between weathered and unweathered glacial till, generally within 8 feet of existing elevations.

Water table elevations often fluctuate over time. The groundwater level will depend on a variety of factors that may include seasonal precipitation, irrigation, land use, climatic conditions and soil permeability. Water levels at the time of the field investigation may be different from those encountered during the construction phase of the project.

6.0 Geologic Hazards

6.1 Steep Slope Hazard

Critical area ordinances designate slopes with magnitudes greater than about 40 percent and vertical relief of at least 10 feet as potentially geologically hazardous (steep slope/landslide hazards). Additional criteria include areas where landslide activity has taken place historically or where there is evidence of slope movements. Slope areas underlain by permeable soils overlying impermeable soils often exhibit landslide activity.

There are steep to very steep slopes along southern margin of the property extending off site into adjacent properties. These slopes have magnitudes of 40 to 80 percent and topographic relief of about 180 feet.

The following are excerpts from Chapter 85 of the Kirkland Municipal Code which pertain to landslide hazard areas. We have added comments after relevant code items.

PO Box 82243
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206-331-1097

3. Landslide Hazard Areas – Both of the following:

   a. High Landslide Hazard Areas – Areas sloping 40 percent or greater, areas subject to previous landslide activities and areas sloping between 15 percent and 40 percent with zones of emergent groundwater or underlain by or embedded with impermeable silts or clays.

   b. Moderate Landslide Hazard Areas – Areas sloping between 15 percent and 40 percent and underlain by relatively permeable soils consisting largely of sand and gravel or highly competent glacial till.

The site is underlain by relatively dense soils; however, the site and adjacent areas have slope magnitudes greater than 40 percent. There is no evidence of emergent groundwater. Site meets criteria of High Landslide Hazard areas although overall stability is consistent with Moderate Landslide Hazard Areas.

2. A geotechnical investigation, prepared by a qualified geotechnical engineer or engineering geologist, to determine if a landslide hazard area or seismic hazard area exists on the subject property.

Part of this report; it is our opinion that the site contains slopes with relatively low likelihood for landslide potential. There are no seismic hazards are present at the site based on the high density of the subsurface soils.

3. A geotechnical report, prepared by a qualified geotechnical engineer or engineering geologist, 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 and adjacent properties.

   Based on our review, the proposal will not adversely affect critical areas on the site or adjacent areas provided the work is performed in accordance with the plans and with periodic monitoring by the geotechnical engineer. All site runoff must be controlled fully during and after construction. This will require the use of erosion control measures, vegetation placement and maintenance, as well as determination of implementation of construction/grading limits that are the minimum required to allow for site development.

   b. Evidence, if any, of holocene or recent landsliding, sloughing, or soil creep.

   None observed. Likely minor to moderate soil creep observed within off-site slopes south of the existing residence.

   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.

   None observed. Possible light perched groundwater present between weathered and unweathered till during late winter and early spring months. We did not observe areas where perched interflow becomes emergent (as springs). It is likely that any perched water migrates laterally and through the thin layer of till into the underlying outwash. Within the outwash, groundwater and/or precipitation is likely to migrate downward relatively quickly, recharging the more regional aquifer. This aquifer is likely more than 200 feet below the site.

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cobaltgeo@gmail.com
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d. Identification of existing fill areas.

None observed. Likely fill around the existing residence from grading activities associated with the construction of that residence. Possible oversteepened slope areas near the top of the slope due to landscaping and/or fill placement over time.

e. Soil description in accordance with the United Soil Classification Systems.

See remainder of report. Site is underlain by a thin layer of glacial till (USCS SM) which overlies advance outwash (USCS SP).

f. Depth to groundwater and estimates of potential seasonal fluctuations.

Possible perched groundwater within 8 feet of the existing site elevations between weathered and unweathered glacial till. This flow is considered minor and possibly extends up to 5 feet below grade at times.

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).

Included on the exploration logs. Soils are consistent with Vashon Glacial Till overlying 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.

Included in Figure 4. Lidar imagery is consistent with a ravine/gully system created through erosion. In this case, the ravine has been created through seasonal stream activity. The stream is likely a result of groundwater/spring activity and seasonal precipitation. Resulting erosion is a combination of stream incision and mass wastage, along with soil creep along steeper slope areas above the stream. No anomalies indicating large scale rotational slides were observed in the vicinity of the site.

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.

Included in Section 6.4. Analyses indicate suitable factors of safety with regard to the proposed construction and location of new residences.

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.

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No emergent seepage, scarps, severe tree trunk deformation, tension cracks, or other evidence of slide activity was observed. Slope systems are consistent with stable landforms created through natural erosion over time.

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.

Based on our explorations and nearby explorations by others, the site is underlain by Vashon Glacial Till and Vashon Advance Outwash which have a low to very low liquefaction potential. Detailed analyses and special mitigation for seismic hazards are not warranted. Groundwater is likely more than 100 feet below the site.

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.

The site is mapped within a 'medium or mixed' seismic hazard area. This designation is likely due to the mapped geologic unit (Vashon Advance Outwash), which is comprised of fine to medium grained sand. Liquefaction often affects sand deposits with few fines, specifically with high groundwater levels.

Based on the results of our site explorations, the site is underlain by glacial till and at depth by advance outwash. Glacial till has a very low risk of liquefaction or seismic hazards. At this site, outwash is dense to very dense and does not have a shallow groundwater table. Seismic hazards for the outwash are also very low. Therefore, it is our opinion that the project does not require special mitigation.

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.

The project can be constructed safely provided the recommendations in our report are followed and verified periodically during construction by the geotechnical engineer.

4. Geotechnical recommendations, prepared by a qualified geotechnical engineer, for special engineering or other mitigation techniques appropriate to the hazard area along with an analysis of how these techniques will affect the subject and adjacent properties, including discussions and recommendations on the following:

a. The present stability of the subject property, the stability of the subject property during construction, the stability of the subject property after all development activities are completed and a discussion of the relative risks and slide potential relating to adjacent properties during each stage of development.

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Site is stable at this time. Recommendations for temporary excavations are included in this report. The location of the new residential lots is suitable provided stormwater runoff is fully managed and vegetation is maintained and/or replaced on developed areas. Stability will not be affected by construction provided runoff is controlled.

b. Location of buildings, roadways, and other improvements.

See Figure 3 for current lot layout. See architectural plans for proposed layouts.

c. Grading and earthwork, including compaction and fill material requirements, use of site solids as fill or backfill, imported fill or backfill requirements, height and inclination of both cut and fill slopes and erosion control and wet weather construction considerations and/or limitations.

Included in this report.

d. Foundation and retaining wall design criteria, including bearing layer(s), allowable capacities, minimum width, minimum depth, estimated settlements (total and differential), lateral loads, and other pertinent recommendations.

Included in this report.

e. Surface and subsurface drainage requirements and drainage material requirements.

Included in this report.

f. Assessment of seismic ground motion amplification and liquefaction potential.

Included below. Liquefaction potential is very low.

g. Other measures recommended to reduce the risk of slope instability.

No additional measures necessary at this time.

h. Any additional information believed to be relevant by the geotechnical engineer preparing the recommendations or requested by the Planning Official.

6.2 Erosion Hazard

The Natural Resources Conservation Services (NRCS) maps for King County indicate that the site is underlain by Alderwood gravelly sandy loam (8 to 15 percent slopes). These soils would have a slight to moderate potential in a disturbed state.

It is our opinion that soil erosion potential at this project site can be reduced through landscaping and surface water runoff control. Typically erosion of exposed soils will be most noticeable during periods of rainfall and may be controlled by the use of normal temporary erosion control measures, such as silt fences, hay bales, mulching, control ditches and diversion trenches. The typical wet weather season, with regard to site grading, is from October 31st to April 1st. Erosion control measures should be in place before the onset of wet weather.

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6.3 Seismic Hazard

The overall subsurface profile corresponds to a Site Class *D* as defined by Table 1613.5.2 of the 2015 International Building Code (2015 IBC). A Site Class *D* applies to an overall profile consisting of dense to very dense soils within the upper 100 feet.

We referenced the U.S. Geological Survey (USGS) Earthquake Hazards Program Website to obtain values for S_S, S_1, F_a, and F_v. The USGS website includes the most updated published data on seismic conditions. The site specific seismic design parameters and adjusted maximum spectral response acceleration parameters are as follows:

PGA	(Peak Ground Acceleration, in percent of g)
S_S	125.20% of g
S_1	48.50% of g
F_A	1.00
F_V	1.515

Additional seismic considerations include liquefaction potential and amplification of ground motions by soft/loose soil deposits. The liquefaction potential is highest for loose sand with a high groundwater table. The relatively dense soil deposits that underlie the site have a low liquefaction potential.

6.4 Slope Stability Analyses

We performed slope stability analyses through a representational cross section through the existing steep slope area. Analyses were performed using data from the drilled borings and King County Imap topography.

The commercially available slope stability computer program Geostase 4 was used to evaluate the global stability of the slope within the property extending into the property to the south. The slope stability was analyzed under static and seismic (pseudo-static method) conditions for the existing topography.

The computer program calculates factors of safety for potential slope failures and generates the potential failure planes. This software calculates the slope stability under seismic conditions using pseudo-static methods. The stability of the described configuration was analyzed by comparing observed factors of safety to minimum values as set by standard geotechnical practice.

A factor of safety of 1.0 is considered equilibrium and less than 1.0 is considered failure. The required factor of safety for global stability is 1.5 for static conditions and 1.1 for seismic conditions. In accordance with typical engineering standards, we used a seismic acceleration equal to one half of the horizontal peak ground acceleration. At this location, the PGA is 0.636 with one half equal to 0.318.

We utilized SPT information along with field Torvayne shear testing to determine suitable soil parameters of the glacial till and advance outwash. The following estimated soil parameters were used in our analyses:

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Soil Description	Unit Weight (pcf)	Cohesion (psf)	Friction (degrees)
Glacial Till (SM)	120	500	36
Advance Outwash (SP)	120	0	38

Slope Stability Results

Cross Section A to A'	Static Factor of Safety	0.32g Seismic Factor of Safety
Failure surface determined by program search	1.174	0.641
Failure surface at residence/lot location	2.382	1.133

The analyses indicate suitable factors of safety for global stability at the location of the proposed building lots. While factors of safety are lower than required values near the slope face, there is no feasible mitigation to increase slope stability, nor is mitigation warranted. The natural slopes are adequately stable for current and lower magnitude seismic conditions and based on high soil densities of the underlying geologic units, the factors of safety observed are likely higher than shown above.

These analyses do not determine safety during construction. Typically, construction activities are temporary and provided excavation recommendations from the geotechnical engineer are followed, the risk of failure can be managed through daily observation of stability. Please see temporary excavation section of this report for more information.

7.0 DISCUSSION

7.1.1 General

The site is underlain by variable thicknesses of weathered and unweathered glacial till, which overlie relatively dense advance outwash. The proposed residential structures may be supported on shallow foundation systems bearing on medium dense or firmer native soils and structural fill placed on suitable native soils.

While there are steep and very steep slopes within and adjacent to the property, the slope areas are adequately stable and will not be adversely affected by the proposed development. Site runoff, both temporary and permanent, must be fully controlled in order to maintain surface stability and limit soil erosion on slope areas.

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Widespread infiltration of stormwater runoff is not feasible at the site. The site is underlain by areas of fill and at depth by weathered and unweathered glacial till. Permeable pavements may be utilized for flow control in the northern half of the property, if necessary.

8.0 Recommendations

8.1.1 Site Preparation

Trees, shrubs and other vegetation should be removed prior to stripping of surficial organic-rich soil and fill. Based on observations from the site investigation program, it is anticipated that the stripping depth will be 6 to 18 inches. Deeper excavations will be necessary below large trees, former foundation elements, and in any areas underlain by undocumented fill materials.

The native soils consist of silty-sand with gravel and at depth, poorly graded sand with gravel. The native soils may be used as structural fill provided they achieve compaction requirements and are within 3 percent of the optimum moisture. Some of these soils may only be suitable for use as fill during the summer months, as they will be above the optimum moisture levels in their current state. These soils are variably moisture sensitive and may degrade during periods of wet weather and under equipment traffic.

Imported structural fill should consist of a sand and gravel mixture with a maximum grain size of 3 inches and less than 5 percent fines (material passing the U.S. Standard No. 200 Sieve). Structural fill should be placed in maximum lift thicknesses of 12 inches and should be compacted to a minimum of 95 percent of the modified proctor maximum dry density, as determined by the ASTM D 1557 test method.

8.1.2 Temporary Excavations

Based on our understanding of the project, we anticipate that the grading could include local cuts on the order of approximately 4 feet or less for foundation, driveway, and utility placement. Any deeper excavations should be sloped no steeper than 1.5H:1V (Horizontal:Vertical) in loose native soils (if present), 1H:1V in medium dense native soils, and 3/4H:1V in dense to very dense native soils. If an excavation is subject to heavy vibration or surcharge loads, we recommend that the excavations be sloped no steeper than 2H:1V, where room permits.

Temporary cuts should be in accordance with the Washington Administrative Code (WAC) Part N, Excavation, Trenching, and Shoring. Temporary slopes should be visually inspected daily by a qualified person during construction activities and the inspections should be documented in daily reports. The contractor is responsible for maintaining the stability of the temporary cut slopes and reducing slope erosion during construction.

Temporary cut slopes should be covered with visqueen to help reduce erosion during wet weather, and the slopes should be closely monitored until the permanent retaining systems or slope configurations are complete. Materials should not be stored or equipment operated within 10 feet of the top of any temporary cut slope.

Soil conditions may not be completely known from the geotechnical investigation. In the case of temporary cuts, the existing soil conditions may not be completely revealed until the excavation work exposes the soil. Typically, as excavation work progresses the maximum inclination of temporary slopes

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will need to be re-evaluated by the geotechnical engineer so that supplemental recommendations can be made. Soil and groundwater conditions can be highly variable. Scheduling for soil work will need to be adjustable, to deal with unanticipated conditions, so that the project can proceed and required deadlines can be met.

If any variations or undesirable conditions are encountered during construction, we should be notified so that supplemental recommendations can be made. If room constraints or groundwater conditions do not permit temporary slopes to be cut to the maximum angles allowed by the WAC, temporary shoring systems may be required. The contractor should be responsible for developing temporary shoring systems, if needed. We recommend that Cobalt Geosciences and the project structural engineer review temporary shoring designs prior to installation, to verify the suitability of the proposed systems.

8.1.3 Erosion and Sediment Control

Erosion and sediment control (ESC) is used to reduce the transportation of eroded sediment to wetlands, streams, lakes, drainage systems, and adjacent properties. Erosion and sediment control measures should be implemented and these measures should be in general accordance with local regulations. At a minimum, the following basic recommendations should be incorporated into the design of the erosion and sediment control features for the site:

- Schedule the soil, foundation, utility, and other work requiring excavation or the disturbance of the site soils, to take place during the dry season (generally May through September). However, provided precautions are taken using Best Management Practices (BMP's), grading activities can be completed during the wet season (generally October through April).
- All site work should be completed and stabilized as quickly as possible.
- Additional perimeter erosion and sediment control features may be required to reduce the possibility of sediment entering the surface water. This may include additional silt fences, silt fences with a higher Apparent Opening Size (AOS), construction of a berm, or other filtration systems.
- Any runoff generated by dewatering discharge should be treated through construction of a sediment trap if there is sufficient space. If space is limited other filtration methods will need to be incorporated.

8.1.4 Foundation Design

The proposed single-family residences may be supported on shallow spread footing foundation systems bearing on undisturbed medium dense or firmer native soils or on properly compacted structural fill placed on the suitable native soils. If structural fill is used to support foundations, then the zone of structural fill should extend beyond the faces of the footing a lateral distance at least equal to the thickness of the structural fill.

For shallow foundation support, we recommend widths of at least 18 and 24 inches, respectively, for continuous wall and isolated column footings supporting the proposed structure. Provided that the footings are supported as recommended above, a net allowable bearing pressure of 3,000 pounds per square foot (psf) may be used for design.

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A 1/3 increase in the above value may be used for short duration loads, such as those imposed by wind and seismic events. Structural fill placed on bearing, native subgrade should be compacted to at least 95 percent of the maximum dry density based on ASTM Test Method D1557. Footing excavations should be inspected to verify that the foundations will bear on suitable material.

Exterior footings should have a minimum depth of 18 inches below pad subgrade (soil grade) or adjacent exterior grade, whichever is lower. Interior footings should have a minimum depth of 12 inches below pad subgrade (soil grade) or adjacent exterior grade, whichever is lower.

If constructed as recommended, the total foundation settlement is not expected to exceed 1 inch. Differential settlement, along a 25-foot exterior wall footing, or between adjoining column footings, should be less than ½ inch. This translates to an angular distortion of 0.002. Most settlement is expected to occur during construction, as the loads are applied. However, additional post-construction settlement may occur if the foundation soils are flooded or saturated. All footing excavations should be observed by a qualified geotechnical consultant.

Resistance to lateral footing displacement can be determined using an allowable friction factor of 0.40 acting between the base of foundations and the supporting subgrades. Lateral resistance for footings can also be developed using an allowable equivalent fluid passive pressure of 275 pounds per cubic foot (pcf) acting against the appropriate vertical footing faces (neglect the upper 12 inches below grade in exterior areas).

The allowable friction factor and allowable equivalent fluid passive pressure values include a factor of safety of 1.5. The frictional and passive resistance of the soil may be combined without reduction in determining the total lateral resistance. A 1/3 increase in the above values may be used for short duration transient loads.

Care should be taken to prevent wetting or drying of the bearing materials during construction. Any extremely wet or dry materials, or any loose or disturbed materials at the bottom of the footing excavations, should be removed prior to placing concrete. The potential for wetting or drying of the bearing materials can be reduced by pouring concrete as soon as possible after completing the footing excavation and evaluating the bearing surface by the geotechnical engineer or his representative.

8.1.5 Stormwater Management

The site is underlain by glacial till which typically has a very low permeability. While advance outwash is comprised of sand, and has a moderate to high permeability, the depth to the advance outwash appears to be prohibitive for shallow infiltration system emplacement. Furthermore, the close proximity of the site to steep slope areas is not suitable for infiltration of runoff.

We conducted a small-scale Pilot Infiltration Test (PIT) in an excavation adjacent to B-1 at a depth of 3 feet below grade. Following saturation, falling head testing, and application of correction factors, the measured/design infiltration rate was 0.25 inches/hour. Some of the infiltration observed was unavoidable lateral migration through weathered glacial till.

The Washington State Department of Ecology (DOE) states that infiltration in soils with permeability of less than 0.3 inches/hour is not recommended and/or potentially infeasible. We recommend direct connection of stormwater infrastructure from new roof areas to the City storm system.

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8.1.6 Slab-on-Grade

We recommend that the upper 12 inches of the existing fill and/or native soils within slab areas be re-compacted to at least 95 percent of the modified proctor (ASTM D1557 Test Method).

Often, a vapor barrier is considered below concrete slab areas. However, the usage of a vapor barrier could result in curling of the concrete slab at joints. Floor covers sensitive to moisture typically requires the usage of a vapor barrier. A materials or structural engineer should be consulted regarding the detailing of the vapor barrier below concrete slabs. Exterior slabs typically do not utilize vapor barriers.

The American Concrete Institutes ACI 360R-06 Design of Slabs on Grade and ACI 302.1R-04 Guide for Concrete Floor and Slab Construction are recommended references for vapor barrier selection and floor slab detailing.

Slabs on grade may be designed using a coefficient of subgrade reaction of 180 pounds per cubic inch (pci) assuming the slab-on-grade base course is underlain by structural fill placed and compacted as outlined in Section 8.1.

A perimeter drainage system is recommended unless interior slab areas are elevated a minimum of 12 inches above adjacent exterior grades. If installed, a perimeter drainage system should consist of a 4 inch diameter perforated drain pipe surrounded by a minimum 6 inches of drain rock wrapped in a non-woven geosynthetic filter fabric to reduce migration of soil particles into the drainage system. The perimeter drainage system should discharge by gravity flow to a suitable stormwater system.

Exterior grades surrounding buildings should be sloped at a minimum of one percent to facilitate surface water flow away from the building and preferably with a relatively impermeable surface cover immediately adjacent to the building.

8.1.7 Groundwater Influence on Construction

Groundwater was not encountered in the borings. There is a chance that perched groundwater will be encountered during construction. We anticipate that perched groundwater would be encountered between 5 and 8 feet below grade during late winter and early spring months.

If groundwater is encountered, we anticipate that sump excavations and small diameter pumps systems will adequately de-water short-term excavations, if required. Any system should be designed by the contractor. We can provide additional recommendations upon request.

8.1.8 Utilities

Utility trenches should be excavated according to accepted engineering practices following OSHA (Occupational Safety and Health Administration) standards, by a contractor experienced in such work. The contractor is responsible for the safety of open trenches. Traffic and vibration adjacent to trench walls should be reduced; cyclic wetting and drying of excavation side slopes should be avoided. Depending upon the location and depth of some utility trenches, groundwater flow into open excavations could be experienced, especially during or shortly following periods of precipitation.

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In general, sandy and silty soils were encountered at shallow depths in the explorations at this site. These soils have low cohesion and density and will have a tendency to cave or slough in excavations. Shoring or sloping back trench sidewalls is required within these soils in excavations greater than 4 feet deep.

All utility trench backfill should consist of imported structural fill or suitable on site soils. Utility trench backfill placed in or adjacent to buildings and exterior slabs should be compacted to at least 95 percent of the maximum dry density based on ASTM Test Method D1557. The upper 5 feet of utility trench backfill placed in pavement areas should be compacted to at least 95 percent of the maximum dry density based on ASTM Test Method D1557. Below 5 feet, utility trench backfill in pavement areas should be compacted to at least 90 percent of the maximum dry density based on ASTM Test Method D1557. Pipe bedding should be in accordance with the pipe manufacturer's recommendations.

The contractor is responsible for removing all water-sensitive soils from the trenches regardless of the backfill location and compaction requirements. Depending on the depth and location of the proposed utilities, we anticipate the need to re-compact existing fill soils below the utility structures and pipes. The contractor should use appropriate equipment and methods to avoid damage to the utilities and/or structures during fill placement and compaction procedures.

8.1.9 Pavement Recommendations

The near surface subgrade soils generally consist of silty sand with gravel. These soils are rated as good for pavement subgrade material (depending on silt content and moisture conditions). We estimate that the subgrade will have a California Bearing Ratio (CBR) value of 10 and a modulus of subgrade reaction value of k = 200 pci, provided the subgrade is prepared in general accordance with our recommendations.

We recommend that, at a minimum, 12 inches of the existing subgrade material be moisture conditioned (as necessary) and re-compacted to prepare for the construction of pavement sections. Deeper levels of recompaction or overexcavation and replacement may be necessary in areas where fill and/or very poor (soft/loose) soils are present. Any soils that cannot be compacted to required levels and soils that have more than 40 percent fines by weight should be removed and replaced with imported structural fill.

The subgrade should be compacted to at least 95 percent of the maximum dry density as determined by ASTM Test Method D1557. In place density tests should be performed to verify proper moisture content and adequate compaction.

The recommended flexible and rigid pavement sections are based on design CBR and modulus of subgrade reaction (k) values that are achieved, only following proper subgrade preparation. It should be noted that subgrade soils that have relatively high silt contents will likely be highly sensitive to moisture conditions. The subgrade strength and performance characteristics of a silty subgrade material may be dramatically reduced if this material becomes wet.

Based on our knowledge of the proposed project, we expect the traffic to range from light duty (passenger automobiles) to heavy duty (delivery trucks). The following tables show the recommended pavement sections for light duty and heavy duty use.

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ASPHALTIC CONCRETE (FLEXIBLE) PAVEMENT

LIGHT DUTY

Asphaltic Concrete	Aggregate Base*	Compacted Subgrade* **
2.5 in.	6.0 in.	12.0 in.

HEAVY DUTY

Asphaltic Concrete	Aggregate Base*	Compacted Subgrade* **
3.5 in.	6.0 in.	12.0 in.

PORTLAND CEMENT CONCRETE (RIGID) PAVEMENT

Min. PCC Depth	Aggregate Base*	Compacted Subgrade* **
6.0 in.	6.0 in.	12.0 in.

** 95% compaction based on ASTM Test Method D1557*

*** A proof roll may be performed in lieu of in place density tests*

The asphaltic concrete depth in the flexible pavement tables should be a surface course type asphalt, such as Washington Department of Transportation (WSDOT) ½ inch HMA. The rigid pavement design is based on a Portland Cement Concrete (PCC) mix that has a 28 day compressive strength of 4,000 pounds per square inch (psi). The design is also based on a concrete flexural strength or modulus of rupture of 550 psi.

9.0 Construction Field Reviews

Cobalt Geosciences should be retained to provide part time field review during construction in order to verify that the soil conditions encountered are consistent with our design assumptions and that the intent of our recommendations is being met. This will require field and engineering review to:

- Monitor and test structural fill placement and soil compaction
- Observe bearing capacity at foundation locations
- Observe slab-on-grade preparation
- Observe excavation stability

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Geotechnical design services should also be anticipated during the subsequent final design phase to support the structural design and address specific issues arising during this phase. Field and engineering review services will also be required during the construction phase in order to provide a Final Letter for the project.

10.0 Closure

This report was prepared for the exclusive use of Shawn Anjaz and Zelly White and their appointed consultants. Any use of this report or the material contained herein by third parties, or for other than the intended purpose, should first be approved in writing by Cobalt Geosciences, LLC.

The recommendations contained in this report are based on assumed continuity of soils with those of our test holes, and assumed structural loads. Cobalt Geosciences should be provided with final architectural and civil drawings when they become available in order that we may review our design recommendations and advise of any revisions, if necessary.

Use of this report is subject to the Statement of General Conditions provided in Appendix A. It is the responsibility of Shawn Anjaz and Zelly White who are identified as "the Client" within the Statement of General Conditions, and its agents to review the conditions and to notify Cobalt Geosciences should any of these not be satisfied.

Respectfully submitted,

Cobalt Geosciences, LLC
Original signed by:

Exp. 6/26/2020
Phil Haberman, PE, LG, LEG
Principal

PH/sc

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APPENDIX A
Statement of General Conditions

Statement of General Conditions

USE OF THIS REPORT: This report has been prepared for the sole benefit of the Client or its agent and may not be used by any third party without the express written consent of Cobalt Geosciences and the Client. Any use which a third party makes of this report is the responsibility of such third party.

BASIS OF THE REPORT: The information, opinions, and/or recommendations made in this report are in accordance with Cobalt Geosciences present understanding of the site specific project as described by the Client. The applicability of these is restricted to the site conditions encountered at the time of the investigation or study. If the proposed site specific project differs or is modified from what is described in this report or if the site conditions are altered, this report is no longer valid unless Cobalt Geosciences is requested by the Client to review and revise the report to reflect the differing or modified project specifics and/or the altered site conditions.

STANDARD OF CARE: Preparation of this report, and all associated work, was carried out in accordance with the normally accepted standard of care in the state of execution for the specific professional service provided to the Client. No other warranty is made.

INTERPRETATION OF SITE CONDITIONS: Soil, rock, or other material descriptions, and statements regarding their condition, made in this report are based on site conditions encountered by Cobalt Geosciences at the time of the work and at the specific testing and/or sampling locations. Classifications and statements of condition have been made in accordance with normally accepted practices which are judgmental in nature; no specific description should be considered exact, but rather reflective of the anticipated material behavior. Extrapolation of in situ conditions can only be made to some limited extent beyond the sampling or test points. The extent depends on variability of the soil, rock and groundwater conditions as influenced by geological processes, construction activity, and site use.

VARYING OR UNEXPECTED CONDITIONS: Should any site or subsurface conditions be encountered that are different from those described in this report or encountered at the test locations, Cobalt Geosciences must be notified immediately to assess if the varying or unexpected conditions are substantial and if reassessments of the report conclusions or recommendations are required. Cobalt Geosciences will not be responsible to any party for damages incurred as a result of failing to notify Cobalt Geosciences that differing site or sub-surface conditions are present upon becoming aware of such conditions.

PLANNING, DESIGN, OR CONSTRUCTION: Development or design plans and specifications should be reviewed by Cobalt Geosciences, sufficiently ahead of initiating the next project stage (property acquisition, tender, construction, etc), to confirm that this report completely addresses the elaborated project specifics and that the contents of this report have been properly interpreted. Specialty quality assurance services (field observations and testing) during construction are a necessary part of the evaluation of sub-subsurface conditions and site preparation works. Site work relating to the recommendations included in this report should only be carried out in the presence of a qualified geotechnical engineer; Cobalt Geosciences cannot be responsible for site work carried out without being present.

APPENDIX B
Figures: Vicinity Map, Site Plan, Site Layout, Lidar Image

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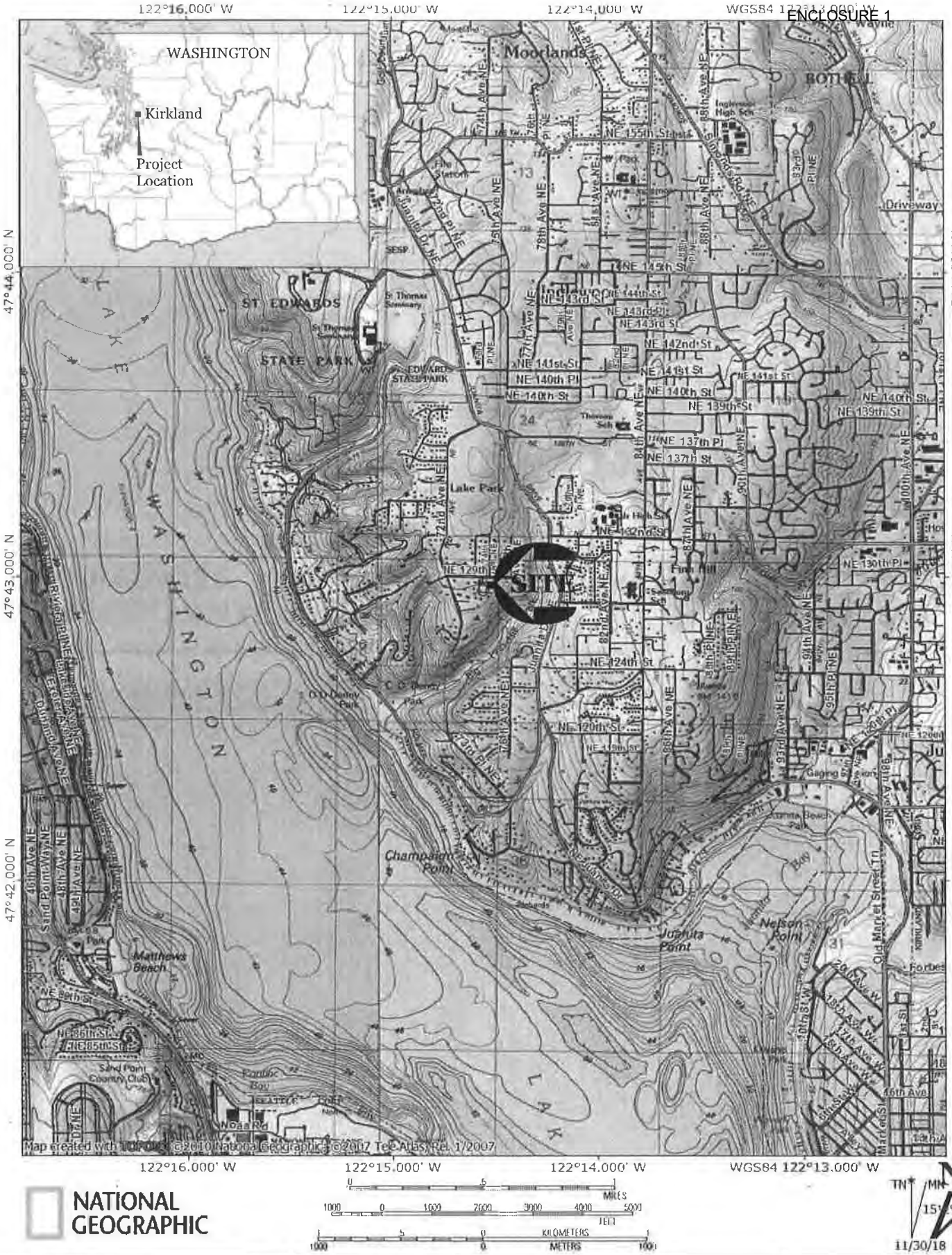
ENCLOSURE 1



COBALT GEOSCIENCES

Proposed Short Plat
7435 NE 129th Street
Kirkland, Washington

VICINITY MAP FIGURE 1

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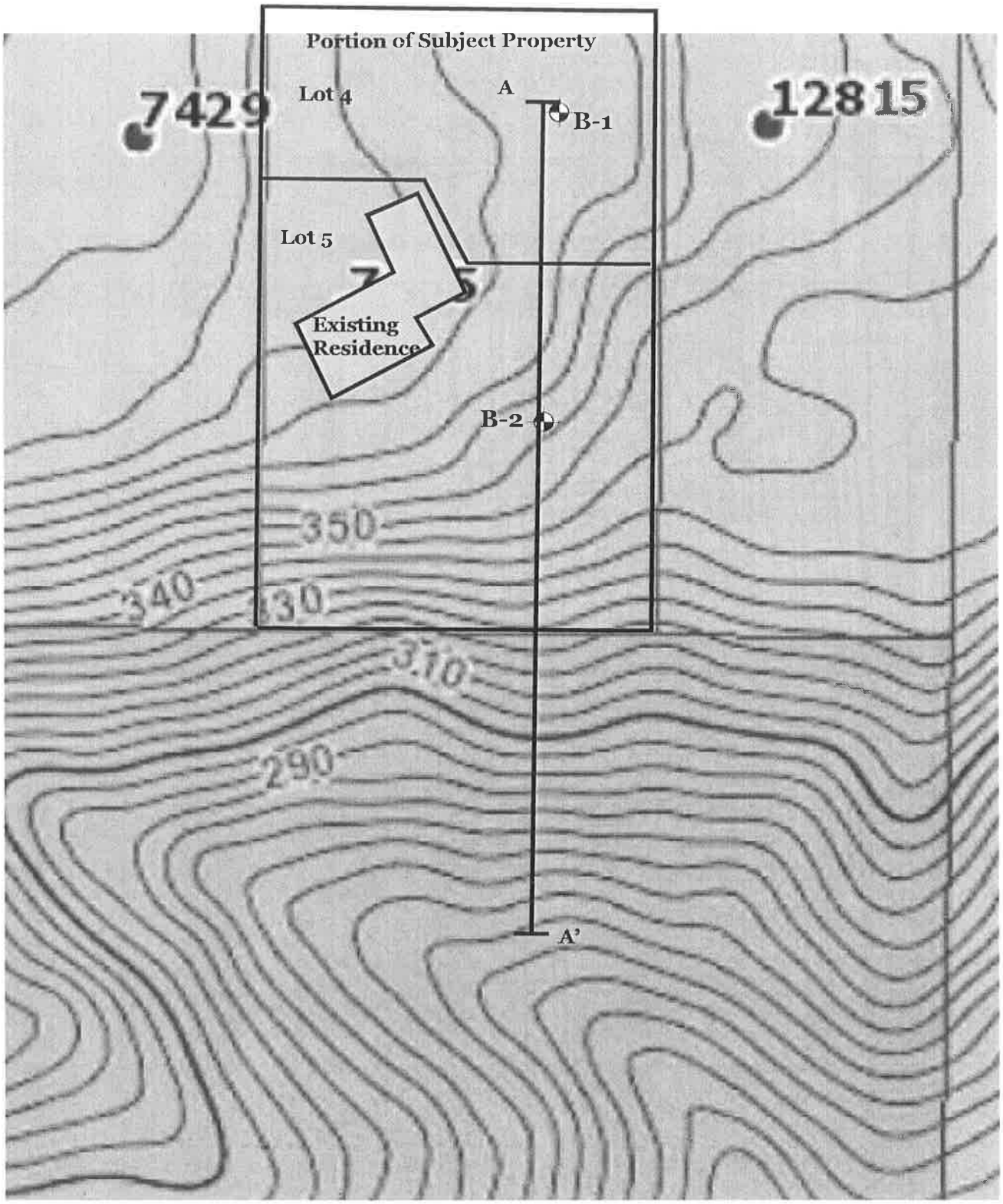


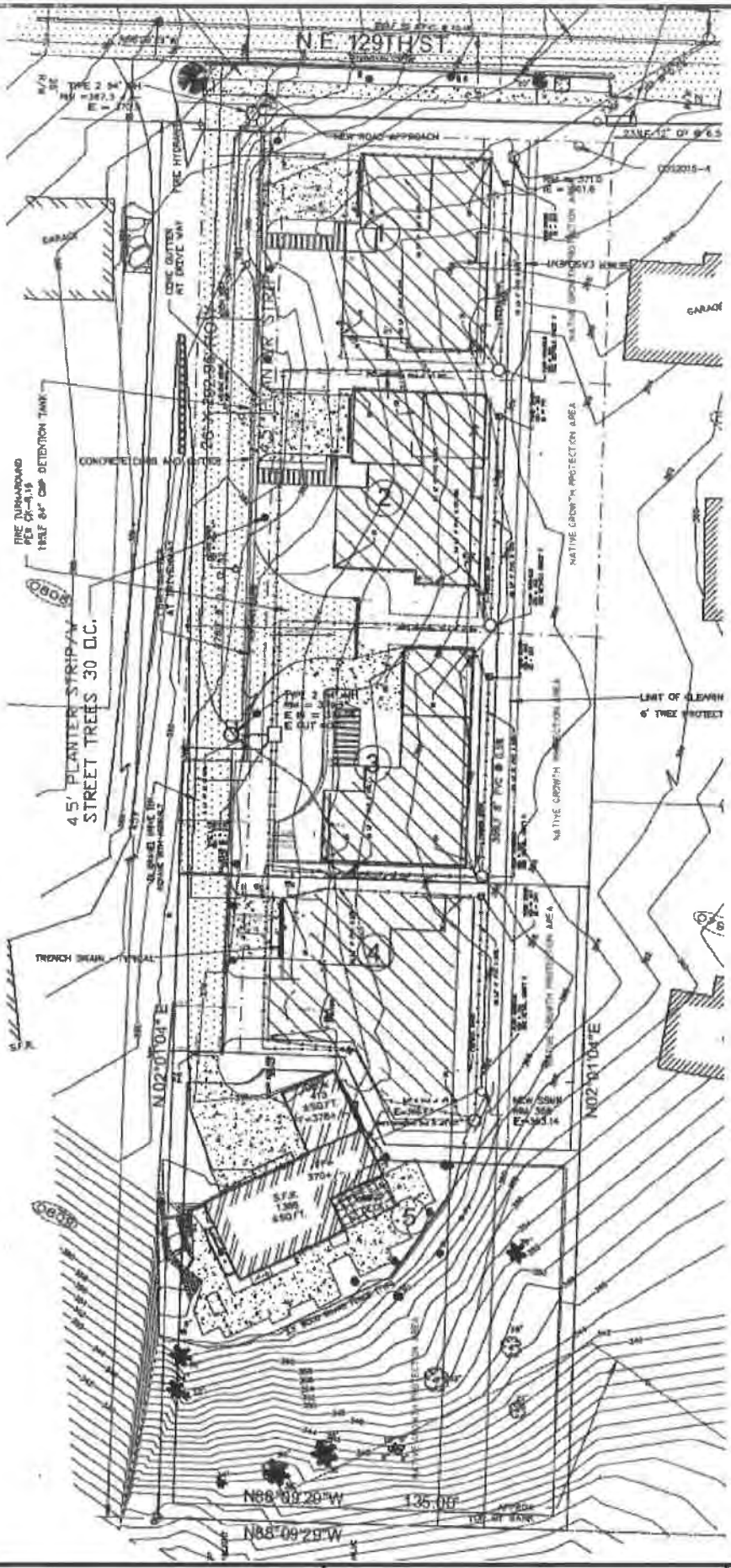
B-1 Approximate Boring Location

1"=50'

N

COBALT GEOSCIENCES	Proposed Short Plat 7435 NE 129th Street Kirkland, Washington	**SITE PLAN FIGURE 2**	Cobalt Geosciences, LLC P.O. Box 82243 Kenmore, WA 98028 (206) 331-1097 www.cobaltgeo.com cobaltgeo@gmail.com

ENCLOSURE 1



N

Not to Scale

COBALT GEOSCIENCES

Proposed Short Plat
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Kirkland, Washington

SITE LAYOUT FIGURE 3

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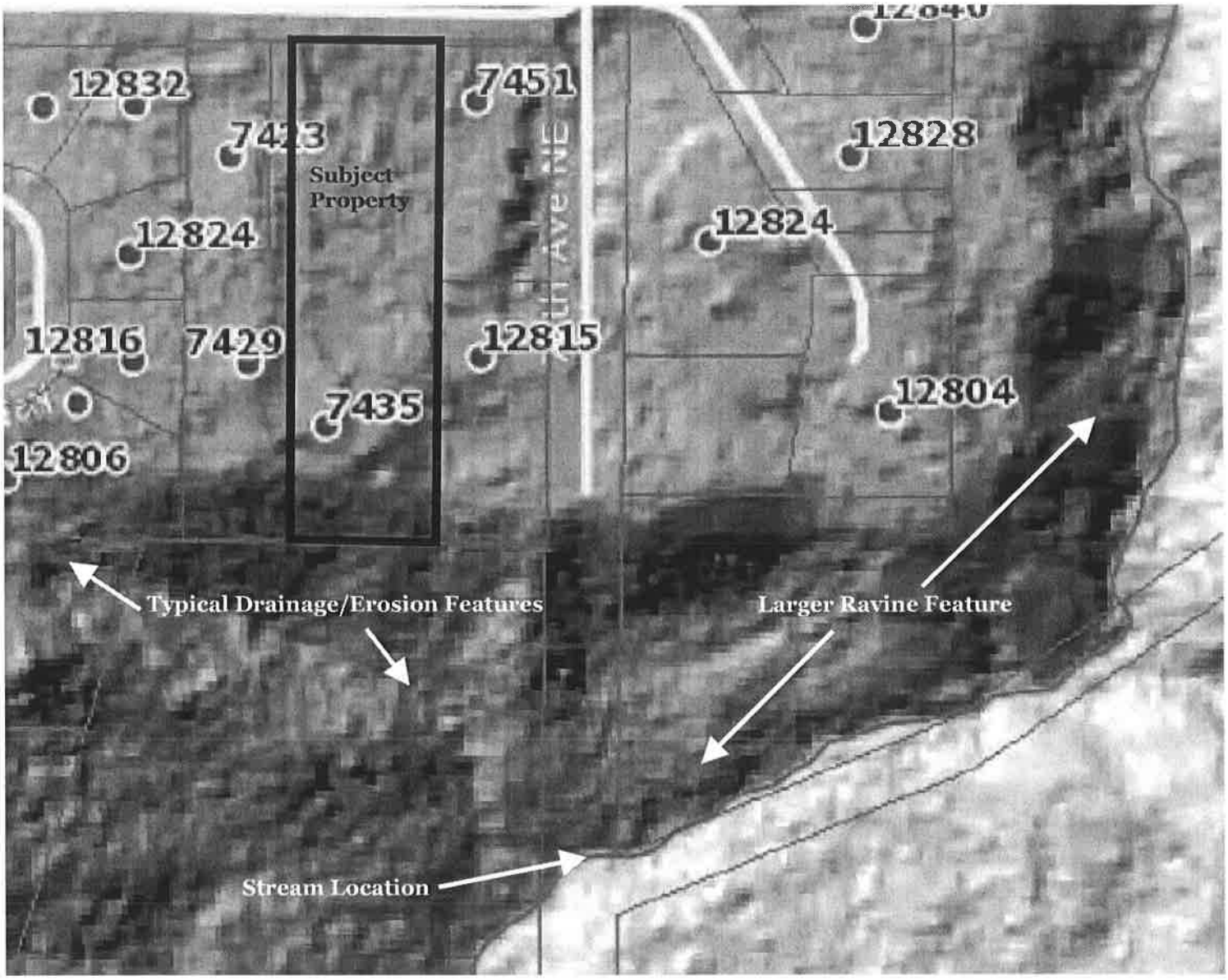

COBALT GEOSCIENCES	Proposed Short Plat 7435 NE 129th Street Kirkland, Washington	**LIDAR IMAGE FIGURE 4**	Cobalt Geosciences, LLC P.O. Box 82243 Kenmore, WA 98028 (206) 331-1097 www.cobaltgeo.com cobaltgeo@gmail.com

APPENDIX C
Boring Logs & Sieve Analysis

Unified Soil Classification System (USCS)

ENCLOSURE 1

MAJOR DIVISIONS			SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS (more than 50% retained on No. 200 sieve)	Gravels (more than 50% of coarse fraction retained on No. 4 sieve)	Clean Gravels (less than 5% fines)	GW	Well-graded gravels, gravels, gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines
		Gravels with Fines (more than 12% fines)	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	Sands (50% or more of coarse fraction passes the No. 4 sieve)	Clean Sands (less than 5% fines)	SW	Well-graded sands, gravelly sands, little or no fines
			SP	Poorly graded sand, gravelly sands, little or no fines
		Sands with Fines (more than 12% fines)	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS (50% or more passes the No. 200 sieve)	Silts and Clays (liquid limit less than 50)	Inorganic	ML	Inorganic silts of low to medium plasticity, sandy silts, gravelly silts, or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays silty clays, lean clays
		Organic	OL	Organic silts and organic silty clays of low plasticity
	Silts and Clays (liquid limit 50 or more)	Inorganic	MH	Inorganic silts, micaceous or diatomaceous fine sands or silty soils, elastic silt
			CH	Inorganic clays of medium to high plasticity, sandy fat clay, or gravelly fat clay
		Organic	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor		PT	Peat, humus, swamp soils with high organic content (ASTM D4427)

Classification of Soil Constituents

MAJOR constituents compose more than 50 percent, by weight, of the soil. Major constituents are capitalized (i.e., SAND).

Minor constituents compose 12 to 50 percent of the soil and precede the major constituents (i.e., silty SAND). Minor constituents preceded by "slightly" compose 5 to 12 percent of the soil (i.e., slightly silty SAND).

Trace constituents compose 0 to 5 percent of the soil (i.e., slightly silty SAND, trace gravel).

Grain Size Definitions

Description	Sieve Number and/or Size
Fines	<#200 (0.08 mm)
Sand	
-Fine	#200 to #40 (0.08 to 0.4 mm)
-Medium	#40 to #10 (0.4 to 2 mm)
-Coarse	#10 to #4 (2 to 5 mm)
Gravel	
-Fine	#4 to 3/4 inch (5 to 19 mm)
-Coarse	3/4 to 3 inches (19 to 76 mm)
Cobbles	3 to 12 inches (75 to 305 mm)
Boulders	>12 inches (305 mm)

Relative Density (Coarse Grained Soils)

N, SPT, Blows/FT	Relative Density
0 - 4	Very loose
4 - 10	Loose
10 - 30	Medium dense
30 - 50	Dense
Over 50	Very dense

Consistency (Fine Grained Soils)

N, SPT, Blows/FT	Relative Consistency
Under 2	Very soft
2 - 4	Soft
4 - 8	Medium stiff
8 - 15	Stiff
15 - 30	Very stiff
Over 30	Hard

Moisture Content Definitions

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, from below water table

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Soil Classification Chart

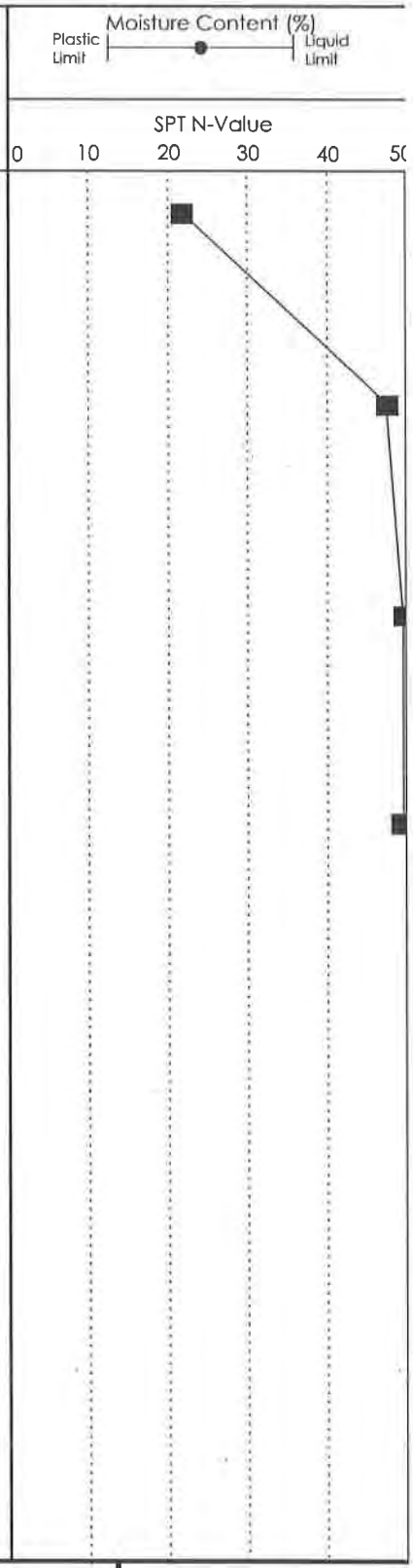
Figure C1

Log of Boring B-1

ENCLOSURE 1

Date: November 23, 2018	Depth: 16.5'	Initial Groundwater: None Observed
Contractor: CN	Elevation: ~367'	Sample Type: Split Spoon
Method: Hollow Stem Auger	Logged By: PH Checked By: SC	Final Groundwater: N/A

Depth (Feet)	Interval	% Recovery	Blows/6"	Graphic Log	USCS Symbol	Material Description	Groundwater
			5 10			Vegetation/Topsoil	
2			12		SM	Medium dense to very dense, silty-fine to medium grained sand with gravel, mottled dark yellowish brown to grayish brown, moist. (Glacial Till)	
4							
6			16 23 24				
8							
10			29 30 36			Unit Weight - 122 pcf	
12					SP	Very dense, fine to medium grained sand trace gravel, yellowish brown to grayish brown, moist. (Advance Outwash)	
14							
16			25 31 34				
18						End of Boring 16.5'	
20							
22							
24							
26							
28							
30							
32							
34							



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Proposed Short Plat
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Kirkland, Washington

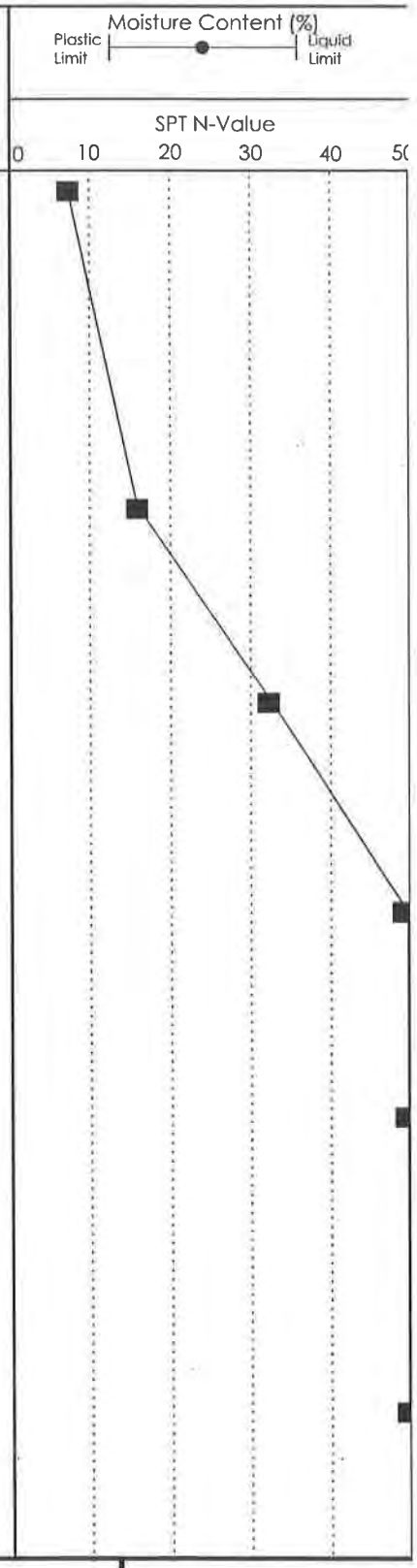
Boring Log

Log of Boring B-2

ENCLOSURE 1

Date: November 23, 2018	Depth: 31.5'	Initial Groundwater: None Observed
Contractor: CN	Elevation: ~356'	Sample Type: Split Spoon
Method: Hollow Stem Auger	Logged By: PH Checked By: SC	Final Groundwater: N/A

Depth (Feet)	Interval	% Recovery	Blows/6"	Graphic Log	USCS Symbol	Material Description	Groundwater
			4 4			Vegetation/Topsoil	
2			5		SM	Loose to medium dense, silty-fine to medium grained sand with gravel, dark yellowish brown to grayish brown, moist. (Glacial Till)	
4					SP	Medium dense to very dense, fine to medium grained sand trace gravel, yellowish brown to grayish brown, moist. (Advance Outwash)	
6							
8			5 6 9				
10							
12			12 15 17			-Local interbeds of silty-sand	
14							
16							
18			18 25 26			Unit Weight 119 pcf	
20							
22			29 34 42				
24							
26							
28						-Areas of coarser grained SP	
30			35 40 50				
32						End of Boring 31.5'	
34							



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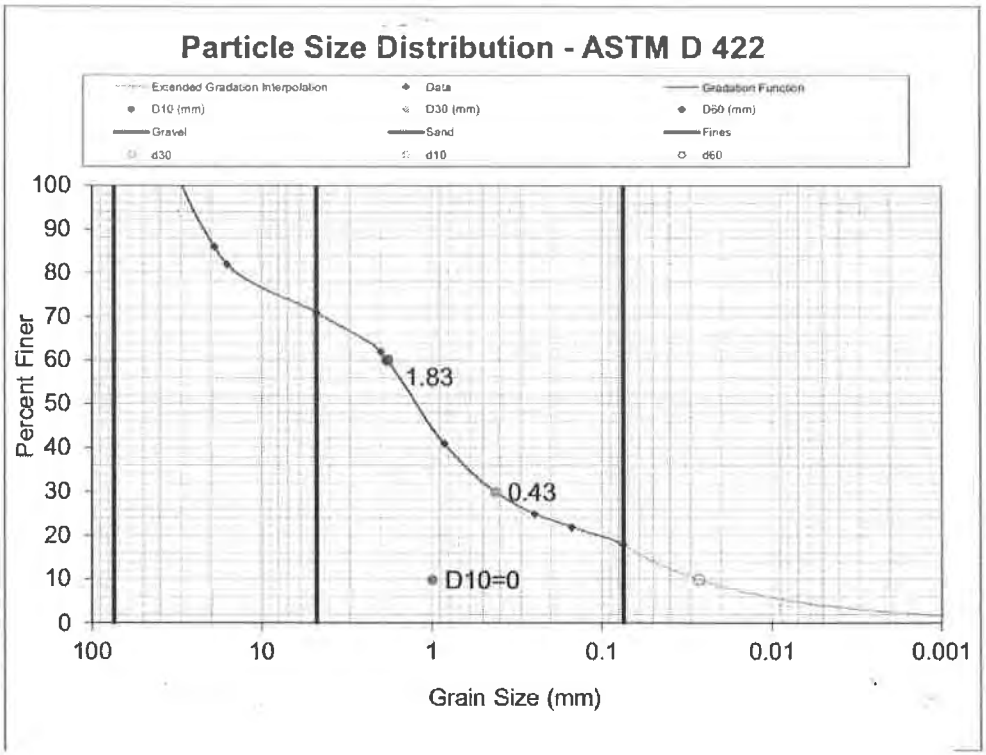
Proposed Short Plat
7435 NE 129th Street
Kirkland, Washington

Boring Log

ENCLOSURE 1

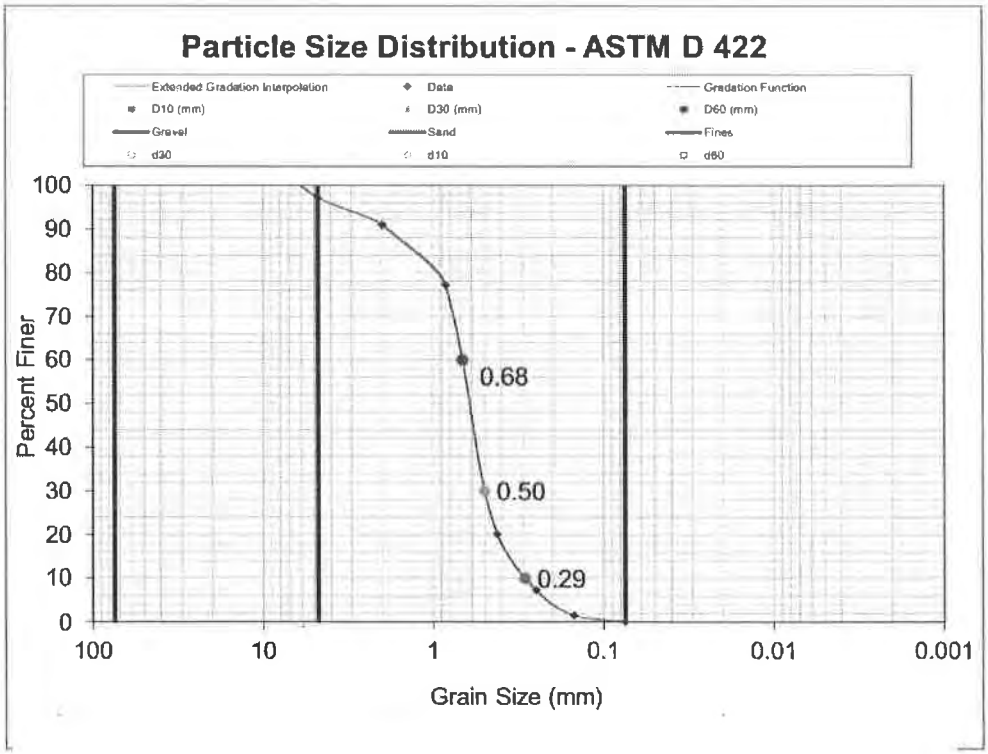


Gradation:	
Sieve (mm)	% Passing
19	86
16	82
4.75	71
2	62
0.85	41
0.425	30
0.25	25
0.15	22
0.075	18

Material Properties	
Description =	5 Lot
Soil ID =	B-1-10
Depth =	10
Max Dry Density =	0.00
Optimum Moisture =	0.00
WD Offset =	0
% Moisture Offset =	9
% > 3 in. =	0.00
% > 3/4 in. =	14.00
% Gravel =	29.00
% Sand =	53.00
% Fines =	18.00
PL =	0.00
LL =	0.00
Cu =	0.00
Cc =	0.00
File Name	SM

Boring B-1 10'

Extrapolated Coefficients (see Limitations on Input Screen)				
d10	d30	d60	Cu	Cc
0.027	0.425	1.826	67.92	3.68



Gradation:	
Sieve (mm)	% Passing
4.75	97.2
2	91.1
0.85	77.2
0.425	20.2
0.25	7.3
0.15	1.6
0.075	0.2
	0
	0

Material Properties	
Description =	5 Lot
Soil ID =	B-2-17.5
Depth =	17.5
Max Dry Density =	0.00
Optimum Moisture =	0.00
WD Offset =	0
% Moisture Offset =	7.5
% > 3 in. =	0.00
% > 3/4 in. =	0.00
% Gravel =	2.80
% Sand =	97.00
% Fines =	0.20
PL =	0.00
LL =	0.00
Cu =	2.33
Cc =	1.29
File Name	SP

Boring B-2 17.5'

Extrapolated Coefficients (see Limitations on Input Screen)				
d10	d30	d60	Cu	Cc
0.291	0.504	0.677	2.33	1.29

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Proposed Short Plat
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SIEVE ANALYSES

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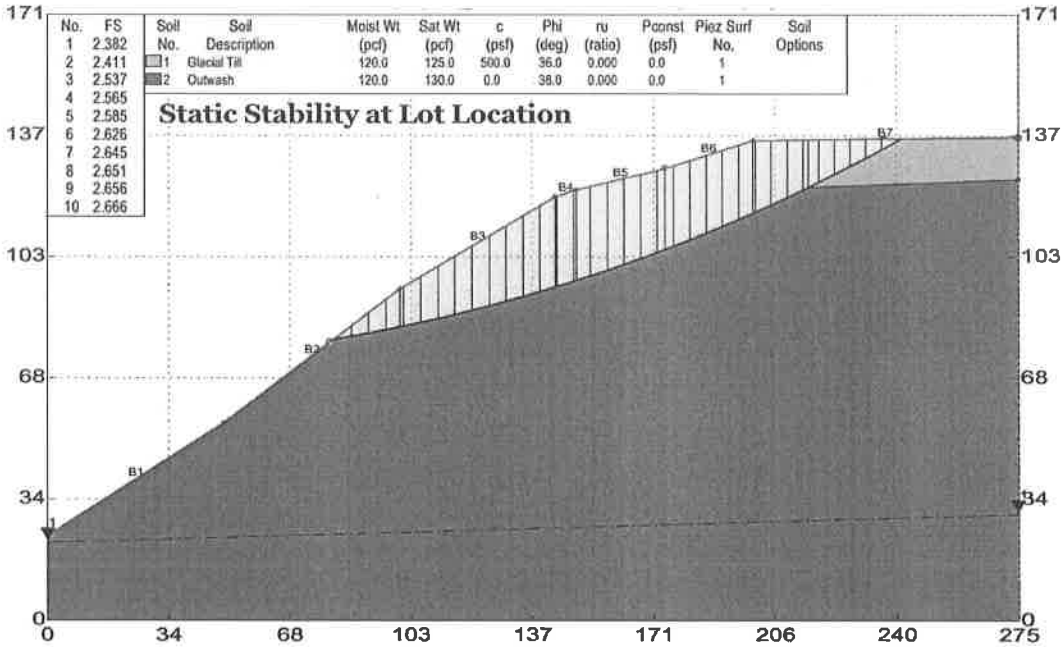
APPENDIX D
Slope Stability Analyses

Proposed Short Plat
7435 NE 129th Street

ENCLOSURE 1

Cobalt Geosciences, LLC

\KIRK OASIS.gsd



GEOSTASE FS = 2.382

Simplified Bishop Method

GEOSTASE
Slope Stability Analysis

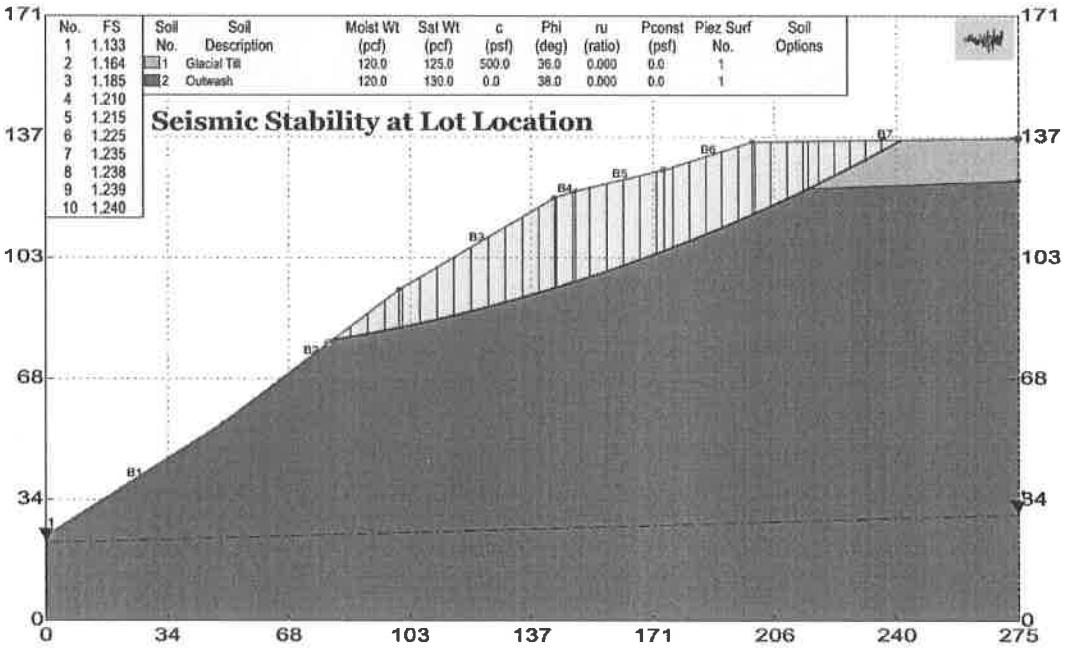
GEOSTASE© by GREGORY GEOTECHNICAL SOFTWARE

PLATE C.1

Proposed Short Plat
7435 NE 129th Street

Cobalt Geosciences, LLC

\KIRK OASIS.gsd



GEOSTASE FS = 1.133

Simplified Bishop Method

GEOSTASE
Slope Stability Analysis

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PLATE C.1

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Proposed Short Plat
7435 NE 129th Street
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SLOPE STABILITY FIGURE D1

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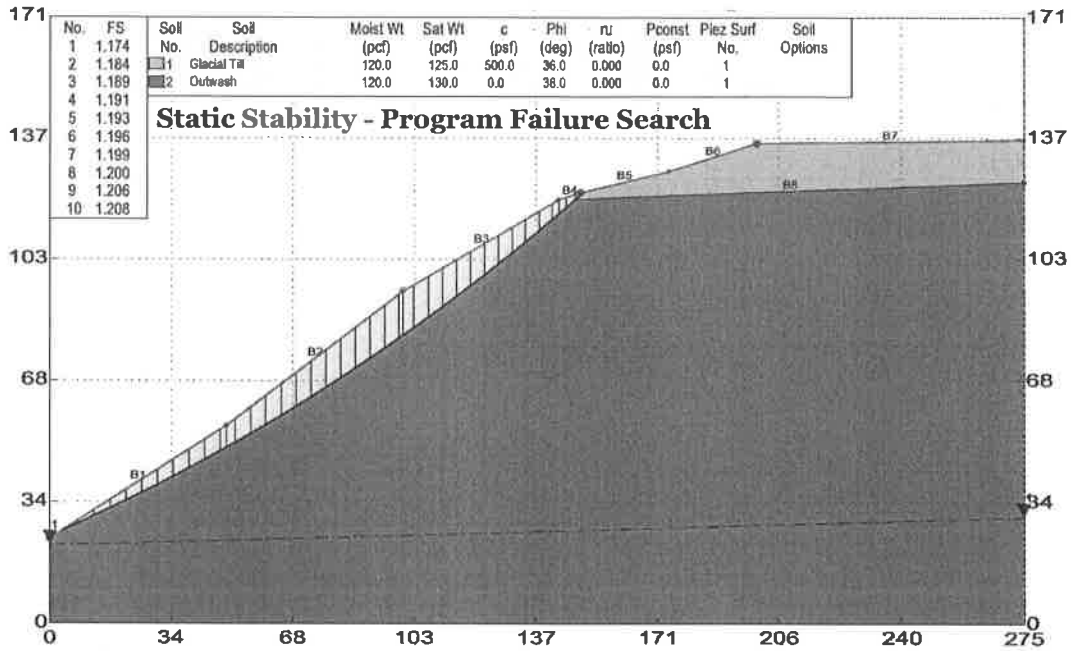
Proposed Short Plat
7435 NE 129th Street

ENCLOSURE 1

Cobalt Geosciences, LLC

\KIRK OASIS.gsd



GEOSTASE FS = 1.174

Simplified Bishop Method

GEOSTASE
Slope Stability Analysis

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PLATE C.1

Proposed Short Plat
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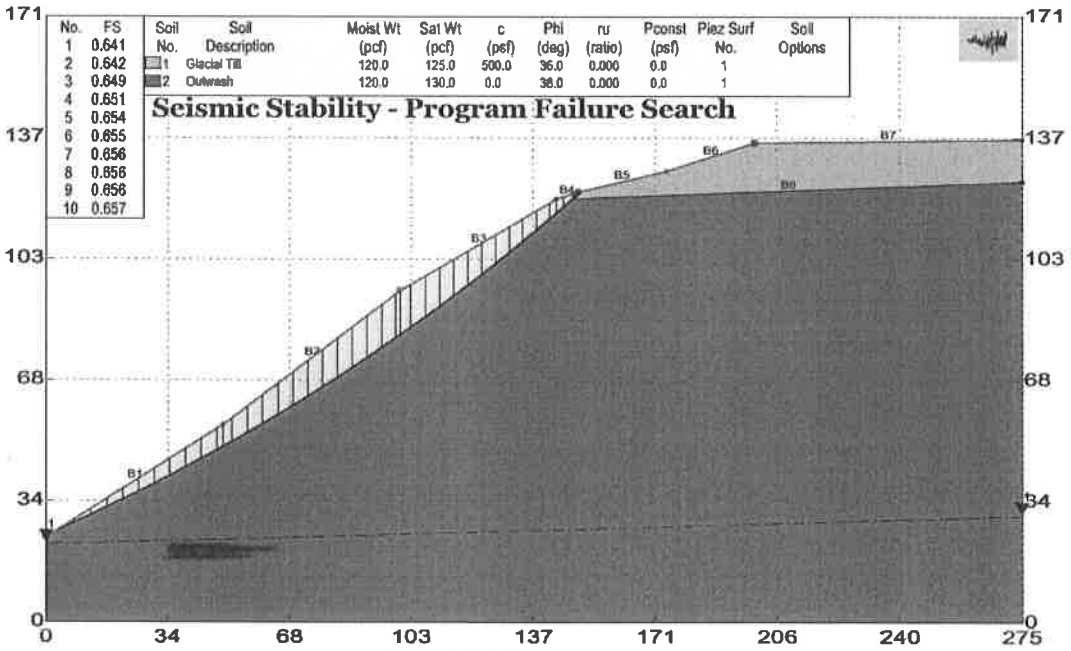

GEOSTASE FS = 0.641

Simplified Bishop Method

GEOSTASE
Slope Stability Analysis

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PLATE C.1

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Proposed Short Plat
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SLOPE STABILITY FIGURE D2

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associated
earth sciences
incorporated

March 15, 2019
Project No. 190071E001

City of Kirkland
123 Fifth Avenue
Kirkland, Washington 98033

Attention: Ms. Allison Zike, Planner

Subject: Geotechnical Peer Review
SUB16-01774 - 7435 NE 129th Street
Kirkland, Washington

Dear Ms. Zike:

At your request, Associated Earth Sciences, Inc. (AESI) recently reviewed the geotechnical engineering report prepared by Cobalt Geosciences for the proposed five-lot plat located at 7435 NE 129th Street, in Kirkland, Washington. Specifically, we reviewed the following:

- "Geotechnical Investigation, Proposed Five Lot Plat, 7435 NE 129th Street, Kirkland, Washington," dated December 9, 2018, prepared by Cobalt Geosciences.
- "Drainage and Utility Site Plan, K5 Oasis Short Plat," Sheets 1 and 2 of 3, dated February 22, 2016, by Anstey Engineering.
- City of Kirkland Geographic Information Systems (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 defined by Chapter 5 of the KZC.

The scope of our review was limited to an evaluation of the report with respect to compliance with Subsections 85.15 and 85.25 of the KZC and our proposal, dated February 13, 2019.

SITE AND PROJECT DESCRIPTION

The site consists of an approximately 1.42-acre residential parcel located at 7435 NE 129th Street, in Kirkland, Washington. The site is bounded to the east and west by residential parcels, to the north by NE 129th Street, and to the south by a steep slope descending to the creek below. Gradients across the building areas are generally less than 15 percent. The steep slope to the south extends at gradients of 40 to 80 percent down to a creek below, and is designated as a Moderate to High Landslide Hazard Area according to the Kirkland GIS mapping. The upper approximately 40 feet of slope is within the subject parcel. The remaining 140 feet or so is designated park space under City of Kirkland jurisdiction. The total slope height is approximately 180 feet.

An existing single-family home is set back from the slope by approximately 20 feet. It is our understanding that this home is to remain, and no modifications to the footprint or height of the dwelling are proposed. New single-family dwellings are proposed for each of the remaining four lots.

Cobalt Geosciences drilled two borings (designated B-1 and B-2) to a depth ranging from 16.5 to 31.5 feet. Cobalt Geosciences encountered approximately 1 foot of vegetation and topsoil overlying glacial till. The glacial till was underlain by advance outwash at depths of 4 to 12 feet. The glacial till in B-2 at the top of slope appeared to be weathered and loose to medium dense down to the advance outwash sediments at a depth of 4 feet. Glacial sediments below a depth of 1 foot in B-1 and below a depth of 4 feet in B-2 were found to be medium dense to very dense. No groundwater was encountered.

REVIEW COMMENTS

AESI reviewed the aforementioned geotechnical engineering report to determine if it meets the criteria specified within KZC Subsection 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 addresses the requirements of the KZC, with the exception of the following.

Report Requirements

1. The referenced civil engineering plans depict a new building on Lot 4 in close proximity to the steep slope. Our review of Plan Sheet 1 indicates that the southwest corner of the proposed building is approximately 10 feet from the steep slope. We recommend that

Cobalt Geosciences provide recommendations for minimum slope setbacks for the proposed building on Lot 4, and review and comment on the adequacy of the slope setbacks shown on the referenced plans.

2. On page 4 of the Cobalt Geosciences report, they have presented definitions for High and Moderate Landslide Hazard Areas from the previous version of Chapter 85 which are incorrect. The definitions for High and Moderate Landslide Hazard Areas have been revised and are now presented in Chapter 5.361.5 and 5.367.7 of the KZC, respectively. We suggest that they review Chapter 5 of the current KZC and update their report accordingly.

3. On page 5 of the report, Cobalt Geosciences references under "Item 3i" the peak ground acceleration (PGA) that should be used from the 2015 *International Building Code* (IBC) for slope stability analyses. Based on our review, the PGA value of 0.636 presented on page 8 of the report appears to be about 25 percent too high for the site. We recommend that Cobalt Geosciences review the PGA value used in their analyses and revise if necessary.

4. On page 12 of the Cobalt Geosciences report, they recommend for foundation design to apply a one third increase to the allowable friction factor and allowable passive pressure for short duration transient loads. This statement is not consistent with local practice which allows for a one third increase to allowable soil bearing pressure. We recommend that Cobalt Geosciences review this statement and revise if necessary.

5. On page 13 of the Cobalt Geosciences report, they provide recommendations for slab-on-grade floors including installation of a vapor barrier below slabs when floor coverings sensitive to moisture are used. Typical standard of practice for interior floor slabs is to also place a capillary break layer comprised of washed gravel below the vapor barrier. We recommend that Cobalt Geosciences review their recommendations for slabs-on-grade and revise them if necessary.

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, 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

Gary P. Mozingo, L.G., L.E.G.
Associate Engineering Geologist

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

STEPHEN A. SIEBERT
STATE OF WASHINGTON
REGISTERED
PROFESSIONAL ENGINEER
3/15/19

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

COBALT
GEOSCIENCES

Geotechnical Investigation
Proposed Five Lot Plat

7435 NE 129th Street
Kirkland, Washington

April 29, 2019

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COBALT GEOSCIENCES

GEOTECHNICAL INVESTIGATION
KIRKLAND, WASHINGTON

April 29, 2019

1.0 Introduction

In accordance with your authorization, Cobalt Geosciences, LLC (Cobalt) has completed a geotechnical investigation for the proposed five-lot residential plat located at 7435 NE 129th Street in Kirkland, Washington (Figure 1).

The purpose of the geotechnical investigation was to identify subsurface conditions and to provide geotechnical recommendations for foundation design, stormwater management, earthwork, soil compaction, and suitability of the on-site soils for use as fill.

The scope of work for the geotechnical evaluation consisted of a site investigation followed by engineering analyses to prepare this report. Recommendations presented herein pertain to various geotechnical aspects of the proposed development, including foundation support of the new buildings, slope stability, and pavement design.

2.0 Project Description

The project includes subdivision of the existing parcel followed by construction of four new multi-story residences, access roadways, utilities, and landscaped regions. An existing residence will remain in place. The new buildings will be situated in the northern portion of the property.

Anticipated building loads are expected to be light and site grading will include cuts and fills on the order of 6 feet or less. We have reviewed updated plans dated March 25, 2019 by Anstey Engineering which show and describe the proposed stormwater management systems.

3.0 Site Description

The site is located at 7435 NE 129th Street in Kirkland, Washington (Figure 1). The property consists of one rectangular shaped parcel (No. 4055700810) with a total area of 61,855 square feet.

The southern portion of the property is developed with a single family residence with daylight basement (facing south) and several accessory buildings. A gravel access driveway extends onto the property from NE 129th Street along the west side of the property. The remainder of the property is undeveloped and vegetated with grasses, ferns, ivy, blackberry vines, along with Cedar, Alder, Maple, and Fir trees.

The site slopes gently to moderately downward from west to east with magnitudes ranging from 5 to 25 percent and relief of about 20 feet. There is a steep to very steep slope near the southern property line and extending downward to the south and southeast into a ravine system. The slope is about 180 feet in height and has magnitudes ranging from 40 to 80 percent. The existing residence is situated approximately 20 feet from the top of the steep slope.

The site is bordered to the north by NE 129th Street, to the east and west by residential properties, and to the south by a ravine.

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4.0 Field Investigation

4.1.1 Site Investigation Program

The geotechnical field investigation program was completed on November 23, 2018 and included drilling and sampling two hollow stem auger borings within the property for subsurface analysis.

Disturbed soil samples were obtained during drilling by using the Standard Penetration Test (SPT) as described in ASTM D-1586. The Standard Penetration Test and sampling method consists of driving a standard 2-inch outside-diameter, split barrel sampler into the subsoil with a 140-pound hammer free falling a vertical distance of 30 inches. The summation of hammer-blows required to drive the sampler the final 12-inches of an 18-inch sample interval is defined as the Standard Penetration Resistance, or N-value. The blow count is presented graphically on the boring logs in this appendix. The resistance, or "N" value, provides a measure of the relative density of granular soils or of the relative consistency of cohesive soils.

The soils encountered were logged in the field and are described in accordance with the Unified Soil Classification System (USCS).

A Cobalt Geosciences field representative conducted the explorations, collected disturbed soil samples, classified the encountered soils, kept a detailed log of the explorations, and observed and recorded pertinent site features.

The results of the boring sampling and laboratory analyses are presented in Appendix C.

5.0 Soil and Groundwater Conditions

5.1.1 Area Geology

The site lies within the Puget Lowland. The lowland is part of a regional north-south trending trough that extends from southwestern British Columbia to near Eugene, Oregon. North of Olympia, Washington, this lowland is glacially carved, with a depositional and erosional history including at least four separate glacial advances/retreats. The Puget Lowland is bounded to the west by the Olympic Mountains and to the east by the Cascade Range. The lowland is filled with glacial and non-glacial sediments consisting of interbedded gravel, sand, silt, till, and peat lenses.

The Geologic Map of King County, indicates that the site is near the contacts between Vashon Glacial Till and Vashon Advance Outwash.

Vashon Glacial Till is typically characterized by an unsorted, non-stratified mixture of clay, silt, sand, gravel, cobbles and boulders in variable quantities. These materials are typically dense and relatively impermeable. The poor sorting reflects the mixing of the materials as these sediments were overridden and incorporated by the glacial ice.

Vashon Advance Outwash consists of fine to medium grained sand with minor gravel and local interbeds of silt and clay. These materials are usually permeable and are typically dense to very dense. Vashon Advance Outwash typically underlies Vashon Glacial Till.

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Boring Explorations

Boring B-1 encountered an approximate 12-inch-thick layer of topsoil and vegetation underlain by approximately 11 feet of medium dense to very dense, silty-fine to medium grained sand with gravel (Glacial Till). This layer was underlain by dense to very dense, fine to medium grained sand trace gravel (Advance Outwash), which continued to the termination depth of the boring.

Boring B-2 encountered an approximately 12-inch-thick layer of topsoil and vegetation underlain by approximately 3 feet of medium dense to dense, silty-fine to medium grained sand with gravel (Glacial Till). This layer was underlain by medium dense to very dense, fine to medium grained sand trace gravel (Advance Outwash), which continued to the termination depth of the boring.

Overall Geologic Conditions

The site is situated near the top of a ravine system that extends downward toward the west (overall). As is fairly typical in the Puget Sound region, glacial till overlies advance outwash and in this case, the glacial till is relatively thin. We anticipate that Pre-Fraser Deposits underlie the Vashon Advance Outwash; however, the likely elevation of this contact is between 50 and 100 feet.

5.1.2 Groundwater

Groundwater was not encountered in either boring. Based on our observations, we do not anticipate that large volumes of groundwater will be encountered at the site. There is a slight chance that perched groundwater may develop between weathered and unweathered glacial till, generally within 8 feet of existing elevations.

Water table elevations often fluctuate over time. The groundwater level will depend on a variety of factors that may include seasonal precipitation, irrigation, land use, climatic conditions and soil permeability. Water levels at the time of the field investigation may be different from those encountered during the construction phase of the project.

6.0 Geologic Hazards

6.1 Steep Slope Hazard

Critical area ordinances designate slopes with magnitudes greater than about 40 percent and vertical relief of at least 10 feet as potentially geologically hazardous (steep slope/landslide hazards). Additional criteria include areas where landslide activity has taken place historically or where there is evidence of slope movements. Slope areas underlain by permeable soils overlying impermeable soils often exhibit landslide activity.

There are steep to very steep slopes along southern margin of the property extending off site into adjacent properties. These slopes have magnitudes of 40 to 80 percent and topographic relief of about 180 feet.

The following are excerpts from Chapter 85 of the Kirkland Municipal Code which pertain to landslide hazard areas. We have added comments after relevant code items.

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3. Landslide Hazard Areas – Both of the following:

   a. High Landslide Hazard Areas – Areas sloping 40 percent or greater, areas subject to previous landslide activities and areas sloping between 15 percent and 40 percent with zones of emergent groundwater or underlain by or embedded with impermeable silts or clays.

   b. Moderate Landslide Hazard Areas – Areas sloping between 15 percent and 40 percent and underlain by relatively permeable soils consisting largely of sand and gravel or highly competent glacial till.

The site is underlain by relatively dense soils; however, the site and adjacent areas have slope magnitudes greater than 40 percent. There is no evidence of emergent groundwater. Site meets criteria of High Landslide Hazard areas although overall stability is consistent with Moderate Landslide Hazard Areas.

2. A geotechnical investigation, prepared by a qualified geotechnical engineer or engineering geologist, to determine if a landslide hazard area or seismic hazard area exists on the subject property.

Part of this report; it is our opinion that the site contains slopes with relatively low likelihood for landslide potential. There are no seismic hazards are present at the site based on the high density of the subsurface soils.

3. A geotechnical report, prepared by a qualified geotechnical engineer or engineering geologist, 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 and adjacent properties.

   Based on our review, the proposal will not adversely affect critical areas on the site or adjacent areas provided the work is performed in accordance with the plans and with periodic monitoring by the geotechnical engineer. All site runoff must be controlled fully during and after construction. This will require the use of erosion control measures, vegetation placement and maintenance, as well as determination of implementation of construction/grading limits that are the minimum required to allow for site development.

   b. Evidence, if any, of holocene or recent landsliding, sloughing, or soil creep.

   None observed. Likely minor to moderate soil creep observed within off-site slopes south of the existing residence.

   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.

   None observed. Possible light perched groundwater present between weathered and unweathered till during late winter and early spring months. We did not observe areas where perched interflow becomes emergent (as springs). It is likely that any perched water migrates laterally and through the thin layer of till into the underlying outwash. Within the outwash, groundwater and/or precipitation is likely to migrate downward relatively quickly, recharging the more regional aquifer. This aquifer is likely more than 200 feet below the site.

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d. Identification of existing fill areas.

None observed. Likely fill around the existing residence from grading activities associated with the construction of that residence. Possible oversteepened slope areas near the top of the slope due to landscaping and/or fill placement over time.

e. Soil description in accordance with the United Soil Classification Systems.

See remainder of report. Site is underlain by a thin layer of glacial till (USCS SM) which overlies advance outwash (USCS SP).

f. Depth to groundwater and estimates of potential seasonal fluctuations.

Possible perched groundwater within 8 feet of the existing site elevations between weathered and unweathered glacial till. This flow is considered minor and possibly extends up to 5 feet below grade at times.

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).

Included on the exploration logs. Soils are consistent with Vashon Glacial Till overlying 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.

Included in Figure 4. Lidar imagery is consistent with a ravine/gully system created through erosion. In this case, the ravine has been created through seasonal stream activity. The stream is likely a result of groundwater/spring activity and seasonal precipitation. Resulting erosion is a combination of stream incision and mass wastage, along with soil creep along steeper slope areas above the stream. No anomalies indicating large scale rotational slides were observed in the vicinity of the site.

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.

Included in Section 6.4. Analyses indicate suitable factors of safety with regard to the proposed construction and location of new residences.

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.

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No emergent seepage, scarps, severe tree trunk deformation, tension cracks, or other evidence of slide activity was observed. Slope systems are consistent with stable landforms created through natural erosion over time.

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.

Based on our explorations and nearby explorations by others, the site is underlain by Vashon Glacial Till and Vashon Advance Outwash which have a low to very low liquefaction potential. Detailed analyses and special mitigation for seismic hazards are not warranted. Groundwater is likely more than 100 feet below the site.

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.

The site is mapped within a 'medium or mixed' seismic hazard area. This designation is likely due to the mapped geologic unit (Vashon Advance Outwash), which is comprised of fine to medium grained sand. Liquefaction often affects sand deposits with few fines, specifically with high groundwater levels.

Based on the results of our site explorations, the site is underlain by glacial till and at depth by advance outwash. Glacial till has a very low risk of liquefaction or seismic hazards. At this site, outwash is dense to very dense and does not have a shallow groundwater table. Seismic hazards for the outwash are also very low. Therefore, it is our opinion that the project does not require special mitigation.

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.

The project can be constructed safely provided the recommendations in our report are followed and verified periodically during construction by the geotechnical engineer.

4. Geotechnical recommendations, prepared by a qualified geotechnical engineer, for special engineering or other mitigation techniques appropriate to the hazard area along with an analysis of how these techniques will affect the subject and adjacent properties, including discussions and recommendations on the following:

a. The present stability of the subject property, the stability of the subject property during construction, the stability of the subject property after all development activities are completed and a discussion of the relative risks and slide potential relating to adjacent properties during each stage of development.

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Site is stable at this time. Recommendations for temporary excavations are included in this report. The location of the new residential lots is suitable provided stormwater runoff is fully managed and vegetation is maintained and/or replaced on developed areas. Stability will not be affected by construction provided runoff is controlled.

b. Location of buildings, roadways, and other improvements.

See Figure 3 for current lot layout. See architectural plans for proposed layouts.

c. Grading and earthwork, including compaction and fill material requirements, use of site solids as fill or backfill, imported fill or backfill requirements, height and inclination of both cut and fill slopes and erosion control and wet weather construction considerations and/or limitations.

Included in this report.

d. Foundation and retaining wall design criteria, including bearing layer(s), allowable capacities, minimum width, minimum depth, estimated settlements (total and differential), lateral loads, and other pertinent recommendations.

Included in this report.

e. Surface and subsurface drainage requirements and drainage material requirements.

Included in this report.

f. Assessment of seismic ground motion amplification and liquefaction potential.

Included below. Liquefaction potential is very low.

g. Other measures recommended to reduce the risk of slope instability.

No additional measures necessary at this time.

h. Any additional information believed to be relevant by the geotechnical engineer preparing the recommendations or requested by the Planning Official.

Comment Letter Responses

The following items are paraphrased geotechnical-related comments from the third party review letter within the City letter dated March 15, 2019. Our discussions and recommendations follow each item.

Comment discussing setback for Lot 4 building from steep slope area.

We recommend a minimum 10 feet building setback for any structure within Lot 4 from the top of the steep slope, approximately elevation 366 feet. It may be necessary to deepen foundation elements closest to the slope in order to achieve an effective setback equal to at least 10 feet. We should be on site to verify suitable soil conditions and setback distance during construction.

Comment discussing updated Kirkland geologic hazard maps and definitions of hazard areas.

Definitions from the updated code are noted below. Steep slopes and areas within the buffer are designated as high landslide hazard per items 4 and 5 below. Report changes are not warranted based on the definitions below.

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.361.5 High Landslide Hazard Areas

1. Areas that have shown movement during the Holocene epoch (from 10,000 years ago to the present) or that are underlain or covered by mass wastage debris of that epoch; or

2. Areas with both of the following characteristics:

a. Slopes steeper than 15 percent that intersect geologic contacts with a relatively permeable sediment overlying a relatively impermeable sediment; and

b. Springs; or

3. Areas potentially unstable because of rapid stream incision, stream bank erosion, or undercutting by wave action; or

4. Any area with a slope of 40 percent or steeper over a height of at least 10 feet.

5. For areas meeting the criteria of subsections (1) through (4) of this definition, the high landslide hazard area also includes the area within a horizontal distance "H" equal to either the height of the slope or 50 feet, whichever is greater.

.536.7 Moderate Landslide Hazard Area

Areas with slopes between 15 percent and 40 percent which do not meet the definition of high landslide hazard area.

Comment discussing peak ground acceleration value used in slope stability analyses.

Since the resulting factors of safety would be similar and slightly higher than those obtained from our current analyses, additional analyses using a lower value do not appear necessary at this time.

Comments discussing one-third increase in passive pressure and friction factor for transient loads.

The allowable passive and friction values provided in the report should be used without the one-third increase as noted in our report.

Comment discussing slab-on-grade capillary break materials.

We recommend placing a capillary break below interior slab-on-grade areas. This should consist of at least 4 inches of clean angular rock over prepared subgrades. The rock should be open graded (no fines) and ½ to ¾ inch in size.

6.2 Erosion Hazard

The Natural Resources Conservation Services (NRCS) maps for King County indicate that the site is underlain by Alderwood gravelly sandy loam (8 to 15 percent slopes). These soils would have a slight to moderate potential in a disturbed state.

It is our opinion that soil erosion potential at this project site can be reduced through landscaping and surface water runoff control. Typically erosion of exposed soils will be most noticeable during periods of rainfall and may be controlled by the use of normal temporary erosion control measures, such as silt fences, hay bales, mulching, control ditches and diversion trenches. The typical wet weather season, with

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regard to site grading, is from October 31st to April 1st. Erosion control measures should be in place before the onset of wet weather.

6.3 Seismic Hazard

The overall subsurface profile corresponds to a Site Class *D* as defined by Table 1613.5.2 of the 2015 International Building Code (2015 IBC). A Site Class *D* applies to an overall profile consisting of dense to very dense soils within the upper 100 feet.

We referenced the U.S. Geological Survey (USGS) Earthquake Hazards Program Website to obtain values for S_S, S_1, F_a, and F_v. The USGS website includes the most updated published data on seismic conditions. The site specific seismic design parameters and adjusted maximum spectral response acceleration parameters are as follows:

PGA	(Peak Ground Acceleration, in percent of g)
S_S	125.20% of g
S_1	48.50% of g
F_A	1.00
F_V	1.515

Additional seismic considerations include liquefaction potential and amplification of ground motions by soft/loose soil deposits. The liquefaction potential is highest for loose sand with a high groundwater table. The relatively dense soil deposits that underlie the site have a low liquefaction potential.

6.4 Slope Stability Analyses

We performed slope stability analyses through a representational cross section through the existing steep slope area. Analyses were performed using data from the drilled borings and King County Imap topography.

The commercially available slope stability computer program Geostase 4 was used to evaluate the global stability of the slope within the property extending into the property to the south. The slope stability was analyzed under static and seismic (pseudo-static method) conditions for the existing topography.

The computer program calculates factors of safety for potential slope failures and generates the potential failure planes. This software calculates the slope stability under seismic conditions using pseudo-static methods. The stability of the described configuration was analyzed by comparing observed factors of safety to minimum values as set by standard geotechnical practice.

A factor of safety of 1.0 is considered equilibrium and less than 1.0 is considered failure. The required factor of safety for global stability is 1.5 for static conditions and 1.1 for seismic conditions. In accordance with typical engineering standards, we used a seismic acceleration equal to one half of the horizontal peak ground acceleration. At this location, the PGA is 0.636 with one half equal to 0.318.

We utilized SPT information along with field Torvayne shear testing to determine suitable soil parameters of the glacial till and advance outwash. The following estimated soil parameters were used in our analyses:

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Soil Description	Unit Weight (pcf)	Cohesion (psf)	Friction (degrees)
Glacial Till (SM)	120	500	36
Advance Outwash (SP)	120	0	38

Slope Stability Results

Cross Section A to A'	Static Factor of Safety	0.32g Seismic Factor of Safety
Failure surface determined by program search	1.174	0.641
Failure surface at residence/lot location	2.382	1.133

The analyses indicate suitable factors of safety for global stability at the location of the proposed building lots. While factors of safety are lower than required values near the slope face, there is no feasible mitigation to increase slope stability, nor is mitigation warranted. The natural slopes are adequately stable for current and lower magnitude seismic conditions and based on high soil densities of the underlying geologic units, the factors of safety observed are likely higher than shown above.

These analyses do not determine safety during construction. Typically, construction activities are temporary and provided excavation recommendations from the geotechnical engineer are followed, the risk of failure can be managed through daily observation of stability. Please see temporary excavation section of this report for more information.

7.0 DISCUSSION

7.1.1 General

The site is underlain by variable thicknesses of weathered and unweathered glacial till, which overlie relatively dense advance outwash. The proposed residential structures may be supported on shallow foundation systems bearing on medium dense or firmer native soils and structural fill placed on suitable native soils.

While there are steep and very steep slopes within and adjacent to the property, the slope areas are adequately stable and will not be adversely affected by the proposed development. Site runoff, both temporary and permanent, must be fully controlled in order to maintain surface stability and limit soil erosion on slope areas.

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Response to Neighbor Comments: Fully controlled runoff for new impervious surfaces should result in a slightly lower potential for erosion and shallow sloughing at the site and adjacent areas. Tree removal should not adversely affect slope stability provided the areas are mitigated with new vegetation or engineered surfacing placement (landscaping, hardscapes, structures). Where feasible, root systems should be left in place.

Widespread infiltration of stormwater runoff is not feasible at the site. The site is underlain by areas of fill and at depth by weathered and unweathered glacial till. Permeable pavements may be utilized for flow control in the northern half of the property, if necessary.

8.0 Recommendations

8.1.1 Site Preparation

Trees, shrubs and other vegetation should be removed prior to stripping of surficial organic-rich soil and fill. Based on observations from the site investigation program, it is anticipated that the stripping depth will be 6 to 18 inches. Deeper excavations will be necessary below large trees, former foundation elements, and in any areas underlain by undocumented fill materials.

The native soils consist of silty-sand with gravel and at depth, poorly graded sand with gravel. The native soils may be used as structural fill provided they achieve compaction requirements and are within 3 percent of the optimum moisture. Some of these soils may only be suitable for use as fill during the summer months, as they will be above the optimum moisture levels in their current state. These soils are variably moisture sensitive and may degrade during periods of wet weather and under equipment traffic.

Imported structural fill should consist of a sand and gravel mixture with a maximum grain size of 3 inches and less than 5 percent fines (material passing the U.S. Standard No. 200 Sieve). Structural fill should be placed in maximum lift thicknesses of 12 inches and should be compacted to a minimum of 95 percent of the modified proctor maximum dry density, as determined by the ASTM D 1557 test method.

8.1.2 Temporary Excavations

Based on our understanding of the project, we anticipate that the grading could include local cuts on the order of approximately 4 feet or less for foundation, driveway, and utility placement. Any deeper excavations should be sloped no steeper than 1.5H:1V (Horizontal:Vertical) in loose native soils (if present), 1H:1V in medium dense native soils, and 3/4H:1V in dense to very dense native soils. If an excavation is subject to heavy vibration or surcharge loads, we recommend that the excavations be sloped no steeper than 2H:1V, where room permits.

Temporary cuts should be in accordance with the Washington Administrative Code (WAC) Part N, Excavation, Trenching, and Shoring. Temporary slopes should be visually inspected daily by a qualified person during construction activities and the inspections should be documented in daily reports. The contractor is responsible for maintaining the stability of the temporary cut slopes and reducing slope erosion during construction.

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Temporary cut slopes should be covered with visqueen to help reduce erosion during wet weather, and the slopes should be closely monitored until the permanent retaining systems or slope configurations are complete. Materials should not be stored or equipment operated within 10 feet of the top of any temporary cut slope.

Soil conditions may not be completely known from the geotechnical investigation. In the case of temporary cuts, the existing soil conditions may not be completely revealed until the excavation work exposes the soil. Typically, as excavation work progresses the maximum inclination of temporary slopes will need to be re-evaluated by the geotechnical engineer so that supplemental recommendations can be made. Soil and groundwater conditions can be highly variable. Scheduling for soil work will need to be adjustable, to deal with unanticipated conditions, so that the project can proceed and required deadlines can be met.

If any variations or undesirable conditions are encountered during construction, we should be notified so that supplemental recommendations can be made. If room constraints or groundwater conditions do not permit temporary slopes to be cut to the maximum angles allowed by the WAC, temporary shoring systems may be required. The contractor should be responsible for developing temporary shoring systems, if needed. We recommend that Cobalt Geosciences and the project structural engineer review temporary shoring designs prior to installation, to verify the suitability of the proposed systems.

8.1.3 Erosion and Sediment Control

Erosion and sediment control (ESC) is used to reduce the transportation of eroded sediment to wetlands, streams, lakes, drainage systems, and adjacent properties. Erosion and sediment control measures should be implemented and these measures should be in general accordance with local regulations. At a minimum, the following basic recommendations should be incorporated into the design of the erosion and sediment control features for the site:

- Schedule the soil, foundation, utility, and other work requiring excavation or the disturbance of the site soils, to take place during the dry season (generally May through September). However, provided precautions are taken using Best Management Practices (BMP's), grading activities can be completed during the wet season (generally October through April).
- All site work should be completed and stabilized as quickly as possible.
- Additional perimeter erosion and sediment control features may be required to reduce the possibility of sediment entering the surface water. This may include additional silt fences, silt fences with a higher Apparent Opening Size (AOS), construction of a berm, or other filtration systems.
- Any runoff generated by dewatering discharge should be treated through construction of a sediment trap if there is sufficient space. If space is limited other filtration methods will need to be incorporated.

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8.1.4 Foundation Design

The proposed single-family residences may be supported on shallow spread footing foundation systems bearing on undisturbed medium dense or firmer native soils or on properly compacted structural fill placed on the suitable native soils. If structural fill is used to support foundations, then the zone of structural fill should extend beyond the faces of the footing a lateral distance at least equal to the thickness of the structural fill.

For shallow foundation support, we recommend widths of at least 18 and 24 inches, respectively, for continuous wall and isolated column footings supporting the proposed structure. Provided that the footings are supported as recommended above, a net allowable bearing pressure of 3,000 pounds per square foot (psf) may be used for design.

A 1/3 increase in the above value may be used for short duration loads, such as those imposed by wind and seismic events. Structural fill placed on bearing, native subgrade should be compacted to at least 95 percent of the maximum dry density based on ASTM Test Method D1557. Footing excavations should be inspected to verify that the foundations will bear on suitable material.

Exterior footings should have a minimum depth of 18 inches below pad subgrade (soil grade) or adjacent exterior grade, whichever is lower. Interior footings should have a minimum depth of 12 inches below pad subgrade (soil grade) or adjacent exterior grade, whichever is lower.

If constructed as recommended, the total foundation settlement is not expected to exceed 1 inch. Differential settlement, along a 25-foot exterior wall footing, or between adjoining column footings, should be less than ½ inch. This translates to an angular distortion of 0.002. Most settlement is expected to occur during construction, as the loads are applied. However, additional post-construction settlement may occur if the foundation soils are flooded or saturated. All footing excavations should be observed by a qualified geotechnical consultant.

Resistance to lateral footing displacement can be determined using an allowable friction factor of 0.40 acting between the base of foundations and the supporting subgrades. Lateral resistance for footings can also be developed using an allowable equivalent fluid passive pressure of 275 pounds per cubic foot (pcf) acting against the appropriate vertical footing faces (neglect the upper 12 inches below grade in exterior areas).

The allowable friction factor and allowable equivalent fluid passive pressure values include a factor of safety of 1.5. The frictional and passive resistance of the soil may be combined without reduction in determining the total lateral resistance.

Care should be taken to prevent wetting or drying of the bearing materials during construction. Any extremely wet or dry materials, or any loose or disturbed materials at the bottom of the footing excavations, should be removed prior to placing concrete. The potential for wetting or drying of the bearing materials can be reduced by pouring concrete as soon as possible after completing the footing excavation and evaluating the bearing surface by the geotechnical engineer or his representative.

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8.1.5 Stormwater Management

The site is underlain by glacial till which typically has a very low permeability. While advance outwash is comprised of sand, and has a moderate to high permeability, the depth to the advance outwash appears to be prohibitive for shallow infiltration system emplacement. Furthermore, the close proximity of the site to steep slope areas is not suitable for infiltration of runoff.

We conducted a small-scale Pilot Infiltration Test (PIT) in an excavation adjacent to B-1 at a depth of 3 feet below grade. Following saturation, falling head testing, and application of correction factors, the measured/design infiltration rate was 0.25 inches/hour. Some of the infiltration observed was unavoidable lateral migration through weathered glacial till.

The Washington State Department of Ecology (DOE) states that infiltration in soils with permeability of less than 0.3 inches/hour is not recommended and/or potentially infeasible. We recommend direct connection of stormwater infrastructure from new roof areas to the City storm system.

8.1.6 Slab-on-Grade

We recommend that the upper 12 inches of the existing fill and/or native soils within slab areas be re-compacted to at least 95 percent of the modified proctor (ASTM D1557 Test Method).

Often, a vapor barrier is considered below concrete slab areas. However, the usage of a vapor barrier could result in curling of the concrete slab at joints. Floor covers sensitive to moisture typically requires the usage of a vapor barrier. A materials or structural engineer should be consulted regarding the detailing of the vapor barrier below concrete slabs. Exterior slabs typically do not utilize vapor barriers.

The American Concrete Institutes ACI 360R-06 Design of Slabs on Grade and ACI 302.1R-04 Guide for Concrete Floor and Slab Construction are recommended references for vapor barrier selection and floor slab detailing.

Slabs on grade may be designed using a coefficient of subgrade reaction of 180 pounds per cubic inch (pci) assuming the slab-on-grade base course is underlain by structural fill placed and compacted as outlined in Section 8.1.

A perimeter drainage system is recommended unless interior slab areas are elevated a minimum of 12 inches above adjacent exterior grades. If installed, a perimeter drainage system should consist of a 4 inch diameter perforated drain pipe surrounded by a minimum 6 inches of drain rock wrapped in a non-woven geosynthetic filter fabric to reduce migration of soil particles into the drainage system. The perimeter drainage system should discharge by gravity flow to a suitable stormwater system.

Exterior grades surrounding buildings should be sloped at a minimum of one percent to facilitate surface water flow away from the building and preferably with a relatively impermeable surface cover immediately adjacent to the building.

8.1.7 Groundwater Influence on Construction

Groundwater was not encountered in the borings. There is a chance that perched groundwater will be encountered during construction. We anticipate that perched groundwater would be encountered between 5 and 8 feet below grade during late winter and early spring months.

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If groundwater is encountered, we anticipate that sump excavations and small diameter pumps systems will adequately de-water short-term excavations, if required. Any system should be designed by the contractor. We can provide additional recommendations upon request.

8.1.8 Utilities

Utility trenches should be excavated according to accepted engineering practices following OSHA (Occupational Safety and Health Administration) standards, by a contractor experienced in such work. The contractor is responsible for the safety of open trenches. Traffic and vibration adjacent to trench walls should be reduced; cyclic wetting and drying of excavation side slopes should be avoided. Depending upon the location and depth of some utility trenches, groundwater flow into open excavations could be experienced, especially during or shortly following periods of precipitation.

In general, sandy and silty soils were encountered at shallow depths in the explorations at this site. These soils have low cohesion and density and will have a tendency to cave or slough in excavations. Shoring or sloping back trench sidewalls is required within these soils in excavations greater than 4 feet deep.

All utility trench backfill should consist of imported structural fill or suitable on site soils. Utility trench backfill placed in or adjacent to buildings and exterior slabs should be compacted to at least 95 percent of the maximum dry density based on ASTM Test Method D1557. The upper 5 feet of utility trench backfill placed in pavement areas should be compacted to at least 95 percent of the maximum dry density based on ASTM Test Method D1557. Below 5 feet, utility trench backfill in pavement areas should be compacted to at least 90 percent of the maximum dry density based on ASTM Test Method D1557. Pipe bedding should be in accordance with the pipe manufacturer's recommendations.

The contractor is responsible for removing all water-sensitive soils from the trenches regardless of the backfill location and compaction requirements. Depending on the depth and location of the proposed utilities, we anticipate the need to re-compact existing fill soils below the utility structures and pipes. The contractor should use appropriate equipment and methods to avoid damage to the utilities and/or structures during fill placement and compaction procedures.

8.1.9 Pavement Recommendations

The near surface subgrade soils generally consist of silty sand with gravel. These soils are rated as good for pavement subgrade material (depending on silt content and moisture conditions). We estimate that the subgrade will have a California Bearing Ratio (CBR) value of 10 and a modulus of subgrade reaction value of k = 200 pci, provided the subgrade is prepared in general accordance with our recommendations.

We recommend that, at a minimum, 12 inches of the existing subgrade material be moisture conditioned (as necessary) and re-compacted to prepare for the construction of pavement sections. Deeper levels of recompaction or overexcavation and replacement may be necessary in areas where fill and/or very poor (soft/loose) soils are present. Any soils that cannot be compacted to required levels and soils that have more than 40 percent fines by weight should be removed and replaced with imported structural fill.

The subgrade should be compacted to at least 95 percent of the maximum dry density as determined by ASTM Test Method D1557. In place density tests should be performed to verify proper moisture content and adequate compaction.

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The recommended flexible and rigid pavement sections are based on design CBR and modulus of subgrade reaction (k) values that are achieved, only following proper subgrade preparation. It should be noted that subgrade soils that have relatively high silt contents will likely be highly sensitive to moisture conditions. The subgrade strength and performance characteristics of a silty subgrade material may be dramatically reduced if this material becomes wet.

Based on our knowledge of the proposed project, we expect the traffic to range from light duty (passenger automobiles) to heavy duty (delivery trucks). The following tables show the recommended pavement sections for light duty and heavy duty use.

ASPHALTIC CONCRETE (FLEXIBLE) PAVEMENT

LIGHT DUTY

Asphaltic Concrete	Aggregate Base*	Compacted Subgrade* **
2.5 in.	6.0 in.	12.0 in.

HEAVY DUTY

Asphaltic Concrete	Aggregate Base*	Compacted Subgrade* **
3.5 in.	6.0 in.	12.0 in.

PORTLAND CEMENT CONCRETE (RIGID) PAVEMENT

Min. PCC Depth	Aggregate Base*	Compacted Subgrade* **
6.0 in.	6.0 in.	12.0 in.

** 95% compaction based on ASTM Test Method D1557*

*** A proof roll may be performed in lieu of in place density tests*

The asphaltic concrete depth in the flexible pavement tables should be a surface course type asphalt, such as Washington Department of Transportation (WSDOT) ½ inch HMA. The rigid pavement design is based on a Portland Cement Concrete (PCC) mix that has a 28 day compressive strength of 4,000 pounds per square inch (psi). The design is also based on a concrete flexural strength or modulus of rupture of 550 psi.

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9.0 Construction Field Reviews

Cobalt Geosciences should be retained to provide part time field review during construction in order to verify that the soil conditions encountered are consistent with our design assumptions and that the intent of our recommendations is being met. This will require field and engineering review to:

- Monitor and test structural fill placement and soil compaction
- Observe bearing capacity at foundation locations
- Observe slab-on-grade preparation
- Observe excavation stability

Geotechnical design services should also be anticipated during the subsequent final design phase to support the structural design and address specific issues arising during this phase. Field and engineering review services will also be required during the construction phase in order to provide a Final Letter for the project.

10.0 Closure

This report was prepared for the exclusive use of Shawn Anjaz and Zelly White and their appointed consultants. Any use of this report or the material contained herein by third parties, or for other than the intended purpose, should first be approved in writing by Cobalt Geosciences, LLC.

The recommendations contained in this report are based on assumed continuity of soils with those of our test holes, and assumed structural loads. Cobalt Geosciences should be provided with final architectural and civil drawings when they become available in order that we may review our design recommendations and advise of any revisions, if necessary.

Use of this report is subject to the Statement of General Conditions provided in Appendix A. It is the responsibility of Shawn Anjaz and Zelly White who are identified as "the Client" within the Statement of General Conditions, and its agents to review the conditions and to notify Cobalt Geosciences should any of these not be satisfied.

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206-331-1097

GEOTECHNICAL INVESTIGATION
KIRKLAND, WASHINGTON

April 29, 2019

Respectfully submitted,

Cobalt Geosciences, LLC
Original signed by:

Exp. 6/26/2020
Phil Haberman, PE, LG, LEG
Principal

PH/sc

PO Box 82243
Kenmore, WA 98028
cobaltgeo@gmail.com
206-331-1097

APPENDIX A
Statement of General Conditions

Statement of General Conditions

USE OF THIS REPORT: This report has been prepared for the sole benefit of the Client or its agent and may not be used by any third party without the express written consent of Cobalt Geosciences and the Client. Any use which a third party makes of this report is the responsibility of such third party.

BASIS OF THE REPORT: The information, opinions, and/or recommendations made in this report are in accordance with Cobalt Geosciences present understanding of the site specific project as described by the Client. The applicability of these is restricted to the site conditions encountered at the time of the investigation or study. If the proposed site specific project differs or is modified from what is described in this report or if the site conditions are altered, this report is no longer valid unless Cobalt Geosciences is requested by the Client to review and revise the report to reflect the differing or modified project specifics and/or the altered site conditions.

STANDARD OF CARE: Preparation of this report, and all associated work, was carried out in accordance with the normally accepted standard of care in the state of execution for the specific professional service provided to the Client. No other warranty is made.

INTERPRETATION OF SITE CONDITIONS: Soil, rock, or other material descriptions, and statements regarding their condition, made in this report are based on site conditions encountered by Cobalt Geosciences at the time of the work and at the specific testing and/or sampling locations. Classifications and statements of condition have been made in accordance with normally accepted practices which are judgmental in nature; no specific description should be considered exact, but rather reflective of the anticipated material behavior. Extrapolation of in situ conditions can only be made to some limited extent beyond the sampling or test points. The extent depends on variability of the soil, rock and groundwater conditions as influenced by geological processes, construction activity, and site use.

VARYING OR UNEXPECTED CONDITIONS: Should any site or subsurface conditions be encountered that are different from those described in this report or encountered at the test locations, Cobalt Geosciences must be notified immediately to assess if the varying or unexpected conditions are substantial and if reassessments of the report conclusions or recommendations are required. Cobalt Geosciences will not be responsible to any party for damages incurred as a result of failing to notify Cobalt Geosciences that differing site or sub-surface conditions are present upon becoming aware of such conditions.

PLANNING, DESIGN, OR CONSTRUCTION: Development or design plans and specifications should be reviewed by Cobalt Geosciences, sufficiently ahead of initiating the next project stage (property acquisition, tender, construction, etc), to confirm that this report completely addresses the elaborated project specifics and that the contents of this report have been properly interpreted. Specialty quality assurance services (field observations and testing) during construction are a necessary part of the evaluation of sub-subsurface conditions and site preparation works. Site work relating to the recommendations included in this report should only be carried out in the presence of a qualified geotechnical engineer; Cobalt Geosciences cannot be responsible for site work carried out without being present.

APPENDIX B
Figures: Vicinity Map, Site Plan, Site Layout, Lidar Image

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206-331-1097

NATIONAL GEOGRAPHIC

MILES 0 .5 1
FEET 1000 0 1000 2000 3000 4000 5000
KILOMETERS 1 .5 0 1
METERS 1000 0 1000

TN MN 15°
N
11/30/18

COBALT GEOSCIENCES

Proposed Short Plat
7435 NE 129th Street
Kirkland, Washington

VICINITY MAP FIGURE 1

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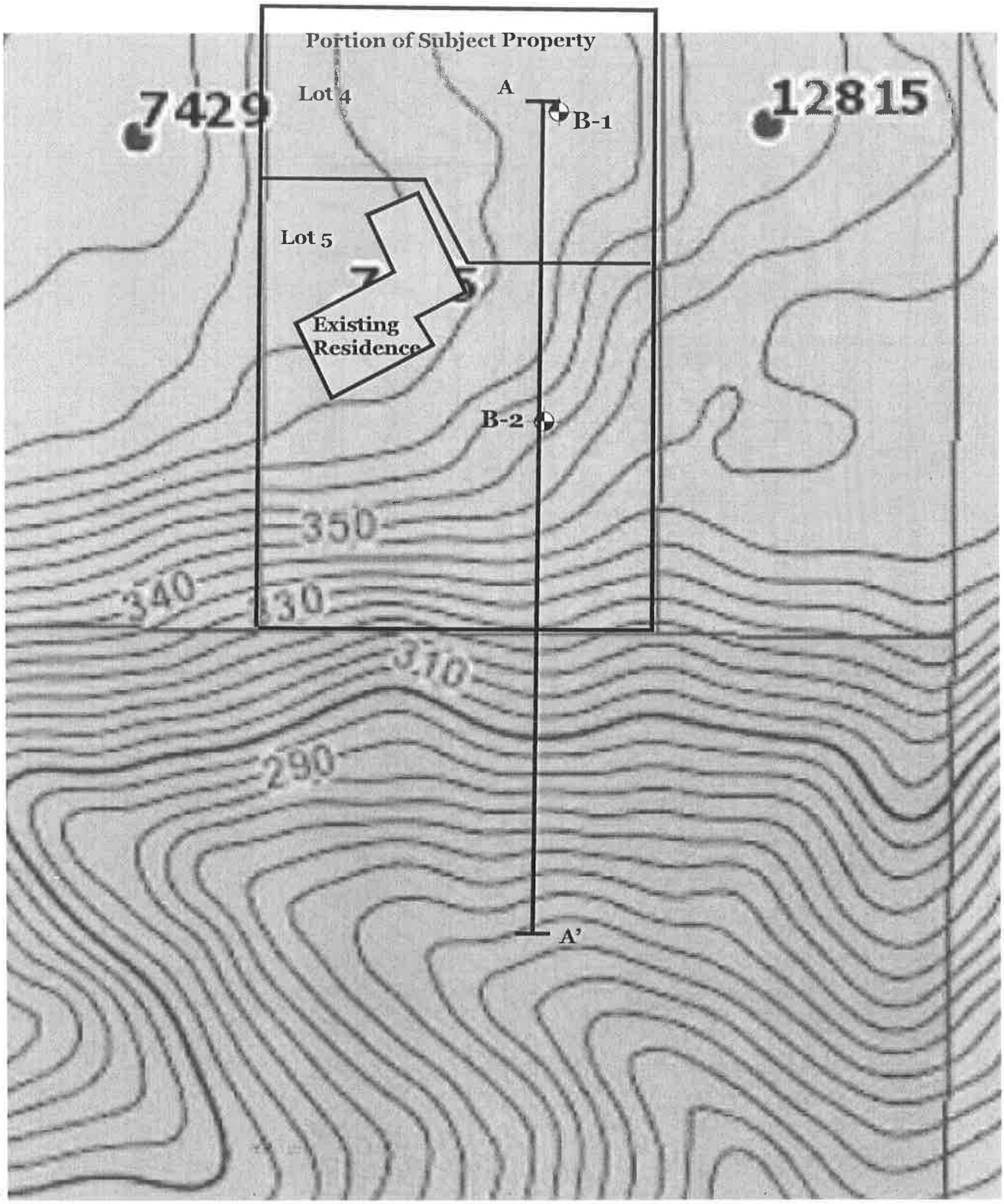


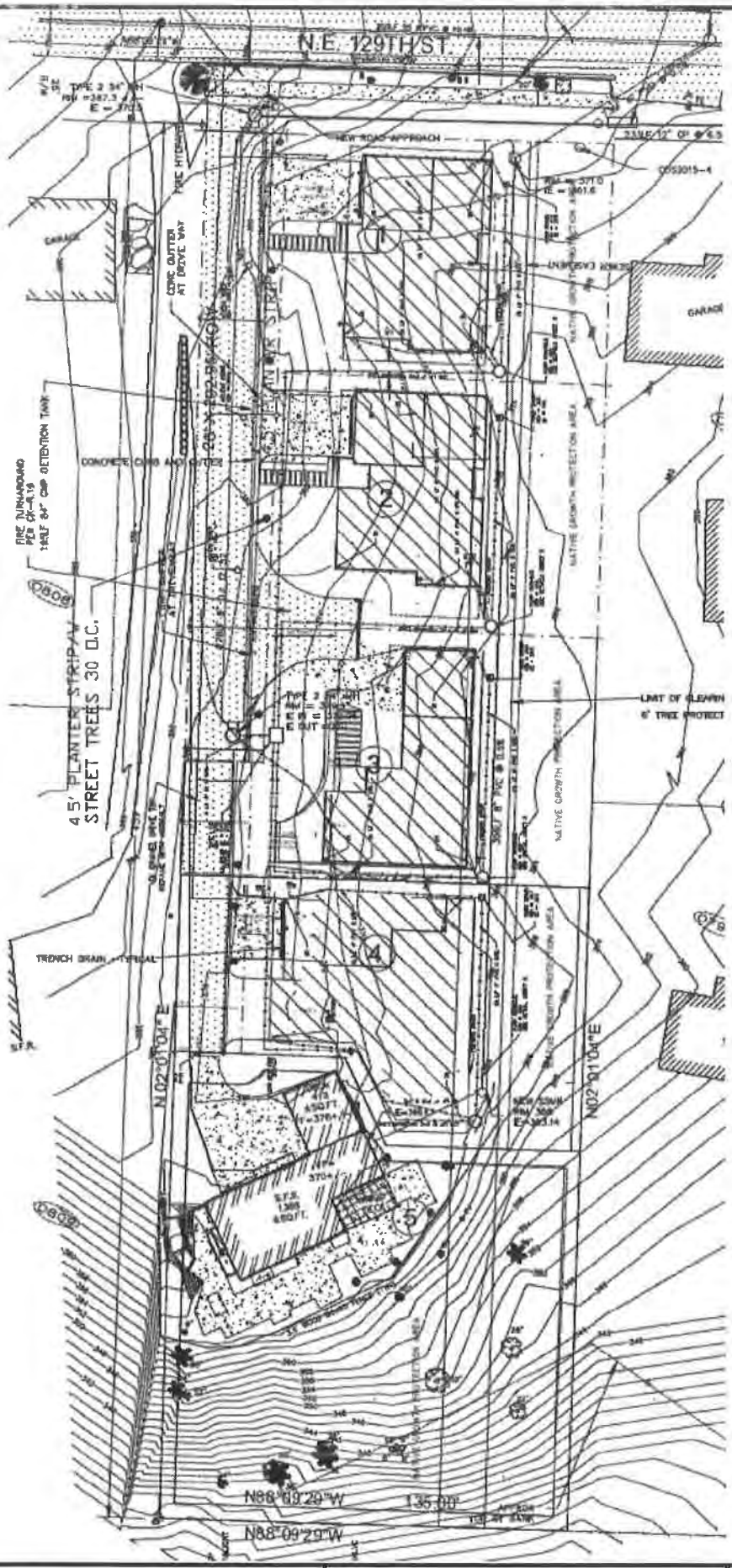
B-1 Approximate Boring Location

1"=50'

N

COBALT GEOSCIENCES	Proposed Short Plat 7435 NE 129th Street Kirkland, Washington	**SITE PLAN FIGURE 2**	Cobalt Geosciences, LLC P.O. Box 82243 Kenmore, WA 98028 (206) 331-1097 www.cobaltgeo.com cobaltgeo@gmail.com

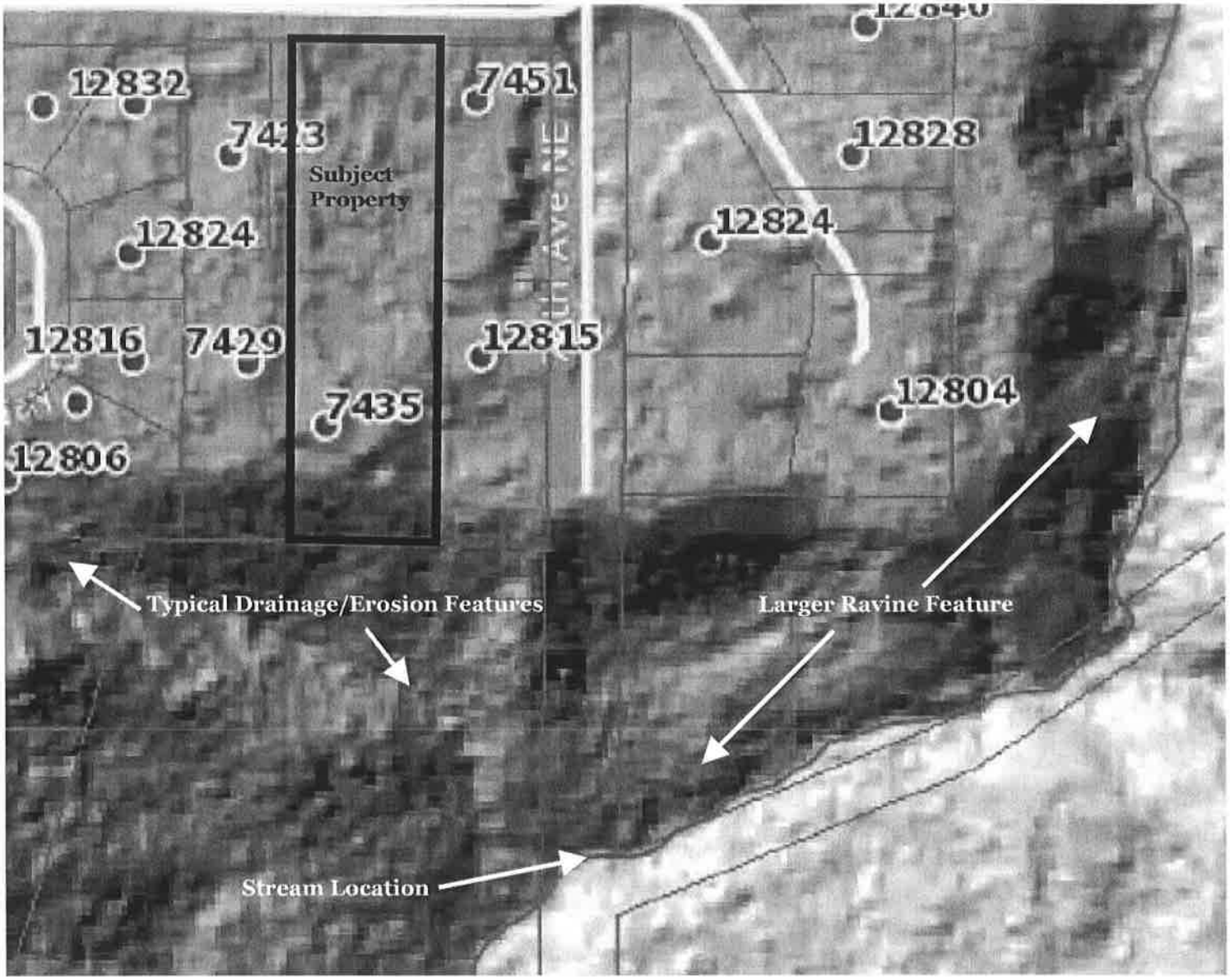
ENCLOSURE 1



N

Not to Scale

COBALT GEOSCIENCES	Proposed Short Plat 7435 NE 129th Street Kirkland, Washington	**SITE LAYOUT FIGURE 3**	Cobalt Geosciences, LLC P.O. Box 82243 Kenmore, WA 98028 (206) 331-1097 www.cobaltgeo.com cobaltgeo@gmail.com



COBALT GEOSCIENCES	Proposed Short Plat 7435 NE 129th Street Kirkland, Washington	**LIDAR IMAGE FIGURE 4**	Cobalt Geosciences, LLC P.O. Box 82243 Kenmore, WA 98028 (206) 331-1097 www.cobaltgeo.com cobaltgeo@gmail.com

APPENDIX C
Boring Logs & Sieve Analysis

ENCLOSURE 1

Unified Soil Classification System (USCS)

MAJOR DIVISIONS			SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS (more than 50% retained on No. 4 sieve)	Gravels (more than 50% of coarse fraction retained on No. 4 sieve)	Clean Gravels (less than 5% fines)	GW	Well-graded gravels, gravels, gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines
		Gravels with Fines (more than 12% fines)	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	Sands (50% or more of coarse fraction passes the No. 4 sieve)	Clean Sands (less than 5% fines)	SW	Well-graded sands, gravelly sands, little or no fines
			SP	Poorly graded sand, gravelly sands, little or no fines
		Sands with Fines (more than 12% fines)	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS (50% or more passes the No. 200 sieve)	Silts and Clays (liquid limit less than 50)	Inorganic	ML	Inorganic silts of low to medium plasticity, sandy silts, gravelly silts, or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays silty clays, lean clays
		Organic	OL	Organic silts and organic silty clays of low plasticity
	Silts and Clays (liquid limit 50 or more)	Inorganic	MH	Inorganic silts, micaceous or diatomaceous fine sands or silty soils, elastic silt
			CH	Inorganic clays of medium to high plasticity, sandy fat clay, or gravelly fat clay
		Organic	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor		PT	Peat, humus, swamp soils with high organic content (ASTM D4427)

Classification of Soil Constituents

MAJOR constituents compose more than 50 percent, by weight, of the soil. Major constituents are capitalized (i.e., SAND).

Minor constituents compose 12 to 50 percent of the soil and precede the major constituents (i.e., silty SAND). Minor constituents preceded by "slightly" compose 5 to 12 percent of the soil (i.e., slightly silty SAND).

Trace constituents compose 0 to 5 percent of the soil (i.e., slightly silty SAND, trace gravel).

Grain Size Definitions

Description	Sieve Number and/or Size
Fines	<#200 (0.08 mm)
Sand	
-Fine	#200 to #40 (0.08 to 0.4 mm)
-Medium	#40 to #10 (0.4 to 2 mm)
-Coarse	#10 to #4 (2 to 5 mm)
Gravel	
-Fine	#4 to 3/4 inch (5 to 19 mm)
-Coarse	3/4 to 3 inches (19 to 76 mm)
Cobbles	3 to 12 inches (75 to 305 mm)
Boulders	>12 inches (305 mm)

Relative Density (Coarse Grained Soils)

N, SPT, Blows/FT	Relative Density
0 - 4	Very loose
4 - 10	Loose
10 - 30	Medium dense
30 - 50	Dense
Over 50	Very dense

Consistency (Fine Grained Soils)

N, SPT, Blows/FT	Relative Consistency
Under 2	Very soft
2 - 4	Soft
4 - 8	Medium stiff
8 - 15	Stiff
15 - 30	Very stiff
Over 30	Hard

Moisture Content Definitions

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, from below water table

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Soil Classification Chart

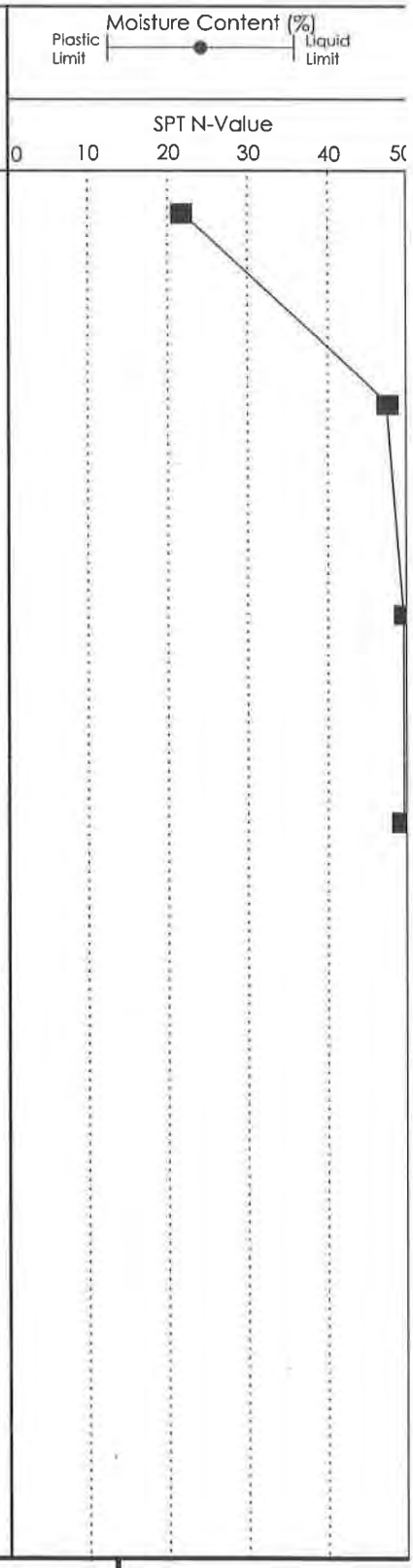
Figure C1

Log of Boring B-1

ENCLOSURE 1

Date: November 23, 2018	Depth: 16.5'	Initial Groundwater: None Observed
Contractor: CN	Elevation: ~367'	Sample Type: Split Spoon
Method: Hollow Stem Auger	Logged By: PH Checked By: SC	Final Groundwater: N/A

Depth (Feet)	Interval	% Recovery	Blows/6"	Graphic Log	USCS Symbol	Material Description	Groundwater
			5 10			Vegetation/Topsoil	
2			12		SM	Medium dense to very dense, silty-fine to medium grained sand with gravel, mottled dark yellowish brown to grayish brown, moist. (Glacial Till)	
4							
6			16 23 24				
8							
10			29 30 36			Unit Weight - 122 pcf	
12					SP	Very dense, fine to medium grained sand trace gravel, yellowish brown to grayish brown, moist. (Advance Outwash)	
14							
16			25 31 34				
						End of Boring 16.5'	
18							
20							
22							
24							
26							
28							
30							
32							
34							



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Proposed Short Plat
7435 NE 129th Street
Kirkland, Washington

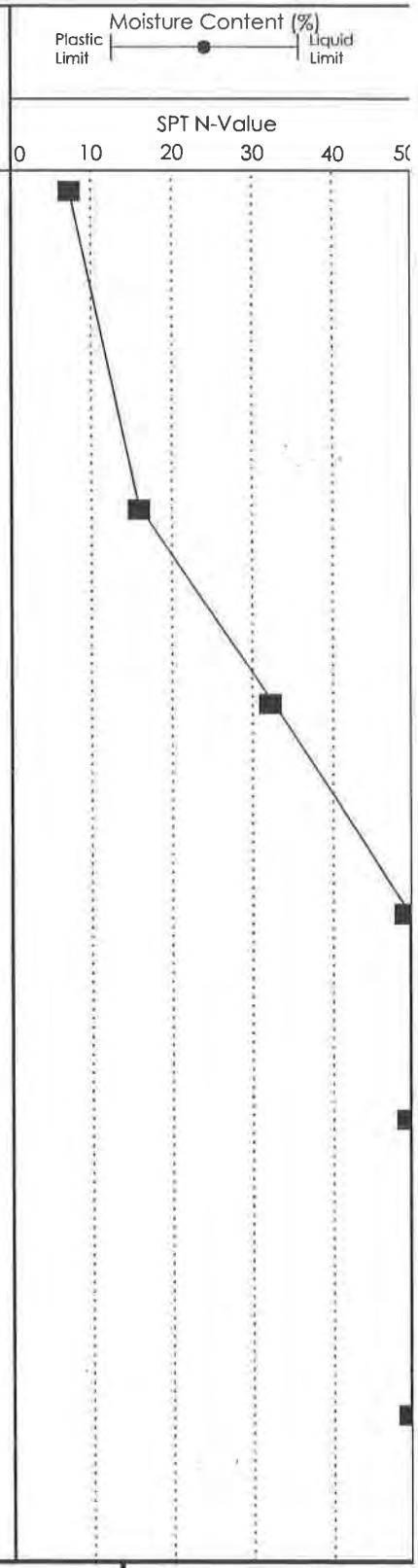
Boring Log

Log of Boring B-2

ENCLOSURE 1

Date: November 23, 2018	Depth: 31.5'	Initial Groundwater: None Observed
Contractor: CN	Elevation: ~356'	Sample Type: Split Spoon
Method: Hollow Stem Auger	Logged By: PH Checked By: SC	Final Groundwater: N/A

Depth (Feet)	Interval	% Recovery	Blows/6"	Graphic Log	USCS Symbol	Material Description	Groundwater
			4 4			Vegetation/Topsoil	
2			5		SM	Loose to medium dense, silty-fine to medium grained sand with gravel, dark yellowish brown to grayish brown, moist. (Glacial Till)	
4					SP	Medium dense to very dense, fine to medium grained sand trace gravel, yellowish brown to grayish brown, moist. (Advance Outwash)	
6							
8			5 6 9				
10							
12			12 15 17			-Local interbeds of silty-sand	
14							
16							
18			18 25 26			Unit Weight 119 pcf	
20							
22			29 34 42				
24							
26							
28						-Areas of coarser grained SP	
30			35 40 50				
32						End of Boring 31.5'	
34							



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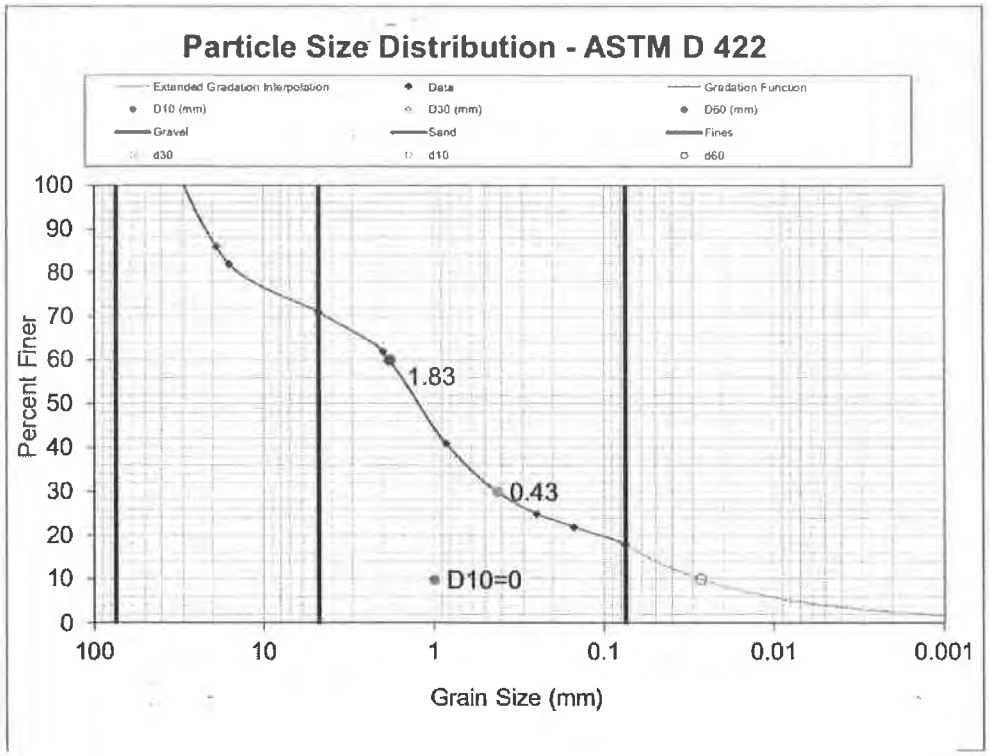
Proposed Short Plat
7435 NE 129th Street
Kirkland, Washington

Boring Log

ENCLOSURE 1

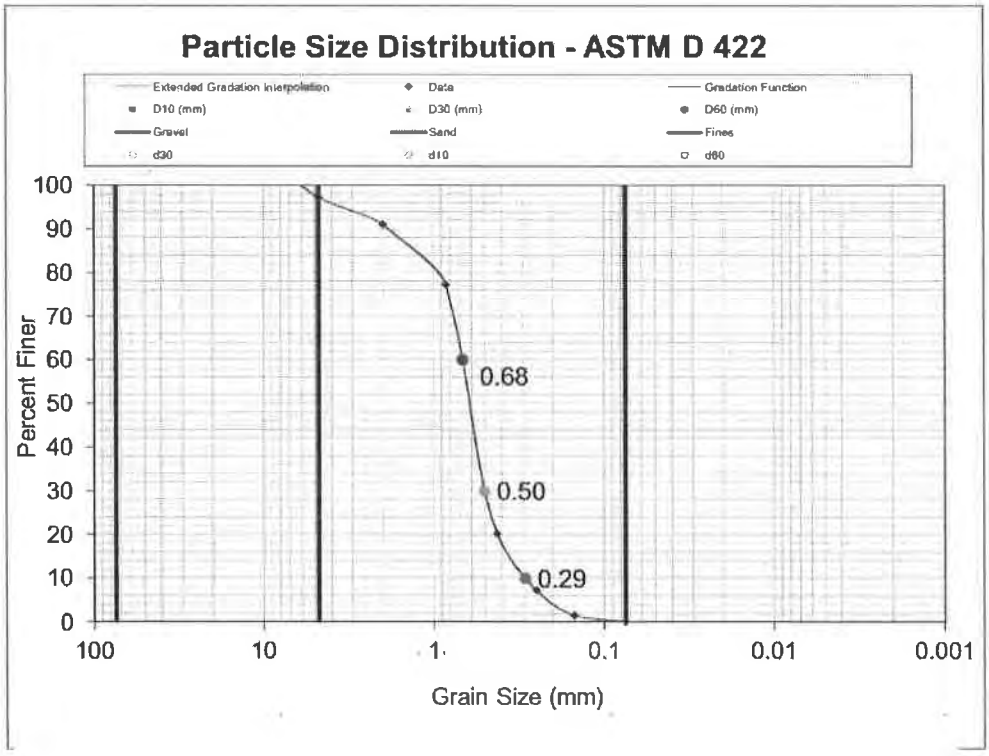


Gradation:	
Sieve (mm)	% Passing
19	86
16	82
4.75	71
2	62
0.85	41
0.425	30
0.25	25
0.15	22
0.075	18

Material Properties	
Description =	5 Lot
Soil ID =	B-1-10
Depth =	10
Max Dry Density =	0.00
Optimum Moisture =	0.00
WD Offset =	0
% Moisture Offset =	9
% > 3 in. =	0.00
% > 3/4 in. =	14.00
% Gravel =	29.00
% Sand =	53.00
% Fines =	18.00
PL =	0.00
LL =	0.00
Cu =	0.00
Cc =	0.00
File Name	SM

Boring B-1 10'

Extrapolated Coefficients (see Limitations on Input Screen)				
d10	d30	d60	Cu	Cc
0.027	0.425	1.826	67.92	3.68



Gradation:	
Sieve (mm)	% Passing
4.75	97.2
2	91.1
0.85	77.2
0.425	20.2
0.25	7.3
0.15	1.6
0.075	0.2
	0
	0

Material Properties	
Description =	5 Lot
Soil ID =	B-2-17.5
Depth =	17.5
Max Dry Density =	0.00
Optimum Moisture =	0.00
WD Offset =	0
% Moisture Offset =	7.5
% > 3 in. =	0.00
% > 3/4 in. =	0.00
% Gravel =	2.80
% Sand =	97.00
% Fines =	0.20
PL =	0.00
LL =	0.00
Cu =	2.33
Cc =	1.29
File Name	SP

Boring B-2 17.5'

Extrapolated Coefficients (see Limitations on Input Screen)				
d10	d30	d60	Cu	Cc
0.291	0.504	0.677	2.33	1.29

COBALT GEOSCIENCES

Proposed Short Plat
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Kirkland, Washington

SIEVE ANALYSES

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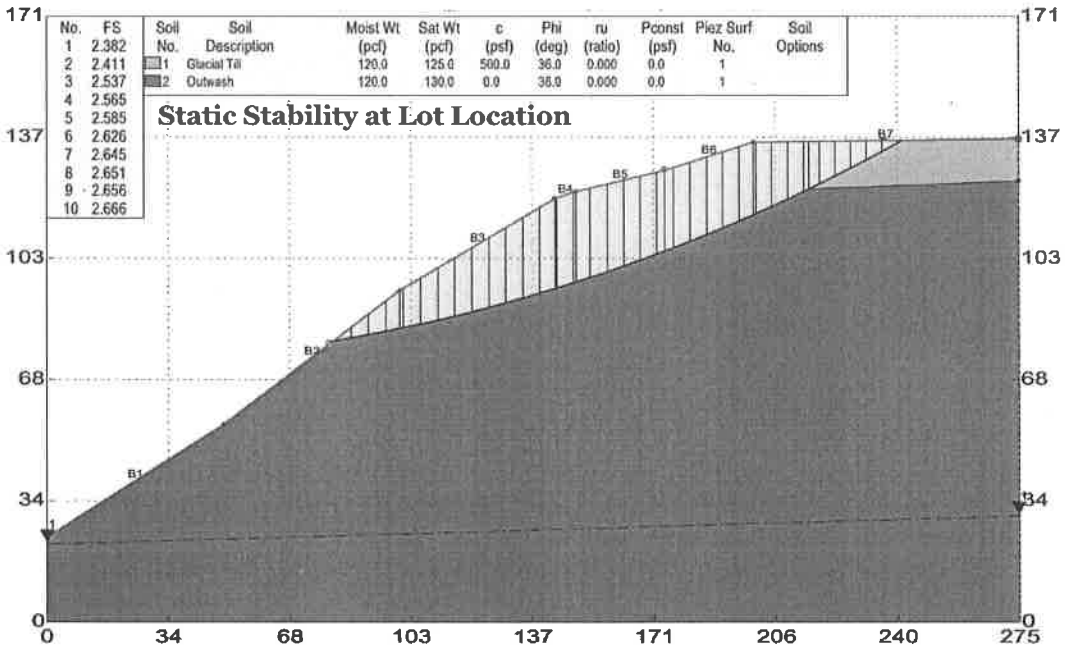
APPENDIX D
Slope Stability Analyses

ENCLOSURE 1

Proposed Short Plat
7435 NE 129th Street

Cobalt Geosciences, LLC

\KIRK OASIS.gsd



GEOSTASE FS = 2.382

Simplified Bishop Method

GEOSTASE Slope Stability Analysis

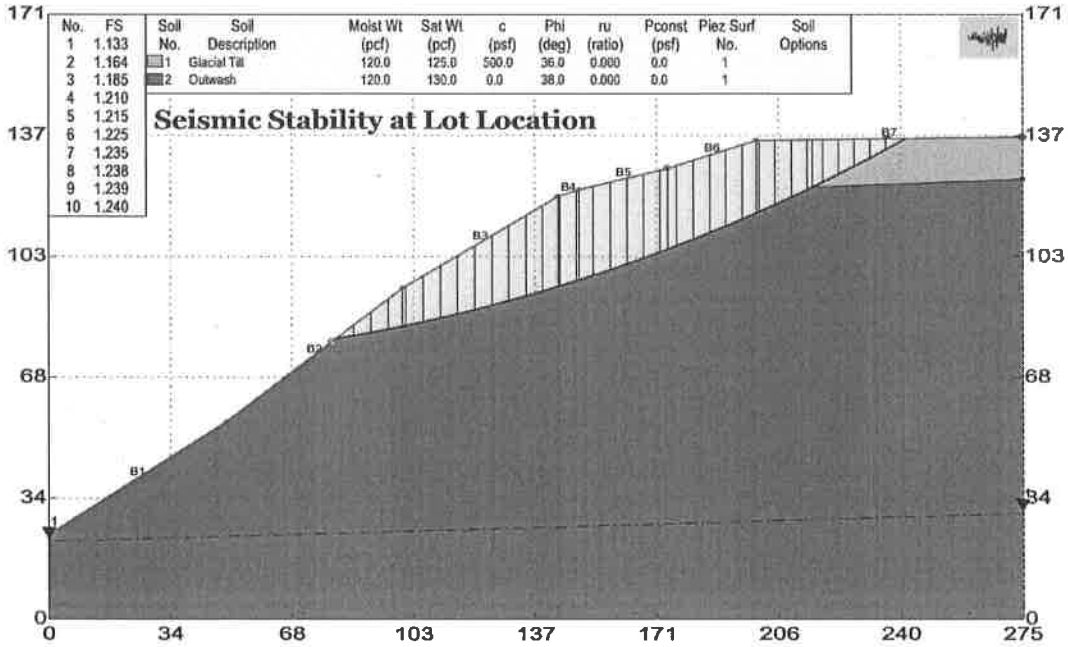
GEOSTASE© by GREGORY GEOTECHNICAL SOFTWARE

PLATE C.1

Proposed Short Plat
7435 NE 129th Street

Cobalt Geosciences, LLC

\KIRK OASIS.gsd



GEOSTASE FS = 1.133

Simplified Bishop Method

GEOSTASE Slope Stability Analysis

GEOSTASE© by GREGORY GEOTECHNICAL SOFTWARE

PLATE C.1

COBALT GEOSCIENCES

Proposed Short Plat
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SLOPE STABILITY FIGURE D1

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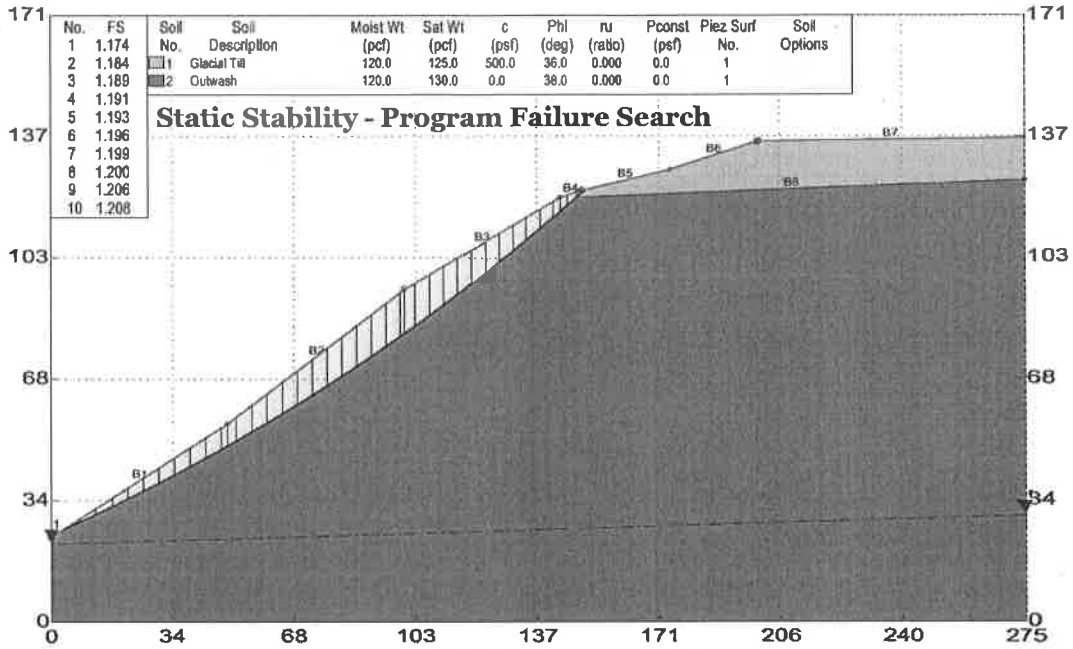
cobaltgeo@gmail.com

Proposed Short Plat
7435 NE 129th Street

ENCLOSURE 1

Cobalt Geosciences, LLC

\KIRK OASIS.gsd



GEOSTASE FS = 1.174

Simplified Bishop Method

GEOSTASE
Slope Stability Analysis

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PLATE C.1

Proposed Short Plat
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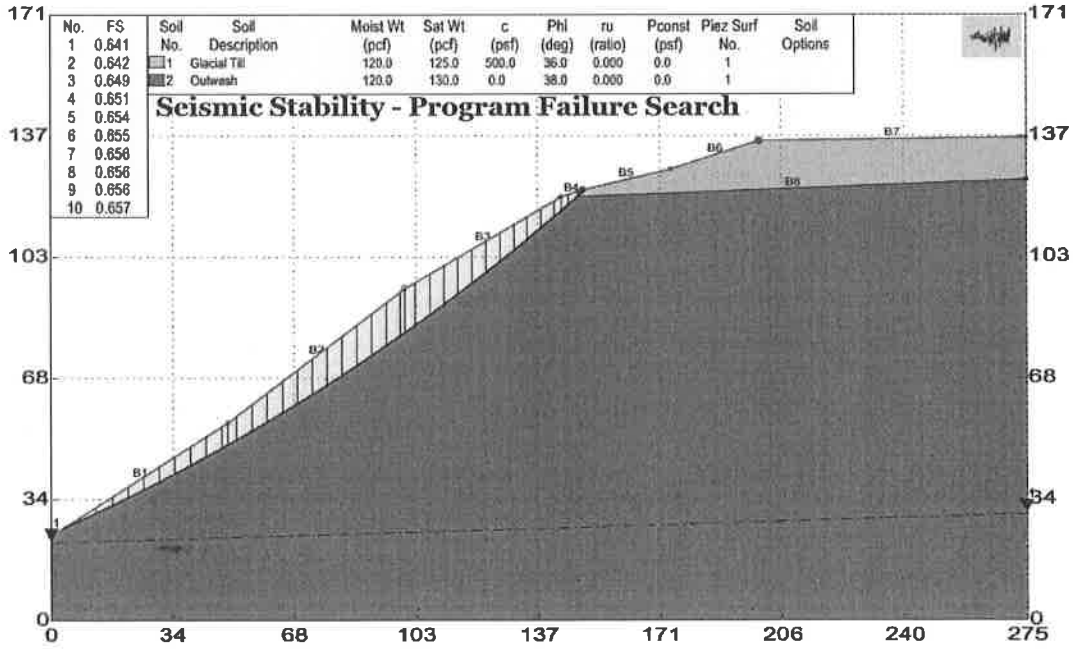

GEOSTASE FS = 0.641

Simplified Bishop Method

GEOSTASE
Slope Stability Analysis

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PLATE C.1

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Proposed Short Plat
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SLOPE STABILITY FIGURE D2

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COBALT GEOSCIENCES

Cobalt Geosciences, LLC
P.O. Box 82243
Kenmore, Washington 98028

August 12, 2019

Shawn Anjaz and Zelly White
C/O Schuyler Tutt
Medici Architects

RE: Plan Review and Response to Comment
Proposed Five Lot Plat
7435 NE 129th Street
Kirkland, Washington

In accordance with your authorization, Cobalt Geosciences, LLC has prepared this letter to present responses to a recent City of Kirkland comment regarding stormwater (June 14, 2019 letter) with relevant geotechnical recommendations.

In preparation of this letter, we have reviewed the following documents:

- Civil Plan "Drainage and Utility Site Plan" prepared by Anstey Engineering dated July 29, 2019
- Geotechnical report prepared by Cobalt Geosciences, LLC dated December 9, 2018
- City comment letter dated June 14, 2019

Recommendations in this letter supersede relevant aspects in our recent geotechnical report.

Comment Letter Responses

The following item is a paraphrased geotechnical-related comment from the City letter followed by our discussion and recommendations.

Comment discussing 48 inch diameters sumps used to detain or infiltrate runoff collected from building footing drains.

The updated drainage site plan shows the location of new sump (drywell) excavations near the east sides of Lot's 1 through 4. We understand that these excavations would be filled with washed rock and meant to collect and disperse or infiltrate any runoff from new footing drains around the residences.

Typically, there is minimal runoff collected from footing drains for new houses set at or near existing grades in nearly level areas. Exceptions usually include new houses that have daylight basement levels in which there is perched groundwater in the adjacent cuts, and new houses in areas with very shallow groundwater, such as in flood plains. Our previous geotechnical report discussed an infiltration rate of 0.25 inches per hour in the upper weathered glacial till soils.

The proposed drywells appear suitable for limited infiltration of new footing drain runoff; however, we recommend that the drywell for Lot 4 be moved at least 25 feet to the north. The current location is at the top of a moderately steep slope area. In other words, we recommend a minimum setback of 25 feet for any drywell.

Closure

The information presented herein is based upon professional interpretation utilizing standard practices and a degree of conservatism deemed proper for this project. We emphasize that this report is valid for this project as outlined above and for the current site conditions and should not be used for any other site.

Sincerely,

Cobalt Geosciences, LLC

Exp 6-26-2020

Phil Haberman, PE, LG, LEG
Principal

PH/sc

NATURAL GREENBELT PROTECTIVE EASEMENT

Grantor: , owner of the hereinafter described real property, hereby grants to

Grantee: The City of Kirkland, a municipal corporation.

A natural greenbelt protective easement over and across the following described real property to wit ("Easement Area"):

No tree trimming, tree topping, tree cutting, tree removal, shrub or brush-cutting or removal of native vegetation, application of pesticides, herbicides, or fertilizers; construction; clearing; or alteration activities shall occur within the Easement Area without prior written approval from the City of Kirkland. Application for such written approval to be made to the Kirkland Department of Planning and Community Development who may require inspection of the premises before issuance of the written approval and following completion of the activities. Any person conducting or authorizing such activity in violation of this paragraph or the terms of any written approval issued pursuant hereto, shall be subject to the enforcement provisions of Chapter 170, Ordinance 3719, the Kirkland Zoning Code. In such event, the Kirkland Department of Planning and Community Development may also require within the immediate vicinity of any damaged or fallen vegetation, restoration of the affected area by planting replacement trees and other vegetation as required in applicable sections of the Kirkland Zoning Code. The Department also may require that the damaged or fallen vegetation be removed.

It is the responsibility of the property owner to maintain critical areas and their buffers by removing non-native, invasive, and noxious plants in a manner that will not harm critical areas or their buffers and in accordance with Kirkland Zoning Code requirements for trees and other vegetation within critical areas and critical area buffers.

The City shall have a license to enter the Easement Area (and the property if necessary for access to the Easement Area) for the purpose of monitoring compliance with the terms of this easement.

Development outside of this Natural Greenbelt Protective Easement may be limited by codified standards, permit conditions, or movement of the critical area.

Each of the undersigned owners agree to defend, pay, and save harmless the City of Kirkland, its officers, agents, and employees from any and all claims of every nature whatsoever, real or imaginary, which may be made against the City, its officers, agents, or employees for any damage to property or injury to any person arising out of the existence of said Natural Greenbelt Protective Easement over said owner's property or the actions of the undersigned owners in carrying out the responsibilities under this agreement, including all costs and expenses, and recover attorney's fees as may be incurred by the City of Kirkland in defense thereof; excepting therefrom only such claims as may arise solely out of the negligence of the City of Kirkland, its officers, agents, or employees.

This easement is given to satisfy a condition of the development permit approved by the City of Kirkland under Kirkland File/Permit No. _____, for construction of _____ upon the following described real property:

This easement shall be binding upon the parties hereto, their successors and assigns, and shall run with the land.

DATED at Kirkland, Washington, this day of , .

(Sign in blue ink)

(*Individuals Only*)

OWNER(S) OF REAL PROPERTY (INCLUDING SPOUSE)

_____

_____

_____

(*Individuals Only*)

STATE OF WASHINGTON)
) SS.
County of King)

On this _____ day of _____, _____, before me, the undersigned, a Notary Public in and for the State of Washington, duly commissioned and sworn, personally appeared _____and _____to me known to be the individual(s) described herein and who executed the Natural Greenbelt Protective Easement and acknowledged that _____ signed the same as _____free and voluntary act and deed, for the uses and purposes therein mentioned.
WITNESS my hand and official seal hereto affixed the day and year first above written.

_____
Notary's Signature

_____
Print Notary's Name
Notary Public in and for the State of Washington,
Residing at: _____
My commission expires: _____

(*Partnerships Only*)

OWNER(S) OF REAL PROPERTY

_____
(Name of Partnership or Joint Venture)

_____
By General Partner

_____
By General Partner

_____
By General Partner

(*Partnerships Only*)

STATE OF WASHINGTON)
) SS.
County of King)

On this _____ day of _____, _____, before me, the undersigned, a Notary Public in and for the State of Washington, duly commissioned and sworn, personally appeared _____and _____ to me, known to be general partners of _____, the partnership that executed the Natural Greenbelt Protective Easement and acknowledged the said instrument to be the free and voluntary act and deed of each personally and of said partnership, for the uses and purposes therein set forth, and on oath stated that they were authorized to sign said instrument.

WITNESS my hand and official seal hereto affixed the day and year first above written.

_____
Notary's Signature

_____
Print Notary's Name
Notary Public in and for the State of Washington,
Residing at: _____
My commission expires: _____

(Corporations Only)

OWNER(S) OF REAL PROPERTY

_____
(Name of Corporation)

_____
By President

_____
By Secretary

(*Corporations Only*)

STATE OF WASHINGTON)
) SS.
County of King)

On this _____ day of _____, _____, before me, the undersigned, a Notary Public in and for the State of Washington, duly commissioned and sworn, personally appeared _____and _____ to me, known to be the President and Secretary, respectively, of _____, the corporation that executed the Natural Greenbelt Protective Easement and acknowledged the said instrument to be the free and voluntary act and deed of said corporation, for the uses and purposes therein set forth, and on oath stated that they were authorized to sign said instrument and that the seal affixed is the corporate seal of said corporation.

WITNESS my hand and official seal hereto affixed the day and year first above written.

_____
Notary's Signature

_____
Print Notary's Name
Notary Public in and for the State of Washington,
Residing at: _____
My commission expires: _____

HOLMES POINT OVERLAY ZONE
PROTECTED NATURAL AREA EASEMENT

_____, owner of the hereinafter described real property ("Grantor"), hereby grants to the City of Kirkland, a municipal corporation ("Grantee") a Holmes Point Overlay Zone Protected Natural Area easement ("PNA Easement") over and across the following described real property:

_____

No tree trimming, tree topping, tree cutting, tree removal, shrub or brush-cutting or removal of native vegetation, application of pesticides, herbicides, or fertilizers; construction; clearing; or alteration activities shall occur within the PNA Easement without prior written approval from the City of Kirkland. Application for such written approval is to be made to the Kirkland Department of Planning and Community Development who may require inspection of the premises before issuance of the written approval and following completion of the activities. Any person conducting or authorizing such activity in violation of this paragraph or the terms of any written approval issued pursuant hereto, shall be subject to the enforcement provisions of Chapter 170, Ordinance 3719, the Kirkland Zoning Code. In such event, the Kirkland Department of Planning and Community Development may also require within the immediate vicinity of any damaged or fallen vegetation, restoration of the affected area by planting replacement trees and other vegetation as required in applicable sections of the Kirkland Zoning Code. The Department also may require that the damaged or fallen vegetation be removed.

It is the responsibility of the property owner to maintain the PNA Area by removing non-native, invasive, and noxious plants in a manner that will not harm the PNA and in accordance with Kirkland Zoning Code Chapter 70 requirements for trees and other vegetation within the PNA.

The City shall have a license to enter the PNA Easement (and the property if necessary for access to the PNA Easement) for the purpose of monitoring compliance with the terms of this easement.

Each of the undersigned owners agree to defend, pay, and save harmless the City of Kirkland, its officers, agents, and employees from any and all claims of every nature whatsoever, real or imaginary, which may be made against the City, its officers, agents, or employees for any damage to property or injury to any person arising out of the existence of said PNA Easement over said owner's property or the actions of the undersigned owners in carrying out the responsibilities under this agreement, including all costs and expenses, and recover attorney's fees as may be incurred by the City of Kirkland in defense thereof; excepting therefrom only such claims as may arise solely out of the negligence of the City of Kirkland, its officers, agents, or employees.

This easement is given to satisfy a condition of the development permit approved by the City of Kirkland under Kirkland File/Permit No. _____, for construction of _____ upon the following described real property:

_____

This easement shall be binding upon the parties hereto, their successors and assigns, and shall run with the land.

DATED at Kirkland, Washington, this _____ day of _____, _____.

(Sign in blue ink)

(*Individuals Only*)

OWNER(S) OF REAL PROPERTY (INCLUDING SPOUSE)

_____

_____

_____

(*Individuals Only*)

STATE OF WASHINGTON)
) SS.
County of King)

On this _____ day of _____, _____, before me, the undersigned, a Notary Public in and for the State of Washington, duly commissioned and sworn, personally appeared _____and _____to me known to be the individual(s) described herein and who executed the Public Ingress and Egress Easement and acknowledged that _____ signed the same as _____ free and voluntary act and deed, for the uses and purposes therein mentioned.

WITNESS my hand and official seal hereto affixed the day and year first above written.

_____
Notary's Signature

_____
Print Notary's Name

Notary Public in and for the State of Washington,

Residing at: _____

My commission expires: _____

(*Partnerships Only*)

OWNER(S) OF REAL PROPERTY

_____
(Name of Partnership or Joint Venture)

_____
By General Partner

_____
By General Partner

_____
By General Partner

(*Partnerships Only*)

STATE OF WASHINGTON)
) SS.
County of King)

On this _____ day of _____, _____, before me, the undersigned, a Notary Public in and for the State of Washington, duly commissioned and sworn, personally appeared _____and _____ to me, known to be general partners of _____, the partnership that executed the Public Ingress and Egress Easement and acknowledged the said instrument to be the free and voluntary act and deed of each personally and of said partnership, for the uses and purposes therein set forth, and on oath stated that they were authorized to sign said instrument.

WITNESS my hand and official seal hereto affixed the day and year first above written.

_____
Notary's Signature

_____
Print Notary's Name
Notary Public in and for the State of Washington, Residing at:
_____
My commission expires: _____

(Corporations Only)

OWNER(S) OF REAL PROPERTY

_____

(Name of Corporation)

_____

By President

_____

By Secretary

(*Corporations Only*)

STATE OF WASHINGTON)
) SS.
County of King)

On this _____ day of _____, _____, before me, the undersigned, a Notary Public in and for the State of Washington, duly commissioned and sworn, personally appeared _____and _____ to me, known to be the President and Secretary, respectively, of _____, the corporation that executed the Public Ingress and Egress Easement and acknowledged the said instrument to be the free and voluntary act and deed of said corporation, for the uses and purposes therein set forth, and on oath stated that they were authorized to sign said instrument and that the seal affixed is the corporate seal of said corporation.

WITNESS my hand and official seal hereto affixed the day and year first above written.

_____

Notary's Signature

_____

Print Notary's Name

Notary Public in and for the State of Washington,

Residing at: _____

My commission expires: _____