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AMENDED SOILS REPORT

Date: 7 Mar 2016 15217

To: KPB Planning Department

Copy: Tim Martin

Integrity Surveys

From: Clayton Spitler, Project Engineer CS

Subject: Swift Water Landing Subdivision
Subdivision Soils Report
2 pages + Attachments

We have performed a soils investigation to determine suitability of Swift Water Landing Subdivision for onsite wastewater systems. The proposed 40.116 acre subdivision consists of 27 lots. Soil conditions encountered are suitable for conventional soil absorption systems (SAS).

Lot areas range from 0.918 acres to 2.376 acres. Tract A contains 4.617 acres and does not require a soils investigation per KPB Code. See attached Working Map for more information. Based on test holes excavated 26 Jan 2016 by Leadens Excavating and logged by Clayton Spitler and Jeremy Kauffman, soils are primarily sand and gravel in likely locations for wastewater systems. Groundwater table was encountered in all test holes except one, at depths ranging from 3.5' (Tract A) to 12'. Observed groundwater table has been estimated as seasonal high water table, based on local knowledge and experience (specifically Kenai River Estates Subdivision to East).

The subdivision is bounded by East Redoubt Avenue right-of-way to the north, South Lark Street right-of-way and private land to the west, Swift Avenue right-of-way to the south, and private land to the east. Subdivision access is via East Redoubt Avenue, South Lark Street, Hester Avenue, Broken Oar Court, or Swift Avenue. The property is within the NW ¼ of Section 34, T 5N, R 10W S.M., near Soldotna, Alaska.

The proposed subdivision is primarily nearly level with a 4-8' drop between the northerly uplands and southerly lowlands. Vegetation includes primarily white spruce, aspen, birch, black spruce, and grasses. Six adjacent lots contain existing private wells within 200' of subdivision, and three have 100' radii that extend into subdivision (see Working Map for well locations). No other wells were observed within 200' of the proposed subdivision.

According to the USDA *Soil Survey of Kenai-Kasilof Area, Alaska*, soils are primarily Tustumena silt loam, nearly level, with some areas of Pincher silt loam and Salamatof peat. "The Tustumena series consists of well-drained soils developed in a moderately deep deposit of wind-laid silty material underlain by water-worked sand and gravel or, in places, by coarse sand. The

boundary between the silty material and the underlying sand and gravel is abrupt. Tustumena soils occupy broad terraces along the Kenai and Kasilof Rivers. For the most part, they support a sparse, young forest of aspen and white spruce, among which there are a few scattered birches." The soils observed by us were similar to the USDA description.

In our professional opinion, sufficient soils information is available based on our site soils investigation, local knowledge and experience, and the USDA Soil Survey. SAS size will likely be 150 square feet per bedroom for all lots except Tract A. Some lots (particularly 13-16) may require a lift station and insulated shallow bed SAS. Soil conditions, percolation rates (if applicable), and separation distance to water table and impermeable soils should be verified at time and location of SAS construction.

Based on the soils investigation, all lots have at least 20,000 contiguous square feet available for on-site wastewater systems. We recommend that the developer of each lot carefully consider locations of existing and future on-lot and nearby wells and septic systems prior to construction. Wastewater treatment and disposal systems must be at least 100' from any private wells, 150' from Class C wells, and 200' from Class A and B wells. For other than single-family or duplex dwellings, ADEC or a qualified engineer should be consulted to determine water supply and wastewater treatment and disposal system requirements.

This investigation was performed according to TET standard procedures to evaluate subdivision soil conditions. This report was prepared solely for Tim Martin to present the findings of our investigation to the Kenai Peninsula Borough for Swift Water Landing Subdivision regarding suitability for on-site wastewater disposal, and is provided based on our knowledge of the area and information collected during our investigation. Information from others considered in this report is believed to be reliable, but no responsibility is assumed for accuracy. Any use of this report, or conclusions drawn, by third parties is at their own risk.

This report is based upon application of scientific principles and professional judgement with resultant subjective interpretation based on information currently available within the limits of scope of service, budget and schedule. Conclusions and recommendations stated herein are intended as guidance and not necessarily a firm course of action, unless explicitly stated. If more definitive conclusions are desired than are warranted by currently available information, additional investigation is recommended.

TET makes no warranties as to merchantability or fitness for a particular purpose. Due to the variable nature of site soils and geology, limited investigation, and lack of a complete record of previous site activities, subsurface conditions may vary from information presented. If conditions are found to differ significantly from those described in this report, please contact us. Please call if you have any questions.

End of Report Text

Attachments

Test Hole Logs (4 pages)
Working Map

Swift Water Landing Subdivision: Test Hole Logs

TEST HOLE 1 (26 Jan 2016)

0 - 0.75'	Organic mat
0.75 - 1.75'	SILT, red-brown, soft, sl moist (ML)
1.75 - 4'	Silty SAND, tan-gray, fine, mod dense, sl moist (SM)
4 - 12'	Gravelly SAND, tr Cobbles, brown-gray, mod dense, sloughing, sl moist to saturated (SP)
TD 12'	Groundwater Table encountered at 9'

TEST HOLE 2 (26 Jan 2016)

0 - 0.75'	Organic mat
0.75 - 1.75'	SILT, red-brown, soft, sl moist (ML)
1.75 - 4'	Silty SAND, tan-gray, fine, mod dense, sl moist (SM)
4 - 12'	Gravelly SAND, tr Cobbles, brown-gray, mod dense, sloughing, sl moist to saturated (SP)
TD 12'	Groundwater Table encountered at 9.25'

TEST HOLE 3 (26 Jan 2016)

0 - 0.75'	Organic mat
0.75 - 1.75'	SILT, red-brown, soft, sl moist (ML)
1.75 - 4'	Silty SAND, tan-gray, fine, mod dense, sl moist (SM)
4 - 12'	Gravelly SAND to Sandy GRAVEL, tr Cobbles, occ Boulders, brown-gray, mod dense, sl moist to saturated (SP-GP)
TD 12'	Groundwater Table encountered at 8.25'

TEST HOLE 4 (26 Jan 2016)

0 - 0.5'	Organic mat
0.5 - 1'	SILT, red-brown, firm, sl moist (ML)
1 - 4'	Sandy SILT, tan, firm, moist (ML)
4 - 12'	Gravelly SAND, tr Cobbles, gray, pockets of black Sand/Gravel concretions, mod dense, moist to saturated (SP)
TD 12'	Groundwater Table encountered at 10'

TEST HOLE 5 (26 Jan 2016)

0 - 0.75'	Organic mat, frozen
0.75 - 1.75'	SILT, red-brown, soft, sl moist (ML)
1.75 - 6'	SAND to Silty SAND, tan-gray, fine, mod dense, sl moist (SP-SM)
6 - 12'	Gravelly SAND, tr Cobbles, brown-gray, mod dense, sl moist to saturated (SP)
TD 12'	Groundwater Table encountered at 8.25'

TEST HOLE 6 (26 Jan 2016)

0 - 0.5'	Organic mat
0.5 - 1'	SILT, red-brown, firm, sl moist (ML)
1 - 6'	SAND, sm Silt, light gray, mod dense, sl moist (SP-SM to SM)
6 - 8'	SAND w Gravel, occ Cobbles, brown, mod dense to dense, moist to wet (SP)
8 - 10'	Sandy GRAVEL, brown, mod dense, saturated, 4" lens of black Sand/Gravel at 8.25' (GP)
TD 10'	Groundwater Table encountered at 8'

TEST HOLE 7 (26 Jan 2016)

0 - 1'	Organic mat
1 - 2.25'	PEAT, dark brown to black, soft to firm, moist to wet (PT)
2.25 - 2.75'	Silty SAND, tan-gray, fine, mod dense, sl moist to moist (SP-SM)
2.75 - 6.5'	Gravelly SAND to Sandy GRAVEL, brown-gray, mod dense, moist to saturated (SP-GP)
TD 6.5'	Groundwater Table encountered at 3.5'

TEST HOLE 8 (26 Jan 2016)

0 - 0.75'	Organic mat, frozen
0.75 - 1.25'	SILT, red-brown, firm, sl moist (ML)
1.25 - 2.5'	Sandy SILT, tan-brown, firm, very moist (ML)
2.5 - 3.5'	Silty SAND, olive-gray, mod dense, moist (SM)
3.5 - 11.5'	Gravelly SAND, num Cobbles, olive to brown w depth, dense, moist to saturated (SP)
TD 11.5'	Groundwater Table encountered at 9'

TEST HOLE 9 (26 Jan 2016)

0 - 0.75'	Organic mat, frozen
0.75 - 1.5'	SILT, red-brown, firm, sl moist (ML)
1.5 - 4'	Silty SAND, gray, mod dense, sl moist (SM)
4 - 7'	Gravelly SAND, tr Cobbles, brown, mod dense, sl moist to saturated (SP)
7 - 9'	Sandy GRAVEL, num Cobbles, gray w blue tint, dense, saturated (GP)
TD 9'	Groundwater Table encountered at 6'

TEST HOLE 10 (26 Jan 2016)

0 - 0.25'	Organic mat, frozen
0.25 - 2'	SILT, brown, firm, sl moist (ML)
2 - 2.5'	Sandy SILT, gray, firm, sl moist (ML)
2.5 - 3.75'	SAND, gray, mod dense, sl moist (SP)
3.75 - 4.75'	Gravelly SAND, occ Cobbles, brown, dense, sl moist (SP)
4.75 - 6.5'	Gravelly SAND, tr Cobbles, gray, dense, sl moist to wet (SP)
6.5 - 6.8'	GRAVEL, pea-sized, rust-colored, mod dense, saturated (GP)
6.8 - 9'	Sandy GRAVEL, tr Silt, num Cobbles, gray-blue, dense, saturated (GP)
TD 9'	Groundwater Table encountered at 6.5'

TEST HOLE 11 (26 Jan 2016)

0 - 0.5'	Organic mat, frozen
0.5 - 1.5'	SILT, red-brown, firm to stiff, sl moist (ML)
1.5 - 2.25'	SILT, tan, firm, moist (ML)
2.25 - 4.5'	SAND w Silt, gray, mod dense, sl moist (SP)
4.5 - 11'	Gravelly SAND, tr Cobbles, gray-brown, dense, moist to saturated (SP)
TD 11'	Groundwater Table encountered at 9'

TEST HOLE 12 (26 Jan 2016)

0 - 0.75'	Organic mat, frozen
0.75 - 1.5'	SILT, red-brown, firm, sl moist (ML)
1.5 - 3'	SAND w Silt, gray, mod dense, sl moist (SP)
3 - 12.5'	Gravelly SAND, tr Cobbles, olive, dense, sl moist to saturated, 2" lens of rust-colored pea-sized Gravel at 9.5' (SP)
TD 12.5'	Groundwater Table encountered at 12'

TEST HOLE 13 (26 Jan 2016)

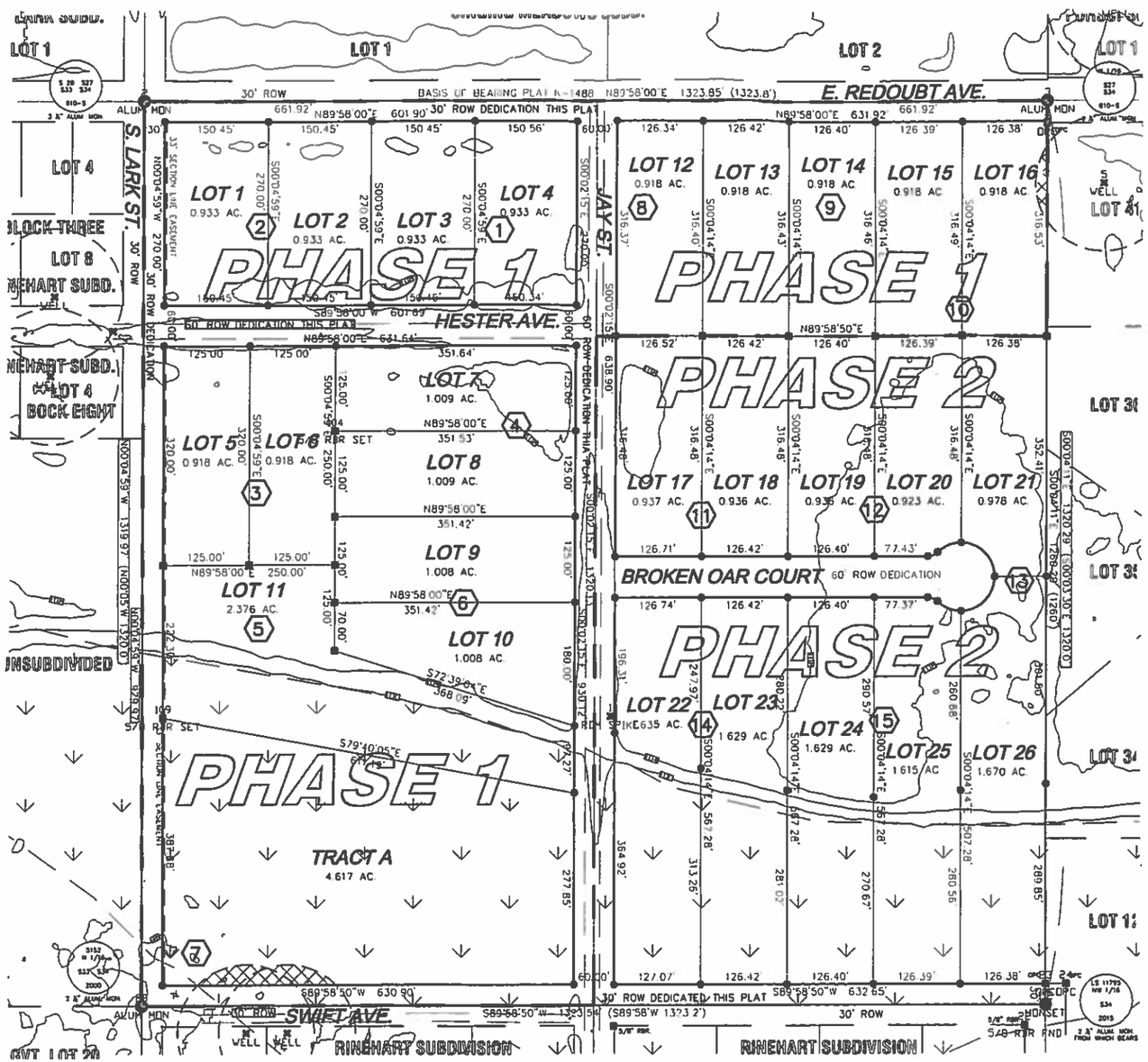
0 - 0.75'	Organic mat, frozen
0.75 - 1.75'	SILT, red-brown, soft, moist (ML)
1.75 - 4.25'	Silty SAND, tan-gray, fine, mod dense, sl moist (SM)
4.25 - 12'	Gravelly SAND to Sandy GRAVEL, tr Cobbles, brown-gray, mod dense, sl moist to saturated (SP/GP)
TD 12'	Groundwater Table encountered at 11.75'

TEST HOLE 14 (26 Jan 2016)

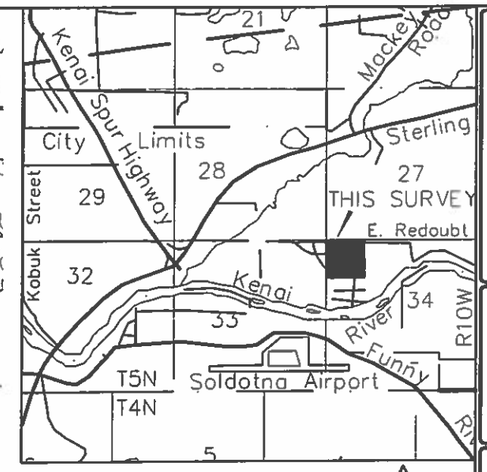
0 - 0.75'	Organic mat, frozen
0.75 - 1.75'	SILT, red-brown, soft, sl moist (ML)
1.75 - 6'	SAND, sm Silt, tan-gray, fine, mod dense, sl moist (SP-SM)
6 - 12'	Gravelly SAND, tr Cobbles, brown-gray, mod dense, sl moist to saturated (SP)
TD 12'	Groundwater Table encountered at 9.5'

TEST HOLE 15 (26 Jan 2016)

0 - 0.75'	Organic mat, frozen
0.75 - 1.75'	SILT, red-brown, soft, sl moist (ML)
1.75 - 4.5'	SAND, sm Silt, tan-gray, fine, mod dense, sl moist (SP-SM)
4.5 - 12'	Gravelly SAND, tr to sm Cobbles, brown-gray, mod dense, sl moist to moist (SP)
TD 12'	No Groundwater Table Encountered



2/1 SITE PLAN
SCALE: 1"= 200'



1/1 VICINITY MAP
SCALE: 1"= 1 MILE

NOTES:
WORKING MAP BASED ON SURVEY PROVIDED BY INTEGRITY SURVEYS INC.

LEGEND

- (1) TEST HOLE (APPROX LOCATION)
- WELL RADIUS
- AREA NOT SUITABLE FOR WASTEWATER DISPOSAL
- AREA MAY NOT BE SUITABLE FOR CONVENTIONAL WASTEWATER DISPOSAL

STATE OF ALASKA
49th
CLAYTON SPITLER
No. CE 13353
15 Feb '16
REGISTERED PROFESSIONAL ENGINEER

REVISIONS

WORKING MAP

SWIFT WATER LANDING
Soldotna, Alaska

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TAURIAINEN ENGINEERING & TESTING

DATE	FEB 2016
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FILE NAME	WM 11X17
PROJ #	15217

SHEET 1 OF 1

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