

**LINDBERG GEOLOGIC CONSULTING**

David N. Lindberg, CEG  
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Cuttan California 95534  
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Received 3/1/2024 HCP&B

March 31, 2023

Project: 0487.01

Mr. Nocona Mendes  
c/o Ms. Katie Kabala  
Post Office Box 430  
Whitethorn, CA 95589

Subject: Engineering-Geologic Prime Agricultural Soils Exploration Letter-Report  
845 Steelhead Road, Alderpoint, California, APN 216-281-015

Dear Mr. Mendez:

In accordance with our agreement, we have conducted an engineering-geologic reconnaissance of the above-noted parcel, and we have reviewed information available from the Humboldt County Community Development Department and the Humboldt County Assessor regarding the subject property. While on-site we collected three soil samples for analysis at a local, certified materials testing laboratory. Our exploration was focused on determining if the soils at your location should be classified as "Prime Agricultural Soils" for potential cannabis cultivation. Prime Agricultural Soils are defined in Humboldt County Ordinance No. 2559 as follows:

*"Prime Agricultural Soils" means all lands which qualify for rating as Class I or Class II in the Soil Conservation Service land use capability classifications or qualify for rating 80 through 100 in the Storie Index Rating. Additionally, where determined through site-specific fieldwork prepared by a qualified professional, soils meeting these characteristics may be recognized as prime."*

Site-specific fieldwork, including excavation of three test holes and collection of three shallow-subsurface soil samples, was conducted by a Certified Engineering Geologist from our office on February 17, 2023. Textural Analysis was performed on the samples collected from the three locations on parcel 216-281-015. The location of the subject property is presented in Figure 1. An annotated copy of the Humboldt County Assessor's parcel map is attached to this report (Figure 2), and a Google-Earth satellite image of the site, as it was on April 21, 2019, is attached as Figure 3. Sample locations were determined in the field by GPS and are noted in Figure 3.

Our samples were collected in the northeast quarter of the southeast quarter of Section 28, T3S R5E, Humboldt Base & Meridian. Our soil samples were collected from the upper 2.5 feet of the profile (minus approximately 2-inches of vegetation and roots) and were delivered to a certified material testing laboratory in Eureka for textural analysis. Laboratory analytical results are attached. SS-1 is reported as **Clay Loam**, SS-2 as **Silty Loam**, and SS-3 as **Loam**, per the United States Department of Agriculture soil classification system.



Sample SS-1 was collected from 40.17228° north latitude and 123.61553° west longitude (±9').

Sample SS-2 was collected from 40.17221° north latitude and 123.61476° west longitude (±9').

Sample SS-3 was collected from 40.17155° north latitude and 123.61549° west longitude (±9').

The Storie Index (University of California, 1948), as revised in 1978, is a method of soil rating based on soil characteristics that govern the land's potential utilization and productive capacity. To calculate the Storie Index, percentage values are assigned to the various characteristics of the soil, including the soil profile (Factor A), the texture of the surface soil (Factor B), and the slopes (Factor C). Other conditions of the soil including drainage, nutrient level, erosion and microrelief are combined as Factor X. Percentage values for each of the four factors are multiplied to obtain the Storie Index. Based on the index, soils in California have been divided into six soil grades, with Grade 1 being excellent, and having a Storie Index rating from 80 to 100 percent. Grade 1 excellent soils are, by the definition in Ordinance 2559, Prime Agricultural Soils.

#### **Sample SS-1**

For sample SS-1, Storie Index Factor A has a range of value from 80 to 90 percent, because this site is in on an older terrace having moderately developed profiles and moderately developed subsoils (Factor A:III). Based on the laboratory textural analysis (attached) the soil is **Clay Loam**, a medium-textured soil. For Clay Loam the Storie Index assigns Factor B a range of value of 85 to 90 percent. Factor C was assigned a range of value of 80 to 95 percent because those areas of the property sampled are gently sloping, with some moderately sloping ground (C:C), as estimated by field observation and USGS slope information in the Humboldt County WebGIS.

Soil Factor X is calculated based on the product of six factors. Soil drainage was rated at 80 to 90 percent because our sampling hole appeared less than well-drained. Alkalinity was not measured but was rated at 100 percent because alkaline soils are not common to the region. Nutrient, or fertility, level was assigned a range of value from 95 to 100 percent because this part of the parcel was utilized historically for grazing, growing hay and fruit, and gardening. Acidity was assigned a value of 95 percent because the soils were not acidic. Moderate sheet erosion appeared likely during vigorous precipitation events, so the erosion factor was estimated at 80 to 95 percent. Microrelief is smooth and was therefore rated 100 percent.

The Storie Index is the product of the four Factors (A, B, C and X), with Factor X itself the product of the six additional soil conditions outlined above. In mathematical terms, the Storie Index for sample SS-1 equals A times B times C times X, as shown (best case scenario):

$$[95\% \times 90\% \times 95\% \times (90\% \times 100\% \times 100\% \times 95\% \times 100\%)], \text{ or} \\ [0.81(0.81)] = 0.66, \text{ or } 66\%$$



### Sample SS-2

For sample SS-2, Storie Index Factor A has a range of value from 80 to 90 percent, because this site is in on an older terrace having moderately developed profiles and moderately developed subsoils (Factor A:III). Based on the laboratory textural analysis (attached) the soil is **Silty Loam**, a medium-textured soil. For Silty Loam the Storie Index assigns Factor B a value of 100 percent. Factor C was assigned a range of value of 80 to 95 percent because those areas of the property sampled are gently sloping, with some moderately sloping ground (C:C), as estimated by field observation and USGS slope information in the Humboldt County WebGIS.

Soil Factor X is the product of six factors. Soil drainage was rated at 80 to 90 percent because our sampling hole appeared less than well-drained. Alkalinity was not measured but was rated at 100 percent because alkaline soils are not common to the region. Nutrient, or fertility, level was assigned a range of value from 95 to 100 percent because this part of the parcel was utilized historically for grazing, growing hay and fruit, and gardening. Acidity was assigned a value of 95 percent because the soil is not likely acidic. Moderate sheet erosion appeared likely during the vigorous precipitation events associated with the area, so the erosion factor was estimated at 80 to 95 percent. Microrelief is smooth and was therefore rated 100 percent.

The product of the four Storie Index Factors (A, B, C and X), with Factor X itself the product of the six conditions outlined above was calculated. In mathematical terms, the Storie Index for this parcel equals A times B times C times X, as shown (best case scenario):

$$[95\% \times 100\% \times 95\% \times (90\% \times 100\% \times 100\% \times 95\% \times 95\% \times 100\%)], \text{ or} \\ [0.90(0.81)] = 0.73, \text{ or } 73\%$$

### Sample SS-3

For sample SS-3, Storie Index Factor A has a range of value from 80 to 90 percent, because this site is in on an older terrace having moderately developed profiles and moderately developed subsoils (Factor A:III). Based on the laboratory textural analysis (attached) the soil is **Loam**, a medium-textured soil. For Loam the Storie Index assigns Factor B a value of 100 percent. Factor C was assigned a range of value of 80 to 95 percent because those areas of the property sampled are gently sloping, with some moderately sloping ground (C:C), as estimated by field observation and USGS slope information in the Humboldt County WebGIS.

For Soil Factor X, soil drainage was rated at 80 to 90 percent because our sampling hole appeared less than well-drained. Alkalinity was not measured but rated at 100 percent as alkaline soils are not common in the region. Nutrient, or fertility, level was assigned a range of value from 95 to 100 percent because this part of the parcel was also utilized historically for grazing, growing hay and fruit, and gardening. Acidity was assigned a value of 95 percent because the soil is not likely acidic.

**LINDBERG GEOLOGIC CONSULTING**  
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Page 4

March 31, 2023

Engineering Geologic Prime Agricultural Soils Exploration  
APN 216-281-015 Mr. Nacona Mendes; LGC Project No. 0487.01

Moderate sheet erosion appeared likely during vigorous precipitation events, so the erosion factor was estimated at 80 to 95 percent. Microrelief is smooth and was therefore rated 100 percent.

The “best case” Storie Index was calculated for this sample and found to be equal to A times B times C times X, as shown:

$$[95\% \times 100\% \times 95\% \times (90\% \times 100\% \times 100\% \times 95\% \times 95\% \times 100\%)], \text{ or} \\ [0.90(0.81)] = 0.73, \text{ or } 73\%$$

With Storie Indices ranging from 66 percent to 73 percent, the site soils in the area sampled do not qualify as Grade 1 (excellent) soils per the University of California (1948). Because these soils just have a Storie Index less than 80 percent, they fail to meet the definition of “Prime Agricultural Soils” in the Ordinance (Humboldt County, California - Ordinance No. 2559). Based on our site-specific fieldwork, certified laboratory analysis, and our professional experience, it is our opinion that the site soil should not be considered or classified as prime agricultural soils per the ordinance.

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

Thank you.

Sincerely,

David N. Lindberg, CEG 1895  
Lindberg Geologic Consulting

DNL:sll

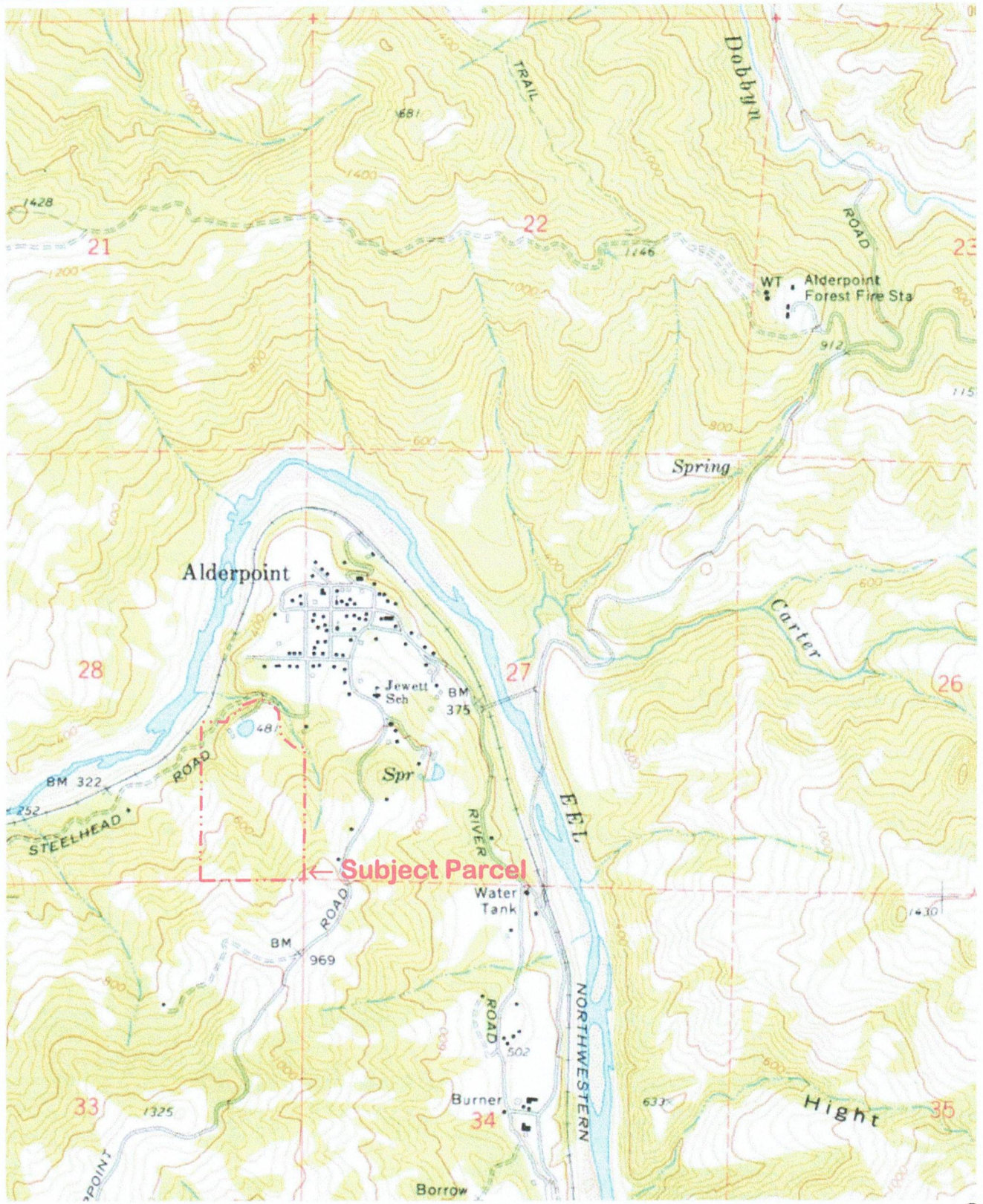
Attachments


- Figure 1: Topographic Location Map
- Figure 2: Assessor’s Parcel Map
- Figure 3: Prime Soil Area Map
- Attachment: Textural Analysis Results

University of California, 1948, Storie, R., Earl, and Walter W. Weir, Manual for Identifying and Classifying California Soil Series, with Supplement, 1958, and revised December 1978, (Special Publication 3203), Published by the Associated Students’ Store, University of California, Berkeley.



Lindberg Geologic Consulting	Engineering-Geologic Prime Agricultural Soil Letter-Report	Figure 1
Post Office Box 306	845 Steelhead Road, Alderpoint, California,	March 31, 2023
Cutten, CA 95534	APN 216-281-015, Mr. Nocona Mendes, Client	Project 0487.01
(707) 442-6000	Topographic Project Location Map (locations approximate)	1" ≈ 1,650'



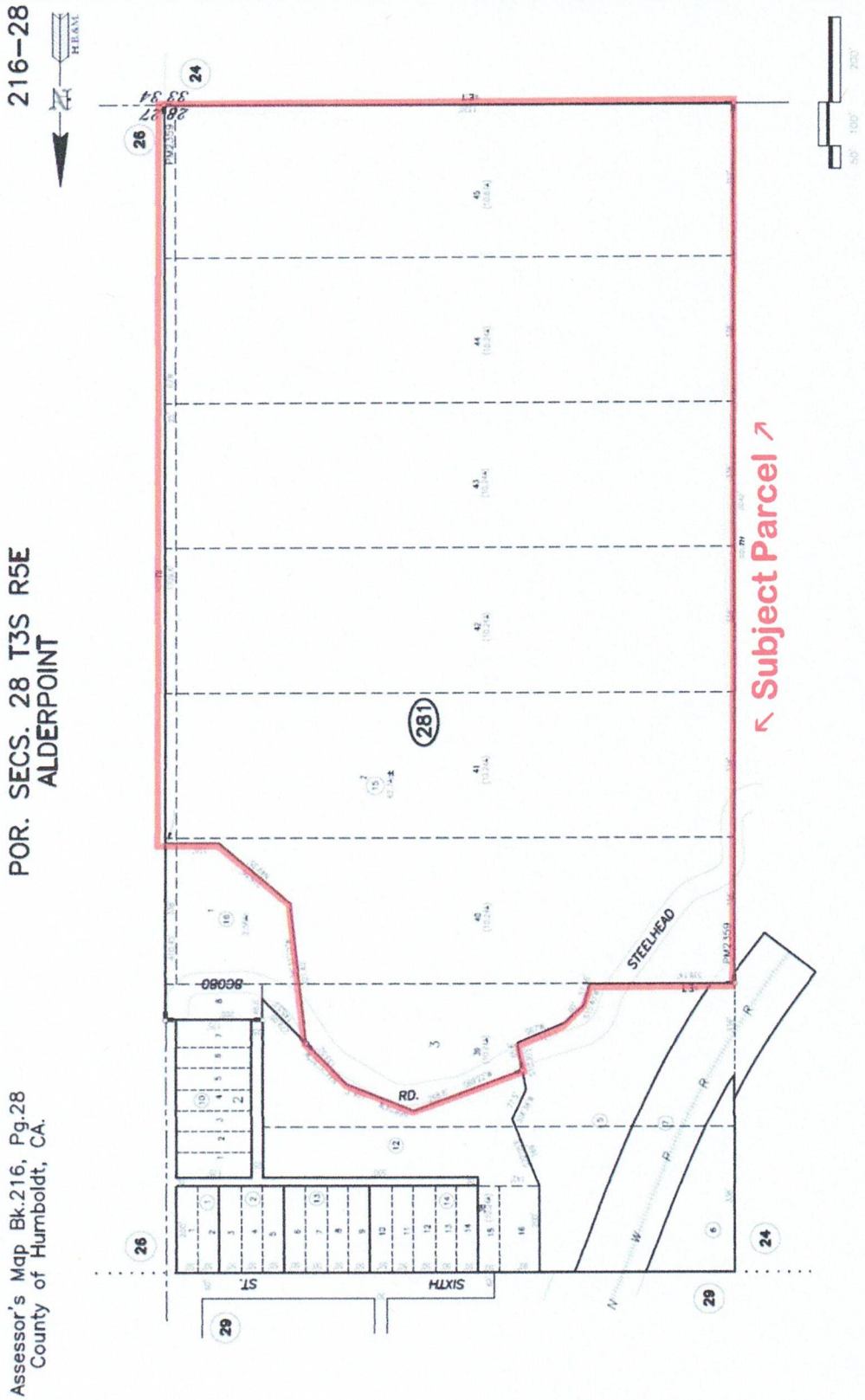
Modified from: USGS "Alderpoint, Calif." 7.5' Quadrangle Map. (1969) N 



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APN 216-281-015, Mr. Nocona Mendes, Client  
Humboldt County Assessor's Parcel Map (locations approximate)

Figure 2  
March 31, 2023  
Project 0487.01  
Scale as Shown





Lindberg Geologic Consulting	Engineering-Geologic Prime Agricultural Soil Letter-Report	Figure 3
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(707) 442-6000	Satellite Image Site Plan (Sample locations approximate)	1" ≈ 250'







Reference: 022027

March 15, 2023

Lindberg Geologic Consulting  
0487.01, Nacoma M

**SOIL PERCOLATION SUITABILITY / TEXTURAL ANALYSIS RESULTS**

Job Name: Lindberg-Nacoma M.      Sampled By: DNL-CEG  
Date Sampled: 02/17/23      Date Tested: 03/06/23  
Date Received: 02/24/23      AP Number: 216-281-015

Sample ID	Depth	% Sand	% Clay	% Silt	% Coarse Fragments by		Bulk Density
					Volume	Zone	
SS-1	--	32.6	29.0	38.4	2.6	3	*
		Material: <b>Clay Loam</b>					
SS-2	--	40.4	7.4	52.2	0.7	2	*
		Material: <b>Silty Loam</b>					
SS-3	--	34.8	27.2	38.0	5.2	3	*
		Material: <b>Loam</b>					

\* = 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.

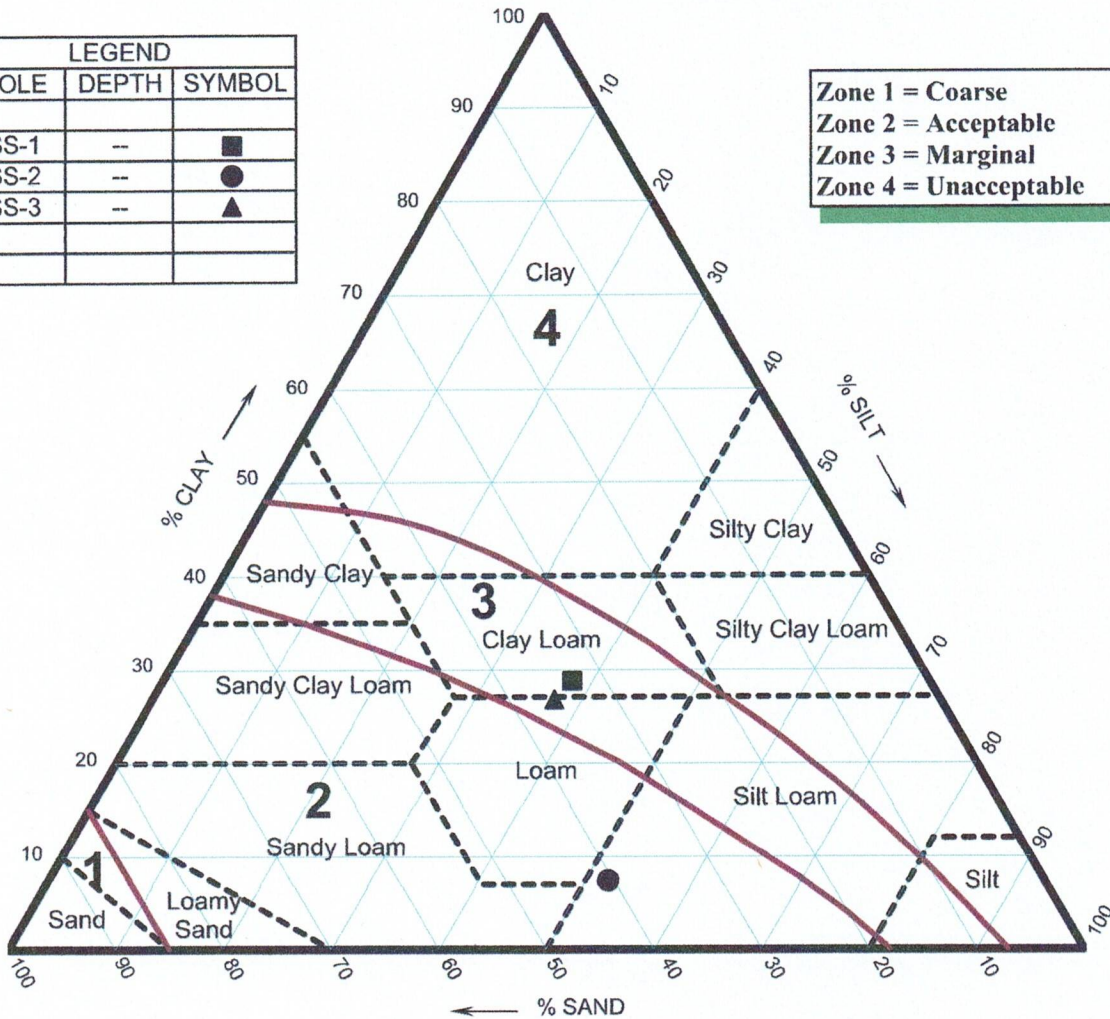
**Zone 4** - Soils in this zone are unsuitable for a conventional leachfield because of their severe limitations for accepting effluent.



# SOIL PERCOLATION SUITABILITY CHART

LEGEND		
HOLE	DEPTH	SYMBOL
SS-1	--	■
SS-2	--	●
SS-3	--	▲

**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:** 022027  
**JOB NAME:** Lindberg-Nacona M.

**DATE:** 03/06/23  
**APN:** 216-281-015

