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TECHNICAL MEMORANDUM

Date: August 27, 2007
To: Mark Mauren, Ueland Tree Farm
From: Phil Struck, Aaron S. Vernik, R.G.
Subject: Preliminary Mineral Resource Characterization, Kitsap Lake Property
cc: File
Project Number: 233-5528-001 02/12
Project Name: UTF Kitsap Lake

INTRODUCTION AND SCOPE

This Technical Memorandum (TM) summarizes mineral resource characterization activities on the Ueland Tree Farm (UTF) Kitsap Lake property located near Bremerton, Washington.

The scope of this TM is limited to discussion of general geologic and mineral resource conditions on the site and is not intended as a comprehensive discussion of geology and hydrogeology. Information contained in this TM summarizes investigations conducted by Parametrix as well as data from other sources. A Hydrogeology Report is currently being prepared in support of land use and SEPA permits.

The report includes discussion of Regional Geology, Sand and Gravel Resources and Basalt Resources on the site. Attachments to this report include Attachment A – Figures; Attachment B – AES Sub-Surface Data; Attachment C – Boring Logs; and Attachment D – Grain Size Test Results.

SUMMARY OF REGIONAL AND SITE GEOLOGY

Kitsap County lies within the Puget Sound lowland, a physiographic province that is bounded by the Cascade and Olympic Mountains. The lowland is a north-south elongate structural trough extending from Thurston and Mason counties, to north of Bellingham, Washington. The regional geologic setting of the Puget Sound Lowland is characterized by sediments deposited during glacial and interglacial intervals that occurred during the Pleistocene and Holocene Epochs (approximately 2.5 million to 15,000 years before present). The glacial sediments range from the 400 to 800 feet in thickness (Hall et al., 1973) and overlie marine sedimentary rocks and oceanic basalt. Five primary depositional units are generally associated with the glacial deposits:

- **Recessional Outwash Deposits** - The melt water from a retreating glacier erodes existing deposits, scours the ground and transports large quantities of sand and gravel into lowland areas.

- Advance Outwash - Streams flowing from the terminus of a glacier carry large quantities of silt, sand, and gravel. These sediments are deposited in lakes or lowland areas. As the glacier advances, coarser gravels overlie the more distal finer grained sediments.
- Till - As the ice advances across the fluvial deposits, it smears the material into the existing land surface forming deposits that are characterized by undifferentiated clay, silt, sand, and gravel units. The till deposits are generally compact from the weight of the overriding glacial ice.
- Morainal Deposits - As the glacial front retreats during interglacial periods, undifferentiated sediment within the melting ice is deposited on the landscape or reworked and transported via outwash streams. Morainal deposits are the poorly sorted, loosely compacted deposits from a block of melting ice.
- Lacustrine Deposits - Water flowing from a retreating glacier will pool in lowland areas and form shallow lakes that are lined with the finer grained sediments (e.g. clay and silt). As these lakes mature, organic matter accumulates in the lake bottom sediment and form peat deposits.

The glacial processes that deposited these units varied greatly geographically and temporally. Localized and rapid fluctuations in depositional energy created very complex and unique stratigraphic relationships. On a regional scale, the deposits can be easily differentiated over large areas; however, on the scale of the proposed project, there can be a great deal of variability between points.

The sedimentary units described in this section represent the primary source for groundwater and aggregate within the Puget Sound Lowland. The loose, gravelly character of the advance and recessional outwash deposits provide good media for the storage and transport of groundwater. Because of the poor water-bearing capacity of the interlying till units, aggregate surface mining of these deposits can generally occur with little or no impact to the deeper units.

Site Geology

Site geology has been characterized by Parametrix in 2007 under contract to UTF, Georesources in 2006 under contract to UTF, and Associated Earth Sciences (AES) in 2000 under contract to Port Blakely Communities. Parametrix investigation consisted of two borings in the northeast sand and gravel portion of the site. The Georesources investigation was completed between March 2006 and October 2006 and consisted of excavation of 83 test pits across the site to a maximum depth of 20 feet below ground surface (bgs), 4 rock cores to depths between 20 to 35 feet bgs, and 25 hammer cores to depths between 72 and 80 feet bgs. The AES investigation was conducted in 1999 and 2000 and consisted of 34 test pits and three borings in the northeast portion of the site. The location of all test pits and borings are shown on the preliminary engineering plans submitted under separate cover.

In summary, site characterization work identified glacial outwash gravels and sand in the northeast portion of the site, glacial till and sand in the north portion of the site, with volcanic basalt rock on the western and southern portions of the site. Generalized cross sections of the site are provided in Attachment A. Cross section A-A' trends east and west across the site, while cross section B-B' trends north and south. Geologic interpretation of the subsurface for these two cross sections was made based on surficial geology maps and inferred based on other regional geologic cross-sections (Kitsap County PUD 1991, and Sceva 1957).

Site Hydrogeology

A hydrogeologic assessment of the site is in preparation. In general, groundwater is encountered in the northern portion of the site at depths of between 30 and 100-ft below ground surface (bgs), depending on location and time of year. In areas of the site underlain by volcanic basalt, groundwater appears limited to perched water within more permeable glacial deposits that lie over the bedrock aquitard. The basalt may transport small quantities of groundwater through limited fractures, but generally acts as an aquitard for the more permeable materials above.

The preliminary engineering drawings for the proposed mine and quarry areas reflect groundwater levels as identified in previous investigations.

SAND AND GRAVEL RESOURCES

Proposed sand and gravel area "A" was delineated based on test pit and boring results by AES and Georesources. Sub-surface investigations by AES (2000) identified several geologic units within the proposed gravel "A" area including advance outwash, recessional outwash, undifferentiated sedimentary silts and lodgement till. Copies of boring logs and a geologic cross section developed by AES are provided in Attachment B. Locations of borings done by AES are also shown on the engineering plans.

To field verify the presence and quality of marketable sand and gravel resources in gravel area "A", Parametrix performed a limited drilling program in 2007 consisting of two hollow stem auger borings in accessible locations. Boring locations are shown on the engineering plans, and logs for the two test holes are provided in Attachment C.

The two borings were advanced by hollow stem auger on May 29, 2007 by Boart Longyear of Tacoma, Washington. Parametrix field geologist logged the soil descriptions during drilling and sampling. Boring B-1 was located on the northeastern portion of proposed gravel area 'A' and was advanced to a depth of 29 feet below ground surface (bgs). Boring B-2 was located in the central area of the proposed gravel area 'A' and was advanced to 44 feet bgs. The soils encountered during were consistent with those characterized by previous investigations.

Both boring B-1 and B-2 contained outwash consisting of brown sand and gravel with varying amounts of silt in the upper portions of the borings, with a silt and till layer encountered below the outwash deposit. The silt/till consisted of a gray silty sand and gravel. Groundwater was not observed in either boring but moisture increased with depth in the outwash and was greatest at the outwash/till interface. Geologic interpretation of the subsurface is depicted in cross-section C-C' (Attachment A), which trends northeast and southwest across the proposed gravel mine "A" area.

Based on the sub-surface investigations conducted in the proposed gravel area "A" site, the proposed excavation area generally consists of a sand and gravel outwash deposit that ranges from about 25-ft in depth on the lower elevation eastern portion of the site, to over 100-ft depth on the higher elevation south and western portion of the site. Outwash deposits are typically characterized as sand and gravel with trace silt, and are encountered to depths of 50-ft or greater on the majority of the site.

Grain Size Analysis

Investigations by AES and Georesources did not include grain size analysis. Therefore, to further characterize sand and gravel resources on the site, representative samples from both Boring B-1 and B-2 were submitted to Krazan and Associates of Poulsbo, Washington for grain size analysis. One composite

TECHNICAL MEMORANDUM (CONTINUED)

sample was collected from 2.5 ft to 30 ft bgs from Boring B-1 since material was consistent from ground surface to the till layer. Two representative composite samples were submitted from Boring B-2; one was collected from 2.5 ft to 20 ft bgs, and one sample was collected from 22 ft to 40 ft bgs.

Grain size test results are summarized in Table 1 and laboratory sheets are provided in Attachment D. Results of the grain size analysis for outwash sand and gravel material indicate that average gravel content in both borings is 28 percent, average sand content is 63 percent and fines averaged approximately 9 percent. It should be noted that sample B-2 (22'-40') was evaluated but was collected from the silt/till unit below the outwash deposit and is therefore not considered representative of the sand and gravel deposit that would be mined at the site. The footprint for gravel area "A", as well as the proposed mine volume are shown on the preliminary engineering plans submitted separately.

Table 1. Summary of grain size analysis, proposed Gravel Area "A" site.

Sample ID	Description	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt/Clay
		(2.9" - 0.75")	(0.75"-0.19")	(0.19"-0.08")	(0.08"-0.02")	(0.02"-0.003")	(<0.003")
B-1 (2.5'-30')	Outwash	2.9	30	11.6	19.6	27.2	8.7
B-2 (2.5'-20')	Outwash	3.3	20.1	13.8	21.9	32.3	8.6
B-2 (22'-40')	Silt/Till	9.5	18.6	11.4	14.1	26.5	19.9
Averages ¹		28.2		63.2			8.7

1. Averages are for outwash material only.

BASALT RESOURCES

Potential quarry areas were selected based on the initial Georesources investigation, as well as other site-specific information including location of environmental critical areas. The Georesources investigation included a total of 29 cores that ranged in depth from 20 feet bgs to 80 feet bgs.

In general, basalt characterization data shows that sub-surface conditions within the proposed quarry areas generally consist of 5 to 10-ft of overburden, underlain by 5 to 10-ft of weathered basalt. Beneath the weathered basalt, more competent rock was observed and the basalt becomes more competent with depth. Fracturing was identified in all cores with fractures being in-filled with mineralization and/or clay materials. Basalt bedrock is massive, and likely extends to several hundred feet bgs in areas identified as potential quarry sites.

Degradation Testing Results

Representative samples of the competent basalt from two core samples were submitted by Georesources for analysis of degradation value. The degradation value is used to determine the suitability of use for rock materials in construction. The table below summarizes data from samples C-1 and C-4. Refer to the Preliminary Geologic Report (Georesources 2006) for boring logs, and the engineering plans for boring locations.

Boring ID	Depth of Sample (ft bgs)	Degradation Value
C-1 ¹	Not indicated on log	26
C-4 ²	Not indicated on log	30

¹ Sample C-1 collected outside the footprint of the proposed quarry area.

² Sample C-4 collected from proposed quarry area "A". Refer to engineering sheets for specific location.

The Washington State Department of Transportation (WSDOT) provides specifications for aggregate material. If quarry material meets these degradation values, as determined by samples collected by WSDOT, the quarry can be used on projects where the contract references WSDOT specifications. Table 2 describes the degradation value requirements for typical WSDOT projects as taken from the WSDOT Standard Specifications (WSDOT 2006).

Table 2. Summary of WSDOT Degradation Specifications.

Material Use	Minimum Degradation Value ¹
Base Course	15
Top Course	25
Asphalt	30
ATB (Asphalt Treated Base)	15

¹ WSDOT Standard Specifications for Road, Bridge, and Municipal Construction – 2006, M 41-10

Based on test results, quarry rock from the site may meet all WSDOT specifications. Additional testing would likely be necessary to confirm locations where that rock meets asphalt specifications.

CONCLUSIONS

In general, sand and gravel and basalt rock on the site appears very suitable for commercial mineral extraction. Aggregate quality, location and volume appear sufficient to warrant development of the infrastructure needed to support mining operations.

Sand and Gravel Resources

Based on the sub-surface investigations conducted in the proposed gravel area “A” site, the proposed excavation area generally consists of a sand and gravel outwash deposit that ranges from about 25-ft in depth on the lower elevation eastern portion of the site, to over 100-ft depth on the higher elevation western portion of the site. Sub-surface investigations show significant variability in depth of outwash deposits on the site with more shallow deposits located along the north and east boundaries, and deeper deposits along the south and west boundary. Outwash deposits are typically characterized as sand and gravel with trace silt, and are typically encountered to depths of 50-ft or greater in the majority of the site.

The outwash deposit is underlain by a low permeable silt/till deposit that consists of hard sandy silt with gravel. The elevation of this low permeable unit varies across the proposed gravel area “A” site, and likely acts as an aquitard.

Gravel content in samples from the outwash deposit average 28 percent, sand content averaged 63 percent, and fines content 8.7 percent. Based on grain size results, the outwash deposit would meet WSDOT specifications for “select borrow”, which has no more that 50 percent passing the No. 40 sieve, and no more than 10 percent passing the No. 200 sieve. Higher silt content is associated with silt and till material found at variable depths in both borings. Preliminary engineering plans identify approximately 2.5 million cubic yards (MCY) of available sand and gravel in the proposed gravel mine area.

Basalt Resources

Basalt is present in significant volumes throughout the south and west portions of the site and coring data indicates that basalt quality generally ranges from good to excellent across most of the site. Degradation values were relatively high and basalt material appears to increase in quality with depth. Cores were not advanced to the full depth of the proposed quarry areas, which range from approximately 100-ft bgs at Quarry A, to over 200-ft bgs at Quarry C. Preliminary engineering plans identify approximately 2.2, 2.1 and 9.1 MCY (13.4 MCY total) of basalt in the proposed Quarry A, B and C area, respectively.

Based on the test results and WSDOT required degradation values, it appears that the basalt resource on site may meet all WSDOT specifications. Additional exploration and testing would likely be required to specifically locate high grade basalt areas that consistently meet asphalt specifications.

Please let me know if you have any questions or need additional information.

Attachments

REFERENCES

- Associated Earth Sciences 1999. Shallow Subsurface Exploration Results, Port Blakely Kitsap Joint Planning Area. Prepared for Port Blakely Communities. July 1999.
- Associated Earth Sciences 2000. Deep Subsurface Exploration Reconnaissance Results, Kitsap Central Business District. Prepared for Port Blakely Communities. September 2000.
- Georesources, LLC. Preliminary Geological Report, Mineral Resource Evaluation, Ueland Tree Farms. Prepared for Ueland Tree Farm. 2006.
- Hall, J.B. and Othberg, K.L. "Thickness of unconsolidated sediments, Puget Sound Lowland, Washington" State of Washington, Department of Natural Resources, Division of Geology and Earth Resources. Geologic Map GM-12. 1974.
- Kitsap County Public Utility District. Kitsap County Groundwater Management Plan. 1991.
- Sceva, Jack E. Geology and Groundwater Resources of Kitsap County Washington, Geological Survey Water-Supply paper 1413. 1957.
- Washington State Department of Transportation. Standard Specifications for Road, Bridge, and Municipal Construction – 2006, M 41-10. 2006.

ATTACHMENT A

Figures



Parametrix DATE: Jun 05, 2007 FILE: BR5528001P02T07.1F-01

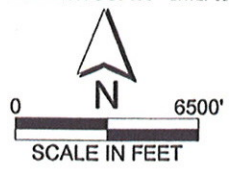
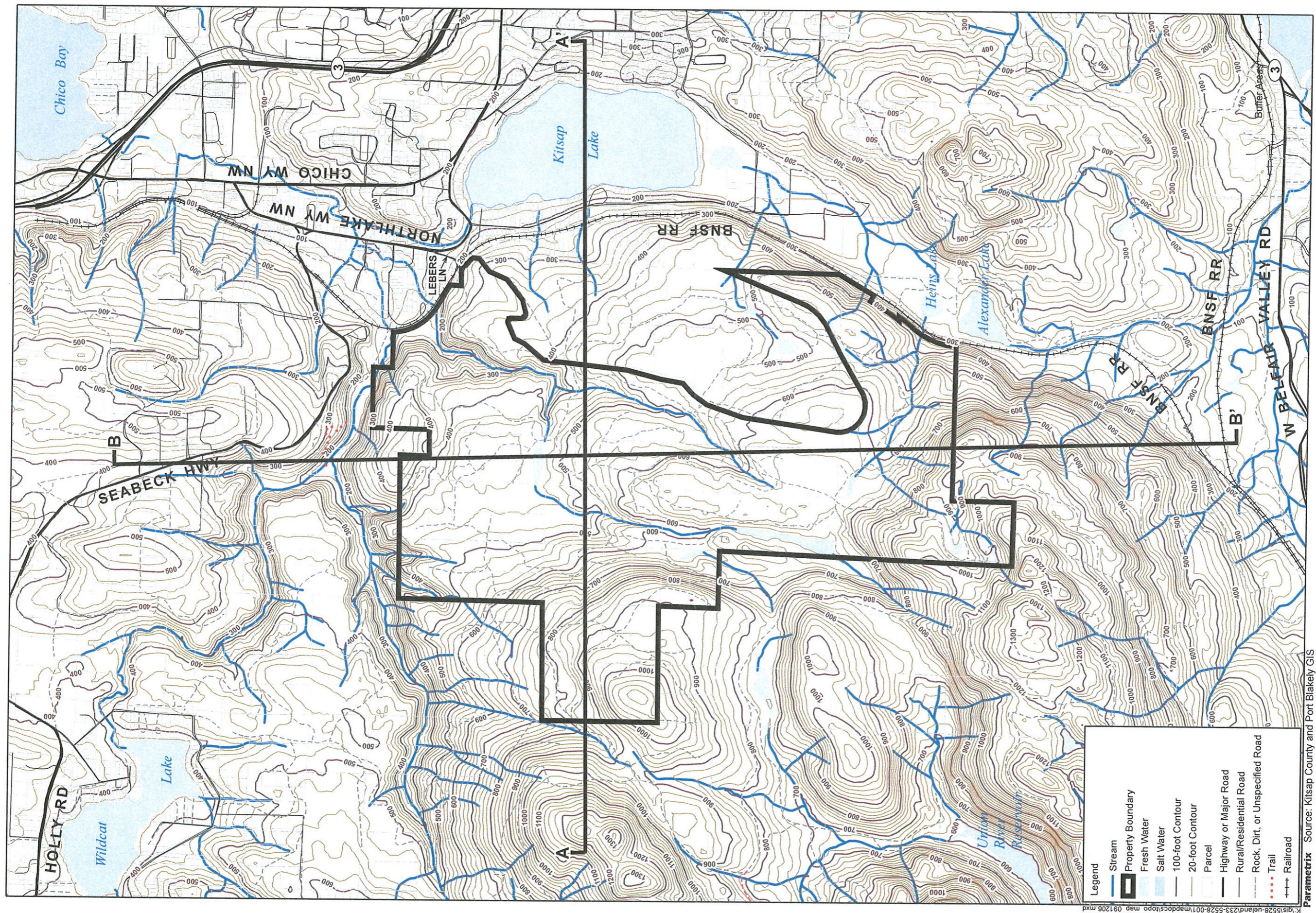


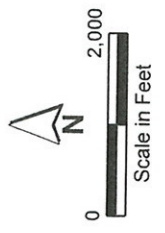
Figure 1-1
Uland Tree Farm
Location Map



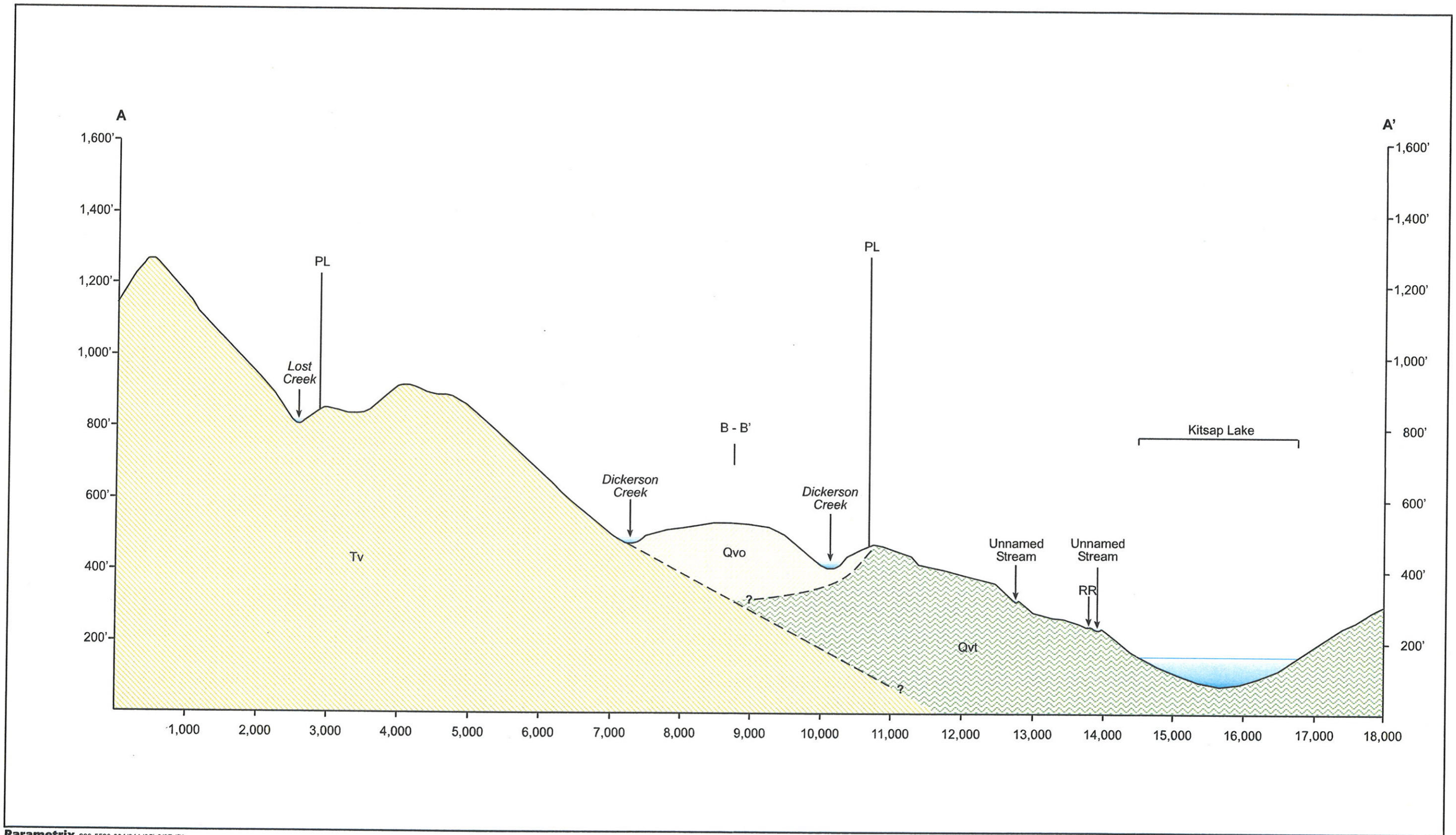
Legend

- Stream
- Property Boundary
- Fresh Water
- Salt Water
- 100-foot Contour
- 20-foot Contour
- Parcel
- Highway or Major Road
- Rural/Residential Road
- Rock, Dirt, or Unspecified Road
- Trail
- Railroad

Parametrix Source: Kitsap County and Port Blakely GIS



**Ueland Tree Farm
Geologic Cross Sections**

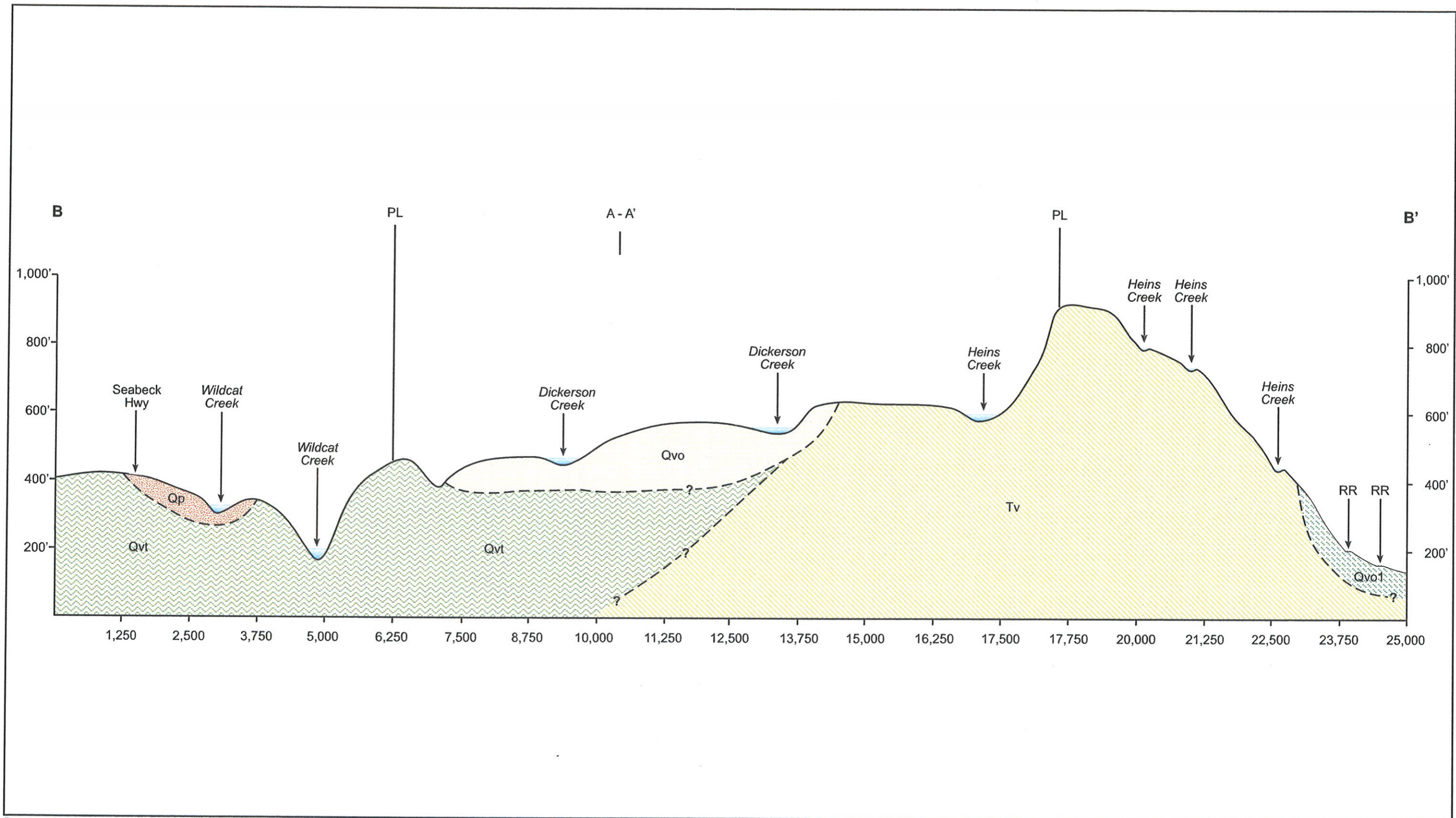


Parametrix 233-5528-001/01A(05) 2/07 (B)

-  Qvt - Till
-  Qvo - Recessional Outwash
-  Tv - Volcanic Rocks
- PL - Property Line
- RR - Railroad Tracks

Approximate Horizontal Scale 1" = 1,300'
 Approximate Vertical Scale 1" = 260'

Cross Section A-A'

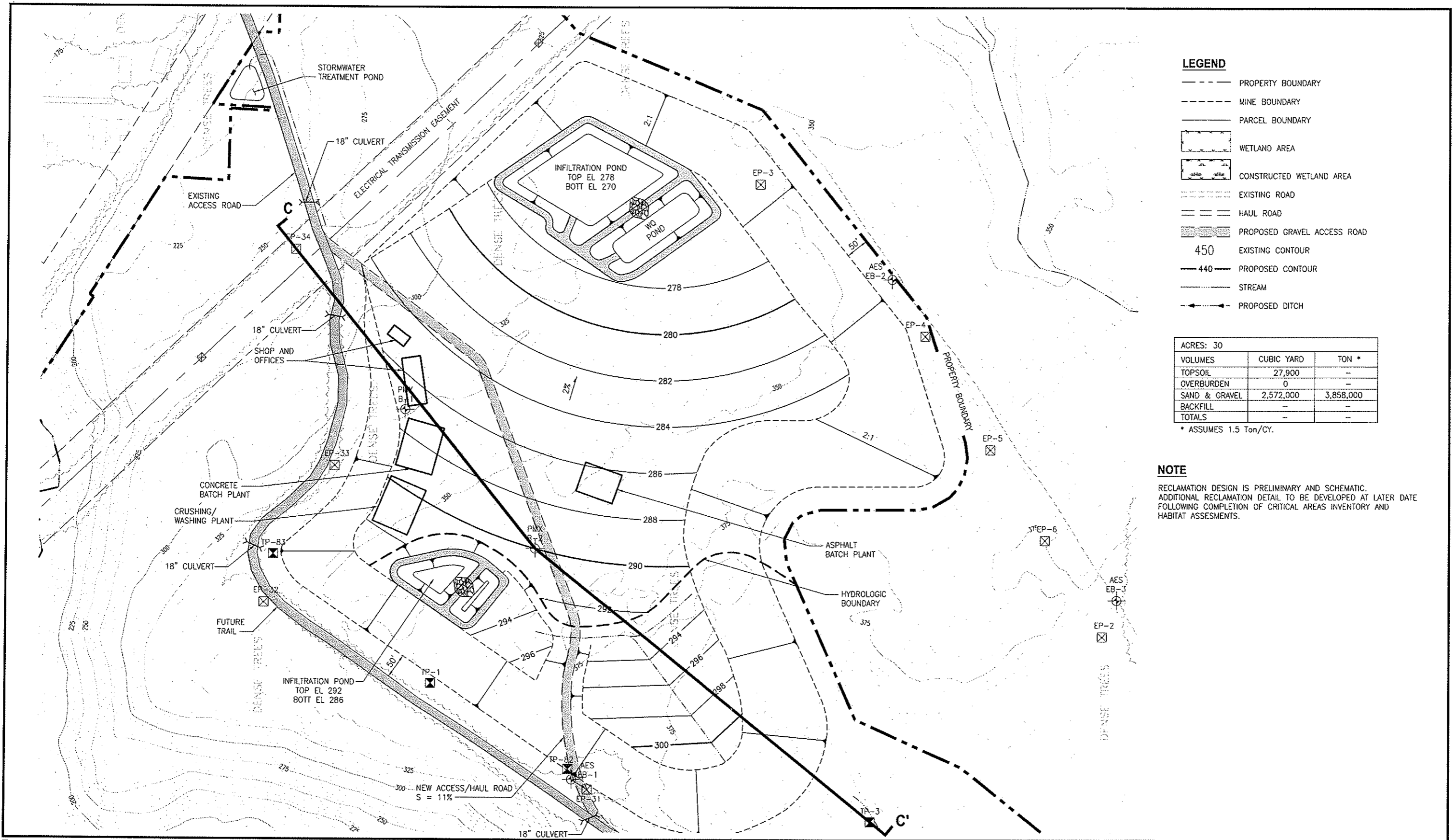


Parametrix 233-5528-001/01A(05) 2/07 (B)

-  Qvt - Till
-  Qvo - Recessional Outwash
-  Qp - Puyallup Sand
-  Qvo1 - Gorst Creek Outwash
-  Tv - Volcanic Rocks
- PL - Property Line
- RR - Railroad Tracks

Approximate Horizontal Scale 1" = 1,700'
 Approximate Vertical Scale 1" = 270'

Cross Section B-B'



LEGEND

- PROPERTY BOUNDARY
- MINE BOUNDARY
- PARCEL BOUNDARY
- WETLAND AREA
- CONSTRUCTED WETLAND AREA
- EXISTING ROAD
- HAUL ROAD
- PROPOSED GRAVEL ACCESS ROAD
- 450 EXISTING CONTOUR
- 440 PROPOSED CONTOUR
- STREAM
- PROPOSED DITCH

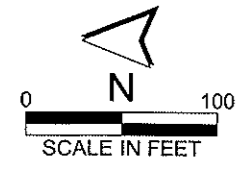
ACRES: 30		
VOLUMES	CUBIC YARD	TON *
TOPSOIL	27,900	--
OVERBURDEN	0	--
SAND & GRAVEL	2,572,000	3,858,000
BACKFILL	--	--
TOTALS	--	--

* ASSUMES 1.5 Ton/CY.

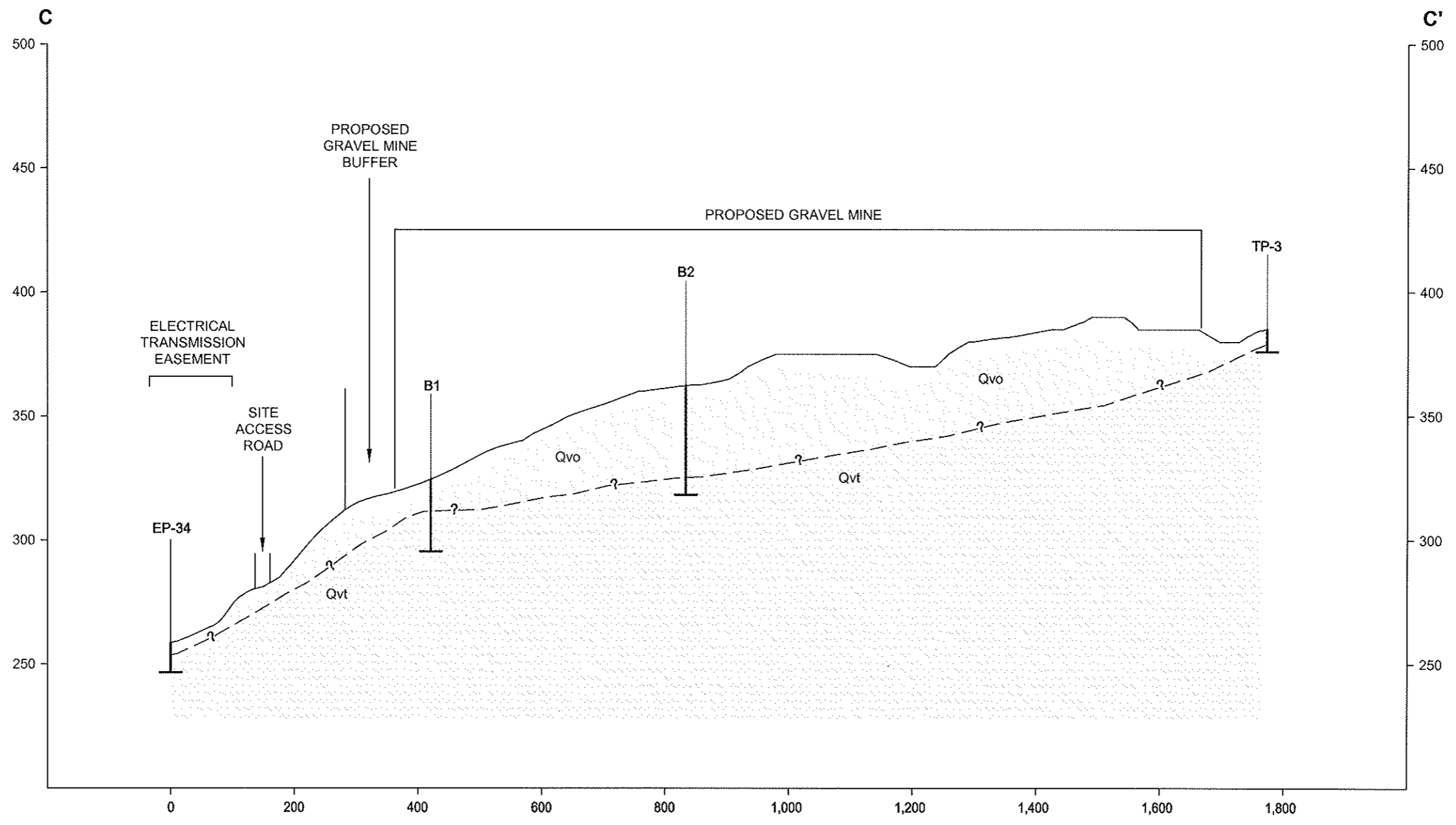
NOTE

RECLAMATION DESIGN IS PRELIMINARY AND SCHEMATIC. ADDITIONAL RECLAMATION DETAIL TO BE DEVELOPED AT LATER DATE FOLLOWING COMPLETION OF CRITICAL AREAS INVENTORY AND HABITAT ASSESMENTS.

Parametrix DATE: Aug 28, 2007 FILE: BR5528001P02T10F-01_A1



**Figure
Ueland Tree Farm
Kitsap Lake
Gravel Mine
Cross Section C-C'**



Parametrix DATE: Sep 14, 2007 FILE: BR5528001P02T10F-02_A1

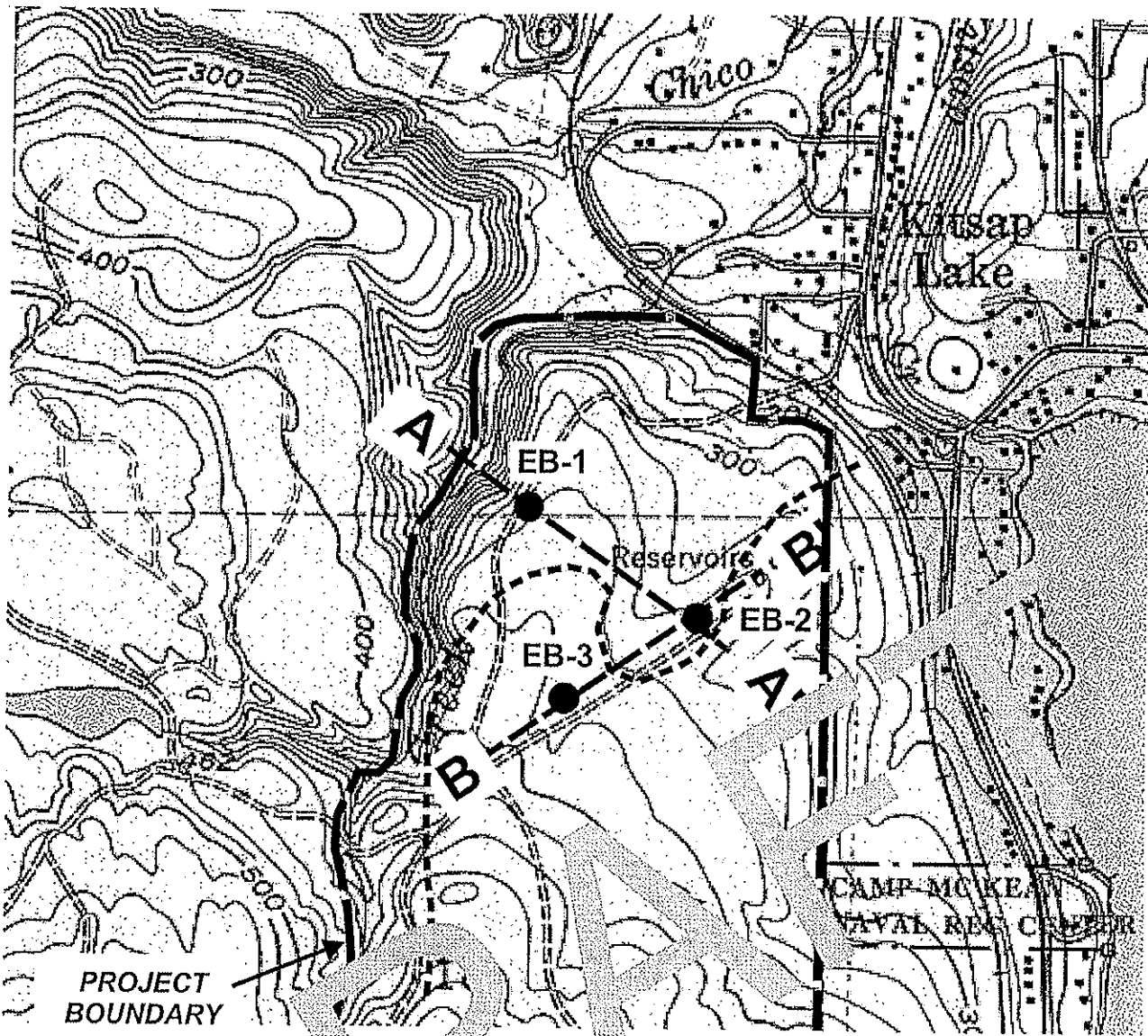
- LEGEND**
- QVT SILTY SAND AND GRAVEL
 - QVO SAND AND GRAVEL, MINOR SILT

NOTE
GROUNDWATER NOT ENCOUNTERED IN B-1 OR B-2

Approximate Horizontal Scale 1" = 200'
Approximate Vertical Scale 1" = 50'

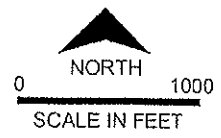
Map
Ueland Tree Farm
Kitsap Lake
Cross Section C-C'

ATTACHMENT B
AES Boring Logs and Cross Section



PROJECT BOUNDARY

- LEGEND
- EB-1 ● Approximate location of exploration boring
 - Proposed development boundary
 - Port Blakely boundary
 - A-----A' Geologic cross section



REFERENCE: TOPO! 1998 WILDFLOWER PRODUCTIONS.



BORING LOCATIONS
BUSINESS DISTRICT SITE
PORT BLAKELY WEST KITSAP JPA
KITSAP COUNTY, WASHINGTON

FIGURE 2
DATE 3/00
PROJ. NO. KH98425A

dema\projects\98-425_w_kitsap_jpa\98425-borings.cdr



Exploration Log

Project Number
KH98425A

Exploration Number
EB-1

Sheet
1 of 3

Project Name Kitsap South Business Park Development
 Location Kitsap Lake, WA
 Driller/Equipment CME-75 HSA Drill Rig
 Hammer Weight/Drop 140# / 30"

Ground Surface Elevation (ft) 358
 Datum USGS 7.5' Quad
 Date Start/Finish 2/25/00, 2/25/2000
 Hole Diameter (in) _____

Depth, ft	S T	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/Foot				Other Tests
							10	20	30	40	
				Concrete surface seal 0' - 2'							
5		S-1		Qvr Medium dense, moist, brown, fine to medium SAND with trace silt and occasional coarse sand and gravel (SP).							
10		S-2				60/8"					▲ 60/8"
		S-3				50/5"					▲ 50/5"
15		S-4		Medium dense, moist, brown, fine to medium SAND with occasional coarse sand, silt and trace silt (SP). Medium dense, moist brown, SILT with occasional fine to medium sand (ML). Medium dense, moist, gray, fine to medium SAND with silt (SP).							
20		S-5		Qva Very dense, moist, brown fine to medium SAND with coarse sand and gravel (SP).							
25		S-6									
				Bentonite seal 2' - 55'							
30		S-7		Dense, moist, brown, fine to medium SAND with occasional coarse sand, gravel and trace silt (SP).							
35		S-8									

AESIBOR 98425.GPJ September 19, 2000

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- ∇ Water Level (03/07/00)
- ▼ Water Level at time of drilling (ATD)

Logged by: GRS
 Approved by:



Exploration Log

Project Number
KH98425A

Exploration Number
EB-1

Sheet
2 of 3

Project Name: Kitsap South Business Park Development
 Location: Kitsap Lake, WA
 Driller/Equipment: CME-75 HSA Drill Rig
 Hammer Weight/Drop: 140# / 30"

Ground Surface Elevation (ft): 358
 Datum: USGS 7.5' Quad
 Date Start/Finish: 2/25/00, 2/25/2000
 Hole Diameter (in): _____

Depth, ft	S T	Samples Graphic Symbol	DESCRIPTION	Well Completion Water Level	Blows/ft	Blows/Foot				Other Tests
						10	20	30	40	
45	S-9		Dense, moist, brown, fine to medium SAND with occasional coarse sand and gravel and trace silt (SP). Dense, moist, brown, fine to medium SAND with silt and occasional coarse sand (SP).	15 24 23						▲47
50	S-10		Very dense, moist, brown, fine to medium SAND with coarse sand and gravel and trace silt, large piece of gravel in shoe (SP)	22 27 36						▲63
55	S-11		Dense, moist, brown, fine to medium SAND with coarse sand and trace silt (SP). Dense, moist, brown, fine SAND with silt (SP). Dense, moist, brown, fine to medium SAND with trace silt (SP).	12 17 26						▲43
60	S-12		Hard, moist, brown SILT (ML). Dense, moist, brown, fine to medium SAND with coarse sand and gravel and trace silt (SP). <i>Well casing 0 - 60'</i>	27 36 49						▲45
65	S-13		Very dense, wet, brown, fine to medium SAND with trace silt (SP). <i>Sand 55' - 70'</i>	25 34 35						▲69
70	S-14		Qvf Hard, wet, brown, SILT with fine sand and occasional medium sand (ML).	14 24 36						▲65
75	S-15			20 32 45						▲77
	S-16			15 31 42						▲73

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- ∇ Water Level (03/07/00)
- ∇ Water Level at time of drilling (ATD)

Logged by: GRS
 Approved by:



**ASSOCIATED
EARTH
SCIENCES, INC**

Exploration Log

Project Number
KH98425A

Exploration Number
EB-1

Sheet
3 of 3

Project Name Kitsap South Business Park Development
 Location Kitsap Lake, WA
 Driller/Equipment CME-75 HSA Drill Rig
 Hammer Weight/Drop 140#/30"

Ground Surface Elevation (ft) 358
 Datum USGS 7.5' Quad
 Date Start/Finish 2/25/00, 2/25/2000
 Hole Diameter (in)

Depth, ft	S T	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level Blows/6"	Blows/Foot				Other Tests	
							10	20	30	40		
85		S-17		Bentonite 70' - 92'	15							
		S-18			28							
		S-19		Hard, moist, brown SILT with fine to coarse sand and gravel (ML).	50							78"
90				Bottom of exploration boring at 92 feet	17							50.5"
95					50.5"							
100												
105												
110												
115												

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT) No Recovery M - Moisture
- 3" OD Split Spoon Sampler (D & M) Ring Sample Water Level (03/07/00)
- Grab Sample Shelby Tube Sample Water Level at time of drilling (ATD)

Logged by: GRS
 Approved by:



**ASSOCIATED
EARTH
SCIENCES, INC**

Exploration Log

Project Number
KH98425A

Exploration Number
EB-2

Sheet
1 of 3

Project Name Kitsap South Business Park Development
 Location Kitsap Lake, WA
 Driller/Equipment CME-75 HSA Drill Rig
 Hammer Weight/Drop 140# / 30"

Ground Surface Elevation (ft) 342
 Datum USGS 7.5' Quad
 Date Start/Finish 2/25/00, 2/25/2000
 Hole Diameter (in)

Depth, ft	S T	Samples Graphic Symbol	DESCRIPTION	Well Completion	Water Level Blows/6"	Blows/Foot				Other Tests
						10	20	30	40	
0-2'			Concrete seal 0-2'							
5	S-1		Qvr Medium dense, moist, brown, fine to medium SAND with trace silt (SP).		2 6					▲11
10	S-2		Medium dense, moist-wet, brown, fine to medium SAND with occasional coarse sand and gravel (SP). Medium dense, moist, SILTY medium to coarse SAND with fine sand (SP).		3 6 16					▲22
15	S-3		Qva Dense, moist, brown, medium to coarse SAND with gravel and occasional fine sand and trace silt (SP).		10 17 19					▲36
20	S-4				17 19 21					▲40
25	S-5				9 21 31					▲52
30	S-6				50/5"					▲50/5"
35	S-7		Bentonite seal 2' - 70' Very dense, moist, brown, SILTY medium to coarse SAND with fine sand and occasional gravel (SM). Very dense, moist, SILTY fine SAND with medium coarse sand and gravel (SM).		19 31 50					▲71

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- Water Level (03/07/00)
- Water Level at time of drilling (ATD)

Logged by: GRS
 Approved by:



Exploration Log

Project Number
KH98425A

Exploration Number
EB-2

Sheet
2 of 3

Project Name Kitsap South Business Park Development
 Location Kitsap Lake, WA
 Driller/Equipment CME-75 HSA Drill Rig
 Hammer Weight/Drop 140# / 30"

Ground Surface Elevation (ft) 342
 Datum USGS 7.5' Quad
 Date Start/Finish 2/25/00, 2/25/2000
 Hole Diameter (in)

Depth, ft	S T	Samples Graphic Symbol	DESCRIPTION	Well Completion Water Level Blows/ft	Blows/foot				Other Tests
					10	20	30	40	
45		S-8	Very dense, moist, brown, SILTY medium to coarse SAND with fine sand and occasional gravel (SM).	50/5.5"					50/5.5"
		S-9		50/5"					50/5"
		S-10		50/5"					50/5"
		S-11		50/1"					50/1"
		S-12	Very dense, moist, brown, SILTY fine to coarse SAND with occasional gravel (SM).	50/1"					50/1"
		S-13	Very dense, moist, brown, medium to coarse SAND with fine sand and occasional gravel and trace silt (SP).	50/5"					50/5"
		S-14	Very dense, moist, brown, SILTY fine SAND with medium coarse sand and occasional gravel (SM).	50/2"					50/2"
		S-15		50/2"					50/2"

DRAFT

Well casing 0 - 75'

Sand 70 - 80'

AESIBOR 98425.GPJ September 19, 2000

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- ∇ Water Level (03/07/00)
- ▼ Water Level at time of drilling (ATD)

Logged by: GRS
 Approved by:



Exploration Log

Project Number
KH98425A

Exploration Number
EB-2

Sheet
3 of 3

Project Name: Kitsap South Business Park Development
 Location: Kitsap Lake, WA
 Driller/Equipment: CME-75 HSA Drill Rig
 Hammer Weight/Drop: 140# / 30"

Ground Surface Elevation (ft): 342
 Datum: USGS 7.5' Quad
 Date Start/Finish: 2/25/00, 2/25/2000
 Hole Diameter (in): _____

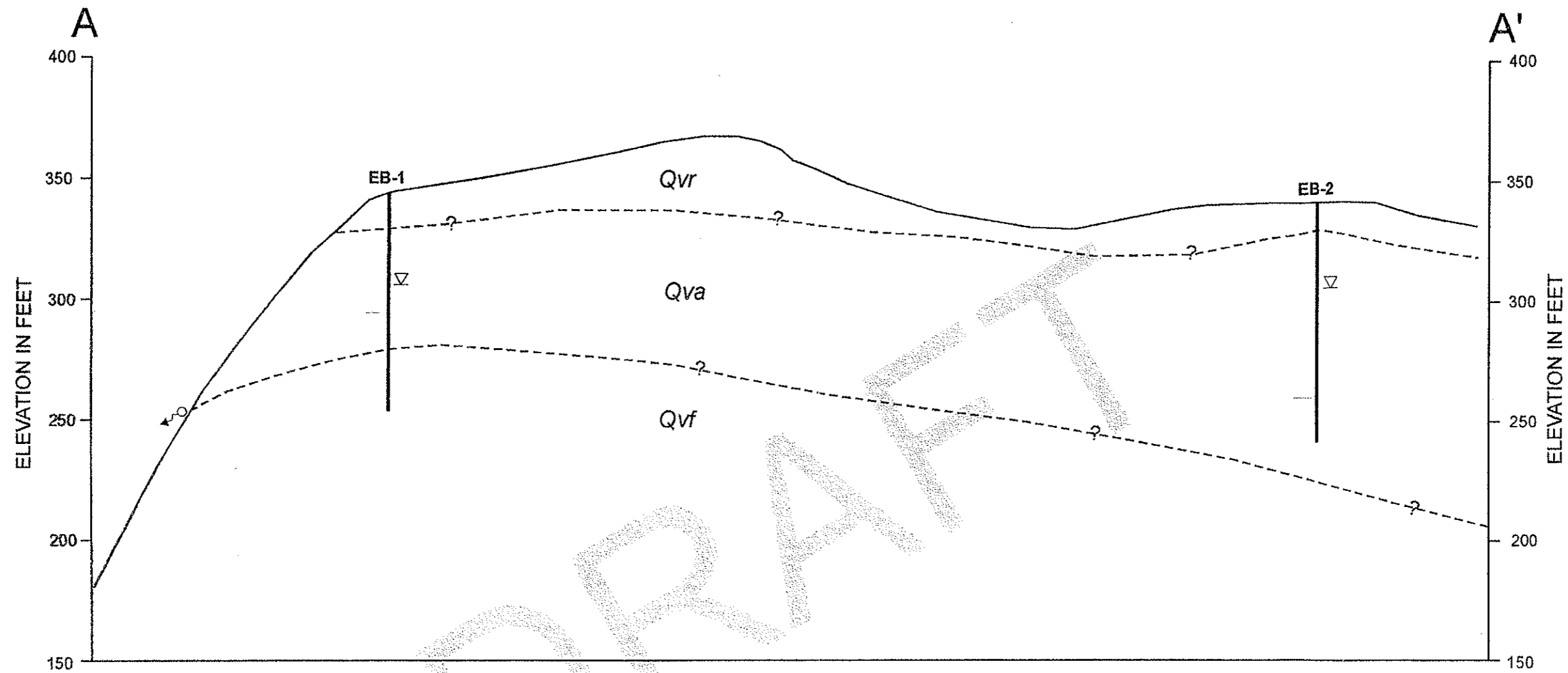
Depth, ft	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/Foot				Other Tests
						Blows/6"	10	20	30	
85	S-16		Very dense, wet, SILTY fine to medium SAND with coarse sand, and gravel (SM).	50/5"						▲ 50/5"
85	S-17		Very dense, moist, brown, SILTY fine to medium SAND with coarse sand and occasional gravel (SM).	50/5"						▲ 50/5"
90	S-18		Bentonite 80' - 102'	50/4"						▲ 50/4"
95	S-19			50/4"						▲ 50/4"
100	S-20			50/4"						▲ 50/4"
105				Bottom of exploration boring at 102 feet Piezometer DW-2 was completed in 80 foot deep boring approximately 10' south of EB-2.						

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT) No Recovery M - Moisture
- 3" OD Split Spoon Sampler (D & M) Ring Sample Water Level (03/07/00)
- Grab Sample Shelby Tube Sample Water Level at time of drilling (ATD)

Logged by: GRS
 Approved by: _____

AESIBOR 98425.GPJ September 19, 2000



LEGEND

- Qvr Vashon recessional outwash
- Qva Vashon advance outwash
- Qvf Vashon glaciolacustrine deposits
- Approximate geologic contact
- ▽ Water level in piezometer on 3/7/00
- Approximate location of spring
- EB-1 Exploration boring

HORIZONTAL SCALE IN FEET
 0 200
 0 50
 VERTICAL SCALE IN FEET

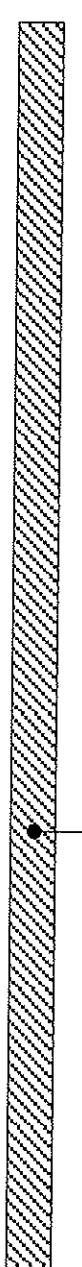
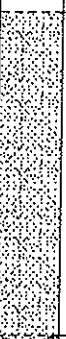


EAST-WEST CROSS SECTION A - A'
 KITSAP CENTRAL BUSINESS DISTRICT AREA
 PORT BLAKELY
 KITSAP LAKE, WASHINGTON

FIGURE 4
 DATE 3/00
 PROJ. NO. KH98425A

ATTACHMENT C
Parametrix Boring Logs

Boring Log

Boring ID: B-1	Drilling Company: Boart Longyear	Sheet 1 of 2
Project Name: Kitsap Lake	Drilling Method: Hollow Stem Auger	Drilling Date: 5/29/07
Project #: 233-5528-001	Logged by: Lara Linde	Boring Depth: 29 ft
Location: Kitsap Lake	Checked by: Ingmar Saul, R.G.	Depth to Water: NA
		Boring Elev: 320 ft est.

Depth (ft)	U.S.C.S	Lithologic Symbol	Description/Classification of Materials	Sample			Boring Diagram	Depth (ft)
				Standard Pen (N)	Sample ID	Recovery		
0			Ground Surface					0
0 - 4.5	SP		Dark brown fine to medium grained SAND with fine to coarse subrounded to rounded gravel, dry, dense. (Outwash) Color grades to dark gray with depth.	31	B-1-1	12/18		5
4.5 - 9.5	GP		Brown to dark brown sandy fine to coarse subrounded to rounded GRAVEL, moist, dense. (Outwash)	39	B-1-2	14/18		10
9.5 - 15			Rounded cobbles in soil cutting at approximately 10 ft bgs. Fine to coarse rounded gravel in silt/sand matrix, well sorted gravel in soil cuttings from 10 to 15 ft bgs. Brown to dark brown sandy fine to coarse subrounded to rounded GRAVEL, moist, dense. (Outwash)	64	B-1-3	2/18		15

Boring Log

Boring ID: B-1 Project Name: Kitsap Lake Project #: 233-5528-001 Location: Kitsap Lake	Drilling Company: Boart Longyear Drilling Method: Hollow Stem Auger Logged by: Lara Linde Checked by: Ingmar Saul, R.G.	Sheet 2 of 2 Drilling Date: 5/29/07 Boring Depth: 29 ft Depth to Water: NA Boring Elev: 320 ft est.
---	--	--

Depth (ft)	U.S.C.S	Lithologic Symbol	Description/Classification of Materials	Sample			Boring Diagram	Depth (ft)
				Standard Pen (N)	Sample ID	Recovery		
20	SM /GM		Dark gray sandy fine to coarse angular to rounded GRAVEL with silt, damp, dense/compact. (Till)	60	B-1-4	13/18		20
25			Driller noted approximately 2 ft of sand inside augers at approximately 22.5 ft bgs.	50	B-1-5	4/18		25
			Driller adds water at approximately 24 ft bgs.					25
30	SP /GM		Very dark gray fine to coarse grained SAND, wet, loose, grading to dark grayish brown silty fine to coarse GRAVEL with fine to coarse grained sand, damp, dense/compact. (Till)	50	B-1-6	6/18		30
			Bottom of boring at 29 feet bgs.					30

Boring Log

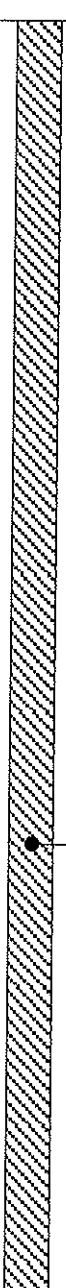
Boring ID: B-2 Project Name: Kitsap Lake Project #: 233-5528-001 Location: Kitsap Lake	Drilling Company: Boart Longyear Drilling Method: Hollow Stem Auger Logged by: Lara Linde Checked by: Ingmar Saul, R.G.	Sheet 1 of 3 Drilling Date: 5/29/07 Boring Depth: 44 ft Depth to Water: NA Boring Elev: 360 ft est.
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Depth (ft)	U.S.C.S	Lithologic Symbol	Description/Classification of Materials	Sample			Boring Diagram	Depth (ft)
				Standard Pen (N)	Sample ID	Recovery		
0			Ground Surface				0	
5	SP		Dark yellowish brown fine to medium grained SAND, trace of fine to coarse angular gravel, dry, loose. (Outwash) Color grading to a dark gray with depth.	10	B-2-1	14/18	5	
10	SP		Very dark grayish brown subrounded to rounded gravel in fine to coarse grained SAND, dry, dense. (Outwash) Iron staining at approximately 4 ft bgs.	38	B-2-2	9/18	10	
15	SP /GP		Very dark grayish brown fine to coarse grained SAND with fine to coarse rounded gravel, damp, dense. (Outwash)	36	B-2-3	4/18	15	
			Rounded cobbles in cuttings at approximately 14.5 ft bgs.				15	

Bentonite Chip Backfill

Boring Log

Boring ID: B-2 Project Name: Kitsap Lake Project #: 233-5528-001 Location: Kitsap Lake	Drilling Company: Boart Longyear Drilling Method: Hollow Stem Auger Logged by: Lara Linde Checked by: Ingmar Saul, R.G.	Sheet 2 of 3 Drilling Date: 5/29/07 Boring Depth: 44 ft Depth to Water: NA Boring Elev: 360 ft est.
---	--	---

Depth (ft)	U.S.C.S	Lithologic Symbol	Description/Classification of Materials	Sample			Boring Diagram	Depth (ft)
				Standard Pen (N)	Sample ID	Recovery		
20	SP		Very dark grayish brown fine to medium grained SAND with fine to coarse rounded gravel, damp, dense. (Outwash)	36	B-2-4	6/18	 <p style="text-align: center; margin-top: 10px;">Bentonite Chip Backfill</p>	20
25	SP /GP		Dark grayish brown rounded gravelly fine to coarse grained SAND with silt and cobbles, moist, very dense. (Outwash)	41	B-2-5	16/18		25
30	GP /GM		Very dark grayish brown sandy fine to coarse angular to rounded GRAVEL with silt and cobbles, moist, very dense. (Outwash)	92	B-2-6	8/18		30

Boring Log

Sheet 3 of 3

Boring ID: B-2

Drilling Company: Boart Longyear

Project Name: Kitsap Lake

Drilling Method: Hollow Stem Auger

Project #: 233-5528-001

Logged by: Lara Linde

Location: Kitsap Lake

Checked by: Ingmar Saul, R.G.

Drilling Date: 5/29/07

Boring Depth: 44 ft

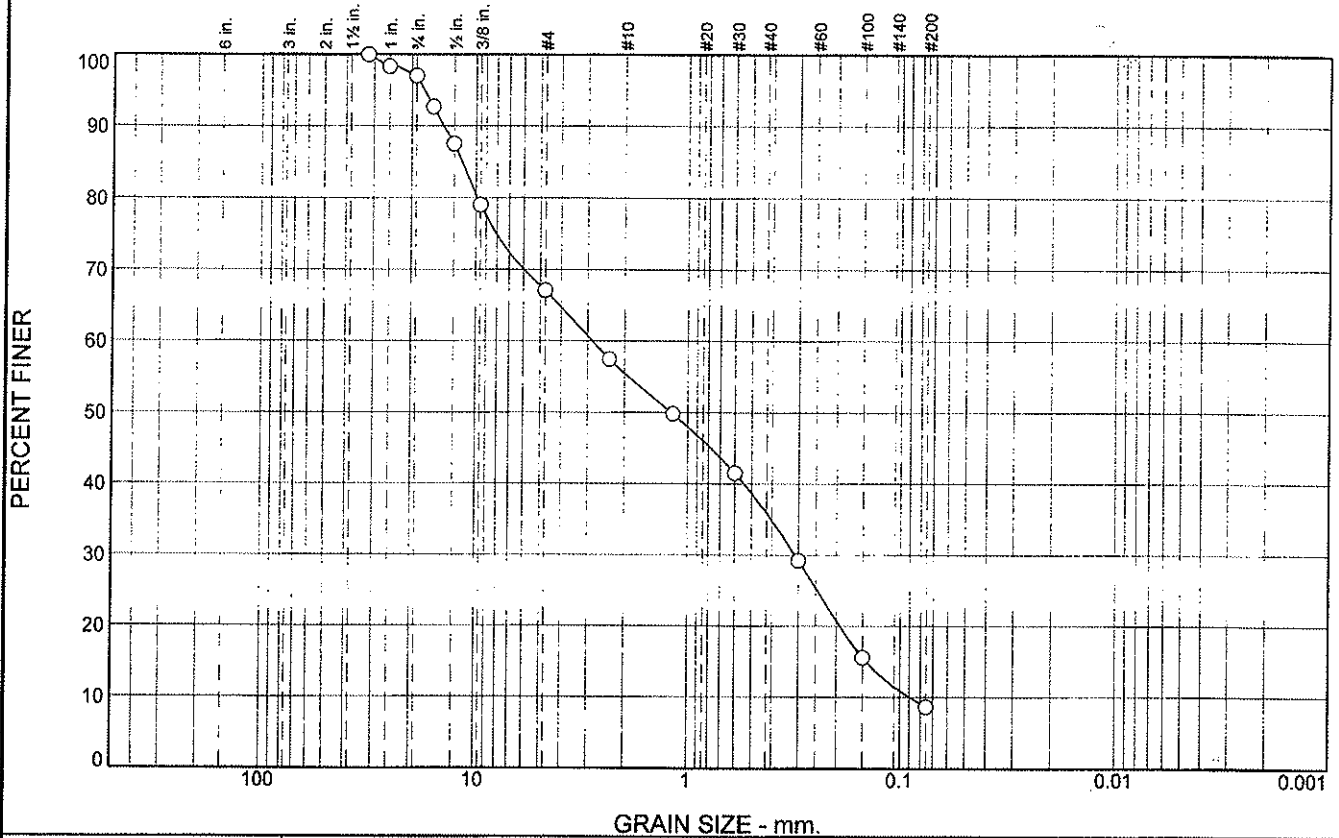
Depth to Water: NA

Boring Elev: 360 ft est.

Depth (ft)	U.S.C.S	Lithologic Symbol	Description/Classification of Materials	Sample			Boring Diagram	Depth (ft)
				Standard Pen (N)	Sample ID	Recovery		
35			Brown to dark brown sandy fine to coarse angular to rounded GRAVEL with silt, trace cobbles, moist, dense. (Outwash) Silt content increases with depth from approximately 27 to 37 ft bgs, hard drilling.	38	B-2-7	12/18		35
40	SM /GM		Dark gray subrounded to rounded gravelly silty fine to coarse grained SAND, dry, hard/dense. (Till) Driller adds water at approximately 37.5 ft bgs.	50	B-2-8	2/18		40
			Same as above. (Till)	82	B-2-9	15/18		
45			Bottom of boring at 44 feet bgs.					45

ATTACHMENT D
Grain Size Test Results

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.9	30.0	11.6	19.6	27.2	8.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.25	100.0		
1.0	98.4		
.75	97.1		
.625	92.7		
.5	87.6		
.375	79.0		
#4	67.1		
#8	57.5		
#16	49.9		
#30	41.6		
#50	29.2		
#100	15.6		
#200	8.7		

Material Description

BROWN SILTY SAND WITH GRAVEL NATIVE

Atterberg Limits

PL= LL= PI=

Coefficients

D₈₅= 11.5902 D₆₀= 2.8388 D₅₀= 1.1957
D₃₀= 0.3114 D₁₅= 0.1441 D₁₀= 0.0895
C_u= 31.71 C_c= 0.38

Classification

USCS= SP-SM AASHTO= A-1-b

Remarks

SAMPLE:P12562
REPORT:94420
DATE:6-7-07

* (no specification provided)

Sample Number: P12562
Location: KITSAP LAKE B-1@ 2.5'-30'

Date: 6-7-07



Client: PARAMETRIX
Project: PARAMETRIX

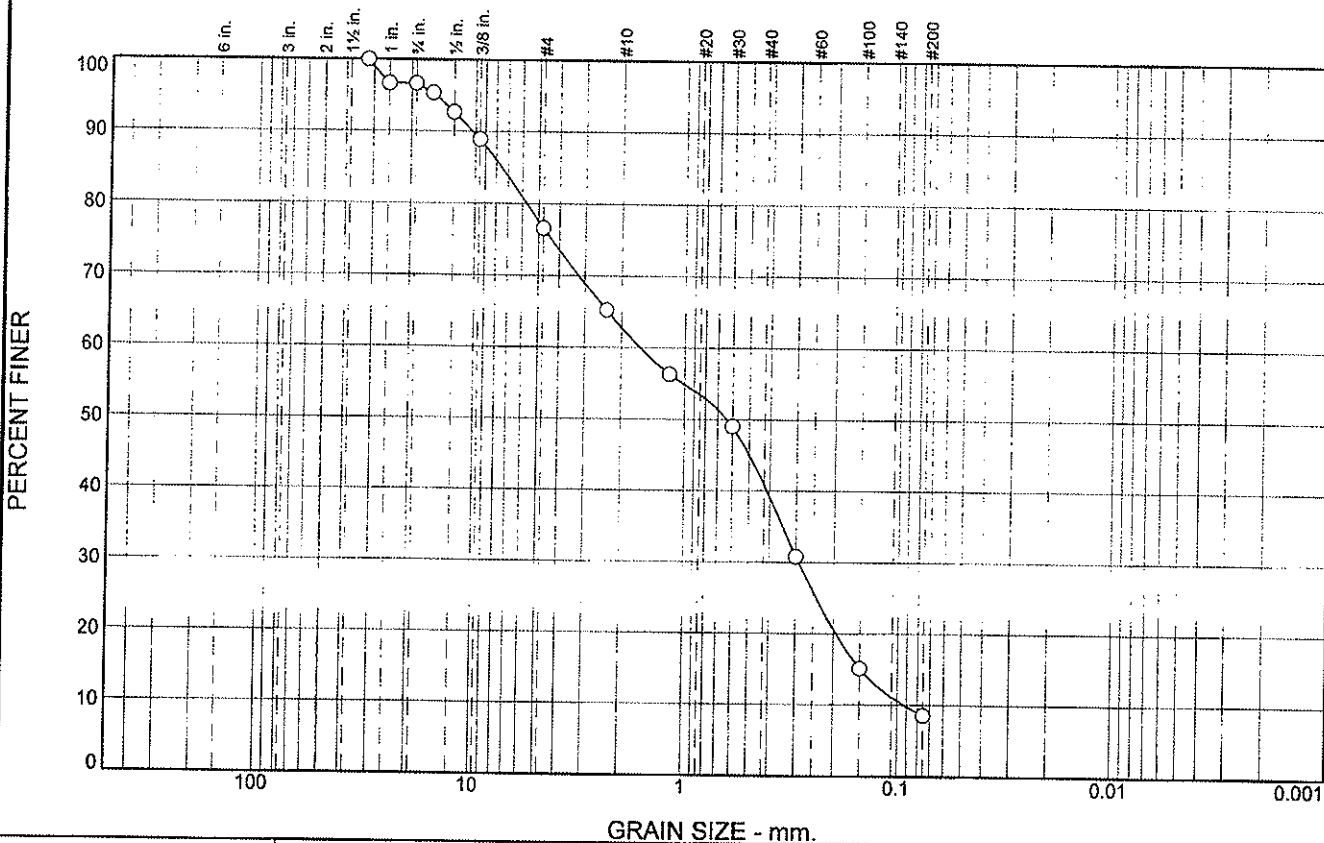
Project No: 106-07001

Figure

Tested By: TIM ALLEN

Checked By: AC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.3	20.1	13.8	21.9	32.3	8.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.25	100.0		
1.0	96.7		
.75	96.7		
.625	95.4		
.5	92.7		
.375	88.9		
#4	76.6		
#8	65.3		
#16	56.4		
#30	49.1		
#50	30.9		
#100	15.1		
#200	8.6		

Material Description

BROWN SILTY SAND WITH GRAVEL

Atterberg Limits

PL= LL= PI=

Coefficients

D₈₅= 7.4840 D₆₀= 1.6290 D₅₀= 0.6319
D₃₀= 0.2910 D₁₅= 0.1486 D₁₀= 0.0924
C_u= 17.64 C_c= 0.56

Classification

USCS= SP-SM AASHTO= A-1-b

Remarks

SAMPLE:P12563
REPORT:94420
DATE:6-7-07

* (no specification provided)

Sample Number: P12563
Location: KITSAP LAKE B-2 @ 2.5'-20' 2/15

Date: 6-7-07



Client: PARAMETRIX
Project: PARAMETRIX

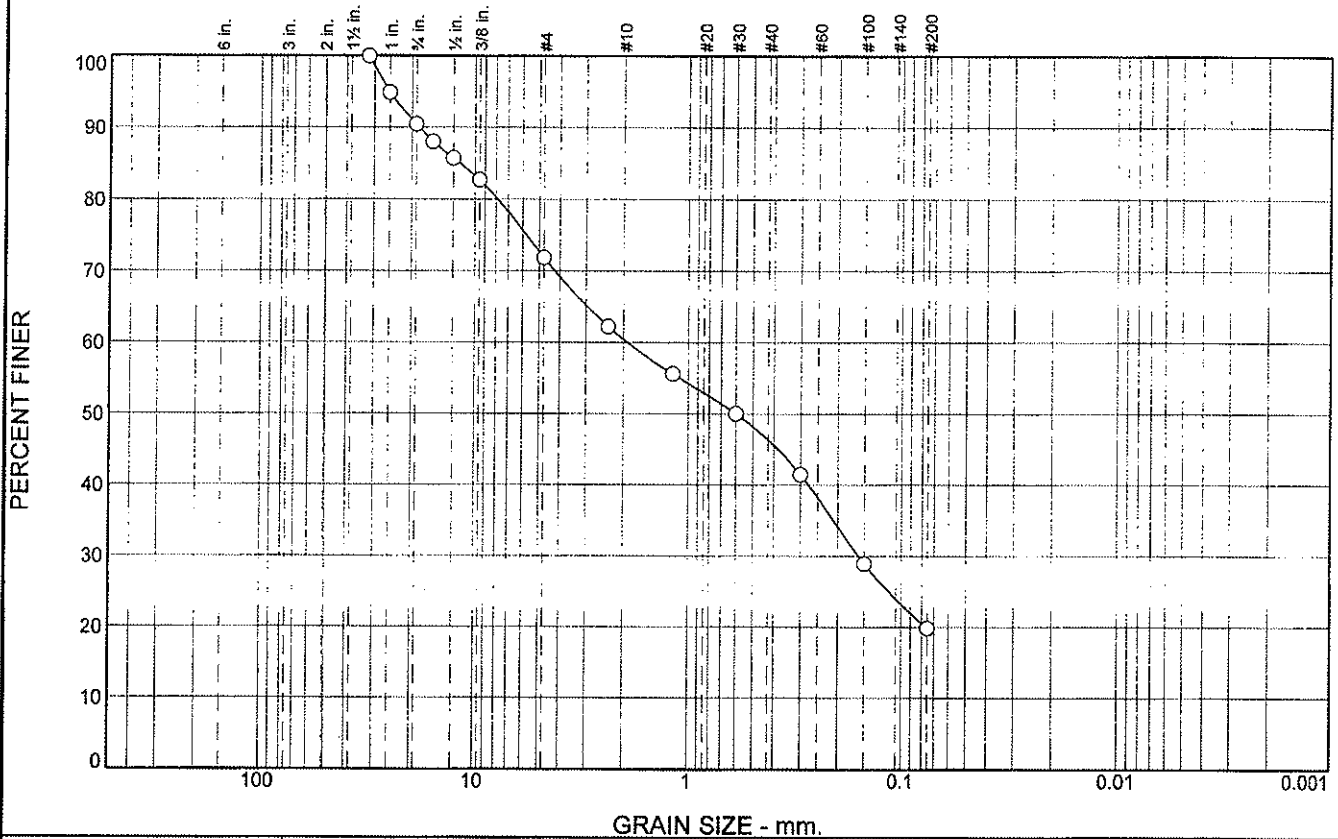
Project No: 106-07001

Figure

Tested By: TIM ALLEN

Checked By: AC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	9.5	18.6	11.4	14.1	26.5	19.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.25	100.0		
1.0	94.9		
.75	90.5		
.625	88.0		
.5	85.7		
.375	82.7		
#4	71.9		
#8	62.3		
#16	55.7		
#30	50.1		
#50	41.5		
#100	29.0		
#200	19.9		

Material Description

BROWN SILTY SAND WITH GRAVEL

Atterberg Limits

PL= LL= PI=

Coefficients

D₈₅= 11.7560 D₆₀= 1.9099 D₅₀= 0.5954
D₃₀= 0.1596 C_u= D₁₀=

Classification

USCS= SM AASHTO= A-1-b

Remarks

SAMPLE:P12564
REPORT:94420
DATE:6-7-07

* (no specification provided)

Sample Number: P12564
Location: KITSAP LAKE B-2 @ 22'-40' 3/15

Date: 6-7-07



Client: PARAMETRIX
Project: PARAMETRIX

Project No: 106-07001

Figure

Tested By: TIM ALLEN

Checked By: AC