

Kelly-O'Hern Associates

3240 Moore Avenue – Eureka, CA 95501
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Professional Land Surveyors
Phone and fax: 707-442-7283

January 20, 2020



Trevor Estlow
Humboldt County Planning Division
3015 H Street
Eureka, CA 95501

RE: Tentative Subdivision Map for Slack & Winzler Properties
APN 304-071-018

Dear Trevor:

Enclosed are two copies of the revised tentative map for Slack and Winzler Properties on Elk River Road. The changes are based on sewage disposal testing by Lindberg Geologic Consulting.

The results of the testing indicate that there are that four areas suitable for leach fields. Thus the proposed lot lines have been revised to use these four areas. The revised map has four lots.

Also enclosed are two copies of the sewage testing results. The testing is reported by lot number, but please note that the enclosed revised map is for the revised lots, which are numbered differently from the numbers in the report. The diagrams in the report can be used to easily correlate the previous lot numbers with the current numbers.

Please let me know if you have any questions regarding this information.

Sincerely,
Kelly-O'Hern Associates

Mike O'Hern

LINDBERG GEOLOGIC CONSULTING
David N. Lindberg, CEG
Post Office Box 306
Cuttan, CA 95534
(707) 442-6000

October 19, 2019

Mr. John Winzler
Slack and Winzler Properties LLC
Post Office Box 549
Eureka, California 95502



Project Number: 0091.03

Subject: Report of Findings: Non-Standard On-Site Wastewater Treatment System
Lot #1 of Proposed Subdivision of APN 304-071-018, Elk River Road, Eureka

Dear Mr. Winzler:

Exploration, testing and preliminary conceptual design for a non-standard On-site Wastewater Disposal System on proposed Lot #1 at APN 304-071-018 has been completed. The subject parcel is located in the Ridgewood, Elk River area of Eureka (Figure 1). An annotated copy of the Assessor's parcel map is attached for reference (Figure 2), as is a copy of the proposed subdivision map (Figure 3). Based on the information developed in our limited-scope investigations and materials testing at the locations explored, a shallow pressure distribution, non-standard On-Site Wastewater Treatment System can not be developed to serve a three bedroom single family residence. Specifically, the shallow winter groundwater and poor soil drainage do not meet the minimum standards of the Humboldt County Health Department. We plan to monitor groundwater elevations at two other locations on Lot 1, through the coming winter wet season to assess their potential suitability.

One hand augered soil boring, an exploratory backhoe percolation test pit (TP-5) and two groundwater monitoring wells (MW-9 and MW-10) were located in an accessible area that appeared potentially suitable for primary and or reserve leach fields. Test boring HB-6 was extended to 10-feet below grade. Free groundwater and soil mottling were not encountered in HB-6 on August 14, 2014. HB-6 was sampled at approximately 3.0, and 5.5 feet below existing grade. The 3.0-foot sample was Silty Clay, a Zone-4 (unsuitable) soil, and the sample from the 5.5-foot depth was Silty Clay Loam, also a Zone-4 soil. A soil boring log (Figure 4) and results of the soil boring, and percolation test pit textural analyses are attached.

Soil samples collected at a depth of 4 to 5 feet below the surface in October and November 2018, from TP-5 consisted of Loam (Zone-3, marginal), and Silty Clay Loam (Zone-4) soils. Groundwater monitoring wells were sounded regularly during the 2018-2019 wet weather test period between January 30, and March 21, 2019. Several substantial rainfall events of greater than 0.5" of precipitation in 24 hours occurred during February and March 2019. Groundwater rose to between 5.6 and 4.5 feet below grade in MW 9 and MW-10; which does not provide the necessary five feet of separation between groundwater and the bottom of a disposal trench for adequate effluent treatment.

Proposed Lot #1 is located in the western part of APN 304-071-018. When percolation testing was conducted in March 2016, soils adjacent to HB-6 were found to have low absorption rates but no shallow groundwater. Percolation tests on Lot #1 showed the soil absorbed water at greater than 120 minutes per inch (MPI) at three to four feet below grade in March 2016. At five to six feet, soils absorbed water at 63 MPI. In the limited areas of slopes less than 30 percent

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(707) 442-6000

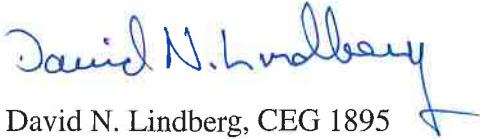
which were accessible during our explorations, test excavations in March 2016 showed that seasonal high groundwater was greater than 6 feet below the existing ground surface around HB-6. Shallow percolation tests in April (2019) in two holes two feet deep resulted in shallow infiltration rates of less than 18 MPI and greater than 120 MPI. April 2019 shallow percolation test results are attached as Sheet 1.

Disposal system development on proposed Lot #1 will require a location with more-permeable soils and deeper winter high groundwater. Based on our observations and experience, it appears that neither standard nor non-standard OWTS can be used in the area around HB-6 on proposed Lot #1. We plan to explore other areas of this large lot during the 2019-2020 wet weather testing period. Specifically, we propose to explore areas in the northwestern and west-central portions of this large lot (Figure 3).

We expect site-specific soil profile exploration, soil sampling and logging with backhoe test pits will be necessary to prove suitable dispersal areas on proposed Lot #1. Hand-augered monitoring wells will be necessary again within potential leachfield areas for wet-season groundwater elevation monitoring. Percolation testing may be necessary if a suitable site can be located. Locations for wet-weather groundwater monitoring can be made accessible for backhoe access in the wet-weather testing season by providing some gravel to operate on.

Please contact me at the number above if you have any concerns or questions.

Sincerely,



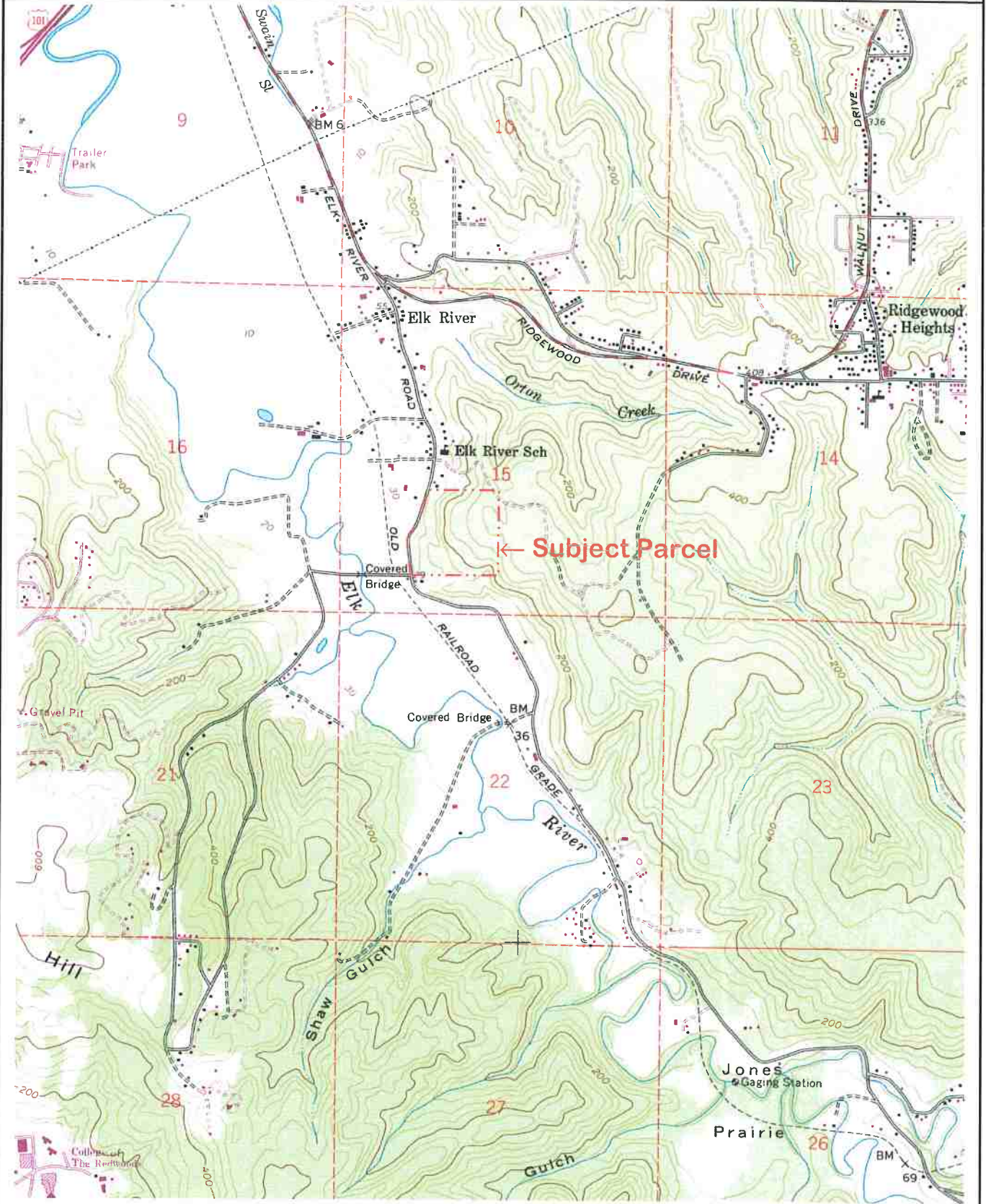
David N. Lindberg, CEG 1895
Lindberg Geologic Consulting

Attachments:

- Location Map (Figure 1)
- Assessor Parcel Map (Figure 2)
- Site Plan Map with Test Locations (Figure 3)
- HB-6 Lot #1 Soil Profile Log (Figure 4)
- Textural Analyses
- Shallow-Depth Percolation Test Report (Sheet 1)

DNL:sll

Lindberg Geologic Consulting	Report of Findings: Non-Standard OWTS Potential Lot #1	Figure 1
Post Office Box 306	"Berta Parcel" – Elk River Road, Eureka, APN: 304-071-018	October 19, 2019
Cutten, CA 95534	Slack – Winzler Properties. LLC, Client	Project 0091.03
(707) 442-6000	Approximate Subject Parcel Location	1" = 2,000'



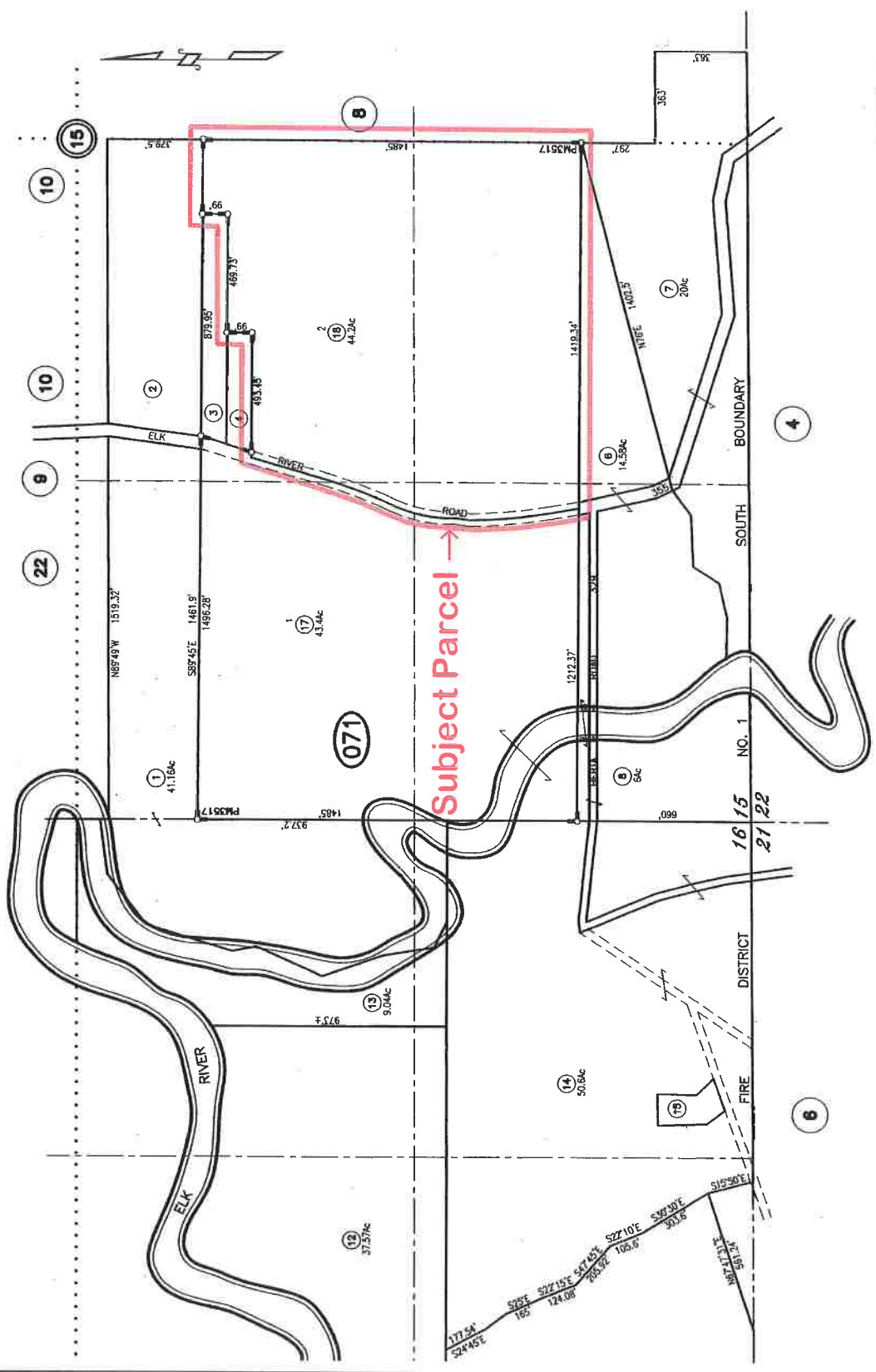
Modified from: USGS "Fields Landing, Calif." 7.5' Quadrangle Map. 1959 (photorevised, 1972) N 

Lindberg Geologic Consulting
 Post Office Box 306
 Cutten, CA 95534
 (707) 442-6000

Report of Findings: Non-Standard OWTs Potential Lot #1
 "Berta Parcel" - Elk River Road, Eureka, APN: 304-071-018
 Slack - Winzler Properties, LLC, Client
 Subject Parcel Location: Humboldt County Assessor's Parcel Map 304-07

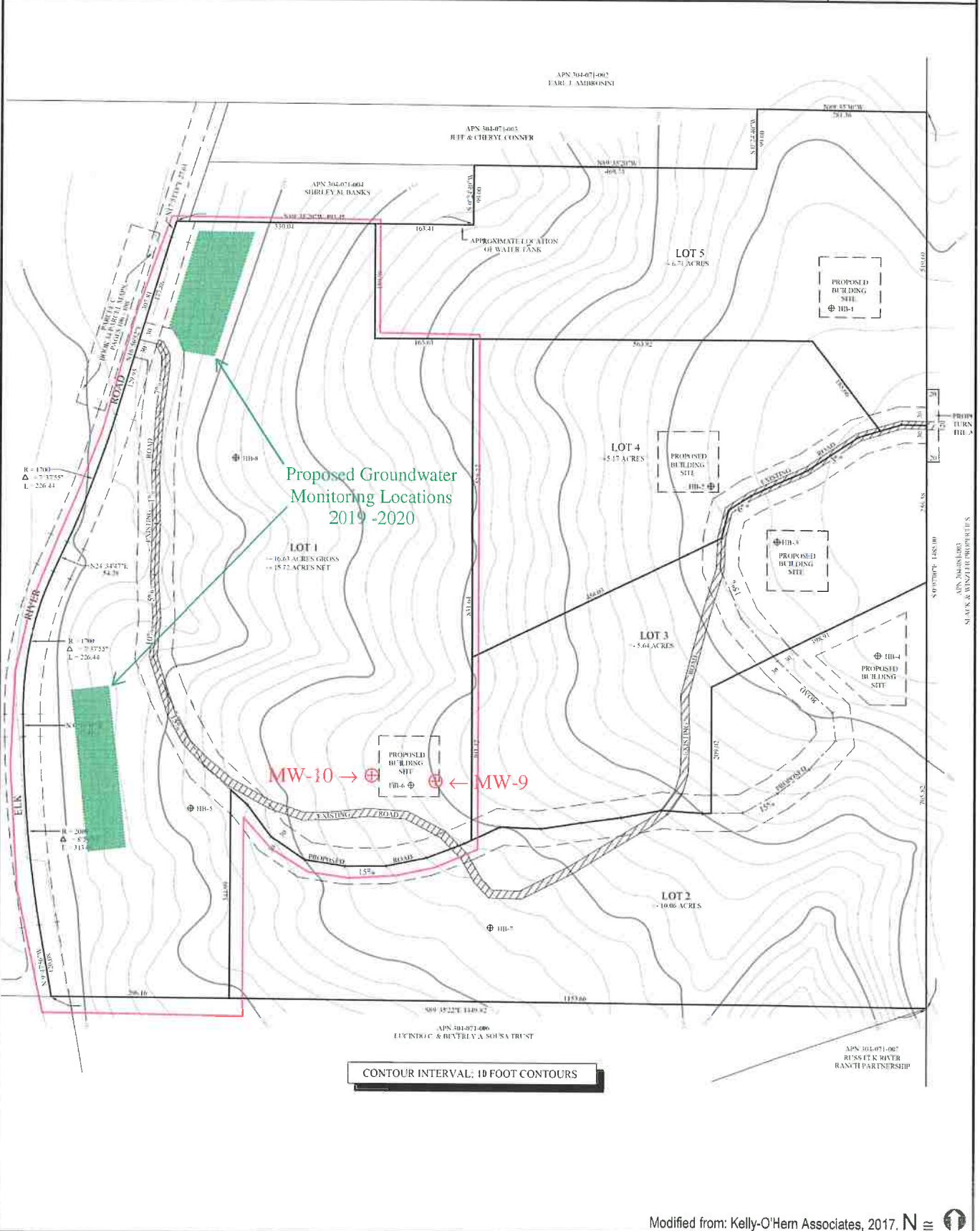
Figure 2
 October 19, 2019
 Project 0091.03
 Scale as Shown

PTN SE1/4 SEC 16 & S1/2 SEC 15 T4N R1W H.B.& M. 304-07



NOTE - Assessor's Block Numbers Shown in Ellipses
 Assessor's Parcel Numbers Shown in Circles.

Lindberg Geologic Consulting	Report of Findings: Non-Standard OWTs Potential Lot #1	Figure 3
Post Office Box 306	"Berta Parcel" – Elk River Road, Eureka, APN: 304-071-018	October 19, 2019
Cutten, CA 95534	Slack – Winzler Properties. LLC, Client	Project 0091.03
(707) 442-6000	Approximate Subject Parcel Location	1" = 230'





Reference: 013034

February 23, 2017

David Lindberg
Lindberg Geologic Consulting
PO Box 306
Cutten, CA 95534

SOIL PERCOLATION SUITABILITY / TEXTURAL ANALYSIS RESULTS

Job Name: Lindberg (Winzler)	Sampled By: DL
Date Sampled: 8/4/14	Date Tested: 2/23/17
Date Received: 2/21/17	AP Number: 304-071-018

<u>Sample ID</u>	<u>Depth</u>	<u>% Sand</u>	<u>% Clay</u>	<u>% Silt</u>	<u>% Coarse Fragments by Volume</u>	<u>Zone</u>	<u>Bulk Density</u>
HB-8	2.5'	39.3	26.8	33.9	1.1	3	*
	Material: Loam						
HB-8	5.5'	34.3	29.8	35.9	0.2	3	*
	Material: Clay Loam						
HB-6	3'	12.5	42.3	45.2	0.0	4	*
	Material: Silty Clay						
HB-6	5.5'	16.4	35.7	47.9	0.0	4	*
	Material: Silty Clay Loam						

* = no peds provided

Regional Water Quality Control Board Zone Descriptions:

Zone 1 - Soils in this zone are very high in sand content. They readily accept effluent, but because of their low silt and clay content they provide minimal filtration. These soils demand greater separation distances from groundwater.

Zone 2 - Soils in this zone provide adequate percolation rates and filtration of effluent. They are suitable for use of a conventional system without further testing.

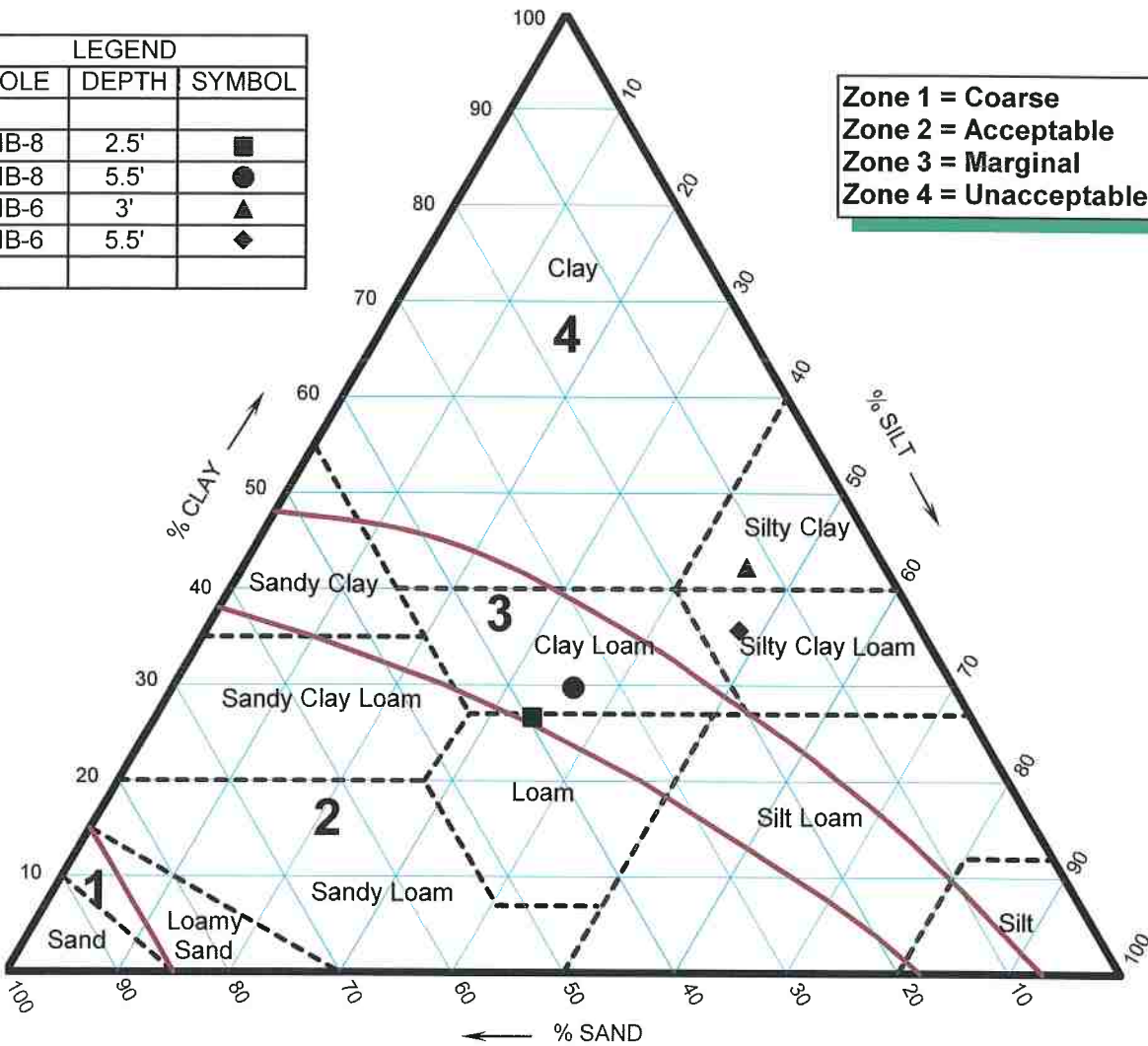
Zone 3 - Soils in this zone are expected to provide good filtration of effluent, but their ability to accept effluent at a suitable rate is questionable. These soils require wet-weather percolation tests to verify their suitability for effluent disposal by conventional leachfield methods.

Zone 4 - Soils in this zone are unsuitable for a conventional leachfield because of their severe limitations for accepting effluent.

SOIL PERCOLATION SUITABILITY CHART

LEGEND		
HOLE	DEPTH	SYMBOL
HB-8	2.5'	■
HB-8	5.5'	●
HB-6	3'	▲
HB-6	5.5'	◆

Zone 1 = Coarse
Zone 2 = Acceptable
Zone 3 = Marginal
Zone 4 = Unacceptable



NOTES

1. Soil texture is plotted on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjustment for coarse fragments has been made by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
3. Adjustment for compactness of soil has been made by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc, when analyzed.
4. For soils falling in sand, loamy sand, or sandy loam, classification adjustment for bulk density will generally not affect suitability and a bulk-density analysis was not necessary.

JOB NUMBER: 013034

DATE: 2/23/17

JOB NAME: Lindberg (Winzler)

APN: 304-071-018

***SEH* Consulting Engineers & Geologists, Inc.**

812 W. Wabash
 Eureka, CA 95501-2138
 (707) 441-8855



Reference: 018007

October 12, 2018

David Lindberg
Lindberg Geologic Consulting
P.O. Box 306
Cuttan, CA 95534

SOIL PERCOLATION SUITABILITY / TEXTURAL ANALYSIS RESULTS

Job Name: Lindberg Sampled By: DNL/CEG
Date Sampled: 10/05/18 Date Tested: 10/11/18
Date Received: 10/08/18 AP Number: 304-017-018

Sample ID	Depth	% Sand	% Clay	% Silt	% Coarse Fragments by		Zone	Bulk Density
					Volume			
TP-1	4-5'	87.3	6.7	6.0	0.0		1	*
	Material: Sand							
TP-2	4-5'	41.3	35.2	23.5	0.0		3	*
	Material: Clay Loam							
TP-3	4-5'	56.7	20.9	22.4	0.0		2	*
	Material: Sandy Clay Loam							
TP-4	4-5'	35.6	36.9	27.5	0.0		3	*
	Material: Clay Loam							
TP-5	4-5'	8.3	29.2	62.5	1.5		4	*
	Material: Silty Clay Loam							

* = no peds provided

Regional Water Quality Control Board Zone Descriptions:

Zone 1 - Soils in this zone are very high in sand content. They readily accept effluent, but because of their low silt and clay content they provide minimal filtration. These soils demand greater separation distances from groundwater.

Zone 2 - Soils in this zone provide adequate percolation rates and filtration of effluent. They are suitable for use of a conventional system without further testing.

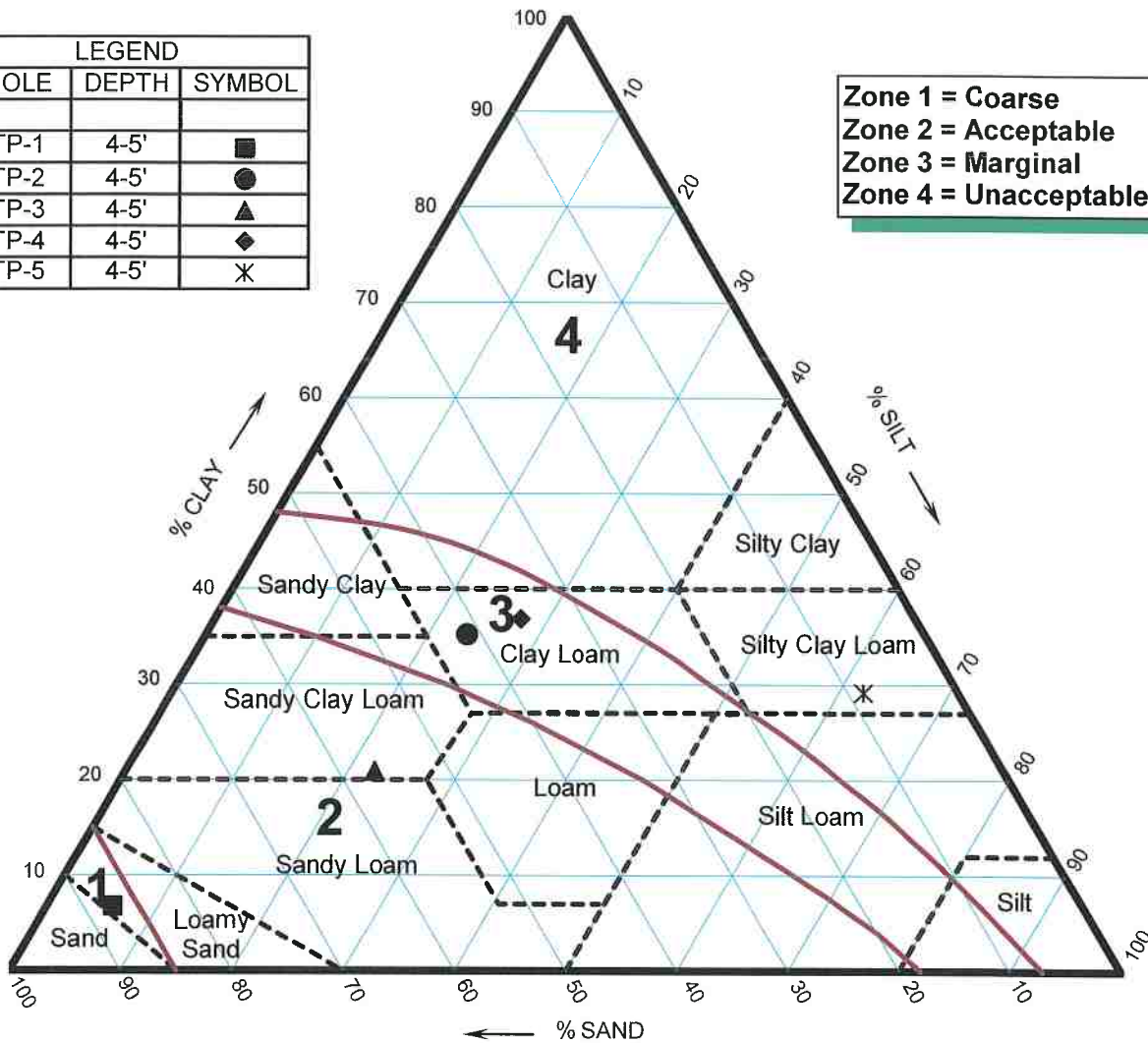
Zone 3 - Soils in this zone are expected to provide good filtration of effluent, but their ability to accept effluent at a suitable rate is questionable. These soils require wet-weather percolation tests to verify their suitability for effluent disposal by conventional leachfield methods.

Zone 4 - Soils in this zone are unsuitable for a conventional leachfield because of their severe limitations for accepting effluent.

SOIL PERCOLATION SUITABILITY CHART

LEGEND		
HOLE	DEPTH	SYMBOL
TP-1	4-5'	■
TP-2	4-5'	●
TP-3	4-5'	▲
TP-4	4-5'	◆
TP-5	4-5'	✕

Zone 1 = Coarse
Zone 2 = Acceptable
Zone 3 = Marginal
Zone 4 = Unacceptable



NOTES

1. Soil texture is plotted on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjustment for coarse fragments has been made by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
3. Adjustment for compactness of soil has been made by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc, when analyzed.
4. For soils falling in sand, loamy sand, or sandy loam, classification adjustment for bulk density will generally not affect suitability and a bulk-density analysis was not necessary.

JOB NUMBER: 018007

DATE: 10/11/18

JOB NAME: Lindberg

APN: 304-017-018

SH Consulting Engineers & Geologists, Inc.

812 W. Wabash
 Eureka, CA 95501-2138
 (707) 441-8855



Reference: 018007

November 26, 2018

David Lindberg
Lindberg Geologic Consulting
P.O. Box 306
Cutten, CA 95534

SOIL PERCOLATION SUITABILITY / TEXTURAL ANALYSIS RESULTS

Job Name: Lindberg
Date Sampled: 11/02/18
Date Received: 11/07/18

Sampled By: DNL-CEG
Date Tested: 11/08/18
AP Number: 304-071-018

Sample ID	Depth	% Sand	% Clay	% Silt	% Coarse		Zone	Bulk Density
					Volume	Fragments by		
TP-5	4-5'	27.5	27.1	45.4	17.5	3	*	
Material: Loam								

* = no peds provided

Regional Water Quality Control Board Zone Descriptions:

Zone 1 - Soils in this zone are very high in sand content. They readily accept effluent, but because of their low silt and clay content they provide minimal filtration. These soils demand greater separation distances from groundwater.

Zone 2 - Soils in this zone provide adequate percolation rates and filtration of effluent. They are suitable for use of a conventional system without further testing.

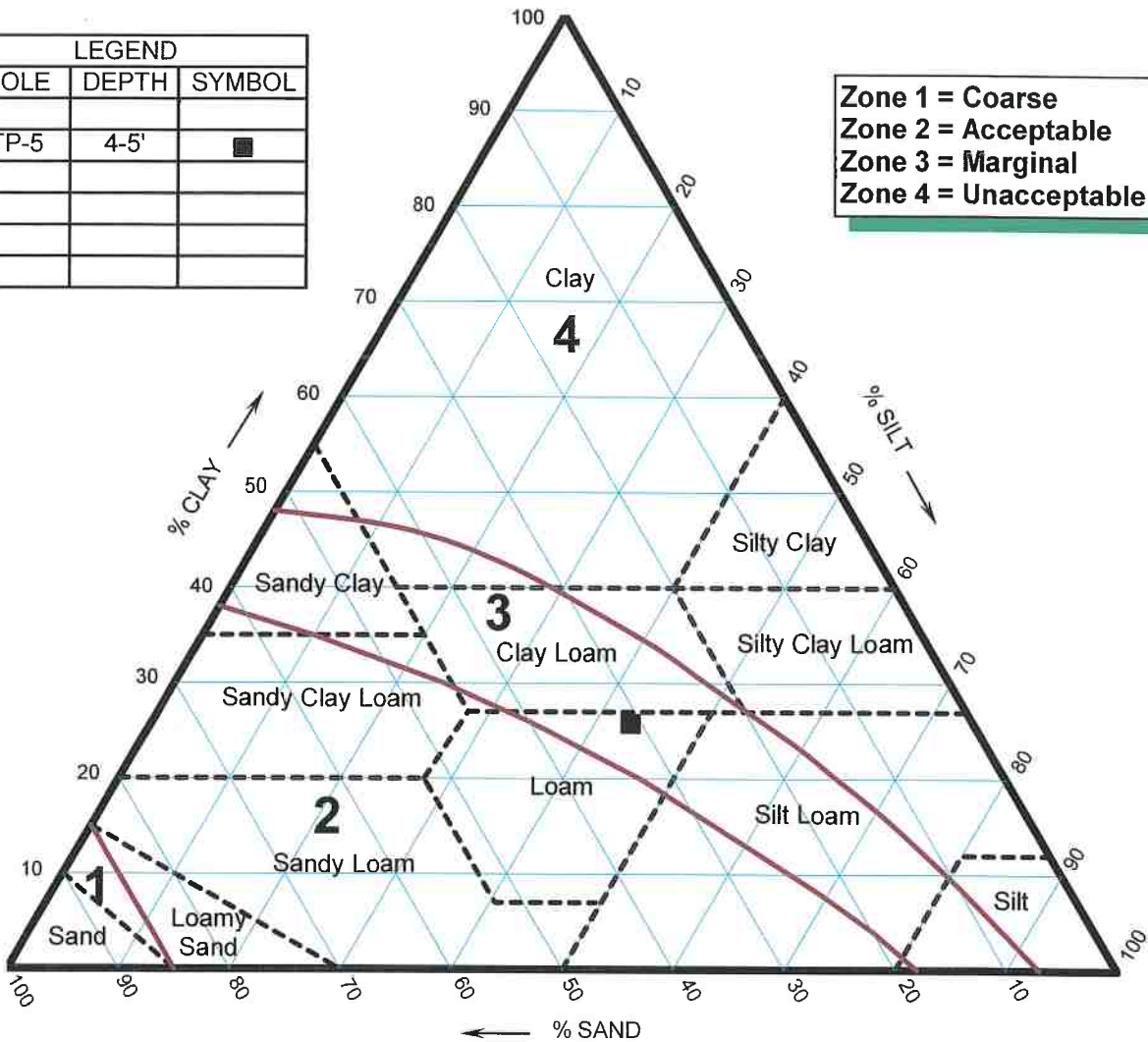
Zone 3 - Soils in this zone are expected to provide good filtration of effluent, but their ability to accept effluent at a suitable rate is questionable. These soils require wet-weather percolation tests to verify their suitability for effluent disposal by conventional leachfield methods.

Zone 4 - Soils in this zone are unsuitable for a conventional leachfield because of their severe limitations for accepting effluent.

SOIL PERCOLATION SUITABILITY CHART

LEGEND		
HOLE	DEPTH	SYMBOL
TP-5	4-5'	■

Zone 1 = Coarse
Zone 2 = Acceptable
Zone 3 = Marginal
Zone 4 = Unacceptable



NOTES

1. Soil texture is plotted on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjustment for coarse fragments has been made by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
3. Adjustment for compactness of soil has been made by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc, when analyzed.
4. For soils falling in sand, loamy sand, or sandy loam, classification adjustment for bulk density will generally not affect suitability and a bulk-density analysis was not necessary.

JOB NUMBER: 018007

DATE: 11/08/18

JOB NAME: Lindberg

APN: 304-071-018

SH Consulting Engineers & Geologists, Inc.

812 W. Wabash
 Eureka, CA 95501-2138
 (707) 441-8855

Lindberg Geologic Consulting	Report of Findings: Non-Standard OWTS Potential Lot #1	Sheet 1
Post Office Box 306	"Berta Parcel" – Elk River Road, Eureka, APN: 304-071-018	October 19, 2019
Cutten, CA 95534	Slack – Winzler Properties. LLC, Client	Project 0091.03
(707) 442-6000	Shallow-Depth Percolation Test Results	No Scale

Shallow-Depth Percolation Test Report
Absorption Rates: Slack and Winzler Berta Property

Test Pit #1: Lot #1

Depth: 2.0 Feet

Diameter: 12 inches

Time	Distance Below Reference (ft)	Refilled to (ft)	Δ feet	Δ inches	Perc Rate (min/inch)
4:25 PM	1.00				
4:40 PM	1.04		0.04	0.48	31.3
4:55 PM	1.05		0.01	0.12	125.0
5:10 PM	1.05		0	0.00	>120
5:25 PM	1.05		0	0.00	>120
5:40 PM	1.05		0	0.00	>120
5:55 PM	1.05		0	0.00	>120
6:10 PM	1.05		0	0.00	>120
40.72553N		124.1716W		Perc Rate:	>120 MPI

Test Pit #2: Lot #1

Depth: 2.0 Feet

Diameter: 12 inches

Time	Distance Below Reference (ft)	Refilled to (ft)	Δ feet	Δ inches	Perc Rate (min/inch)
4:27 PM	1.00				
4:42 PM	1.29		0.29	3.48	4.3
4:57 PM	1.40		0.11	1.32	11.4
5:12 PM	1.49		0.09	1.08	13.9
		1.05			
5:27 PM	1.19		0.14	1.68	8.9
5:42 PM	1.26		0.07	0.84	17.9
5:57 PM	1.36		0.10	1.20	12.5
		1.15			
6:12 PM	1.23		0.08	0.96	15.6
6:27 PM	1.31		0.08	0.96	15.6
6:42 PM	1.39	end test	0.08	0.96	15.6
40.7256N		124.17211W		Perc Rate:	<18 MPI

LINDBERG GEOLOGIC CONSULTING
David N. Lindberg, CEG
Post Office Box 306
Cutten, CA 95534
(707) 442-6000

October 21, 2019

Project Number: 0091.03

Mr. John Winzler
Slack and Winzler Properties LLC
Post Office Box 549
Eureka, California 95502

Subject: Report of Findings: Non-Standard On-Site Wastewater Treatment System
Lot #2 of Proposed Subdivision of APN 304-071-018, Elk River Road, Eureka

Dear Mr. Winzler:

Exploration, testing and preliminary conceptual design for a non-standard On-site Wastewater Disposal System on proposed Lot #2 at APN 304-071-018 has been completed. The subject parcel is located in the Ridgewood, Elk River area of Eureka (Figure 1). An annotated copy of the Assessor's parcel map is attached for reference (Figure 2), as is a copy of the proposed subdivision map (Figure 3). Based on the information developed in our limited-scope investigations and materials testing at the locations explored, it appears likely that a shallow pressure distribution (SPD), a non-standard On-Site Wastewater Treatment System (OWTS) can be developed to serve a three bedroom single family residence on this proposed lot. Shallow winter groundwater and soil drainage appear to exceed the minimum standards of the Humboldt County Health Department.

One hand augered soil boring (HB-4), an exploratory backhoe percolation test pit (TP-4) and two groundwater monitoring wells (MW-7 and MW-8) were located in an accessible area that appeared potentially suitable for primary and or reserve leach fields. Test boring HB-4 was extended to 10-feet below grade. Free groundwater and soil mottling were not encountered in HB-4 on August 5, 2014. HB-4 was sampled at approximately 2.5, and 5.5 feet below existing grade. The 2.5-foot sample was Clay Loam, a Zone-3 (marginal) soil; the sample from the 5.5-foot depth was Loam, an "acceptable" Zone-2 soil. A soil boring log (Figure 4) and results of the soil boring, and percolation test pit textural analyses are attached.

Soil collected at a depth of 4 to 5 feet below the surface in October 2018, from TP-4 consisted of Clay Loam (Zone-3, marginal) soils. Groundwater monitoring wells 7 and 8 were sounded regularly during the 2018-2019 wet weather test period between January 30, and March 21, 2019. Several substantial rainfall events of greater than 0.5-inch of precipitation within 24 hours occurred during February and March 2019. Groundwater rose to between 2.5 and 6.6 feet below grade in MW-7 and MW-8; which in the case of MW-7 would not provide five feet of separation between groundwater and the bottom of a disposal trench for adequate effluent treatment. However, MW-7 was close to TP-4 which flooded with surface water, and we consider the results anomalously shallow.

Proposed Lot #2 is located in the southeastern part of APN 304-071-018. When percolation testing was conducted in March 2016, soils adjacent to HB-4 were found to have low absorption rates but no shallow groundwater to 6-feet. Percolation tests on Lot #2 showed the soil absorbed water at greater than 120 minutes per inch at three to four feet below grade; at five to six feet soils absorbed water at 42 minutes per inch in March 2016. In the limited areas of slopes less than 30 percent which were accessible during our explorations, test excavations in 2016 showed that seasonal high

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(707) 442-6000

groundwater was greater than 6 feet below the existing ground surface around HB-4 on Lot #2. Shallow percolation tests in April (2019) in two holes two feet deep demonstrated shallow infiltration rates of less than 11 MPI. April 2019 percolation test results are attached as Sheet 1.

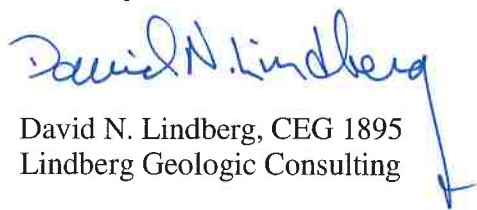
A SPD disposal system can be developed on proposed Lot #2. Based on our observations and experience, it appears that a standard OWTS or an infiltrator system can not be used in the area around HB-6 on proposed Lot #2. We recommend a SPD in the northeastern corner of this large lot (Figure 3). Given the Clay Loam soils we conservatively used an absorption rate of 50 MPI and an application rate of 0.296 gallons per day per square foot (gpd/ft²) of absorption area. Utilizing a SPD system with trenches 2.0 feet wide by 2.5 feet deep provides 5 square feet of absorption area per linear foot of trench. Effluent loading is 450 gallons per day, and with an absorption capacity of 0.296 gpd/ft², 1,521 square feet of absorption area, or 305 feet of SPD trench is required.

A shallow Pressure Distribution System appears feasible for this proposed new lot. We recommend five trenches, 61 feet in length, with each trench separated by five feet from the adjacent trenches. Trenches shall be contour parallel and level. The disposal field for a three-bedroom residence will then be approximately 20 feet by 61 feet, with a 100 percent reserve area. A septic tank with a capacity of at least 1,500 gallons is required; a pump chamber will be required. We recommend 900 gallon dosing and backup power for this system. Additional, site-specific sampling, testing and design is necessary if the number of bedrooms is not three, or if the future owner chooses another location for the disposal field. Primary and reserve disposal fields are shown (Figure 3).

In our opinion, site-specific soil profile exploration, soil sampling and logging, and percolation testing demonstrated that a suitable dispersal area exists on proposed Lot #2 for a shallow pressure distribution on-site wastewater treatment system. If any other areas are proposed for OWTS on Lot #2, additional monitoring wells may be needed in those areas for wet-season groundwater monitoring. Percolation testing will also be necessary in other locations on Lot #2.

Please contact me at the number above if you have any concerns or questions.

Sincerely,


David N. Lindberg, CEG 1895
Lindberg Geologic Consulting

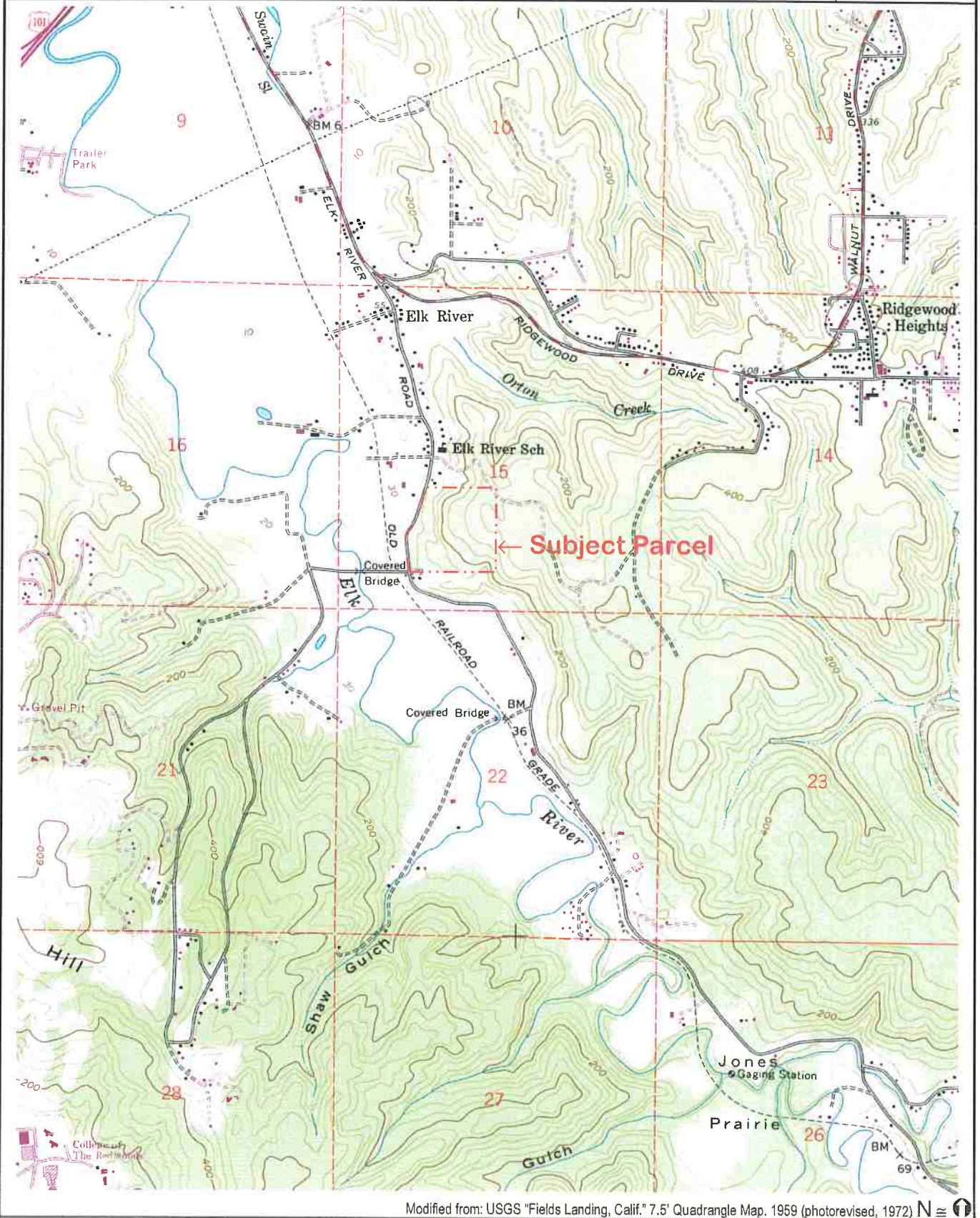


Attachments:

- Location Map (Figure 1)
- Assessor Parcel Map (Figure 2)
- Site Plan Map with Well and Drain Field Locations (Figure 3)
- HB-4 Lot #2 Soil Profile Log (Figure 4)
- Textural Analyses, October 2018 (TP-5) and February 2017 (HB-4)
- Shallow-Depth Percolation Test Report (Sheet 1)

DNL:sll

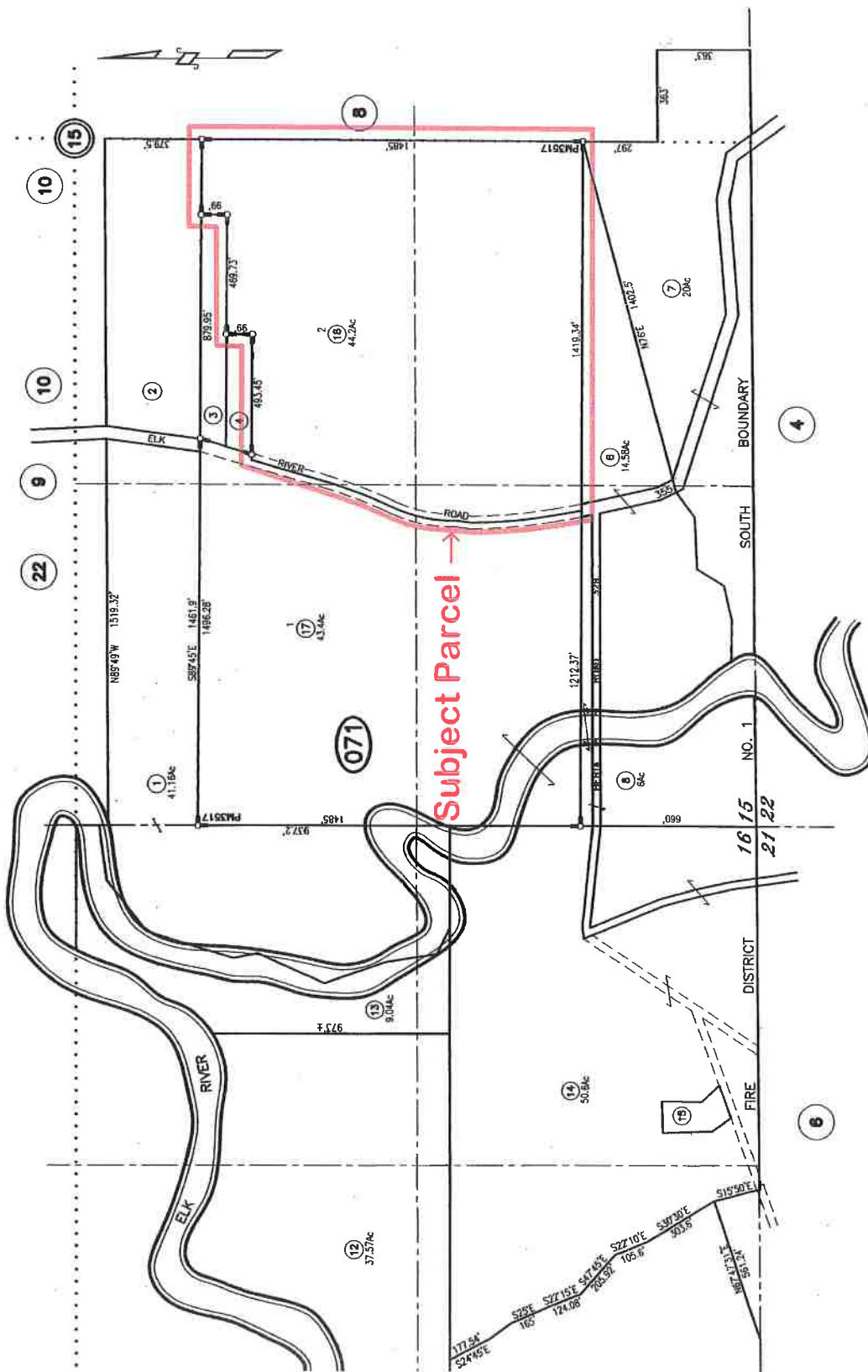
Lindberg Geologic Consulting	Report of Findings: Non-Standard OWS Potential Lot #2	Figure 1
Post Office Box 306	"Berta Parcel" – Elk River Road, Eureka, APN: 304-071-018	October 21, 2019
Cutten, CA 95534	Slack – Winzler Properties. LLC, Client	Project 0091.03
(707) 442-6000	Approximate Subject Parcel Location	1" = 2,000'



Modified from: USGS "Fields Landing, Calif." 7.5' Quadrangle Map, 1959 (photorevised, 1972) N \approx 1" = 2,000'

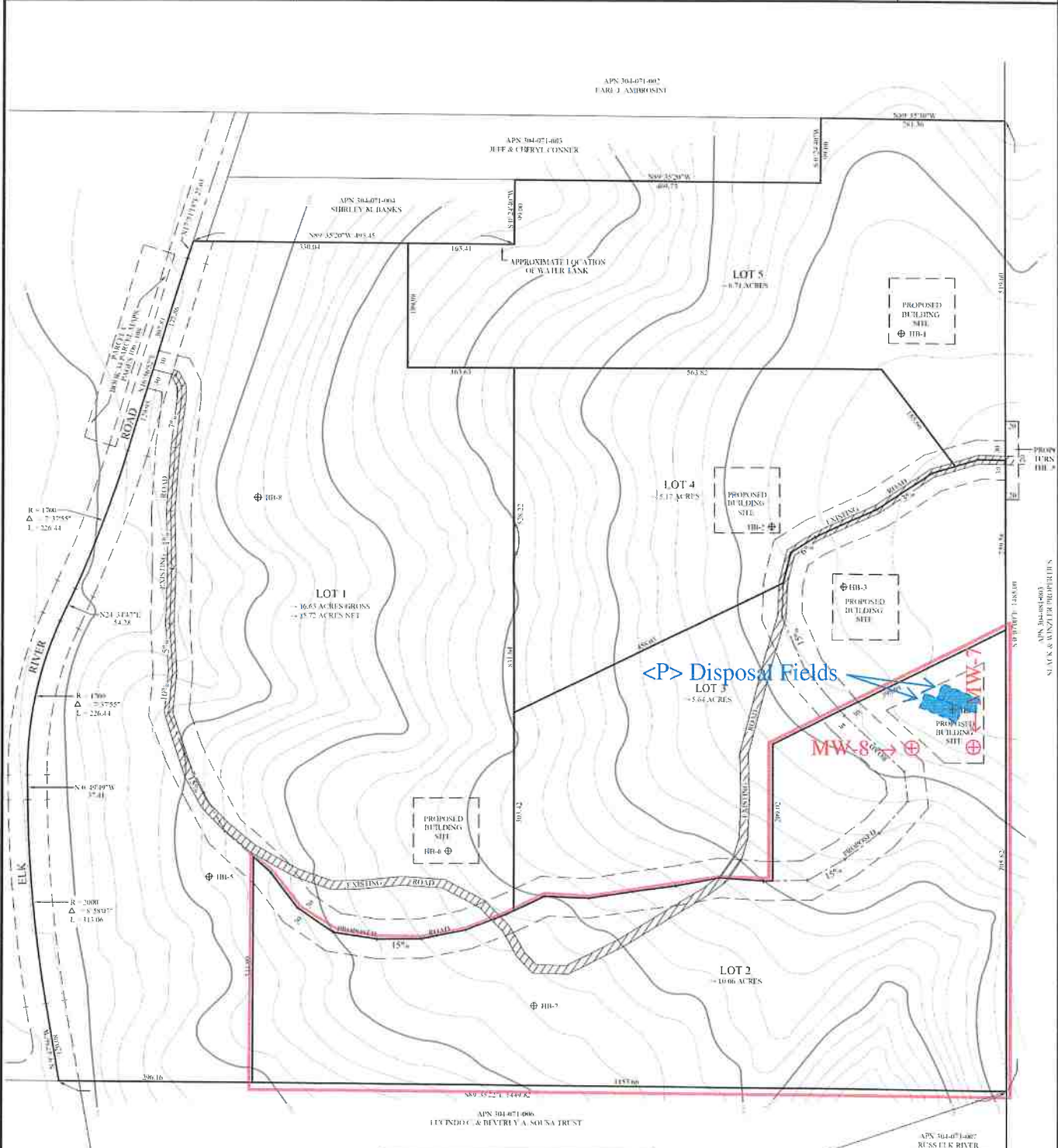
Lindberg Geologic Consulting	Report of Findings: Non-Standard OWTs Potential Lot #2	Figure 2
Post Office Box 306	"Berta Parcel" - Elk River Road, Eureka, APN: 304-071-018	October 21, 2019
Cutten, CA 95534	Slack - Winzler Properties. LLC, Client	Project 0091.03
(707) 442-6000	Subject Parcel Location: Humboldt County Assessor's Parcel Map 304-07	Scale as Shown

PTN SE1/4 SEC 16 & S1/2 SEC 15 T4N R1W H.B.& M. 304-07



NOTE - Assessor's Block Numbers Shown in Ellipses
Assessor's Parcel Numbers Shown in Circles.

Lindberg Geologic Consulting	Report of Findings: Non-Standard OWTS Potential Lot #2	Figure 3
Post Office Box 306	"Berta Parcel" – Elk River Road, Eureka, APN: 304-071-018	October 21, 2019
Cutten, CA 95534	Slack – Winzler Properties. LLC, Client	Project 0091.03
(707) 442-6000	Approximate Subject Parcel Location	1" = 230'



LABORATORY				FIELD		Depth (feet)	Graphic Lithology	U.S.C.S. Designation	SOIL DESCRIPTION
Dry Density (pcf)	Moisture Content (%)	Cohesion; Friction Angle (psf, degrees)	Other Tests	Blows/foot*	Sample				
						1		ML	Silt with fine sand, loose, brown, dry, common fine roots; Topsoil.
						2		SM	Fine sand with silt, medium dense, yellowish brown grading to strong brown, dry, occasional fine roots.
			33% Sand, 38% Silt, 29% Clay			3		ML	Silt with fine sand and clay, stiff, light olive brown with strong brown mottling, dry, friable, occasional roots to 3/4" diameter, fine granular crumb to weak angular blocky structure, secondary porosity evident. Sample 2 to 3 feet.
						4		SM	Fine sand with silt, medium dense, light olive brown with strong brown mottling. moist, friable, granular crumb to weak subangular blocky structure, apparent secondary porosity.
						5		CL	Clay, stiff, olive brown, moist.
			49% Sand, 31% Silt, 20% Clay			6		SM	Fine sand with silt and clay, dense, olive brown with strong brown mottling, moist, friable, angular blocky structure. Sample 5 to 6 feet.
						7			
						8		ML	Silt with fine sand interbedded with silty fine sand and thin clay layers, stiff/medium dense to dense, olive brown to strong brown, often with strong brown mottling, moist, friable to slightly plastic, granular crumb to subangular blocky structure, secondary porosity evident.
						9			
						10		CL	Clay, silty, stiff, gray, moist, slightly plastic. No free water to 10.2 feet below grade. Boring backfilled with cuttings on completion. Lat./Long.: 40.72629, -124.16916, +/-9.8'

* The blow counts have been converted to standard N-value blow counts

SURFACE ELEVATION: 333 Feet

TOTAL DEPTH: 10.2 Feet

GROUNDWATER DEPTH: >10.2 Feet

LOGGED BY: David N. Lindberg, CEG

BOREHOLE DIAMETER: 3.5 inches

EQUIPMENT: Hand Auger

HAMMER TYPE: None

LINDBERG GEOLOGIC CONSULTING

LOG OF TEST EXCAVATION / BORING

HB-4, Lot 5 Slack & Winzler - Berta

Figure No.

4

PROJECT NUMBER: 0091.01

DATE: August 5, 2014



Reference: 018007

October 12, 2018

David Lindberg
Lindberg Geologic Consulting
P.O. Box 306
Cutten, CA 95534

SOIL PERCOLATION SUITABILITY / TEXTURAL ANALYSIS RESULTS

Job Name: Lindberg
Date Sampled: 10/05/18
Date Received: 10/08/18

Sampled By: DNL/CEG
Date Tested: 10/11/18
AP Number: 304-017-018

Sample ID	Depth	% Sand	% Clay	% Silt	% Coarse		Zone	Bulk Density
					Volume	Fragments by		
TP-1	4-5'	87.3	6.7	6.0	0.0		1	*
	Material: Sand							
TP-2	4-5'	41.3	35.2	23.5	0.0		3	*
	Material: Clay Loam							
TP-3	4-5'	56.7	20.9	22.4	0.0		2	*
	Material: Sandy Clay Loam							
TP-4	4-5'	35.6	36.9	27.5	0.0		3	*
	Material: Clay Loam							
TP-5	4-5'	8.3	29.2	62.5	1.5		4	*
	Material: Silty Clay Loam							

* = no peds provided

Regional Water Quality Control Board Zone Descriptions:

Zone 1 - Soils in this zone are very high in sand content. They readily accept effluent, but because of their low silt and clay content they provide minimal filtration. These soils demand greater separation distances from groundwater.

Zone 2 - Soils in this zone provide adequate percolation rates and filtration of effluent. They are suitable for use of a conventional system without further testing.

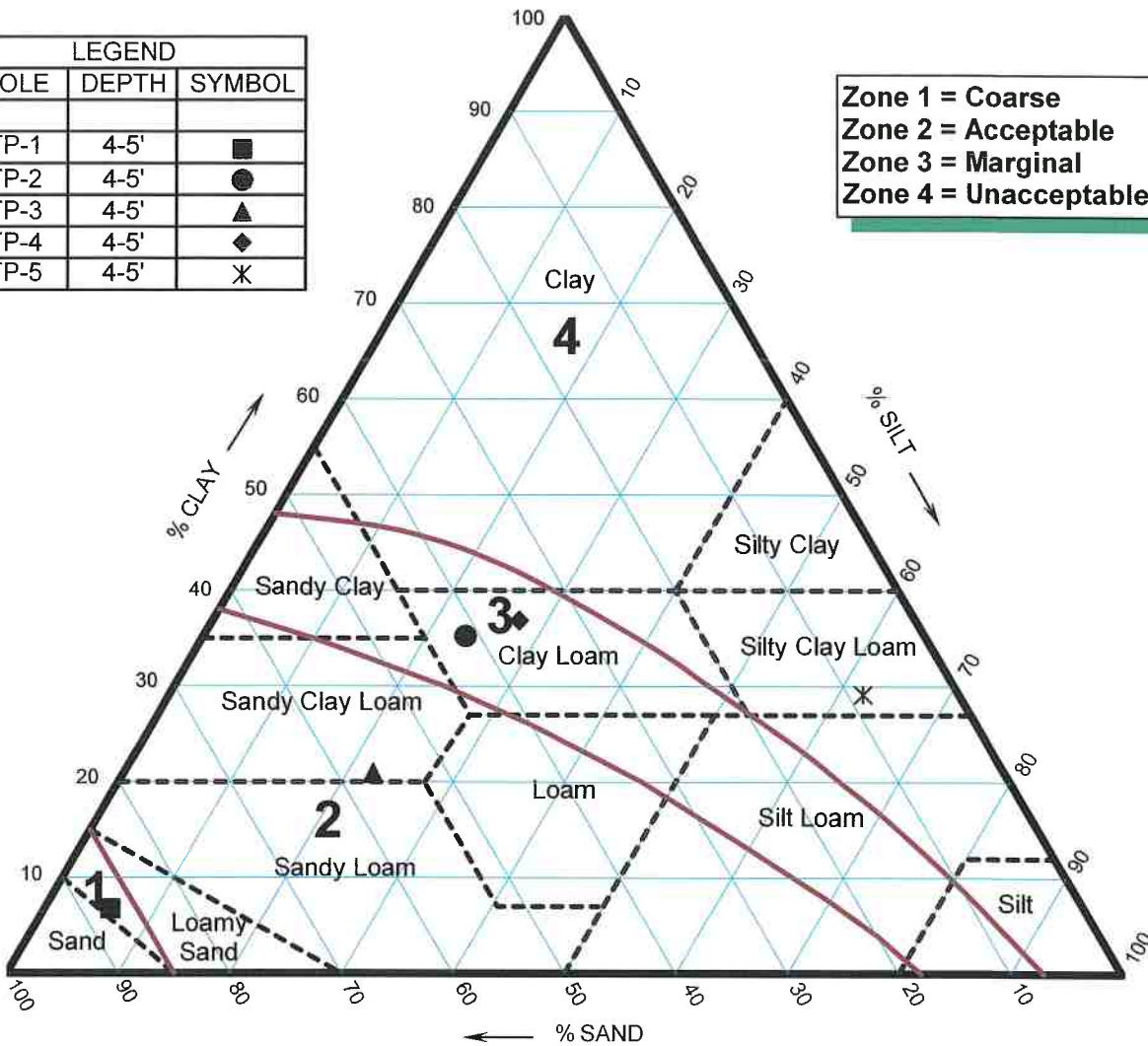
Zone 3 - Soils in this zone are expected to provide good filtration of effluent, but their ability to accept effluent at a suitable rate is questionable. These soils require wet-weather percolation tests to verify their suitability for effluent disposal by conventional leachfield methods.

Zone 4 - Soils in this zone are unsuitable for a conventional leachfield because of their severe limitations for accepting effluent.

SOIL PERCOLATION SUITABILITY CHART

LEGEND		
HOLE	DEPTH	SYMBOL
TP-1	4-5'	■
TP-2	4-5'	●
TP-3	4-5'	▲
TP-4	4-5'	◆
TP-5	4-5'	✕

Zone 1 = Coarse
Zone 2 = Acceptable
Zone 3 = Marginal
Zone 4 = Unacceptable



NOTES

1. Soil texture is plotted on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjustment for coarse fragments has been made by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
3. Adjustment for compactness of soil has been made by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc, when analyzed.
4. For soils falling in sand, loamy sand, or sandy loam, classification adjustment for bulk density will generally not affect suitability and a bulk-density analysis was not necessary.

JOB NUMBER: 018007

DATE: 10/11/18

JOB NAME: Lindberg

APN: 304-017-018

SH Consulting Engineers & Geologists, Inc.

812 W. Wabash
 Eureka, CA 95501-2138
 (707) 441-8855



Reference: 0131034

February 24, 2017

David Lindberg
Lindberg Geologic Consulting
PO Box 306
Cuttan, CA 95534

SOIL PERCOLATION SUITABILITY / TEXTURAL ANALYSIS RESULTS

Job Name: Lindberg (Winzler) Sampled By: DL
Date Sampled: 8/4/14 Date Tested: 2/24/17
Date Received: 2/21/17 AP Number: 304-071-018

Sample ID	Depth	% Sand	% Clay	% Silt	% Coarse		Bulk Density
					Volume	Fragments by	
HB-4	2.5'	33.1	28.7	38.2	0.0	3	*
		Material: Clay Loam					
HB-4	5.5'	48.4	20.3	31.3	0.0	2	*
		Material: Loam					
HB-3	2.5'	66.4	16.9	16.7	0.1	2	*
		Material: Sandy loam					
HB-3	5.5'	56.3	15.1	28.6	0.0	2	*
		Material: Sandy Loam					

* = no peds provided

Regional Water Quality Control Board Zone Descriptions:

Zone 1 - Soils in this zone are very high in sand content. They readily accept effluent, but because of their low silt and clay content they provide minimal filtration. These soils demand greater separation distances from groundwater.

Zone 2 - Soils in this zone provide adequate percolation rates and filtration of effluent. They are suitable for use of a conventional system without further testing.

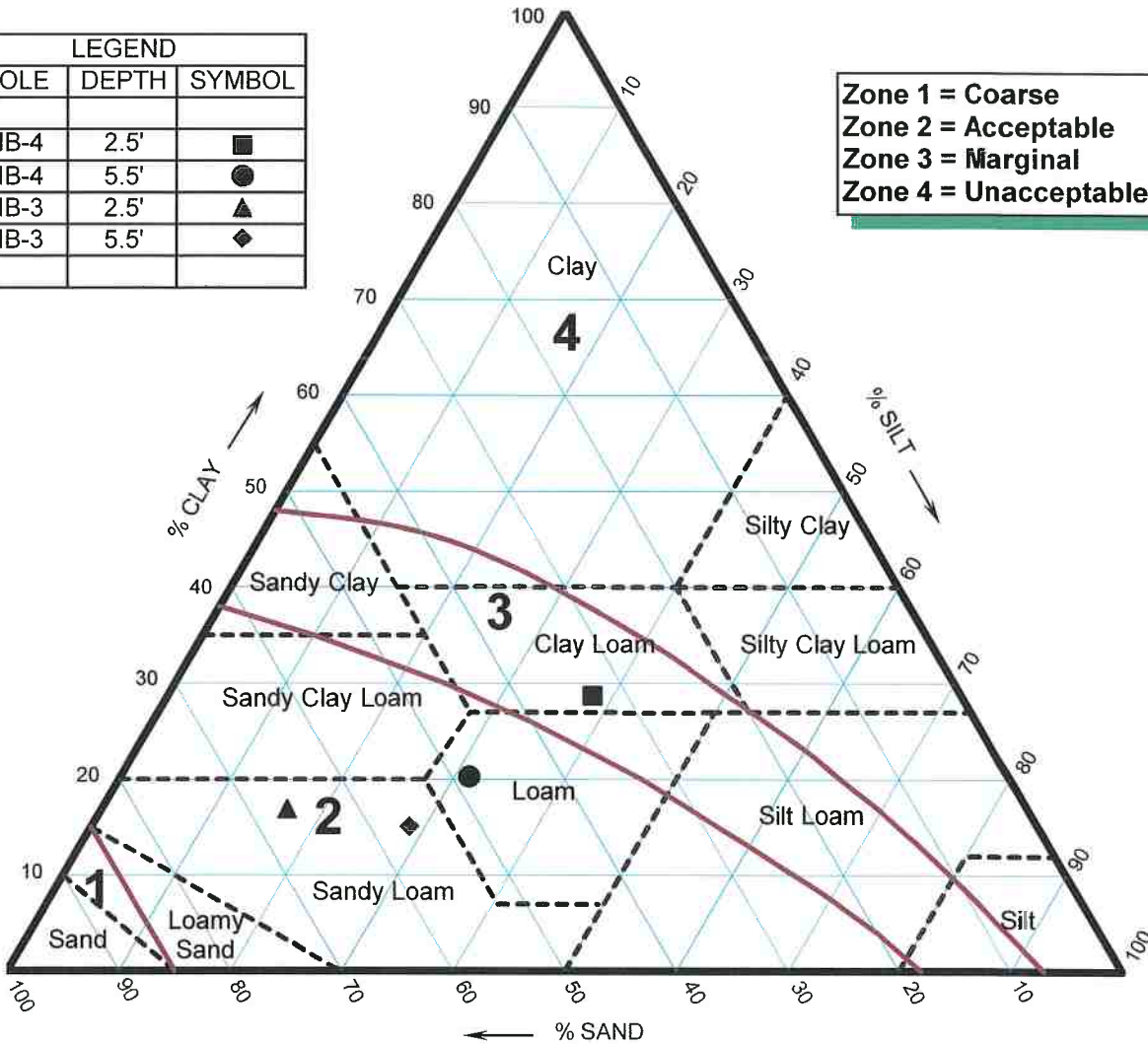
Zone 3 - Soils in this zone are expected to provide good filtration of effluent, but their ability to accept effluent at a suitable rate is questionable. These soils require wet-weather percolation tests to verify their suitability for effluent disposal by conventional leachfield methods.

Zone 4 - Soils in this zone are unsuitable for a conventional leachfield because of their severe limitations for accepting effluent.

SOIL PERCOLATION SUITABILITY CHART

LEGEND		
HOLE	DEPTH	SYMBOL
HB-4	2.5'	■
HB-4	5.5'	●
HB-3	2.5'	▲
HB-3	5.5'	◆

Zone 1 = Coarse
Zone 2 = Acceptable
Zone 3 = Marginal
Zone 4 = Unacceptable



NOTES

1. Soil texture is plotted on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjustment for coarse fragments has been made by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
3. Adjustment for compactness of soil has been made by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc, when analyzed.
4. For soils falling in sand, loamy sand, or sandy loam, classification adjustment for bulk density will generally not affect suitability and a bulk-density analysis was not necessary.

JOB NUMBER: 0131034
JOB NAME: Lindberg (Winzler)

DATE: 2/24/17
APN: 304-071-018

SH Consulting Engineers & Geologists, Inc.

812 W. Wabash
 Eureka, CA 95501-2138
 (707) 441-8855

Lindberg Geologic Consulting	Report of Findings: Non-Standard OWTS Potential Lot #2	Sheet 1
Post Office Box 306	"Berta Parcel" – Elk River Road, Eureka, APN: 304-071-018	October 21, 2019
Cutten, CA 95534	Slack – Winzler Properties. LLC, Client	Project 0091.03
(707) 442-6000	Shallow-Depth Percolation Test Results	No Scale

Shallow-Depth Percolation Test Report
Slack and Winzler Berta Property

Test Pit #1: Lot #2

Depth: 2.0 Feet

Diameter: 12 inches

Time	Distance Below Reference (ft)	Refilled to (ft)	Δ feet	Δ inches	Perc Rate (min/inch)
3:04 PM	1.10				
3:24 PM	2.00		0.9	10.80	1.9
3:25 PM		1.37			
3:49 PM	1.56		0.19	2.28	10.5
3:51 PM		0.87			
4:18 PM	2.00		1.13	13.56	2.0
4:20 PM		1.15			
4:41 PM	1.59	end test	0.44	5.28	4.0
40.72628N		124.1698W		Perc Rate:	<10 MPI

Test Pit #2: Lot #2

Depth: 2.0 Feet

Diameter: 12 inches

Time	Distance Below Reference (ft)	Refilled to (ft)	Δ feet	Δ inches	Perc Rate (min/inch)
3:05 PM	0.98				
3:26 PM	1.38		0.40	4.80	4.4
3:27 PM		1.29			
3:52 PM	1.63		0.34	4.08	6.1
3:54 PM		1.00			
4:21 PM	1.30		0.30	3.60	7.5
4:22 PM		1.00			
4:42 PM	1.15	end test	0.15	1.80	11.1
40.72623N		124.16946W		Perc Rate:	<12

LINDBERG GEOLOGIC CONSULTING
David N. Lindberg, CEG
Post Office Box 306
Cuttan, CA 95534
(707) 442-6000

October 22, 2019

Project Number: 0091.03

Mr. John Winzler
Slack and Winzler Properties LLC
Post Office Box 549
Eureka, California 95502

Subject: Report of Findings: Non-Standard On-Site Wastewater Treatment System
Lot #3 of Proposed Subdivision of APN 304-071-018, Elk River Road, Eureka

Dear Mr. Winzler:

Exploration, testing and preliminary conceptual design for a non-standard On-site Wastewater Disposal System on proposed Lot #3 at APN 304-071-018 has been completed. The subject parcel is located in the Ridgewood, Elk River area of Eureka (Figure 1). An annotated copy of the Assessor's parcel map is attached for reference (Figure 2), as is a copy of the proposed subdivision map (Figure 3). Based on the information developed in our limited-scope investigations and materials testing at the locations explored, it appears likely that a shallow pressure distribution (SPD), a non-standard On-Site Wastewater Treatment System (OWTS) can be developed to serve a three bedroom single family residence on this proposed lot. Shallow winter groundwater and soil drainage appear to exceed the minimum standards of the Humboldt County Health Department.

One hand augered soil boring (HB-3), an exploratory backhoe percolation test pit (TP-3) and two groundwater monitoring wells (MW-5 and MW-6) were located in an accessible area that appeared potentially suitable for primary and or reserve drain fields. Test boring HB-3 was extended to 10-feet below grade. Free groundwater and soil mottling were not encountered in HB-3 on August 7, 2014. HB-4 was sampled at approximately 2.5, and 5.5 feet below existing grade. Both samples proved to be Sandy Loam, a Zone-2 (acceptable) soil. A soil boring log (Figure 4) and results of the soil boring, and percolation test pit textural analyses are attached.

Soil collected at a depth of 4 to 5 feet below the surface in October 2018, from TP-3 consisted of Sandy Clay Loam (Zone-2, acceptable) soil. Groundwater monitoring wells 5 and 6 were sounded regularly during the 2018-2019 wet weather test period between January 30, and March 21, 2019. Several substantial rainfall events of greater than 0.5-inch of precipitation within 24 hours occurred during February and March 2019. Groundwater rose to between 1.6 and 3.75 feet below grade in MW-5 and MW-6; which in the case of MW-5 would not provide five feet of separation between groundwater and the bottom of a disposal trench for adequate effluent treatment. However, MW-5 was close to TP-3 which flooded with surface water, and we consider the MW-5 results to be anomalously shallow.

Proposed Lot #3 is located in the central eastern part of APN 304-071-018 (Figure 3). When percolation testing was conducted in March 2016, soils adjacent to HB-3 were found to have low absorption rates but no shallow groundwater to 6-feet. Percolation tests on Lot #3 showed the soil absorbed water at greater than 63 minutes per inch at three to four feet below grade; at five to six feet soils absorbed water at 62 minutes per inch in March 2016. In the limited areas of slopes less than 30 percent which were accessible during our explorations, test excavations in 2016 showed that seasonal high groundwater was greater than 6 feet below the existing ground surface around

LINDBERG GEOLOGIC CONSULTING
(707) 442-6000

HB-3 on Lot #3. Shallow percolation tests in April (2019) in two holes two feet deep demonstrated shallow infiltration rates of less than 8 MPI. April 2019 percolation test results are attached as Sheet 1.

A SPD disposal system can be developed on proposed Lot #3. Based on our observations and experience, it appears that a standard OWTS or an infiltrator system can not be used in the area around HB-3 on proposed Lot #3. We recommend a SPD in the eastern part of this large lot (Figure 3). Given the Sandy Clay Loam soils we conservatively used an absorption rate of 35 MPI and an application rate of 0.344 gallons per day per square foot (gpd/ft²) of absorption area. Utilizing a SPD system with trenches 2.0 feet wide by 2.5 feet deep provides 5 square feet of absorption area per linear foot of trench. Effluent loading is 450 gallons per day, and with an absorption capacity of 0.344 gpd/ft², 1,310 square feet of absorption area, or 262 feet of SPD trench is required.

A shallow Pressure Distribution System appears feasible for this proposed new lot. We recommend four trenches, 66 feet in length, with each trench separated by five feet from the adjacent trenches. Trenches shall be contour parallel and level. The disposal field for a three-bedroom residence will then be approximately 15 feet by 66 feet, with a 100 percent reserve area. A septic tank with a capacity of at least 1,500 gallons is required; a pump chamber will be required. We recommend 800 gallon dosing and backup power for this system. Additional, site-specific sampling, testing and design will be necessary if the number of bedrooms is not three, or if the future owner chooses another location for the disposal field. Primary and reserve disposal fields are shown (Figure 3).

In our opinion, site-specific soil profile exploration, soil sampling and logging, and percolation testing demonstrated that a suitable dispersal area exists on proposed Lot #3 for a shallow pressure distribution on-site wastewater treatment system. If any other areas are proposed for OWTS on Lot #3, additional monitoring wells may be needed in those areas for wet-season groundwater monitoring. Percolation testing will also be necessary in other locations on Lot #3.

Please contact me at the number above if you have any concerns or questions.

Sincerely,

David N. Lindberg

David N. Lindberg, CEG 1895
Lindberg Geologic Consulting

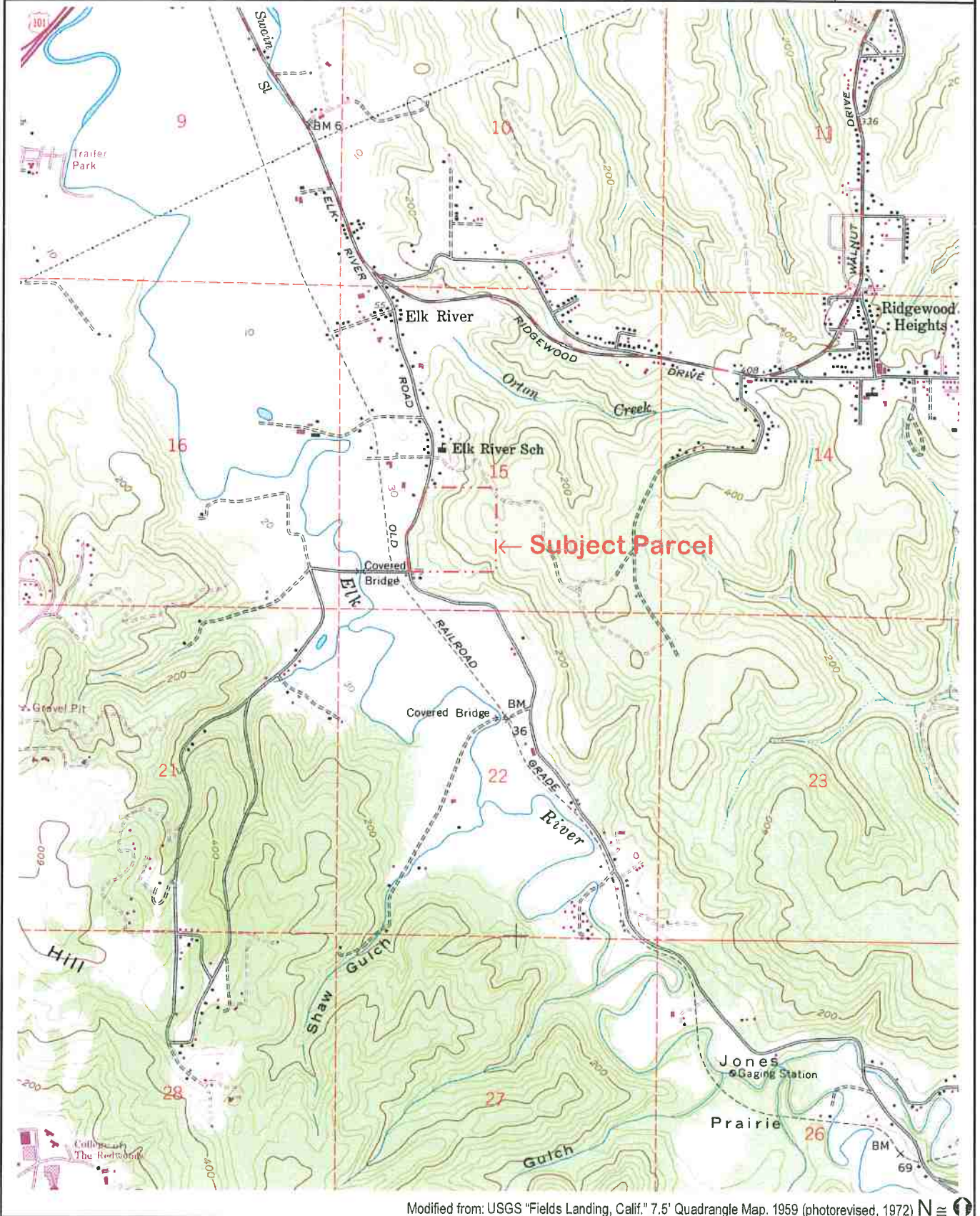


Attachments:

- Location Map (Figure 1)
- Assessor Parcel Map (Figure 2)
- Site Plan Map with Well and Drain Field Locations (Figure 3)
- HB-3 Lot #3 Soil Profile Log (Figure 4)
- Textural Analyses, October 2018 (TP-3) and February 2017 (HB-3)
- Shallow-Depth Percolation Test Report (Sheet 1)

DNL:sll

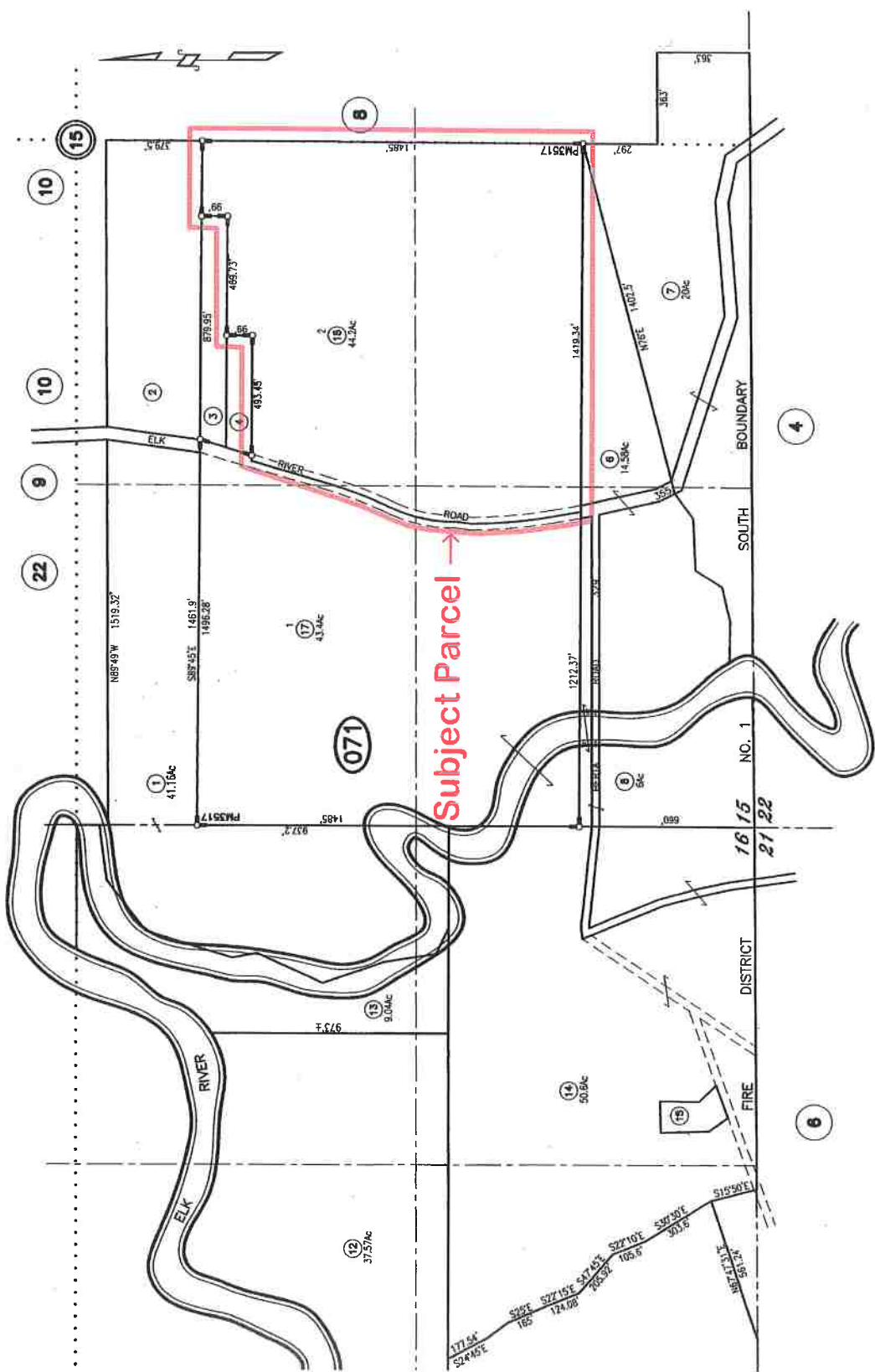
Lindberg Geologic Consulting	Report of Findings: Non-Standard OWS Potential Lot #3	Figure 1
Post Office Box 306	"Berta Parcel" – Elk River Road, Eureka, APN: 304-071-018	October 22, 2019
Cutten, CA 95534	Slack – Winzler Properties, LLC, Client	Project 0091.03
(707) 442-6000	Approximate Subject Parcel Location	1" = 2,000'



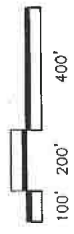
Modified from: USGS "Fields Landing, Calif." 7.5' Quadrangle Map, 1959 (photorevised, 1972) N \approx 1" = 2,000'

Lindberg Geologic Consulting	Report of Findings: Non-Standard OWS Potential Lot #3	Figure 2
Post Office Box 306	"Berta Parcel" – Elk River Road, Eureka, APN: 304-071-018	October 22, 2019
Cutten, CA 95534	Slack – Winzler Properties. LLC, Client	Project 0091.03
(707) 442-6000	Subject Parcel Location: Humboldt County Assessor's Parcel Map 304-07	Scale as Shown

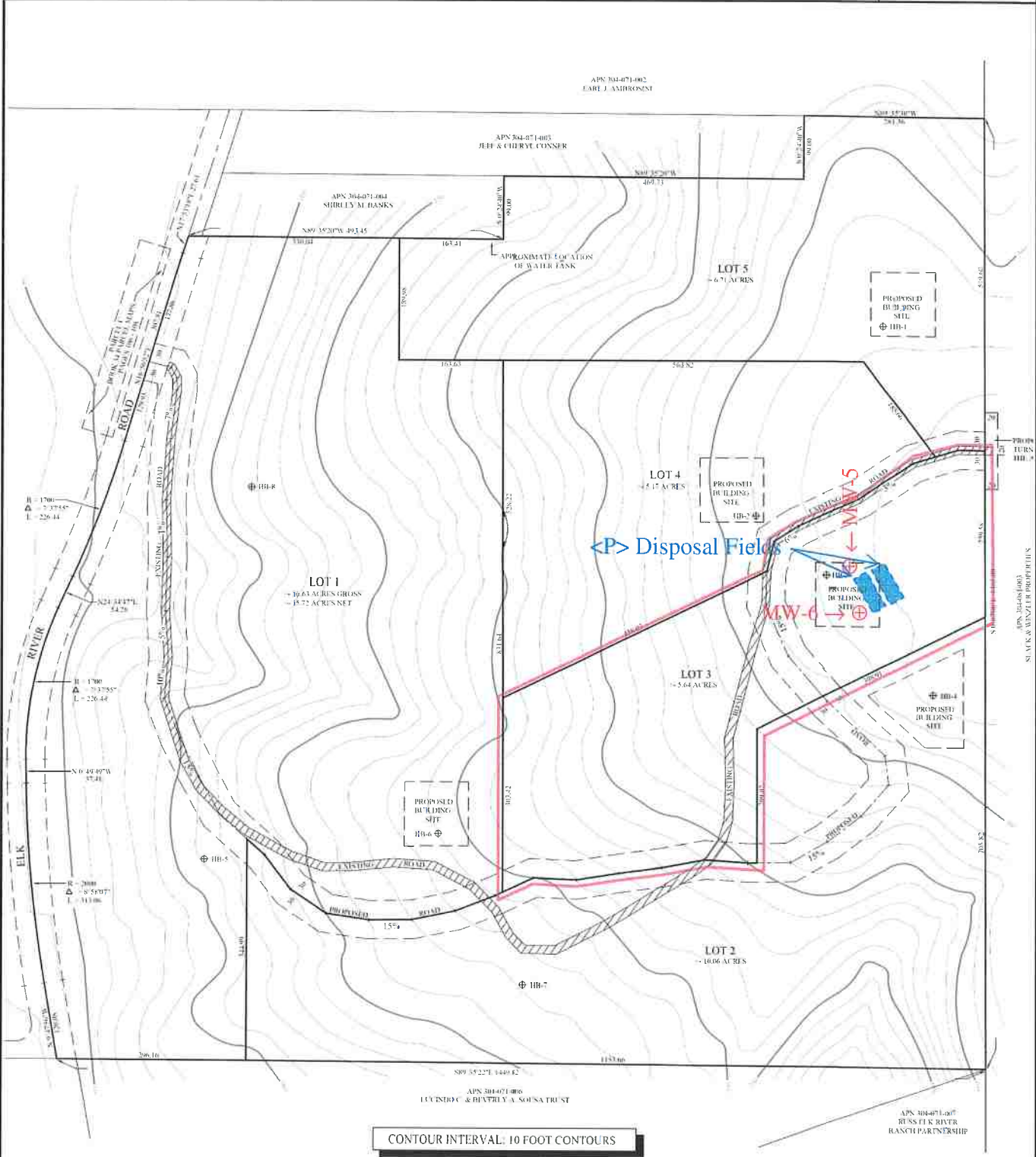
PTN SE1/4 SEC 16 & S1/2 SEC 15 T4N R1W H.B.& M. 304-07



NOTE – Assessor's Block Numbers Shown in Ellipses
Assessor's Parcel Numbers Shown in Circles.



Lindberg Geologic Consulting	Report of Findings: Non-Standard OWS Potential Lot #3	Figure 3
Post Office Box 306	"Berta Parcel" – Elk River Road, Eureka, APN: 304-071-018	October 22, 2019
Cutten, CA 95534	Slack – Winzler Properties. LLC, Client	Project 0091.03
(707) 442-6000	Approximate Subject Parcel Location	1" = 230'



LABORATORY				FIELD		Depth (feet)	Graphic Lithology	U.S.C.S. Designation	SOIL DESCRIPTION
Dry Density (pcf)	Moisture Content (%)	Cohesion; Friction Angle (psf; degrees)	Other Tests	Blows/foot*	Sample				
			66% Sand, 17% Silt, 17% Clay			1		ML	Silt with fine sand, stiff, brown, dry, friable, common roots to 3/4" diameter. Forest duff, sod and topsoil.
						2		SM	Sand with silt, medium dense, olive brown and light olive brown, moist, friable, fine granular crumb structure. Sample 2.5 to 3.0 feet: Zone 2 Sandy Loam.
						3			
						4		SM	Sand with silt, medium dense, olive brown grading to strong brown, moist, friable, fine granular crumb structure, silt content decreasing with depth.
			56% Sand, 29% Silt, 15% Clay			5			
						6		SM	Sand, medium dense, olive brown, moist, slightly silty, friable, weak fine granular crumb structure. Sample 5.0 to 6.0 feet: Zone 2 Sandy Loam.
						7		ML	Sandy silt, stiff, light gray, moist, friable, porous weak subangular blocky structure.
						8		SM	Fine sand with silt, dense, olive gray, moist, friable, granular crumb structure.
						9		CL	Clay with fine sand and silt, stiff, light gray, moist, slightly plastic, slightly sticky, visible secondary porosity.
						10		SM	Fine sand with silt, dense, light olive gray, moist, friable, fine granular crumb structure, grades to strong brown at 10 feet and olive brown at 10.3 feet.

* The blow counts have been converted to standard N-value blow counts

SURFACE ELEVATION: 321 Feet

TOTAL DEPTH: 10.6 Feet

GROUNDWATER DEPTH: >10.6 Feet

LOGGED BY: David N. Lindberg, CEG

BOREHOLE DIAMETER: 3.5 Inches

EQUIPMENT: Hand Auger

HAMMER TYPE: None

LINDBERG GEOLOGIC CONSULTING		LOG OF TEST EXCAVATION / BORING	Figure No.
PROJECT NUMBER: <u>0091.01</u>	DATE: <u>August 4, 2014</u>	HB-3, Lot 3 Slack & Winzler - Berta	4



Reference: 018007

October 12, 2018

David Lindberg
Lindberg Geologic Consulting
P.O. Box 306
Cuttan, CA 95534

SOIL PERCOLATION SUITABILITY / TEXTURAL ANALYSIS RESULTS

Job Name: Lindberg
Date Sampled: 10/05/18
Date Received: 10/08/18
Sampled By: DNL/CEG
Date Tested: 10/11/18
AP Number: 304-017-018

Table with 8 columns: Sample ID, Depth, % Sand, % Clay, % Silt, % Coarse Fragments by Volume, Zone, Bulk Density. Rows include TP-1 through TP-5 with material descriptions like Sand, Clay Loam, and Silty Clay Loam.

* = no peds provided

Regional Water Quality Control Board Zone Descriptions:

Zone 1 - Soils in this zone are very high in sand content. They readily accept effluent, but because of their low silt and clay content they provide minimal filtration.

Zone 2 - Soils in this zone provide adequate percolation rates and filtration of effluent. They are suitable for use of a conventional system without further testing.

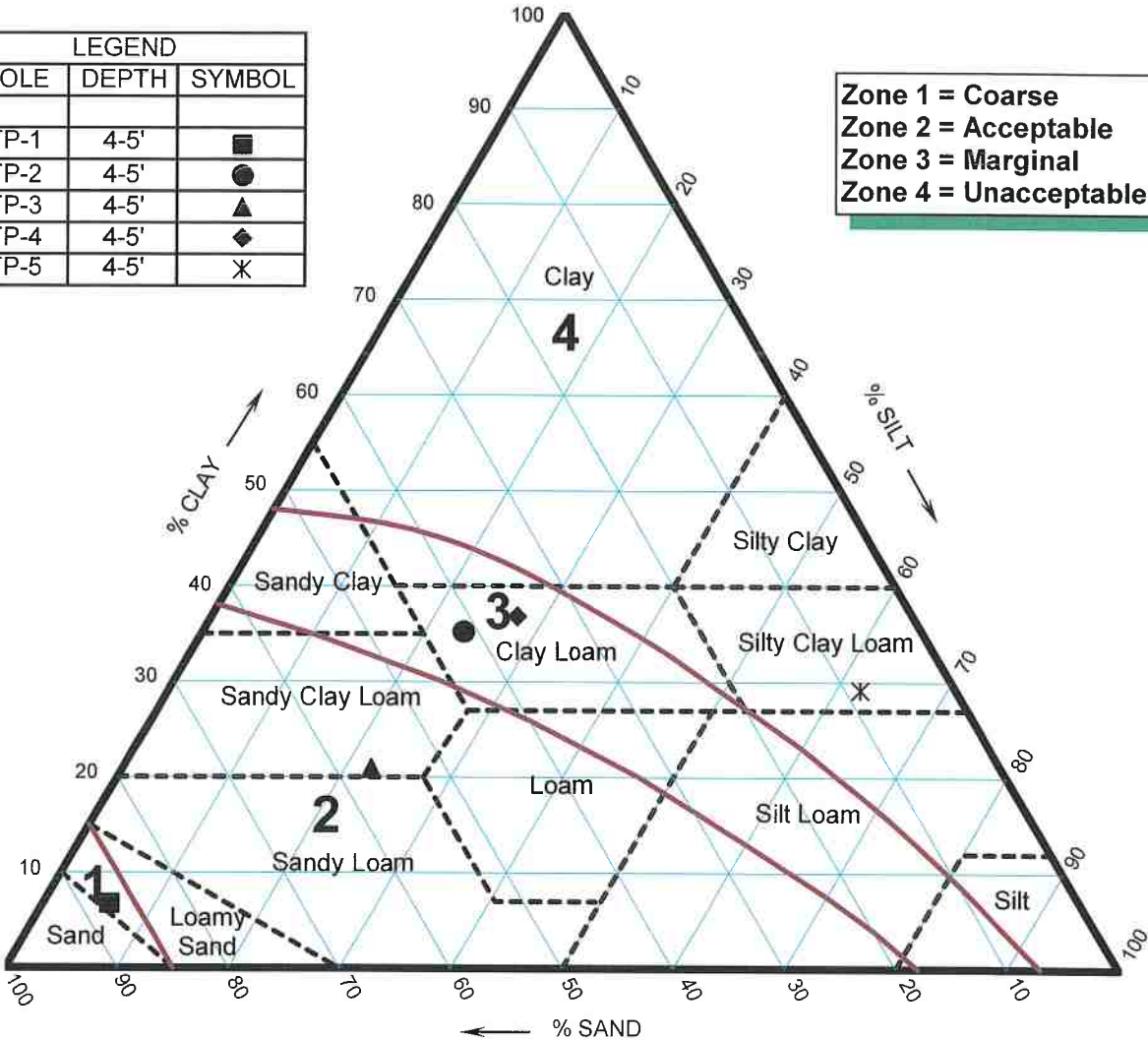
Zone 3 - Soils in this zone are expected to provide good filtration of effluent, but their ability to accept effluent at a suitable rate is questionable. These soils require wet-weather percolation tests to verify their suitability for effluent disposal by conventional leachfield methods.

Zone 4 - Soils in this zone are unsuitable for a conventional leachfield because of their severe limitations for accepting effluent.

SOIL PERCOLATION SUITABILITY CHART

LEGEND		
HOLE	DEPTH	SYMBOL
TP-1	4-5'	■
TP-2	4-5'	●
TP-3	4-5'	▲
TP-4	4-5'	◆
TP-5	4-5'	✕

Zone 1 = Coarse
Zone 2 = Acceptable
Zone 3 = Marginal
Zone 4 = Unacceptable



NOTES

1. Soil texture is plotted on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjustment for coarse fragments has been made by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
3. Adjustment for compactness of soil has been made by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc, when analyzed.
4. For soils falling in sand, loamy sand, or sandy loam, classification adjustment for bulk density will generally not affect suitability and a bulk-density analysis was not necessary.

JOB NUMBER: 018007

DATE: 10/11/18

JOB NAME: Lindberg

APN: 304-017-018



812 W. Wabash
 Eureka, CA 95501-2138
 (707) 441-8855



CONSULTING ENGINEERS & GEOLOGISTS, INC.

812 W.Wabash Eureka, CA 95501-2138 Tel:707/441-8855 FAX:707/441-8877 E-mail:shninfo@shn-engr.com

Reference: 0131034

February 24, 2017

David Lindberg
Lindberg Geologic Consulting
PO Box 306
Cutten, CA 95534

SOIL PERCOLATION SUITABILITY / TEXTURAL ANALYSIS RESULTS

Job Name: Lindberg (Winzler)	Sampled By: DL
Date Sampled: 8/4/14	Date Tested: 2/24/17
Date Received: 2/21/17	AP Number: 304-071-018

<u>Sample ID</u>	<u>Depth</u>	<u>% Sand</u>	<u>% Clay</u>	<u>% Silt</u>	% Coarse Fragments by		<u>Bulk Density</u>
					<u>Volume</u>	<u>Zone</u>	
HB-4	2.5'	33.1	28.7	38.2	0.0	3	*
		Material: Clay Loam					
HB-4	5.5'	48.4	20.3	31.3	0.0	2	*
		Material: Loam					
HB-3	2.5'	66.4	16.9	16.7	0.1	2	*
		Material: Sandy loam					
HB-3	5.5'	56.3	15.1	28.6	0.0	2	*
		Material: Sandy Loam					

* = no peds provided

Regional Water Quality Control Board Zone Descriptions:

Zone 1 - Soils in this zone are very high in sand content. They readily accept effluent, but because of their low silt and clay content they provide minimal filtration. These soils demand greater separation distances from groundwater.

Zone 2 - Soils in this zone provide adequate percolation rates and filtration of effluent. They are suitable for use of a conventional system without further testing.

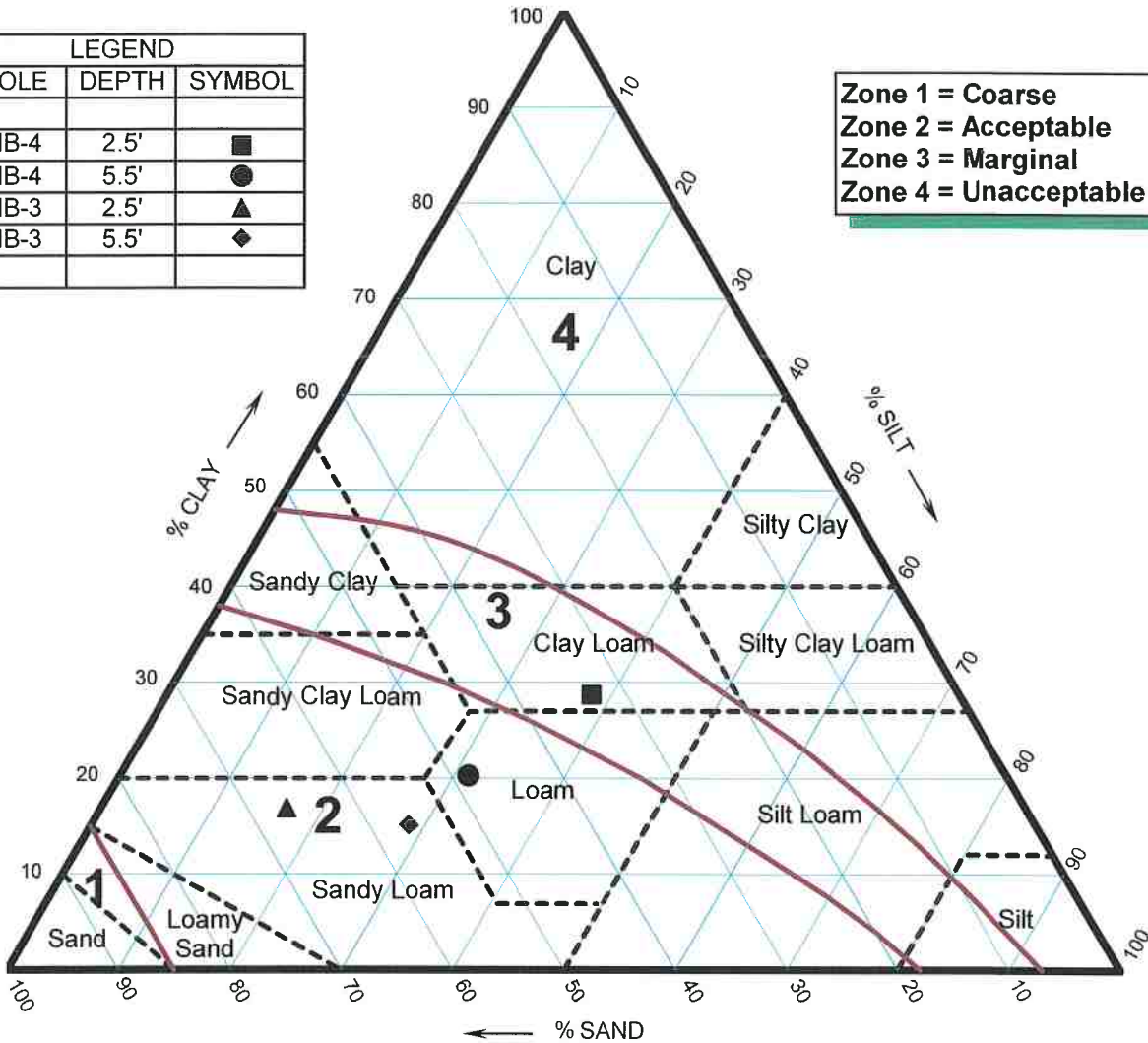
Zone 3 - Soils in this zone are expected to provide good filtration of effluent, but their ability to accept effluent at a suitable rate is questionable. These soils require wet-weather percolation tests to verify their suitability for effluent disposal by conventional leachfield methods.

Zone 4 - Soils in this zone are unsuitable for a conventional leachfield because of their severe limitations for accepting effluent.

SOIL PERCOLATION SUITABILITY CHART

LEGEND		
HOLE	DEPTH	SYMBOL
HB-4	2.5'	■
HB-4	5.5'	●
HB-3	2.5'	▲
HB-3	5.5'	◆

Zone 1 = Coarse
Zone 2 = Acceptable
Zone 3 = Marginal
Zone 4 = Unacceptable



NOTES

1. Soil texture is plotted on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjustment for coarse fragments has been made by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
3. Adjustment for compactness of soil has been made by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc, when analyzed.
4. For soils falling in sand, loamy sand, or sandy loam, classification adjustment for bulk density will generally not affect suitability and a bulk-density analysis was not necessary.

JOB NUMBER: 0131034

DATE: 2/24/17

JOB NAME: Lindberg (Winzler)

APN: 304-071-018

SH Consulting Engineers & Geologists, Inc.

812 W. Wabash
 Eureka, CA 95501-2138
 (707) 441-8855

Lindberg Geologic Consulting	Report of Findings: Non-Standard OWTS Potential Lot #3	Sheet 1
Post Office Box 306	"Berta Parcel" – Elk River Road, Eureka, APN: 304-071-018	October 22, 2019
Cutten, CA 95534	Slack – Winzler Properties. LLC, Client	Project 0091.03
(707) 442-6000	Shallow-Depth Percolation Test Results	No Scale

**Shallow-Depth Percolation Test Report
Slack and Winzler Berta Property**

Test Pit #1: Lot #3

Depth: 2.0 Feet

Diameter: 12 inches

Time	Distance Below Reference (ft)	Refilled to (ft)	Δ feet	Δ inches	Perc Rate (min/inch)
2:57 PM	1.25				
3:18 PM	2.00		0.75	9.00	2.3
3:21 PM		1.51			
3:42 PM	2.00		0.49	5.88	3.6
3:43 PM		1.23			
4:11 PM	2.00		0.77	9.24	3.0
4:13 PM		1.23			
4:36 PM	2.00		0.77	9.24	2.5
40.72689N		124.16886W		Perc Rate:	<4 MPI

Test Pit #2: Lot #3

Depth: 2.0 Feet

Diameter: 12 inches

Time	Distance Below Reference (ft)	Refilled to (ft)	Δ feet	Δ inches	Perc Rate (min/inch)
3:00 PM	0.96				
3:20 PM	1.39		0.43	5.16	3.9
3:44 PM	1.55		0.16	1.92	7.8
3:46 PM		1.08			
4:13 PM	1.25		0.17	2.04	7.4
4:14 PM		0.99			
4:37 PM	1.35	end test	0.36	4.32	3.5
40.72683N		124.16902W		Perc Rate:	<8 MPI

LINDBERG GEOLOGIC CONSULTING
David N. Lindberg, CEG
Post Office Box 306
Cutten, CA 95534
(707) 442-6000

October 23, 2019

Project Number: 0091.03

Mr. John Winzler
Slack and Winzler Properties LLC
Post Office Box 549
Eureka, California 95502

Subject: Report of Findings: Non-Standard On-Site Wastewater Treatment System
Lot #4 of Proposed Subdivision of APN 304-071-018, Elk River Road, Eureka

Dear Mr. Winzler:

Exploration, testing and preliminary conceptual design for a non-standard On-site Wastewater Disposal System on proposed Lot #4 at APN 304-071-018 has been completed. The subject parcel is located in the Ridgewood, Elk River area of Eureka (Figure 1). An annotated copy of the Assessor's parcel map is attached for reference (Figure 2), as is a copy of the proposed subdivision map (Figure 3). Based on the information developed in our limited-scope investigations and materials testing at the locations explored, it appears likely that a shallow pressure distribution (SPD), a non-standard On-Site Wastewater Treatment System (OWTS) can be developed to serve a three bedroom single family residence on this proposed lot. Shallow winter groundwater and soil drainage appear to exceed the minimum standards of the Humboldt County Health Department.

One hand augered soil boring (HB-2), an exploratory backhoe percolation test pit (TP-2) and two groundwater monitoring wells (MW-3 and MW-4) were located in an accessible area that appeared potentially suitable for primary and or reserve drain fields. Test boring HB-2 was extended to 10-feet below grade. Free groundwater and soil mottling were not encountered in HB-2 on August 4, 2014. HB-2 was sampled at approximately 3.0, and 5.5 feet below existing grade. Samples proved to be Sandy Loam, a Zone-2 (acceptable) soil and Loam (Zone-2, acceptable). A soil boring log (Figure 4) and results of the soil boring, and percolation test pit textural analyses are attached.

Soil collected at a depth of 4 to 5 feet below the surface in October 2018, from TP-2 consisted of Clay Loam (Zone-3, marginal) soil. Groundwater monitoring wells 3 and 4 were sounded regularly during the 2018-2019 wet weather test period between January 30, and March 21, 2019. Several substantial rainfall events of greater than 0.5-inch of precipitation within 24 hours occurred during February and March 2019. Groundwater rose to between 5.8 and 4.7 feet below grade in MW-3 and MW-6, respectively; which in the case of MW-6 would not provide five feet of separation between groundwater and the bottom of a disposal trench for adequate effluent treatment. Groundwater was sufficiently deep for a shallow pressure distribution system.

Proposed Lot #4 is located in the central eastern part of APN 304-071-018 (Figure 3). When percolation testing was conducted in March 2016, soils adjacent to HB-2 were found to have low absorption rates but no shallow groundwater to 6-feet. Percolation tests on Lot #4 showed the soil absorbed water at greater than 62 minutes per inch (MPI) at three to four feet below grade; at five to six feet soils absorbed water at greater than 120 MPI minutes per inch in March 2016. In the limited areas of slopes less than 30 percent which were accessible during our explorations, test excavations in 2016 showed that seasonal high groundwater was greater than 6 feet below the existing ground surface around HB-2 on Lot #4. Shallow percolation tests in April (2019) in two

LINDBERG GEOLOGIC CONSULTING
(707) 442-6000

holes two feet deep demonstrated shallow infiltration rates of less than 8 MPI. April 2019 percolation test results are attached as Sheet 1.


A SPD disposal system can be developed on proposed Lot #4. Based on our observations and experience, it appears that a standard OWTS or an infiltrator system can not be used in the area around HB-2 on proposed Lot #4. We recommend a SPD in the eastern part of this large lot (Figure 3). Given the Clay Loam soils we conservatively used an absorption rate of 50 MPI and an application rate of 0.296 gallons per day per square foot (gpd/ft²) of absorption area. Utilizing a SPD system with trenches 2.0 feet wide by 2.5 feet deep provides 5 square feet of absorption area per linear foot of trench. Effluent loading is 450 gallons per day, and with an absorption capacity of 0.296 gpd/ft², 1,521 square feet of absorption area, or 305 feet of SPD trench is required.

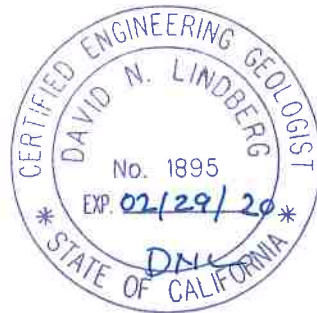
A shallow Pressure Distribution System appears feasible for this proposed new lot. We recommend five trenches, 61 feet in length, with each trench separated by five feet from the adjacent trenches. Trenches shall be contour parallel and level. The disposal field for a three-bedroom residence will then be approximately 20 feet by 61 feet, with an equivalent 100 percent reserve area. A septic tank with a capacity of at least 1,500 gallons is required; a pump chamber will be required. We recommend 900 gallon dosing and backup power for this system. Additional, site-specific sampling, testing and design will be necessary if the number of bedrooms is not three, or if the future owner chooses another location for the disposal field. Primary and reserve disposal fields are shown on Figure 3.

In our opinion, site-specific soil profile exploration, soil sampling and logging, and percolation testing demonstrated that a suitable dispersal area exists on proposed Lot #4 for a shallow pressure distribution on-site wastewater treatment system. If any other areas are proposed for OWTS on Lot #4, additional monitoring wells may be needed in those areas for wet-season groundwater monitoring. Percolation testing will also be necessary in other locations on Lot #4.

Please contact me at the number above if you have any concerns or questions.

Sincerely,


David N. Lindberg, CEG 1895
Lindberg Geologic Consulting

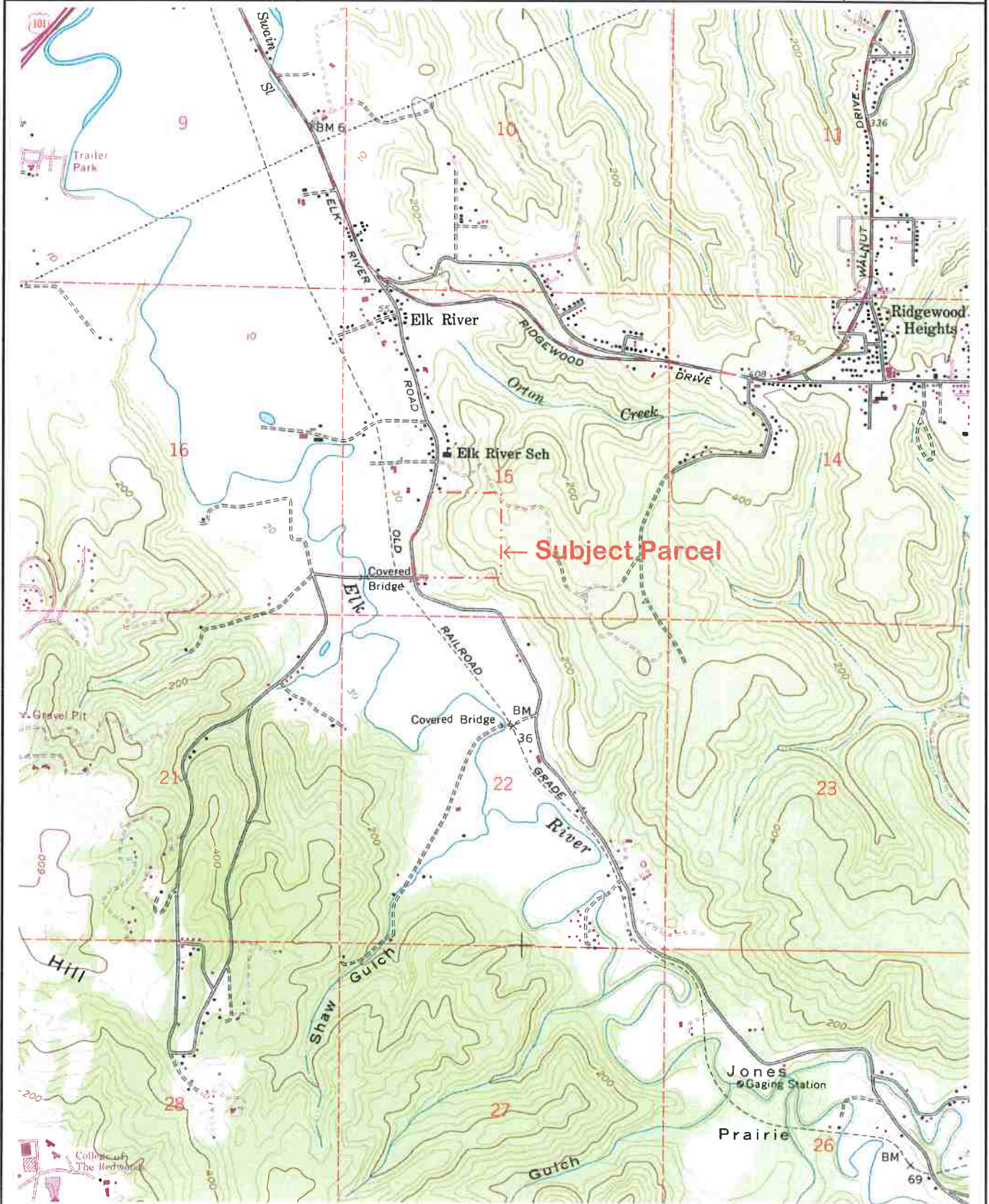


Attachments:

- Location Map (Figure 1)
- Assessor Parcel Map (Figure 2)
- Site Plan Map with Well and Drain Field Locations (Figure 3)
- HB-2 Lot #4 Soil Profile Log (Figure 4)
- Textural Analyses, October 2018 (TP-2) and February 2017 (HB-2)
- Shallow-Depth Percolation Test Report (Sheet 1)

DNL:sll

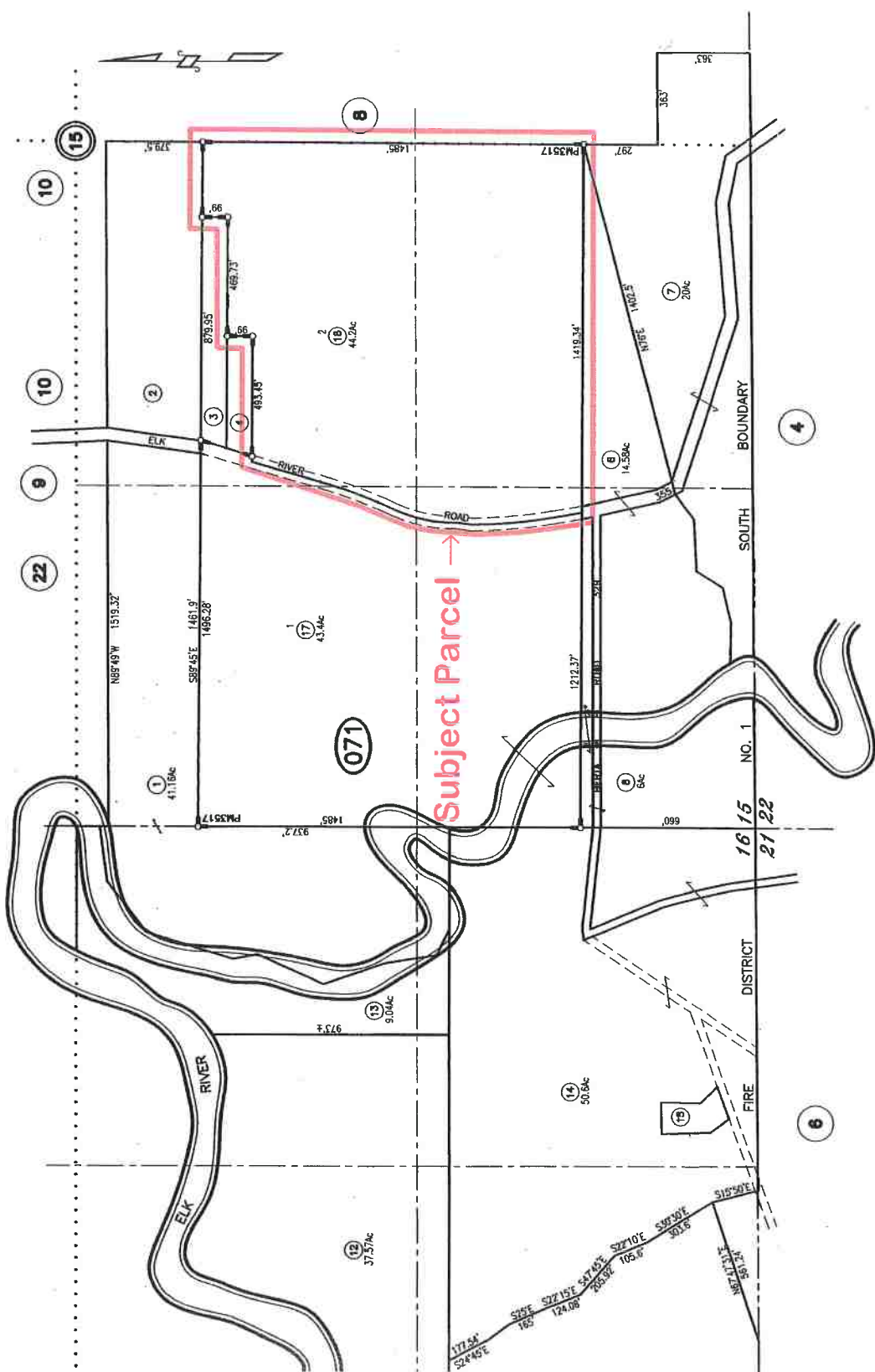
Lindberg Geologic Consulting	Report of Findings: Non-Standard OWTs Potential Lot #4	Figure 1
Post Office Box 306	"Berta Parcel" – Elk River Road, Eureka, APN: 304-071-018	October 23, 2019
Cutten, CA 95534	Slack – Winzler Properties. LLC, Client	Project 0091.03
(707) 442-6000	Approximate Subject Parcel Location	1" = 2,000'



Modified from: USGS "Fields Landing, Calif." 7.5' Quadrangle Map, 1959 (photorevised, 1972) N

Lindberg Geologic Consulting	Report of Findings: Non-Standard OWTs Potential Lot #4	Figure 2
Post Office Box 306	"Berta Parcel" - Elk River Road, Eureka, APN: 304-071-018	October 23, 2019
Cutten, CA 95534	Slack - Winzler Properties, LLC, Client	Project 0091.03
(707) 442-6000	Subject Parcel Location: Humboldt County Assessor's Parcel Map 304-07	Scale as Shown

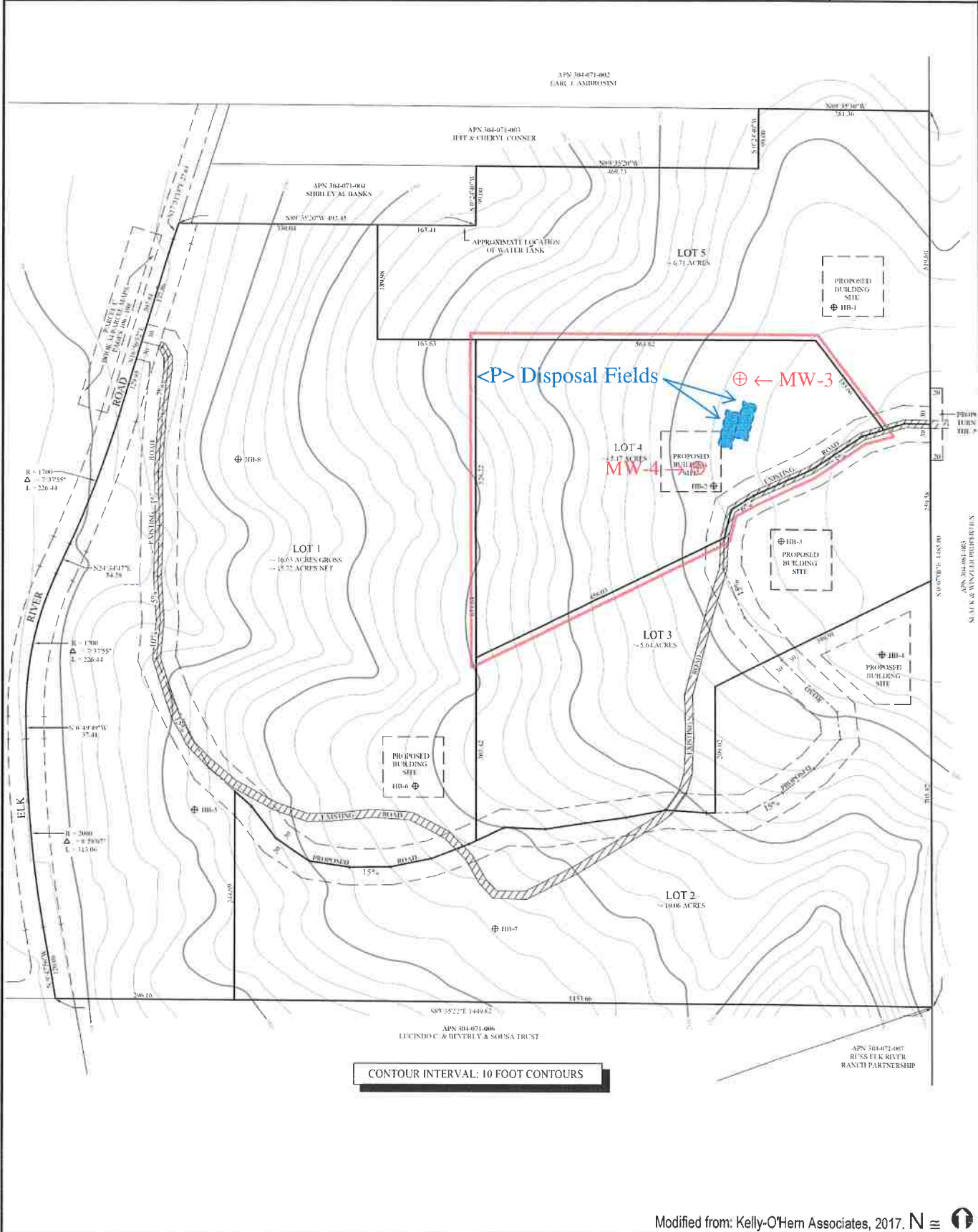
PTN SE1/4 SEC 16 & S1/2 SEC 15 T4N R1W H.B.& M. 304-07



NOTE - Assessor's Block Numbers Shown in Ellipses
Assessor's Parcel Numbers Shown in Circles.



Lindberg Geologic Consulting	Report of Findings: Non-Standard OWTS Potential Lot #4	Figure 3
Post Office Box 306	"Berta Parcel" – Elk River Road, Eureka, APN: 304-071-018	October 23, 2019
Cutten, CA 95534	Slack – Winzler Properties. LLC, Client	Project 0091.03
(707) 442-6000	Approximate Subject Parcel Location	1" = 230'



LABORATORY				FIELD		Depth (feet)	Graphic Lithology	U.S.C.S. Designation	SOIL DESCRIPTION
Dry Density (pcf)	Moisture Content (%)	Cohesion; Friction Angle (psf; degrees)	Other Tests	Blows/foot*	Sample				
			67% Sand, 14% Silt, 19% Clay			1		ML	Topsoil. Sandy silt, loose, dry, brown, common fine roots.
						2		ML	Silt with fine sand, stiff, dry, brown, few roots, friable, fine granular crumb structure.
						3		SM	Silty sand, medium dense, strong brown, moist, friable, granular crumb to weak blocky prismatic structure. Sample 2.5 to 3.5 feet: Zone 2 Sandy Loam.
						4		SM	Fine sand with silt, medium dense, light olive brown, moist, trace strong brown mottling, friable, fine granular crumb to weak blocky prismatic structure.
						5		CL	Sandy clay, stiff, variegated light olive brown and strong brown, moist, slightly plastic.
			42% Sand, 35% Silt, 23% Clay			6		SM	Clayey sand, grades to silty fine sand, medium dense, moist, light olive brown and strong brown, granular crumb structure, visible secondary porosity. Sample 5.0 to 6.0 feet: Zone 2 Loam.
						7		SM	Silty Sand, medium dense, light olive brown and strong brown variegated, moist, friable, granular crumb weak blocky prismatic structure, visible secondary porosity.
						8		ML	Silt with fine sand, stiff, light olive brown mottled with strong brown, moist, blocky prismatic structure, visible secondary porosity.
						9		ML	Silt with fine sand, stiff, olive brown with strong brown mottles, moist, granular crumb structure.
								CL	Silty clay, stiff, olive/strg. brn., moist, sl. plastic.
						10		CL	Clay with silt, stiff, blueish gray to gray, moist, plastic, common plant material.
No free water to 10.5 feet below grade.									

* The blow counts have been converted to standard N-value blow counts

SURFACE ELEVATION: 310 Feet

TOTAL DEPTH: 10.5 Feet

GROUNDWATER DEPTH: >10.5 Feet

LOGGED BY: David N. Lindberg, CEG

BOREHOLE DIAMETER: 3.5 Inches

EQUIPMENT: Hand Auger

HAMMER TYPE: None

LINDBERG GEOLOGIC CONSULTING

LOG OF TEST EXCAVATION / BORING
HB-2, Lot 4 Slack & Winzler - Berta

Figure No.

4

PROJECT NUMBER: 0091.01

DATE: August 4, 2014



Reference: 018007

October 12, 2018

David Lindberg
Lindberg Geologic Consulting
P.O. Box 306
Cutten, CA 95534

SOIL PERCOLATION SUITABILITY / TEXTURAL ANALYSIS RESULTS

Job Name: Lindberg
Date Sampled: 10/05/18
Date Received: 10/08/18
Sampled By: DNL/CEG
Date Tested: 10/11/18
AP Number: 304-017-018

Table with 8 columns: Sample ID, Depth, % Sand, % Clay, % Silt, % Coarse Fragments by Volume, Zone, Bulk Density. Rows include TP-1 through TP-5 with material descriptions like Sand, Clay Loam, and Silty Clay Loam.

* = no peds provided

Regional Water Quality Control Board Zone Descriptions:

Zone 1 - Soils in this zone are very high in sand content. They readily accept effluent, but because of their low silt and clay content they provide minimal filtration.

Zone 2 - Soils in this zone provide adequate percolation rates and filtration of effluent. They are suitable for use of a conventional system without further testing.

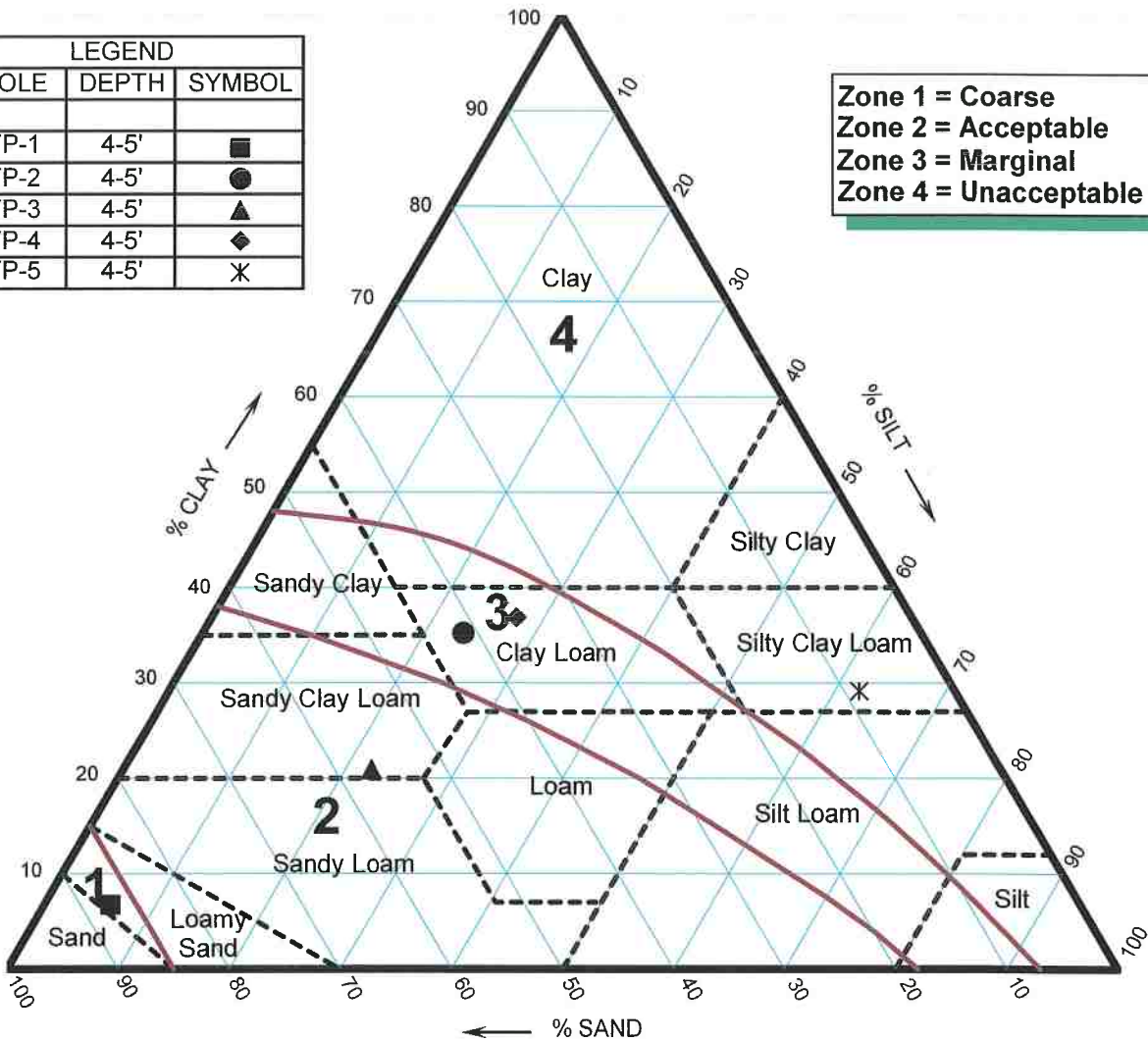
Zone 3 - Soils in this zone are expected to provide good filtration of effluent, but their ability to accept effluent at a suitable rate is questionable. These soils require wet-weather percolation tests to verify their suitability for effluent disposal by conventional leachfield methods.

Zone 4 - Soils in this zone are unsuitable for a conventional leachfield because of their severe limitations for accepting effluent.

SOIL PERCOLATION SUITABILITY CHART

LEGEND		
HOLE	DEPTH	SYMBOL
TP-1	4-5'	■
TP-2	4-5'	●
TP-3	4-5'	▲
TP-4	4-5'	◆
TP-5	4-5'	✕

Zone 1 = Coarse
Zone 2 = Acceptable
Zone 3 = Marginal
Zone 4 = Unacceptable



NOTES

1. Soil texture is plotted on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjustment for coarse fragments has been made by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
3. Adjustment for compactness of soil has been made by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc, when analyzed.
4. For soils falling in sand, loamy sand, or sandy loam, classification adjustment for bulk density will generally not affect suitability and a bulk-density analysis was not necessary.

JOB NUMBER: 018007

DATE: 10/11/18

JOB NAME: Lindberg

APN: 304-017-018



812 W. Wabash
 Eureka, CA 95501-2138
 (707) 441-8855



CONSULTING ENGINEERS & GEOLOGISTS, INC.

812 W.Wabash Eureka, CA 95501-2138 Tel:707/441-8855 FAX:707/441-8877 E-mail:shninfo@shn-engr.com

Reference: 013034

February 24, 2017

David Lindberg
Lindberg Geologic Consulting
PO Box 306
Cutten, CA 95534

SOIL PERCOLATION SUITABILITY / TEXTURAL ANALYSIS RESULTS

Job Name: Lindberg (Winzler)	Sampled By: DL
Date Sampled: 8/4/14	Date Tested: 2/24/17
Date Received: 2/21/17	AP Number: 304-071-018

<u>Sample ID</u>	<u>Depth</u>	<u>% Sand</u>	<u>% Clay</u>	<u>% Silt</u>	<u>% Coarse Fragments by Volume</u>	<u>Zone</u>	<u>Bulk Density</u>
HB-2	3'	66.9	19.2	13.9	0.0	2	*
	Material:	Sandy Loam					
HB-2	5.5'	42.1	23.3	34.6	0.0	2	*
	Material:	Loam					
HB-1	2.25'	50.6	30.4	19.0	0.0	2	*
	Material:	Sandy Clay loam					
HB-1	5.5'	78.3	11.0	10.7	0.0	2	*
	Material:	Sandy Loam					

* = no peds provided

Regional Water Quality Control Board Zone Descriptions:

Zone 1 - Soils in this zone are very high in sand content. They readily accept effluent, but because of their low silt and clay content they provide minimal filtration. These soils demand greater separation distances from groundwater.

Zone 2 - Soils in this zone provide adequate percolation rates and filtration of effluent. They are suitable for use of a conventional system without further testing.

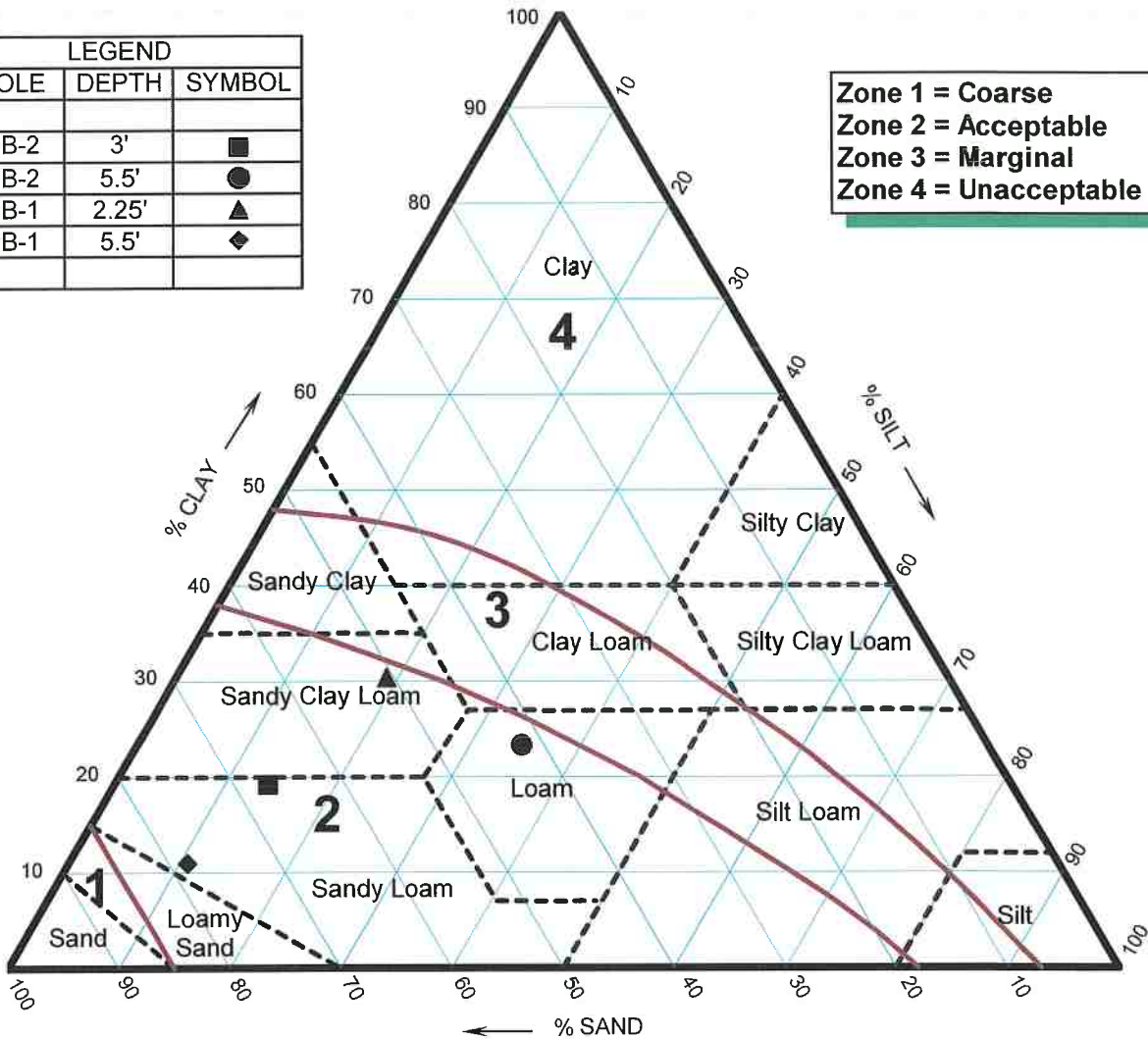
Zone 3 - Soils in this zone are expected to provide good filtration of effluent, but their ability to accept effluent at a suitable rate is questionable. These soils require wet-weather percolation tests to verify their suitability for effluent disposal by conventional leachfield methods.

Zone 4 - Soils in this zone are unsuitable for a conventional leachfield because of their severe limitations for accepting effluent.

SOIL PERCOLATION SUITABILITY CHART

LEGEND		
HOLE	DEPTH	SYMBOL
HB-2	3'	■
HB-2	5.5'	●
HB-1	2.25'	▲
HB-1	5.5'	◆

Zone 1 = Coarse
Zone 2 = Acceptable
Zone 3 = Marginal
Zone 4 = Unacceptable



NOTES

1. Soil texture is plotted on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjustment for coarse fragments has been made by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
3. Adjustment for compactness of soil has been made by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc, when analyzed.
4. For soils falling in sand, loamy sand, or sandy loam, classification adjustment for bulk density will generally not affect suitability and a bulk-density analysis was not necessary.

JOB NUMBER: 013034
JOB NAME: Lindberg (Winzler)

DATE: 2/24/17
APN: 304-071-018



812 W. Wabash
 Eureka, CA 95501-2138
 (707) 441-8855

Lindberg Geologic Consulting	Report of Findings: Non-Standard OWTS Potential Lot #4	Sheet 1
Post Office Box 306	"Berta Parcel" – Elk River Road, Eureka, APN: 304-071-018	October 23, 2019
Cutten, CA 95534	Slack – Winzler Properties. LLC, Client	Project 0091.03
(707) 442-6000	Shallow-Depth Percolation Test Results	No Scale

**Shallow-Depth Percolation Test Report
Slack and Winzler Berta Property**

Test Pit #1: Lot #4

Depth: 2.0 Feet

Diameter: 12 inches

Time	Distance Below Reference (ft)	Refilled to (ft)	Δ feet	Δ inches	Perc Rate (min/inch)
2:51 PM	1.26				
3:12 PM	2.00		0.74	8.88	2.4
3:13 PM		1.39			
3:36 PM	1.91		0.52	6.24	3.7
3:36 PM		1.32			
4:04 PM	1.87		0.55	6.60	4.5
4:06 PM		1.09			
4:31 PM	1.72	end test	0.63	7.56	3.3
40.72737N		124.16954W		Perc Rate:	<5 MPI

Test Pit #2: Lot #4

Depth: 2.0 Feet

Diameter: 12 inches

Time	Distance Below Reference (ft)	Refilled to (ft)	Δ feet	Δ inches	Perc Rate (min/inch)
2:53 PM	1.00				
3:15 PM	2.00		1.00	12.00	1.8
3:16 PM		1.41			
3:38 PM	1.68		0.27	3.24	6.8
3:39 PM		1.06			
4:07 PM	1.45		0.39	4.68	6.0
4:08 PM		1.06			
4:32 PM	1.35		0.29	3.48	6.9
4:33 PM		1.00			
5:02 PM	1.32	end test	0.32	3.84	7.6
40.70721N		127.16982W		Perc Rate:	<8 MPI

LINDBERG GEOLOGIC CONSULTING
David N. Lindberg, CEG
Post Office Box 306
Cutten, CA 95534
(707) 442-6000

October 24, 2019

Project Number: 0091.03

Mr. John Winzler
Slack and Winzler Properties LLC
Post Office Box 549
Eureka, California 95502

Subject: Report of Findings: Non-Standard On-Site Wastewater Treatment System
Lot #5 of Proposed Subdivision of APN 304-071-018, Elk River Road, Eureka

Dear Mr. Winzler:

Exploration, testing and preliminary conceptual design for a non-standard On-site Wastewater Disposal System on proposed Lot #5 at APN 304-071-018 has been completed. The subject parcel is located in the Ridgewood, Elk River area of Eureka (Figure 1). An annotated copy of the Assessor's parcel map is attached for reference (Figure 2), as is a copy of the proposed subdivision map (Figure 3). Based on the information developed in our limited-scope investigations and materials testing at the locations explored, it appears likely that a shallow pressure distribution (SPD), a non-standard On-Site Wastewater Treatment System (OWTS) can be developed to serve a three bedroom single family residence on this proposed lot. Shallow winter groundwater and soil drainage appear to exceed the minimum standards of the Humboldt County Health Department.

One hand augered soil boring (HB-1), an exploratory backhoe percolation test pit (TP-1) and two groundwater monitoring wells (MW-1 and MW-2) were located in an accessible area that appeared potentially suitable for primary and or reserve drain fields. Test boring HB-1 was extended to 10-feet below grade. Free groundwater and soil mottling were not encountered in HB-1 on August 4, 2014. HB-1 was sampled at approximately 2.0, and 5.0 feet below existing grade. Samples proved to be Sandy Clay Loam, a Zone-2 (acceptable) soil and Sandy Loam (Zone-2, acceptable). A soil boring log (Figure 4) and results of the soil boring, and percolation pit textural analyses are attached.

Soil collected at a depth of 4 to 5 feet below the surface in October 2018, from TP-1 consisted of Sand (Zone-1, coarse) soil. Resampling the opposite side of the Test Pit on October 16, 2018 showed Sandy Loam (Zone-2, acceptable) soils. Groundwater monitoring wells 1 and 2 were sounded regularly during the 2018-2019 wet weather test period between January 30, and March 21, 2019. Several substantial rainfall events of greater than 0.5-inch of precipitation within 24 hours occurred during February and March 2019. Groundwater rose to between 3.2 and 5.2 feet below grade in MW-1 and MW-2, respectively; which in the case of MW-1 would not provide five feet of separation between groundwater and the bottom of a disposal trench for adequate effluent treatment. Groundwater was sufficiently deep for a shallow pressure distribution system.

Proposed Lot #5 is located in the northeastern part of APN 304-071-018 (Figure 3). When percolation testing was conducted in March 2016, soils adjacent to HB-1 were found to have no shallow groundwater to 6-feet. Percolation tests on Lot #5 were not performed in March 2016 due to the presence of Zone-2 soils. In the limited areas of slopes less than 30 percent which were accessible during our explorations, test excavations in 2016 showed that seasonal high groundwater was greater than 6 feet below the existing ground surface around HB-1 on Lot #5.

LINDBERG GEOLOGIC CONSULTING
(707) 442-6000

Shallow percolation tests in April (2019) in two holes two feet deep demonstrated shallow infiltration rates of less than 11 MPI. April 2019 percolation test results are attached as Sheet 1.

A SPD disposal system can be developed on proposed Lot #5. Based on our observations and experience, it appears that a standard OWTS or an infiltrator system can not be used in the area around HB-1 on proposed Lot #5 due to seasonally shallow groundwater. We recommend a SPD in the eastern part of this large lot (Figure 3). Given the Sandy Clay Loam soils we conservatively used an absorption rate of 25 MPI and an application rate of 0.389 gallons per day per square foot (gpd/ft²) of absorption area. Utilizing a SPD system with trenches 2.0 feet wide by 2.5 feet deep provides 5 square feet of absorption area per linear foot of trench. Effluent loading is 450 gallons per day, and with an absorption capacity of 0.389 gpd/ft², therefore 1,157 square feet of absorption area, or 240 linear feet of SPD trench is required.

A shallow Pressure Distribution System appears feasible for this proposed new lot. We recommend five trenches, 50 feet in length, with each trench separated by five feet from the adjacent trenches. Trenches shall be contour parallel and level. The disposal field for a three-bedroom residence will then be approximately 20 feet by 50 feet, with an equivalent 100 percent reserve area. A septic tank with a capacity of at least 1,500 gallons is required; a pump chamber will be required. We recommend 1,000 gallon dosing and backup power for this system. Additional, site-specific sampling, testing and design will be necessary if the number of bedrooms is not three, or if the future owner chooses another location for the disposal field. Primary and reserve disposal fields are shown on Figure 3.

In our opinion, site-specific soil profile exploration, soil sampling and logging, and percolation testing demonstrated that a suitable dispersal area exists on proposed Lot #5 for a shallow pressure distribution on-site wastewater treatment system. If any other areas are proposed for OWTS on Lot #5, additional monitoring wells may be needed in those areas for wet-season groundwater monitoring. Percolation testing will also be necessary in other locations on Lot #5.

Please contact me at the number above if you have any concerns or questions.

Sincerely,

David N. Lindberg

David N. Lindberg, CEG 1895
Lindberg Geologic Consulting

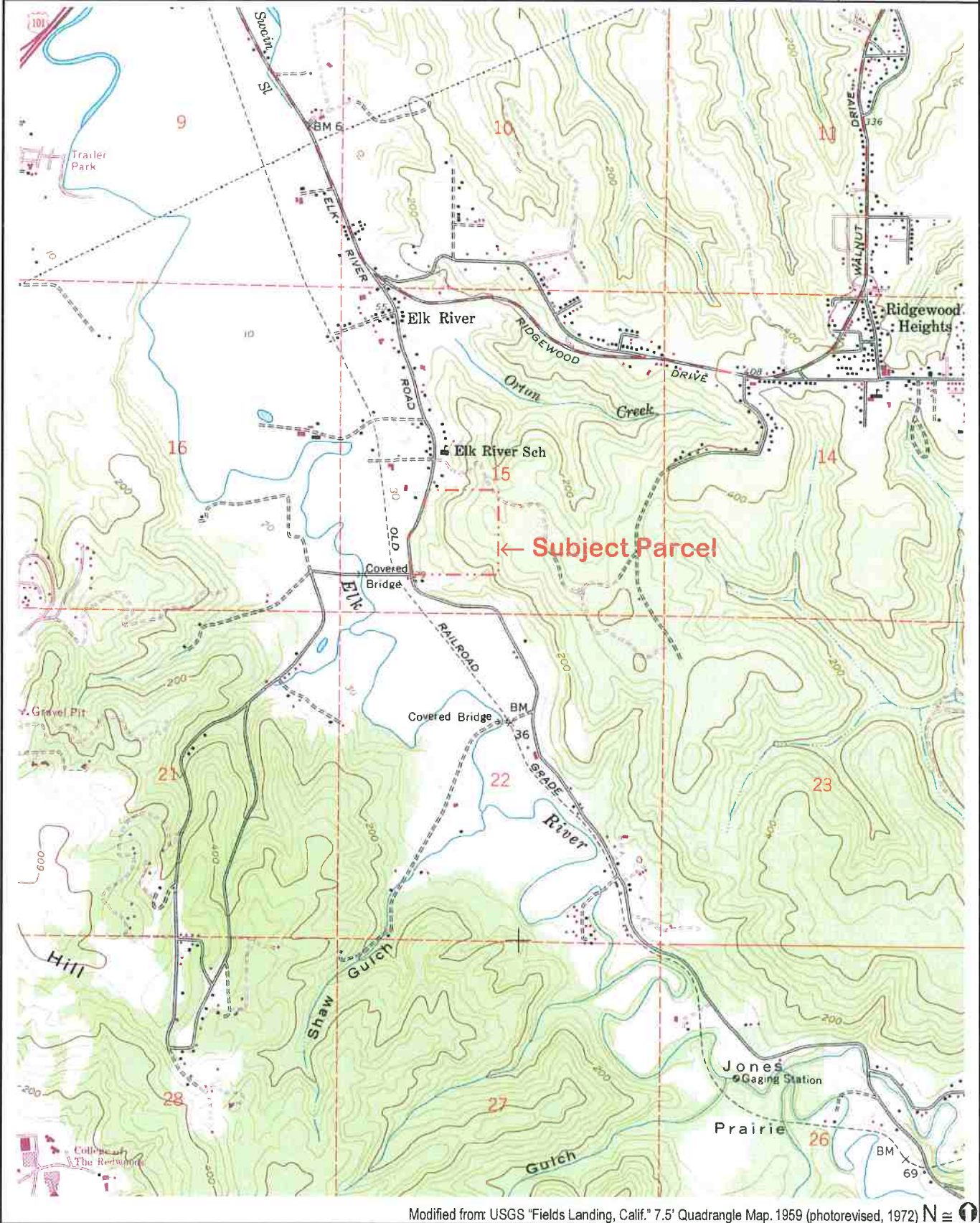


Attachments:

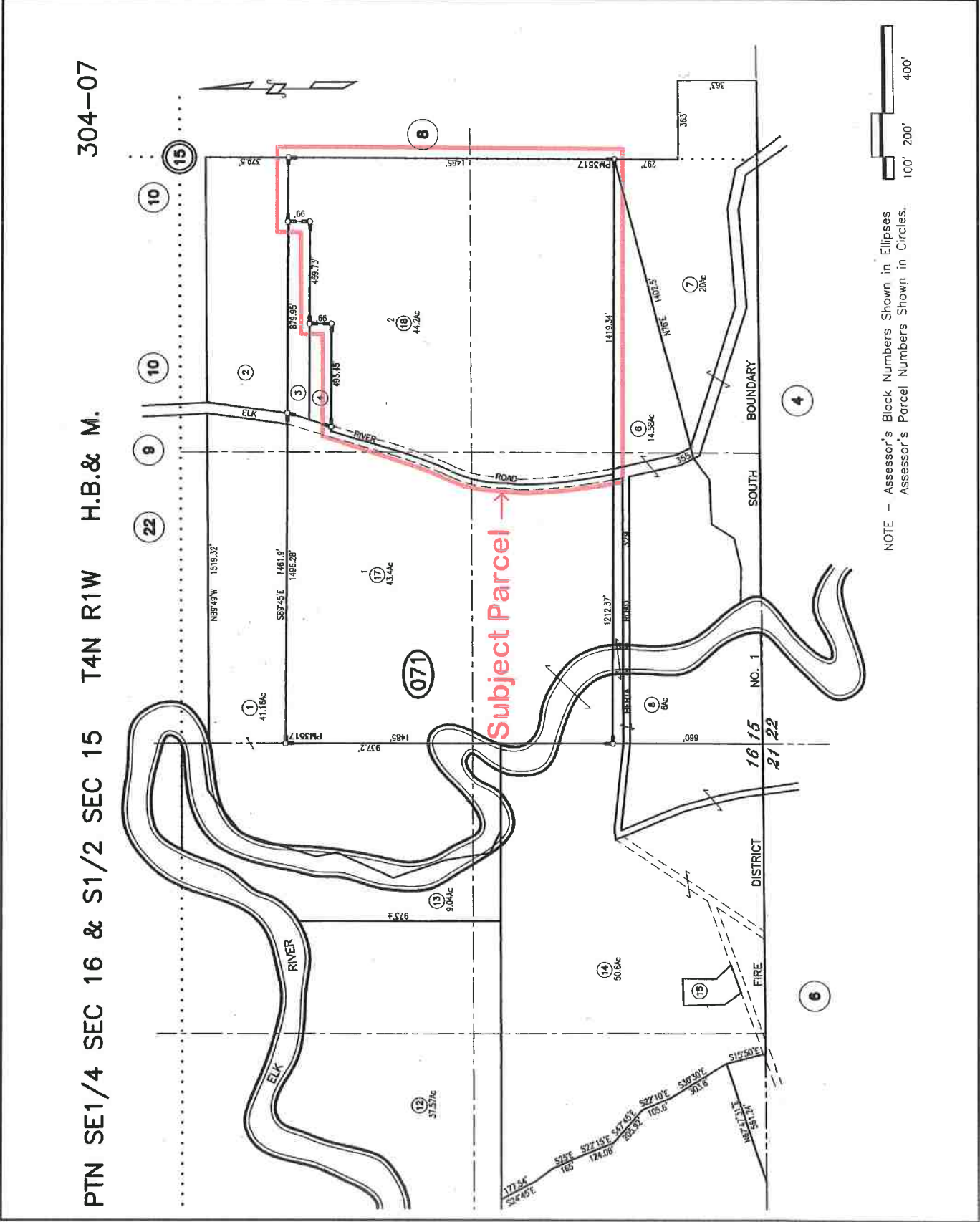
- Location Map (Figure 1)
- Assessor Parcel Map (Figure 2)
- Site Plan Map with Well and Drain Field Locations (Figure 3)
- HB-3 Lot #5 Soil Profile Log (Figure 4)
- Textural Analyses, October 2018 (TP-1) and February 2017 (HB-1)
- Shallow-Depth Percolation Test Report (Sheet 1)

DNL:sll

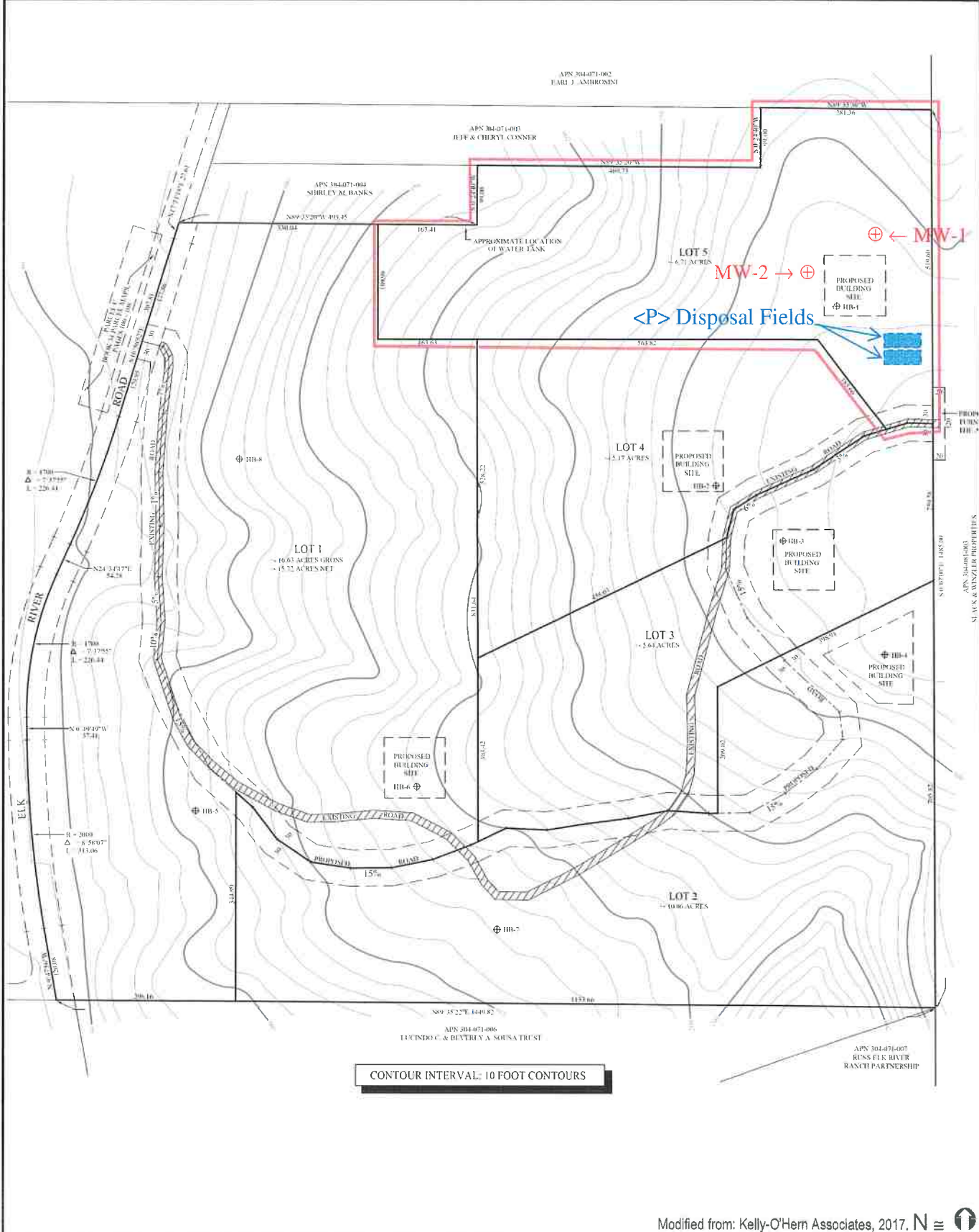
Lindberg Geologic Consulting	Report of Findings: Non-Standard OWTS Potential Lot #5	Figure 1
Post Office Box 306	"Berta Parcel" – Elk River Road, Eureka, APN: 304-071-018	October 24, 2019
Cutten, CA 95534	Slack – Winzler Properties. LLC, Client	Project 0091.03
(707) 442-6000	Approximate Subject Parcel Location	1" = 2,000'



Lindberg Geologic Consulting	Report of Findings: Non-Standard OWTs Potential Lot #5	Figure 2
Post Office Box 306	"Berta Parcel" – Elk River Road, Eureka, APN: 304-071-018	October 24, 2019
Cutten, CA 95534	Slack – Winzler Properties. LLC, Client	Project 0091.03
(707) 442-6000	Subject Parcel Location: Humboldt County Assessor's Parcel Map 304-07	Scale as Shown



Lindberg Geologic Consulting	Report of Findings: Non-Standard OWTs Potential Lot #5	Figure 3
Post Office Box 306	"Berta Parcel" – Elk River Road, Eureka, APN: 304-071-018	October 24, 2019
Cutten, CA 95534	Slack – Winzler Properties. LLC, Client	Project 0091.03
(707) 442-6000	Approximate Subject Parcel Location	1" = 230'



LABORATORY				FIELD		Depth (feet)	Graphic Lithology	U.S.C.S. Designation	SOIL DESCRIPTION
Dry Density (pcf)	Moisture Content (%)	Cohesion; Friction Angle (psf; degrees)	Other Tests	Blows/foot*	Sample				
			51% Sand, 19% Silt, 30% Clay			1		ML	Topsoil, Silt with fine sand, stiff, dark brown, dry, common fine roots.
						2		SM	Silty fine sand, medium dense, strong brown, dry to slightly moist, friable, weak blocky prismatic structure. Sampled from 2.0 - 3.0 feet; Sandy Clay Loam.
			78% Sand, 11% Silt, 11% Clay			3			
						4			
						5		SM	Fine sand with silt, dense, yellowish brown, slightly moist, occasional MnO stains, friable. Sampled from 5 to 6 feet; Sandy Loam.
						6			
						7		SM	Fine sand with silt, dense, light olive brown, moist, interbedded with strong brown fine sand, occasional MnO staining, friable.
						8		CL	Clay with fine sand and silt, stiff, light gray, slightly moist, slightly plastic.
						9			
						10		SM	Silty fine sand, medium dense, brown and strong brown, moist, friable, fine granular crumb structure. Grades to dense sand, and moisture content increases to 11 feet below grade,

* The blow counts have been converted to standard N-value blow counts

SURFACE ELEVATION: 315 Feet

TOTAL DEPTH: 11 Feet

GROUNDWATER DEPTH: >11 Feet

LOGGED BY: David N. Lindberg, CEG

BOREHOLE DIAMETER: 3.5 Inches

EQUIPMENT: Hand Auger

HAMMER TYPE: None

LINDBERG GEOLOGIC CONSULTING

LOG OF TEST EXCAVATION / BORING
HB-1, Lot 5 Slack & Winzler - Berta

Figure No.

4

PROJECT NUMBER: 0091.01

DATE: August 4, 2014



Reference: 018007

October 12, 2018

David Lindberg
Lindberg Geologic Consulting
P.O. Box 306
Cutten, CA 95534

SOIL PERCOLATION SUITABILITY / TEXTURAL ANALYSIS RESULTS

Job Name: Lindberg	Sampled By: DNL/CEG
Date Sampled: 10/05/18	Date Tested: 10/11/18
Date Received: 10/08/18	AP Number: 304-017-018

<u>Sample ID</u>	<u>Depth</u>	<u>% Sand</u>	<u>% Clay</u>	<u>% Silt</u>	% Coarse Fragments by		<u>Bulk Density</u>
					<u>Volume</u>	<u>Zone</u>	
TP-1	4-5'	87.3	6.7	6.0	0.0	1	*
	Material:	Sand					
TP-2	4-5'	41.3	35.2	23.5	0.0	3	*
	Material:	Clay Loam					
TP-3	4-5'	56.7	20.9	22.4	0.0	2	*
	Material:	Sandy Clay Loam					
TP-4	4-5'	35.6	36.9	27.5	0.0	3	*
	Material:	Clay Loam					
TP-5	4-5'	8.3	29.2	62.5	1.5	4	*
	Material:	Silty Clay Loam					

* = no peds provided

Regional Water Quality Control Board Zone Descriptions:

Zone 1 - Soils in this zone are very high in sand content. They readily accept effluent, but because of their low silt and clay content they provide minimal filtration. These soils demand greater separation distances from groundwater.

Zone 2 - Soils in this zone provide adequate percolation rates and filtration of effluent. They are suitable for use of a conventional system without further testing.

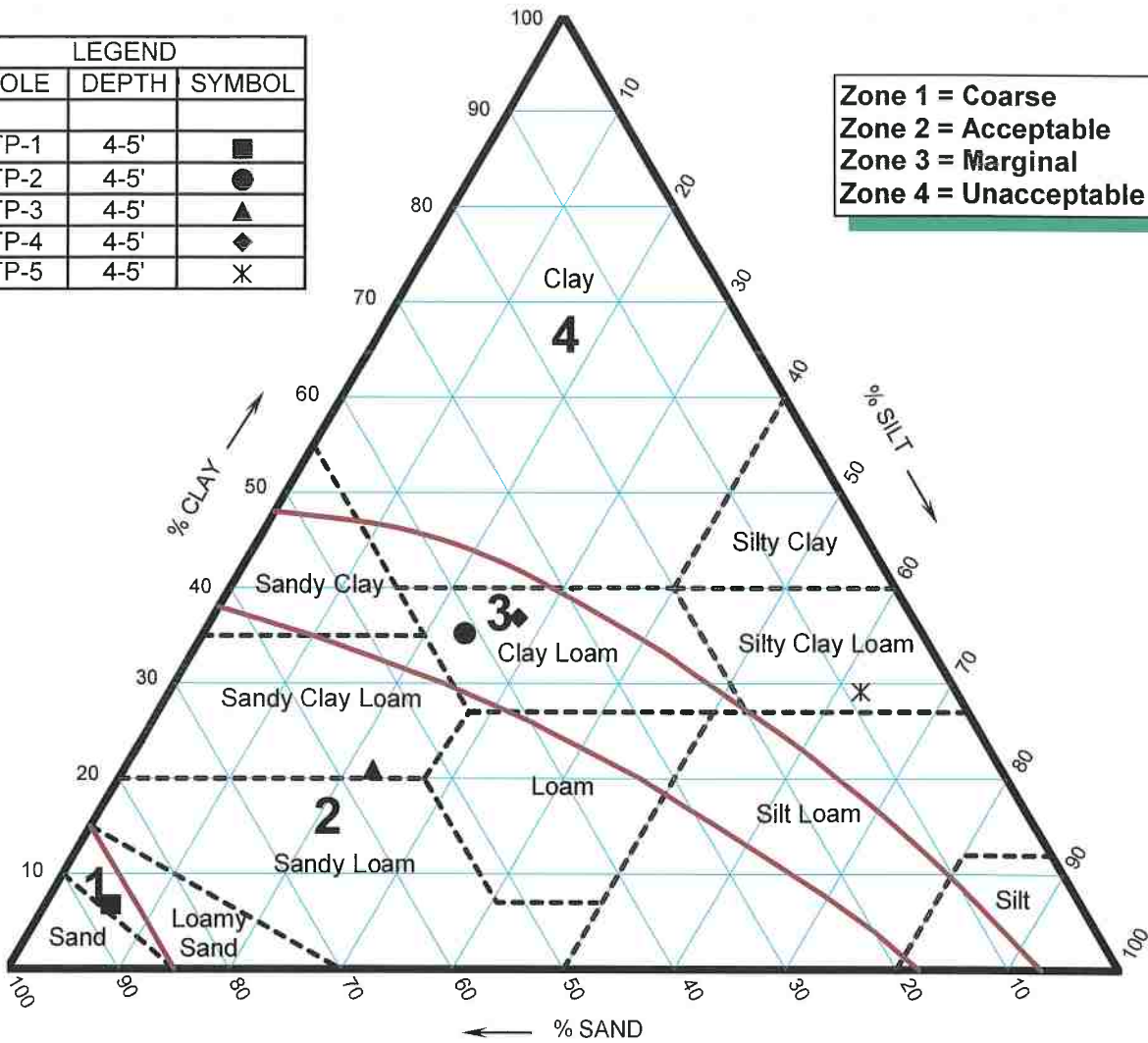
Zone 3 - Soils in this zone are expected to provide good filtration of effluent, but their ability to accept effluent at a suitable rate is questionable. These soils require wet-weather percolation tests to verify their suitability for effluent disposal by conventional leachfield methods.

Zone 4 - Soils in this zone are unsuitable for a conventional leachfield because of their severe limitations for accepting effluent.

SOIL PERCOLATION SUITABILITY CHART

LEGEND		
HOLE	DEPTH	SYMBOL
TP-1	4-5'	■
TP-2	4-5'	●
TP-3	4-5'	▲
TP-4	4-5'	◆
TP-5	4-5'	✕

Zone 1 = Coarse
Zone 2 = Acceptable
Zone 3 = Marginal
Zone 4 = Unacceptable



NOTES

1. Soil texture is plotted on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjustment for coarse fragments has been made by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
3. Adjustment for compactness of soil has been made by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc, when analyzed.
4. For soils falling in sand, loamy sand, or sandy loam, classification adjustment for bulk density will generally not affect suitability and a bulk-density analysis was not necessary.

JOB NUMBER: 018007

DATE: 10/11/18

JOB NAME: Lindberg

APN: 304-017-018

SEW Consulting Engineers & Geologists, Inc.

812 W. Wabash
 Eureka, CA 95501-2138
 (707) 441-8855



Reference: 018007

November 6, 2018

David Lindberg
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P.O. Box 306
Cuttan, CA 95534

SOIL PERCOLATION SUITABILITY / TEXTURAL ANALYSIS RESULTS

Job Name: S&W Properties	Sampled By: 304-071-018
Date Sampled: 10/16/18	Date Tested: 10/19/18
Date Received: 10/19/18	AP Number: 304-071-018

<u>Sample ID</u>	<u>Depth</u>	<u>% Sand</u>	<u>% Clay</u>	<u>% Silt</u>	<u>% Coarse Fragments by Volume</u>	<u>Zone</u>	<u>Bulk Density</u>
TP-1a	4-5'	72.1	15.0	12.9	0.2	2	*
Material: Sandy Loam							

* = no peds provided

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Zone 2 - Soils in this zone provide adequate percolation rates and filtration of effluent. They are suitable for use of a conventional system without further testing.

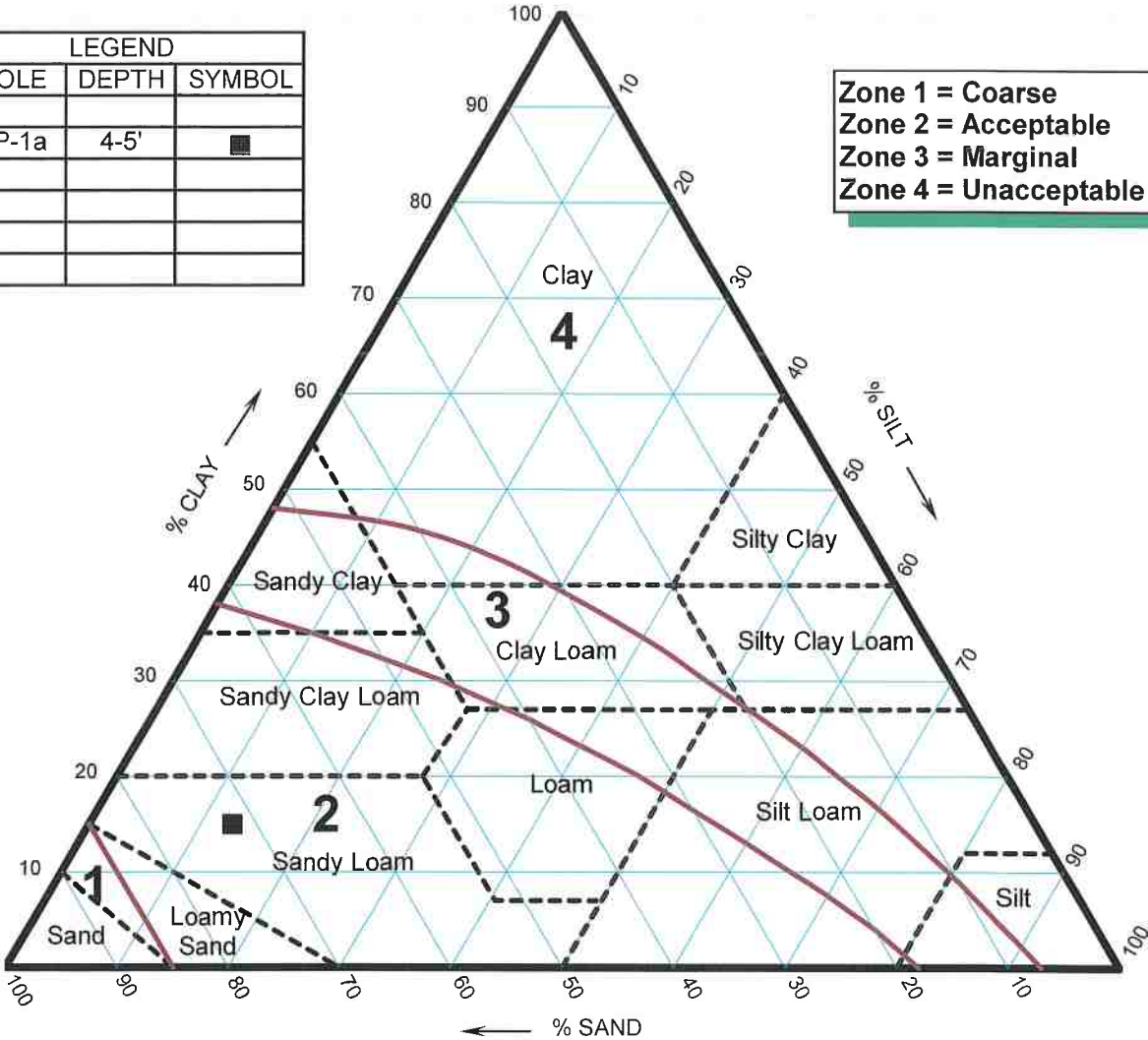
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SOIL PERCOLATION SUITABILITY CHART

LEGEND		
HOLE	DEPTH	SYMBOL
TP-1a	4-5'	■

Zone 1 = Coarse
Zone 2 = Acceptable
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NOTES

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4. For soils falling in sand, loamy sand, or sandy loam, classification adjustment for bulk density will generally not affect suitability and a bulk-density analysis was not necessary.

JOB NUMBER: 018007 **DATE:** 10/19/18
JOB NAME: S&W Properties **APN:** 304-071-018



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