

time, it may be necessary to re-evaluate specific recommendations in this report and make appropriate changes.

3.1 Exploration Pits

Exploration pits were excavated with a track-mounted excavator. The pits permitted direct, visual observation of subsurface conditions. Materials encountered in the exploration pits were studied and classified in the field by an engineering geologist from our firm. All exploration pits were backfilled immediately after examination and logging. Selected samples were then transported to our laboratory for further visual classification and testing, as necessary.

4.0 SUBSURFACE CONDITIONS

Subsurface conditions at the project site were inferred from the field explorations accomplished for this study, visual reconnaissance of the site, and review of applicable geologic literature. As shown on the field logs, the exploration pits generally encountered either granular glacial sediments or sedimentary rock. The following section presents more detailed subsurface information organized from the youngest to the oldest sediment types.

4.1 Stratigraphy

Forest Duff/Topsoil

A surficial forest duff/organic topsoil layer was encountered at each of the exploration pit locations. The thickness of the topsoil layer ranged from approximately ½ to 1 foot. The forest duff/organic topsoil is not suitable for foundation support or for use in a structural fill.

Vashon Lodgement Till

Sediments encountered below the topsoil at the locations of exploration pits EP-1, EP-7 through EP-10, and EP-12 generally consisted of loose to medium dense, silty sand with gravel. These sediments were observed to become dense to very dense below depths of approximately 2.5 to 5 feet. We interpret these sediments to be representative of Vashon lodgement till. The Vashon lodgement till was deposited directly from basal, debris-laden glacial ice during the Vashon Stade of the Fraser Glaciation approximately 12,500 to 15,000 years ago. The reduced density observed within 2.5 to 5 feet of the ground surface is interpreted to be due to weathering. The high relative density of the unweathered till is due to its consolidation by the massive weight of the glacial ice from which it was deposited. At the location of exploration pit EP-1, the Vashon lodgement till extended to a depth of approximately 8 feet. At the locations of exploration pits EP-7 through EP-10 and EP-12, the till extended beyond the maximum depths explored of approximately 10 to 14 feet.

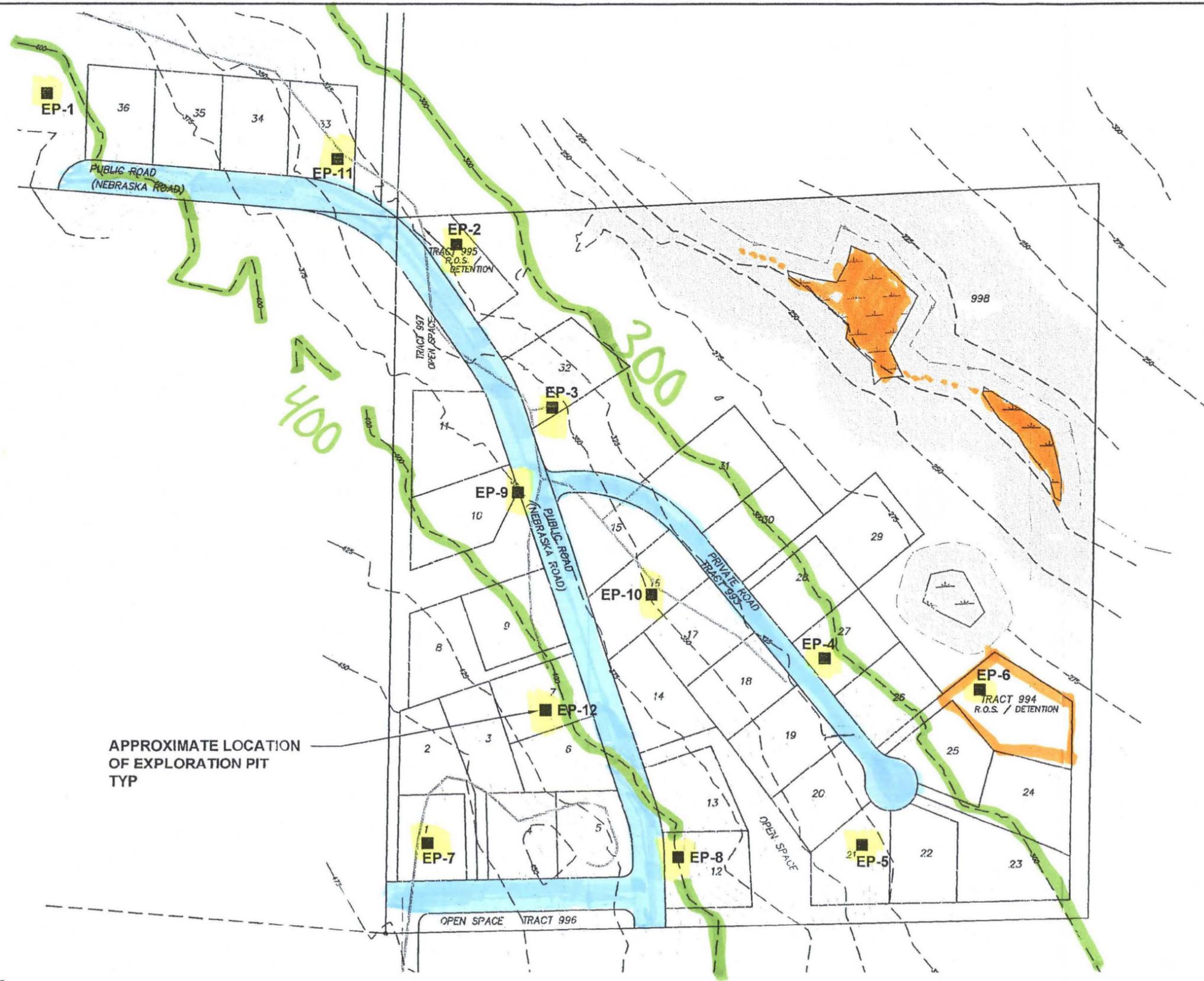
Sedimentary Rock

At the location of exploration pit EP-1, the lodgement till was underlain at a depth of approximately 8 feet by sandstone. At the locations of exploration pits EP-2 through EP-6 and EP-11, the bedrock was encountered directly below the surficial forest duff/topsoil. Where present directly below the forest duff/topsoil layer, the portion of the bedrock within 2 to 4 feet of the ground surface consisted of loose to medium dense, bedrock-derived soil. The rock present below the soil horizon consisted of sandstone and siltstone. The sandstone and siltstone encountered in our explorations is generally moderately hard and was rippable with the Cat 312 excavator used for our exploration. Due to the relatively weak induration of the rock, descriptions of the rock on the attached exploration pit logs are similar to those used to describe soils. At the locations of exploration pits EP-4 and EP-11, the rock contained thin layers or pockets of organic debris that appeared to be low-grade coal. Where encountered, the sedimentary rock extended beyond the maximum depths explored of approximately 11 to 12 feet.

Review of the regional geologic map titled *Geologic Map of the Skykomish River 30- by 60-Minute Quadrangle, Washington* by R.W. Tabor, V.A. Frizzell, Jr., D.B. Booth, R.B. Waitt, J.T. Whetten, and R.G. Zartman (1993) indicates that the area of the subject site is underlain by Vashon lodgement till and an unnamed Tertiary sandstone. Our interpretation of the sediments encountered in our explorations is in general agreement with the regional geologic map.

4.2 Hydrology

Slow to heavy ground water seepage was encountered within the bedrock at depths of approximately 4 to 8 feet in exploration pits EP-5, EP-6, and EP-11. Slow ground water seepage was encountered within the till at depths of approximately 4 to 10 feet at the locations of exploration pits EP-7 through EP-10. In all of the explorations where seepage was encountered, the seepage was limited to a thin zone less than about 6 inches thick. For this reason, and the variable depth and geologic conditions where the seepage was observed, it is our opinion that the seepage is representative of perched ground water. It should be noted that the depth or occurrence of ground water seepage may vary in response to changes in season, precipitation, and site use. Exploration for this study was conducted during the month of March when ground water levels are typically at or near their seasonal high.



APPROXIMATE LOCATION
OF EXPLORATION PIT
TYP

Reference: Land Resolutions

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SITE AND EXPLORATION PLAN
WHISPERWOOD
SHOHOMISH COUNTY, WASHINGTON

FIGURE 2

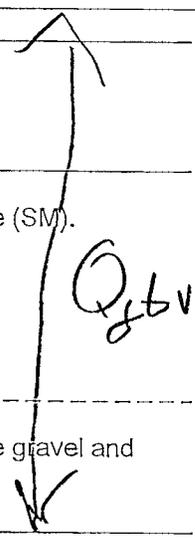
DATE 4/06

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LOG OF EXPLORATION PIT NO. EP-1

TP 33

Depth (ft)	DESCRIPTION
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	Forest duff with 6" of topsoil.
1	Weathered Till Loose to medium dense, moist to very moist, silty SAND with gravel (SM).
2	
3	Vashon Lodgement Till Dense, moist, rust mottled, gray, silty fine SAND with fine to coarse gravel and cobble (SM).
4	
5	
6	
7	Dense, moist to very moist, gray-brown, silty fine to medium SAND with fine to coarse gravel and cobble, cemented (SM).
8	Sandstone
9	Very dense, moist to very moist, rust stained, brown, silty fine SAND with fine to coarse gravel.
10	DEC vs Q _{gph}
11	
12	Becomes gray.
13	Bottom of exploration pit at depth 12 feet No caving or seepage observed.
14	
15	
16	
17	
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19	
20	



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Snohomish County, WA**

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3/21/06

LOG OF EXPLORATION PIT NO. EP-2

TP 34

Depth (ft)	<p>This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.</p>	
DESCRIPTION		
	Forest duff with 1' of topsoil.	
1	Loose to medium dense, weathered bedrock soils.	
2	↑	
3		Siltstone
4		Hard, moist, rust stained, gray-brown, SILT, few fine sand (ML).
5	OEc vs Qcph	
6		
7		
8		
9		
10	Sandstone	
11	Very dense, moist, gray, silty fine SAND (SM).	
12	↓	
13		Bottom of exploration pit at depth 12 feet No caving or seepage observed.
14		
15		
16		
17		
18		
19		
20		

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LOG OF EXPLORATION PIT NO. EP-3

TP. 35

Depth (ft)	DESCRIPTION
	<p>This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.</p>
1	<p>Forest duff with 6" of topsoil. Loose to medium dense, weathered bedrock soils.</p>
2	
3	
4	<p>Siltstone</p>
5	<p>Very stiff, very moist, gray, SILT with sand (MH). <i>Siltstone</i></p>
6	<p><i>sk</i></p>
7	
8	<p>Very stiff to hard, moist, rust stained, gray-brown, SILT with sand (MH).</p>
9	
10	
11	<p>Hard, moist, gray, SILT with sand (MH).</p>
12	<p>Bottom of exploration pit at depth 11 feet No caving or seepage observed.</p>
13	
14	
15	
16	
17	
18	
19	
20	

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LOG OF EXPLORATION PIT NO. EP-4

TP 36

Depth (ft)	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.
	DESCRIPTION
	Forest duff with 6" of topsoil.
1	Loose to medium dense, weathered bedrock soils.
2	
3	
4	Sandstone
5	Dense to very dense, moist, rust stained, gray-brown, medium SAND, trace silt (SP).
6	Dense to very dense, moist, rusty gray, silty SAND; contains thin (<1/8" thick) layers of coal (SM).
7	-----
8	Very dense, moist, gray, fine SAND, trace silt (SP).
9	
10	
11	
12	Bottom of exploration pit at depth 11 feet No caving or seepage observed.
13	
14	
15	
16	
17	
18	
19	
20	

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LOG OF EXPLORATION PIT NO. EP-5

TP 37

Depth (ft)	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.
DESCRIPTION	
1	Forest duff with 6" of topsoil. Loose to medium dense, weathered bedrock soils.
2	Sandstone/Conglomerate
3	Dense to very dense, moist, gray-brown, silty fine to coarse SAND with fine to coarse gravel and cobble (SM).
4	
5	Dense to very dense, moist, gray-brown, silty fine to coarse GRAVEL with fine to coarse sand and cobble (GM).
6	
7	Dense to very dense, moist, gray-brown, silty fine to coarse SAND with fine to coarse gravel and cobble.
8	
9	Dense to very dense, very moist to wet, rust stained, gray-brown, silty fine to coarse SAND with fine to coarse gravel (SM).
10	
11	
12	
13	Bottom of exploration pit at depth 12 feet Moderate seepage at 8'.
14	
15	
16	
17	
18	
19	
20	

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LOG OF EXPLORATION PIT NO. EP-6

TP 38

Depth (ft)	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.
DESCRIPTION	
1	Forest duff with 6" of topsoil. Loose to medium dense, weathered bedrock soils.
2	
3	Sandstone
4	Dense to very dense, moist, gray-brown, fine to coarse SAND with fine to coarse gravel and silt (SP).
5	
6	
7	Dense to very dense, moist, gray-brown, silty fine SAND with fine gravel (SM).
8	
9	Siltstone
10	Hard, moist, gray, SILT, trace fine SAND (ML).
11	
12	
13	Bottom of exploration pit at depth 12 feet No caving observed, heavy seepage at 4'.
14	
15	
16	
17	
18	
19	
20	

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LOG OF EXPLORATION PIT NO. EP-7 TP 39

Depth (ft)	<p style="font-size: small;">This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.</p> <p style="text-align: center;">DESCRIPTION</p>	
1	<p style="text-align: center;">Topsoil</p> <p>Loose, moist, dark brown, silty SAND with thin fibrous roots and organic material.</p>	
2	<p style="text-align: center;">Weathered Vashon Lodgement Till</p> <p>Medium dense, moist to wet, brown, silty SAND with gravel (SM).</p>	
3		
4	<p style="text-align: center;">Vashon Lodgement Till</p> <p>Dense, moist, tan-brown, silty SAND, little gravel with scattered cobbles (SM).</p>	
5	<p>Wet at 6'.</p>	
6		
7	Becomes very dense and blue-gray.	
8		
9		
10		
11	<p>Bottom of exploration pit at depth 10 feet No caving. Slight seepage at 6'.</p>	
12		
13		
14		
15		
16		
17		
18		
19		
20		

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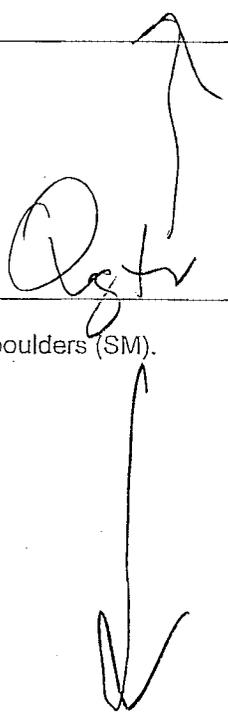
Project No. KE060160A

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LOG OF EXPLORATION PIT NO. EP-8

TP 40

Depth (ft)	<p>This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.</p>
DESCRIPTION	
	Topsoil
1	Loose, moist, dark brown, silty SAND, little gravel, thin fibrous roots.
2	Weathered Vashon Lodgement Till
3	Medium dense, moist, light brown, silty SAND with gravel (SM).
4	
5	Vashon Lodgement Till
6	Dense, moist, gray-brown, gravelly silty SAND, scattered cobbles and boulders (SM).
7	
8	
9	
10	Wet at 10'.
11	
12	
13	Becomes very dense and blue-gray.
14	
15	Bottom of exploration pit at depth 14 feet No caving. Slight seepage at 10'.
16	
17	
18	
19	
20	



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LOG OF EXPLORATION PIT NO. EP-9

TP 41

Depth (ft)	<p>This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.</p>	
	DESCRIPTION	
	Topsoil	
1	Weathered Vashon Lodgement Till	
	Medium dense, moist, red-brown, silty SAND with gravel (SM).	
2		
3		
4	Vashon Lodgement Till	
	Dense, moist, gray-brown, gravelly silty SAND, scattered cobbles and boulders.	
5		
6		
7	Wet at 7'.	
8		
9	Becomes very dense and blue-gray.	
10		
11	Bottom of exploration pit at depth 10 feet No caving. Slight seepage at 7'.	
12		
13		
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15		
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Qytv

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LOG OF EXPLORATION PIT NO. EP-10 **TP 42**

Depth (ft)	DESCRIPTION
	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.
	Topsoil
1	Weathered Vashon Lodgement Till
2	Medium dense, moist, brown, silty SAND, trace gravel (SM).
3	
4	Becomes wet.
5	Vashon Lodgement Till
6	Dense, moist, gray-brown, gravelly silty SAND, scattered cobbles and boulders (SM).
7	
8	
9	
10	Becomes very dense and blue-gray.
11	
12	Bottom of exploration pit at depth 11 feet Slight caving at 6'. Seepage at 4'
13	
14	
15	
16	
17	
18	
19	
20	

Qjtv

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LOG OF EXPLORATION PIT NO. EP-11

TP 43

Depth (ft)	<p>This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.</p>	
	DESCRIPTION	
	Topsoil	
1	Weathered Siltstone	
2	Medium dense, moist, brown, silty SAND, few gravel with organics.	
3		
4	Siltstone	
5	Hard, very moist, red-brown with oxide staining, sandy SILT, trace gravel.	
6		
7	Wet at 7'.	
8	Becomes dark brown/black, few sand, with organics.	
9		
10		
11		
12		
13	Bottom of exploration pit at depth 12 feet No caving. Slight seepage at 7'.	
14		
15		
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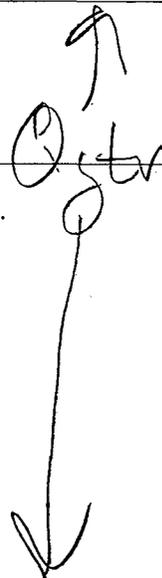
Project No. KE060160A

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LOG OF EXPLORATION PIT NO. EP-12

TP 44

Depth (ft)	This log is part of the report prepared by Associated Earth Sciences, Inc. (AESI) for the named project and should be read together with that report for complete interpretation. This summary applies only to the location of this trench at the time of excavation. Subsurface conditions may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.
DESCRIPTION	
Topsoil	
1	Weathered Vashon Lodgement Till
2	Medium dense, moist, brown, gravelly silty SAND (SM).
3	
4	Vashon Lodgement Till
5	Dense, moist, gray-brown, gravelly silty SAND, scattered cobbles and boulders (SM).
6	
7	
8	
9	
10	Becomes blue-gray.
11	
12	Bottom of exploration pit at depth 11 feet. No caving. No seepage.
13	
14	
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