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Ogle Property Soil Report

Executive Summary

This report presents the results of the soil investigation that was conducted by *Agronomic Analytics* on the Ogle Property, Eugene, Ore. The investigation as described in this report was conducted at selected locations across the property. Sample sites were chosen which were considered to be representative of the soil and vegetation present on this property. Particular attention was focused on the large grassy areas in the center of the property in order to determine if soil and environmental site conditions were influencing the growth or lack of trees.

The investigation was conducted at the request of Mr. Brad Ogle in support of his application for a change in land use designation.

The purpose of the investigation was to evaluate the soils present on the property, especially those in the large grassy areas and determine if the soils showed any significant deviation from published values. Also noted was the significance of existing environmental site conditions, especially in how they may hinder or promote the growth of commercially desirable tree species.

The field investigations were conducted in April and May of 2005. Extensive research was also conducted into historical surveys and aerial photography. The site investigation included the soil sampling across the property utilizing sharpshooter, hand auger, and backhoe. A total of 20 auger and backhoe pits were dug to a maximum depth of 60 inches or until bedrock was encountered.

The following historical records were consulted in order to understand the vegetation and land use trends on the site.

- General Land Office Maps from 1850's
- 1909 Historic Vegetation Survey
- 1925 Bureau of Chemistry Soil Survey
- 1936 Earliest Aerial Photo
- 1968 Aerial Photo
- 1987 USDA Soil Survey
- 2004 Aerial Photo

Field examination of soil and environmental conditions entailed an initial site reconnaissance to assess soil and vegetation trends, and the digging of numerous sharpshooter holes to detect soil patterns. Further detailed sampling by digging 20 auger holes and backhoe pits were dug in areas identified in the initial reconnaissance as meriting further examination. Soil samples were taken from every foot or less when clear horizonal differences were apparent.

Observations of field samples were compared to the published soil series data. Specifically looked at were soil texture, color (wet and dry), stoniness, pH, depth to bedrock, presence and type of vegetation, site conditions (aspect, slope, exposure, landscape position), and any other observable limitations. Concentrated observations and sampling were on areas mapped as Philomath silty clay both with and without trees.

The conclusions drawn from the historical record, field investigations, and soil sample analysis were that:

- Soils did not deviate significantly from the published range of characteristics.
- The Philomath appeared to contain more observed inclusions than the published series descriptions, however these inclusions were similar to the surrounding geographically associated soils.
- In general, where the soil depth encountered was greater than the published values for the soil series, especially when greater than the identified inclusions of Hazelair and Dixonville; then it was common to find trees as the predominant component of the vegetation present. Where the soils were shallow grass tended to predominate.
- The large grassy area in the center of the property which is predominantly mapped as the Philomath series has been observed to support grass vegetation as far back as detailed surveys have been made.
- The large grassy area is characterized by steep slopes, shallow soils, south (hot and dry) aspect, and in general environmental conditions detrimental to the establishment of native tree species (Douglas fir).
- The shallow soils hold less than one half the available moisture than the deeper soils on the property.
- The pattern of forest cover on the property was found to follow closely the presence of deeper soils on the property.
- The soils on this property are absolutely unsuitable for cultivation and production of any agronomic (grass seed, small grains, row crop), high value fruit and vegetable, wine grapes, or nursery crops. They are best suited for pasture and small woodlot production on the better soils. The areas of slightly better soils can be used for tree production. The Philomath cobbly silty clay is unrated for timber production indicating just how poorly suited this soil is for long-term production of commercially viable trees.
- This property is only marginally suited for agricultural purposes. It is composed of thin, poor soils with little potential for high value production. It is incapable of supporting any commercial agricultural. Even with a high level of management and agricultural inputs the expected rates of return would be insufficient to support a commercial operation.

Report Limitations

This report utilizes generally accepted practice standards for care and diligence as employed by recognized consulting firms undertaking similar studies. This report presents our professional judgement based upon data and findings identified in this report and on data reported by independent analytical services and governmental agencies. This report reflects the interpretation of such data based on our experience and background, and no warranty, either expressed or implied, is made. The conclusions and recommendations presented are based upon the conditions observed at the time of the site visits and as a result of the limited laboratory analysis conducted. Recommendations are subject to change if field conditions warrant or more extensive sample collection and laboratory analysis is desired and conducted.

(1) General Information

(a) Report Title:

Ogle Property Soil Depth Investigation Report

(b) Land Owner:

Brad Ogle
Trendsetter Homes Corp.
P.O. Box 25509
Eugene, OR 97402

(c) Preparer:

Stephen Caruana
Principal Agronomist
Agronomic Analytics
3419 Chaucer Way
Eugene, OR
(see Statement of Qualifications in Attachments)

(d) Land Use Case File Number:

____

(e) County of Survey:

Lane County, OR

(f) Location:

The subject property consists of 78 acres in two parcels approximately 1 mile from the end of Timberline Rd., Eugene, OR. The Map & Tax Lot Numbers are: 18-04-11-303 & 304. The property is located approximately 1/2 miles south of the current Urban Growth Boundary of Eugene. The property is located in the Cascade Range foothills which demarcate the south boundary of the City of Eugene. These soils of the foothills are generally not suitable for cultivation of any commercially viable agricultural crops. They have traditionally been used for sheep, cattle, and timber production on the more suitable soils. The property has a landuse designation of ___________, with the adjoining parcels are designated as ___________. The property is crossed by power lines of the BPA and EWEB. Access is limited.

(g) Present Zoning Designation

____

(h) Current Land Use:

Rural residential, small woodlots and open lands, adjoining parcels support small scale sheep and cattle ranching.

(i) Purpose of the Investigation:

The landowner contacted *Agronomic Analytics* to conduct a site investigation to determine if the soils mapped on this property showed any variation from the published soil survey. A further consideration was a desire on the part of the landowner and the consulting forester to sufficiently characterize the soils present in order to explain the presence or absence of commercially viable tree species on certain mapped soils. *Agronomic Analytics* was also engaged to interpret soils information and provide estimates of the productive capacity of the tract. *Agronomic Analytics* conducted field visits in May, 2005.

Agronomic Analytics examined the property for the following factors:

- Soil depth (actual and variation from published values)
- Extent and areal coverage of soil inclusions
- Soil pH
- Soil moisture holding capacity (as influenced by soil texture)
- Present land use (absence or presence of specific vegetation to be noted)
- Environmental factors (aspect, slope, hydrology, other conditions)

This report contains a summary of the observations made during the site investigation, an interpretation of the results, and conservative estimates of the returns that can be expected from various agricultural enterprises. Agricultural returns are provided in order to give a baseline value for the productive capacity of the soil. There is no indication that such use is contemplated by the landowner.

Recommendations are also given on the expected costs of inputs (fertilizer, liming, and gopher control) which would be necessary for the property to be managed to its highest potential. Data are summarized in the accompanying report and graphically displayed as reference maps.

This report and its findings are based upon my interpretation of the Soil Survey of Lane County Area, Oregon, 1987, SCS. It includes the examination and measurement of soil maps, field visits and soil sampling, soil tests conducted by *Agronomic Analytics*, and interpretation of current and historic aerial photography and earlier forest and vegetation inventories.

Detailed, site specific analysis is always likely to find field variability which may differ slightly from published values. Intensive laboratory analysis may be necessary to further define phases of published soil series. The summaries below were made based upon the best professional judgment and conclusions of the investigator.

(2) Previous Mapping and Supporting Documentation

The soils of the subject property was mapped by the Natural Resource Conservation Service (formerly Soil Conservation Service) and published as the Soil Survey of Lane County Area, Oregon in 1987. An excerpt of the Soil Survey (Map No. 90) showing the subject property is provided in the attachments.

The following maps are provided for historical reference:

- 1909 Historic Vegetation Survey
- 1936 Army Corps of Engineer Aerial Photography
- Oregon Geology
- USGS 7.5 Quadrangle Eugene West
- USDA Soil Survey of Lane County Area, Map 90

The following tables summarize the published values for the soils observed on the property. Explanations of technical terms are provided where necessary.

Table 1. Soil Properties - Capability Class & Slope Range			
Map Unit	**Soil Name**	**Capability Class**	**Slope Range**
81D	McDuff clay loam	VIe	3 - 25%
102C	Panther silty clay loam	VIw	2 - 12%
107C	Philomath silty clay	VIe	3 - 12%
108F	Philomath cobbly silty clay	VIe	12 - 45%
113E	Ritner cobbly silty clay loam	VIs	12 - 30%
113G	Ritner cobbly silty clay loam	VIIs	30 - 60%

Capability class - A classification of a soil's limitations and potential. Ranges from I to VIII, with I the best and VIII the worst. The soils on this property are ranked:

- VIe – Soils that have severe limitations that make them generally unsuitable for cultivation. The 'e' indicates that the soil is mainly limited due to a risk of erosion unless a close-growing plant cover is maintained.
- VIs - Soils that have severe limitations that make them generally unsuitable for cultivation. The 's' indicates that the soil is mainly limited due to shallowness, doughtiness, and/or stoniness.
- VIw - Soils that have severe limitations that make them generally unsuitable for cultivation. The 'w' indicates that the soil is mainly limited due to water in or on the soil interferes with plant growth or cultivation.
- VIIs - Soils that have severe limitations that make them unsuitable for cultivation. The 's' indicates that the soil is mainly limited due to shallowness, doughtiness, and/or stoniness.

Table 2. Soil Properties - Pasture & Woodland Ratings					
Map Unit	**Soil Name**	**Pasture Yields (AUM)**		**Wodland Productivity**	
		Nonirrigated	**Irrigated**	**Tree**	**Site Index**
81D	McDuff clay loam	7		Douglas fir	142
102C	Panther silty clay loam	5			
107C	Philomath silty clay	4	8		
108F	Philomath cobbly silty clay	4	8		
113E	Ritner cobbly silty clay loam	5		Douglas fir	131
113G	Ritner cobbly silty clay loam	4		Douglas fir	131

Pasture yield (AUM) - Animal-Unit-Month: the amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days. So for example, to feed one horse for one year requires 12 AUMs (1 Animal Unit x 12 Months). If the pasture is rated at 2 AUMs then 6 acres will be required to supply the feed and forage needs for one horse for one year (12 Animal Unit Months / 2 Acres) either as pasture or hay. If a 15 acre property had an average AUM rating of 2 AUMs/acre then the total available AUMs available would be 30 AUMs. This would produce enough forage to feed 2.5 horses (or 12.5 sheep) for the entire year. The above assumes that the pastures are being managed to a high level of productivity with proper liming, fertilization, and weed control. Anything less will significantly reduce the AUMs available and/or the amount of forage available.

Woodland Productivity - This table shows the potential productivity of the soils for wood crops. Potential productivity of merchantable or common trees on a soil is expressed as a site index and as a volume number. The site index is the average height, in feet, that dominant and co-dominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that forest managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability. The volume of wood fiber, a number, is the yield likely to be produced by the most important tree species. This number, expressed as cubic feet per acre per year and calculated at the age of culmination of the mean annual increment (CMAI), indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

Table 3. Soil Properties - Horizon Depth and Texture

Map Unit	Soil Name	Depth (in)	Texture	Fragments (>3in)
81D	McDuff clay loam	0 - 14	Clay loam	0 - 5
		14 - 37	Silty clay, clay	0
		37	Weathered bedrock	
102C	Panther silty clay loam	0 - 10	Silty clay loam	0
		10 - 42	Clay	0
		42	Weathered bedrock	
107C	Philomath silty clay	0 - 6	Silty clay	0
		6 - 14	Clay, Cobbly silty clay, Cobbly clay	0 - 30
		14	Weathered bedrock	
108F	Philomath cobbly silty clay	0 - 6	Cobbly silty clay	15 - 30
		6 - 14	Clay, Cobbly silty clay, Cobbly clay	0 - 30
		14	Weathered bedrock	
113E, 113G	Ritner cobbly silty clay loam	0 - 7	Cobbly silty clay loam	0 - 35
		7 - 32	Very gravelly silty clay, Very cobbly silty clay loam	20 - 45
		32	Unweathered bedrock	

Table 4. Soil Properties - pH Values

Map Unit	Soil Name	Depth (in)	pH

81D	McDuff clay loam	0 - 14	4.5 - 5.5
		14 - 37	3.6 - 5.0
		37	
102C	Panther silty clay loam	0 - 10	5.6 - 6.5
		10 - 42	3.6 - 6.5
		42	
107C	Philomath silty clay	0 - 6	5.6 - 6.5
		6 - 14	5.6 - 7.3
		14	
108F	Philomath cobbly silty clay	0 - 6	5.6 - 6.5
		6 - 14	5.6 - 7.3
		14	
113E, 113G	Ritner cobbly silty clay loam	0 - 7	5.6 - 6.0
		7 - 32	5.1 - 6.0
		32	

Table 5. Soil Properties - Soil Classification			
Map Unit	**Soil Name**	**Taxonomic Class**	
		Soil Order	**Soil Family**
81D	McDuff clay loam	Ultisols	Fine, isotic, mesic Typic Haplohumults
102C	Panther silty clay loam	Mollisols	Very-fine, smectitic, mesic Vertic Epiaquolls
107C	Philomath silty clay	Mollisols	Clayey, smectitic, mesic, shallow Vertic Haploxerolls
108F	Philomath cobbly silty clay	Mollisols	Clayey, smectitic, mesic, shallow Vertic Haploxerolls
113E	Ritner cobbly silty clay loam	Inceptisols	Clayey-skeletal, superactive, mesic Typic Haploxweepts
113G	Ritner cobbly silty clay loam	Inceptisols	Clayey-skeletal, superactive, mesic Typic Haploxweepts

Tables 6, 7, 8, 9, 10 and 11 - Properties of Soil Series Inclusions (see attachments)

Table 12. Soil Properties - Total Available Soil Moisture			
Map Unit	**Soil Name**	**Soil Depth (in)**	**Total Available Water (in/profile)**
81D	McDuff clay loam	37	5.93
102C	Panther silty clay loam	42	7.22
107C	Philomath silty clay	14	2.54
108F	Philomath cobbly silty clay	14	2.30
113E, 113G	Ritner cobbly silty clay loam	32	5.08

Soil available moisture is a critical limiting factor influencing the adaptability of plants and the suitability of certain soils for desirable species. Because native species (e.g. Douglas fir) are adapted to the prevalent winter rainfall pattern, the moisture stored in the soil at the beginning of the growing season greatly influences the health and vigor of the plants growing there. Table 12. above clearly shows that the shallow soils on the Ogle property (107C and 108F) have only half the total available soil moisture in the soil profile than the deeper soils on the property.

(3) Report Methodology

(a) Order of Survey

Orders of soil surveys are described as the level of detail that is mapped and sampled in the survey. Orders range from 1st Order surveys up to and exceeding 5th Order surveys. First order surveys are very intensive (i.e. experimental plots, individual building sites), with delineation of less than 2.5 acres, and at scales of 1:15,840. Fifth order surveys are very extensive (i.e. regional planning), delineation range from 750 to greater than 10,000 acres. Scales for fifth order surveys can be as small as 1:1,000,000.

The published Soil Survey of Lane County would be described as generally a 2nd order survey. It is typically useful for general agriculture and urban planning. The minimum areas delineated range from 2 to 4 acres. The survey is mapped at a scale of 1:20,000 or 3.168 inches per mile.

The recommended scale for intensive land use studies is 1:5000. On the 78 acres under study on the Ogle Property this would require a sampling rate of approximately 1 soil sample per acre. *Agronomic Analytics* chose to concentrate sampling in the open areas and in those areas mapped as Philomath Series that had forest cover. Samples were also taken in the soil series mapped in the forested areas (Ritner, McDuff, and Panther series). The most detailed maps supplied in this report are at a scale of 17 inches to the mile.

The number of samples chosen for this investigation was based upon field examination and selection deemed sufficient to support the purposes outlined above.

(b) Field Investigation Dates

Field investigations were conducted on April 25, 29; and May 6, 12, 23, 24, 26, 2005. Conditions were mixed and variable ranging from cool, overcast and rainy to clear dry and warm. Preceding seasonal conditions were at the outer bounds of observed norms for the area. Winter rainfall was significantly below normal, however spring rainfall was above normal, especially for the month of May. The investigator recorded rainfall for the month of May at his base of operations in South Hills of Eugene at twice the long term average for the May.

(b) Observation Methodology

A wide range of observations were conducted in order to characterize the landscape and soils present. Historical aerial photography and vegetation surveys were consulted (see maps in the attachments) in order to detect trends in vegetative cover. An initial field observation was conducted in order to detect vegetation patterns and determine representative soils present. This survey was conducted on 4/29/05. Also general site conditions were observed at this time.

An intensive examination of representative sites (both forested and open grassy areas) was conducted on 5/6/05. Soil pits were dug with a backhoe until bedrock was encountered. Two weeks of heavy rainfall followed this examination and precluded further backhoe excavation.

Auger holes were dug to a depth of 60 inches on 5/23,24,26/05. Sites were chosen based upon their position in the landscape, vegetative cover present, and the published soil mapping. The results of field sampling are displayed as tables in the attachments.

Representative soil samples were collected at backhoe and auger sites. Samples were collected sufficient to distinguish horizonal difference in texture, color, and structure. Especially noted was the depth to either fractured or weathered bedrock. Soil pH tests were conducted on the A horizon of the collected samples. Observations of collected samples were compared with published values for the soil series mapped on the property.

(d) Observed Limitations

Soils were examined with the goal of determining the extent of any limitations present to the growth of desirable tree species. The principal question asked was what if anything is preventing growth of desirable tree species on the large, grassy open area which bisects the property. This open area is primarily mapped as Philomath silty clay (107C) and Philomath cobbly silty clay (108F). These are both shallow soils, however they do include inclusions of deeper soils. The investigation conducted by Agronomic Analytics sought to identify if the presence or absence of deeper soils was contributing to the observed pattern of vegetative cover.

Table 13. below summarizes the silvicultural requirements for Douglas fir. One can observe in particular that Douglas fir grows poorly on shallow soils, germinates poorly in grassy, overgrown areas, and is especially subject to lethal conditions on hot, dry aspects. The large open, grassy area of this property satisfies or exceeds these conditions and consequently is severely limited for the propagation and survival of desirable tree species based upon these published values.

Table 13. Douglas Fir Silvicultural Requirements	
Regimes	Moderate Temperatures & Moisture
Growth Limitations	Poor growth on shallow soils or over high water tables
Climate	Mild, humid climate, dry summers
Temperature	Average annual temperatures: 45 - 55 degrees F
Precipitation	Annual precipitation: 35 - 200 inches/yr.
Elevation	Sea level - 1,500 ft
Reproduction	Reproduction difficulties - germination & survival best on mineral soils. Natural restocking low due high soil temperature. Seedling failures after clearcutting caused by temperature extremes.
Limitations	Lethal conditions - soil surface temperature above 140°F common on south slopes in late spring and summer. Temperatures are usually too high on sunlit seedbeds of organic matter

Shade Tolerance	Medium shade tolerance, Young Douglas fir seedlings require 1/3 full sunlight to achieve maximum photosynthesis. 50% shade required on worst sites for best survival.
Soil Quality	Presence of soil aggregations improves long term productivity. Shallow soils generally do not support productive forests.

(4) Results, Findings, and Decisions

(a) Geologic Setting and Overview

The fundamental geology of this area is well understood and has been extensively described. Several types of bedrock were encountered during the course of this investigation. Commonly occurring fractured basalt and weathered tuffaceous materials were observed. The entire property is underlain by basaltic flows of the Fisher Formation (Tfeb described below). Backhoe pit No. 5 uncovered an unusual bright red bedrock resembling sandstone but unbedded. Consultations with specialists at the University of Oregon Geology Department indicated that this material was possibly ancient paleosoil.

The fractured and weathered bedrock encountered in this investigation conformed to the published basalt and sandstones described for these soils.

Cascade Range – Consolidated Deposits (see Geology Map in Attachments)

Tfe - Fisher Formation, undivided (Oligocene and Eocene) – Predominantly continental volcaniclastic[1] rocks, including andesitic[2] lapilli[3] tuff[4], breccia[5], water-laid and air-fall silicic[6] ash, and interbedded basaltic flows. The upper part of the upper Eocene and Oligocene Fisher Formation apparently laps onto and interfingers with the Eugene Formation.

Tfeb - Basaltic Flows – Flows, some of which may be invasive into the undivided Fisher Formation (Tf), and undivided and questionable sills that may intrude the undivided Fisher.

Tfee – Eugene Formation (Oligocene and Eocene) – Thin to moderately thick bedded, coarse to fine-grained arkosic[7], micaceous[8], and, locally, palagonitic[9] sandstone and siltstone, locally highly pumiceous[10], assigned to the upper Eocene to middle Oligocene, marine Eugene Formation. Intruded by mafic[11] sills, dikes, and plugs, that in a few places, have been radiometrically dated at about 30 Ma. In Coburg Hills,

[1] Volcaniclastic -
[2] Andesitic – A common volcanic rock intermediate in composition between basalt and rhyolite.
[3] Lapilli -
[4] Tuff – A rock formed of compacted volcanic ash.
[5] Breccia – A rock made of highly angular, coarse fragments.
[6] Silicic – Silicon dioxide; when it occurs as a mineral, it is called quartz.
[7] Arkosic – A sandstone rich in feldspar minerals.
[8] Micaceous – A family of common minerals which may be either black or colorless but are always flaky.
[9] Palagonitic -
[10] Pumiceous -
[11] Mafic sills- A thin sheet of igneous rock sandwiched between layers of sedimentary rock.

north of Eugene, this unit is overlain unconformably by continental volcanogenic rocks, including an ash-flow tuff radimetrically dated at 30.9 ± 0.4 Ma.

(b) Landforms and Topographical Relationships

This property is characterized by convex hills dissected by intermittent streams. Slopes range from 3 to greater than 70%. Associated with this general setting are areas of swales, concave slope and slump benches where deeper soils are deposited. Significant portions of this landform is classified as the Looney geomorphic surface which is described as completely dissected and predominantly steeply sloping.

(c) Local Hydrological Conditions

This property is dissected by small, intermittent streams. There were no areas of standing water observed. Soil drainage and permeability ranges from well drained and slow permeability in the Philomath series to well drained with moderately slow permeability for the McDuff and Ritner series. The Panther soils are poorly drained and exhibit very slow permeability, also a perched water table is present during the winter months of the rainy season on the Panther series.

A high water table was encountered at several backhoe pits and auger hole locations. Water was actively flowing along the clay layer at a depth of 6 to 8 inches at BH # 2.

The open, grassy areas of the property are characterized by steep, south facing slopes. These slopes in combination with the shallow soils present this location contribute to the hot, dry and droughty conditions of this area.

(d) Revised Soil Mapping Units Characterization

Revision of the existing soil mapping units was beyond the scope of this survey. The primary purpose of the survey was to identify the existing variability in soil depth. Insufficient sampling was undertaken to map the soils to the level of a 1st Order Survey. No revisions are made to existing soil mapping units. The following table shows the variability encountered between observed and published values for soil depth.

Table 14. Comparison of Published and Observed Soil Depths

Map Unit	Published Soil Depth (inches)	Auger Holes (AH) Back Hoe Pits (BH)	Observed Soil Depth (inches)	Landuse Cover
81D – McDuff clay loam	37	AH # C	25	Trees
102C - Panther silty clay loam	48	AH # A	41	Grass
107C – Philomath silty clay	14	AH # G	48	Trees
		BH # 2	40	Grass
		BH # 3	14	Grass
		BH # 4	14	Trees
		BH # 5	23	Grass
		BH # 7	48	Trees
		BH # 8	38	Trees

		BH # 9	40	Trees
		BH # 10	14	Grass
		BH # 11	48	Trees
		BH # 12	56	Trees
108F – Philomath cobbly silty clay	14	AH # D	22	Trees
		AH # E1	14	Trees
		AH # E2	8	Trees
		AH # E3	31	Trees
		BH # 1	14	Grass
113E – Ritner cobbly silty clay loam	32	AH # B	46	Trees
		BH # 6	45	Trees
113G – Ritner cobbly silty clay loam	32	AH # F	58	Trees

(e) Soil Mapping Unit Tabulation

Table 15. Existing Soil Mapping Unit Acreage		
Map Unit	**Soil Name**	**Acreage**
81D	McDuff clay loam	5.6
102C	Panther silty clay loam	14.7
107C	Philomath silty clay	31.2
108F	Philomath cobbly silty clay	12.6
113E	Ritner cobbly silty clay loam	6.9
113G	Ritner cobbly silty clay loam	2.7
	Total	**73.7**

(5) Summary and Conclusions

Detailed descriptions of the individual sample sites can be found on the site evaluation forms and field observation summaries in the attachments. Soils conform in general to the mapped data in the published Lane County Area Soil Survey (1987, USDA Soil Conservation Service). Soils noted in the field matched. Texture and stoniness in the field were as reported in the soil survey.

Significant areas of the soil mapped as Philomath silty clay (107C) exhibit evidence of deeper soil inclusions. These areas are identified in the soil depth profile map in the attachments. Deeper soils were encountered throughout the lower half of this mapped unit.

The pattern of forest cover on the property was found to follow closely the presence of deeper soils on the property.

The soils on the fields examined are currently being used to their highest best use. If it was desired to manage the open areas for pasture production, the productive value of the pastures could be improved through the use of moderate fertilization, liming, and weed control. This however would be expensive and difficult to accomplish. The Philomath cobbly silty clay is rated for available AUM's in the soil survey at 4 AUMs, however in the judgement of investigator the condition is so poor that and the numbers used below are based upon my best field judgement.

The soils on this property are absolutely unsuitable for cultivation and production of any agronomic (grass seed, small grains, row crop), high value fruit and vegetable, wine grapes, or nursery crops. They are best suited for pasture and small woodlot production on the better soils. The areas of slightly better soils can be used for tree production. The Philomath cobbly silty clay is unrated for timber production indicating just how poorly suited this soil is for long-term production.

The soils are all rated as either Class VI or Class VII in the USDA Land Capability Classification system. They are severely limited for uses other than permanent cover. They have limited water holding capacity, shallow rooting depth and have high hazards for erosion and potential runoff.

In conducting this site investigation the following additional vegetative and soil conditions were also observed: areas of invasive brush (scotch broom, blackberries, and poison oak).

Agricultural Productive Capacity					
Soil	**Acres**	**Total Available AUM's**	**Tons of Hay**	**Sheep**	**Cows**
McDuff	5.6	39	39	16.5	3.3
Panther	14.7	74	74	31.0	6.2
Philomath	43.8	44	44	18.5	3.7
Ritner	9.6	38	38	16.0	3.2
Totals	**73.7**	**195**	**195**	**82.0**	**16.4**

Note: Available AUMs are based on a high level of management utilizing proper pasture in excellent condition, fertilization, liming, rest/rotation, weed control, and proper stocking rate.

Expected Rates of Return			
Product	**Range of Return ($/unit)**	**No. of Units**	**Total Gross Return (Yearly)**
Sheep	$50/ewe	82	$4,100
Cows	$600/cow-calf	16	$9,600
Hay	$50./ton	195	$9,750

Note: Returns per unit are based on general averages, these prices are highly variable, subject to supply and demand, and dependent upon the quality of the product. Note especially that the Total Return represents the gross return. The net return may be considerably less when the costs of fertilization, liming, initial stock purchase, machinery costs, veterinary costs, pest control, and labor are accounted.

Management of pastures for maximum production requires a high level of management and the application of inputs. The following quoted rates are based on large scale commercial application, rates for small acreage can run considerably more. The typical inputs applied are:

- Liming - Approximately $50 to $70 per acre for 2 tons of lime applied once every several years.

- Fertilizer - Approximately $50 to $100/acre yearly depending upon current cost of fertilizer (rising quickly at present due to rising energy and natural gas costs)
- Weed and Gopher Control - Spot application on an as needed basis at approximately $2 to $5/acre.
- Brush Control – Significant area are heavily infested with non-native blackberry, scotch broom, and native poison oak. Control with the commonly recommended herbicide Crossbow on the worst acres would cost approximately $75 to $100 per acre for a one time application.

Pasture thrives best when pH is at the ideal level. Consideration of pasture liming is recommended when soil pH in a pasture is 5.4 or below.

This property is only marginally suited for agricultural purposes. It is composed of thin, poor soils with little potential for high value production. It is incapable of supporting any commercial agricultural. Even with a high level of management and agricultural inputs the expected rates of return would be insufficient to support a commercial operation.

(6) References of Preparer and Literature Citations

Agronomic Analytics Statement of Qualifications

Introduction

Agronomic Analytics began in 1997. The object was to provide the highest level of service for developing environmentally sound and economically viable solutions to agricultural and land use challenges. We bring a solid background in agronomy, soils, ecosystem analysis, environmental marketing, soil testing, and conservation engineering to the challenges of conducting thorough and detailed analysis of soils, vegetation, and erosion processes.

Agronomic Analytics has expertise in agricultural consulting, watershed restoration, project development, erosion studies and public outreach campaigns. *Agronomic Analytics* brings fifteen years experience with the Natural Resources Conservation Service (NRCS), eleven of those years as a District Conservationist in three field offices in the Midwest and the Pacific Northwest. This experience allows *Agronomic Analytics* to bring a complete familiarity and understanding of the soils, geology, and vegetation analysis required to complete detailed erosion and sediment studies.

We bring direct experience working with endangered species and sensitive watershed issues. As the Salmon Recovery Coordinator for the NRCS the principal of *Agronomic Analytics* worked closely with agencies and tribal entities to promote positive habitat improvement.

Mission Statement

The mission of *Agronomic Analytics* is to cultivate the harmonious integration of agriculture and the environment.

Experience

Soils Analysis, Erosion and Sediment Control

- Completed refined soil surveys for land use studies and marginal lands applications in Lane and Linn Counties, OR.
- Designed streambank and vegetation restoration measures for Brae Burn Creek (Eugene, Ore.)
- Determination of past, present, and future erosion and sediment conditions on an Idaho Ski Resort.
- Administered eight separate federal cost-share programs to encourage voluntary installation of conservation treatments on private land.
- Supervised planting of 75,000 acres of native and introduced grasses for the Conservation Service.

Modeling

- Completed hydrological and recurrence interval analysis of the North Fork Siuslaw River Watershed for use in bank protection projects.
- Developed the Farming Systems Comparison Procedure decision analysis tool for the Soil Quality Institute and the Conservation Technology Information Center. Model developed utilizing extensive Excel and Visual Basic Programming language.

- Extensive experience with the Revised Universal Soil Loss Equation (RUSLE), Water Erosion Prediction Project (WEPP), and the Wind Erosion Equation (WEQ)
- Experience and knowledge of Geographic Information Systems (ArcView), Climate and Crop Modeling (CropSyst, Climgen), and the hydrology of sediment delivery.
- Watershed modeling and hydrological analysis of semi-arid, forested, and urban watersheds.

Project Management

- Oversight of non-native vegetation removal and water quality testing for Brae Burn Creek Stream Stabilization Project.
- Formulated the goals, workplan and strategy and developed the technical criteria for the Salmon Safe Program of the Pacific Rivers Council.
- Developed technical criteria and certification standards for assessing the soil, water, and ecosystem resources of participating farms.

Watershed Analysis

- Conducted hydrological analysis (TR-55 and Rational Method) of Brae Burn Creek Watershed.
- Assisted Oregon's Soil and Water Conservation Districts in the formation of watershed councils.
- Evaluated and recommended watershed assessment strategies for use by the Soil Conservation Service.
- Collaborated with staff specialists of the Confederated Tribes of the Umatilla Indian Reservation to select suitable watersheds for restoration.

Resource Assessment

- Completed econometric and socioeconomic analysis of Conservation Reserve Enhancement Program proposal for the Governor's Watershed Enhancement Program.
- Developed environmental impact statements in accordance with NEPA to assess archaeological, cultural, and environmental values.

Credentials

- B.S. – Agronomy, 1979, Oregon State University, Corvallis
- Post Graduate Work: Landscape Architecture, University of Oregon, Eugene
- Board of Directors: Northwest Certified Crop Advisors
- Member: Soil and Water Conservation Society

Client List

Agronomic Analytics has provided technical consulting services for the past five years. Besides private individuals, we have worked with the following agencies and groups.

- Edgewood Townhouse Association
- Northwest Power Planning Council
- Brundage Mountain Ski Resort
- USDA - Soil Quality Institute
- Conservation Technology Information Center

- Oregon Governor's Watershed Enhancement Board
- National Marine Fisheries Service
- Environmental Protection Agency
- Forest Service Employees for Environmental Ethics
- Pacific Rivers Council
- K&A Engineering
- Ag Conservation Solutions
- Dryland and Irrigated Farmers
- Private Attorneys
- Private Landowners
- Property Developers

Literature Cited

Patching, W.R. 1987. Soil Survey of Lane County Area, Oregon. USDA Soil Conservation Service. U.S. Government Printing Office. Washington, DC.

Retallack, G.J. et al. 2004. Eocene-Oligocene extinction and paleoclimatic change near Eugene, Oregon. GSA Bulletin. 116:7/8 p. 817-839.

Soil Survey Division Staff. 1993. Soil Survey Manual. USDA Handbook No. 18. U.S. Government Printing Office. Washington, DC.

Walker, G.W. and R.A. Duncan. 1989. Geologic Map of the Salem 1° by 2° Quadrangle, Western Oregon.. Miscellaneous Investigations Series. Map I-1893. U.S. Geological Survey. Washington, D.C.

(7) Attachments

(a) Soil Depth Profile Map

(b) NRCS Soils Map (1:20,000)

(c) Soils Map with Sampling Sites (1:3,000)

(d) Topography Map (1:24,000)

(e) Assessor's Map (1:5,000) (not included)

(f) Historical Maps

(g) Soil Profile and Site Observation Notes

(h) Published Soil Series Descriptions

Ogle Property Soil Report
Landscape and Soil Pit Photos

Figure No. 1 Pit No. 1 - Philomath cobbly silty clay

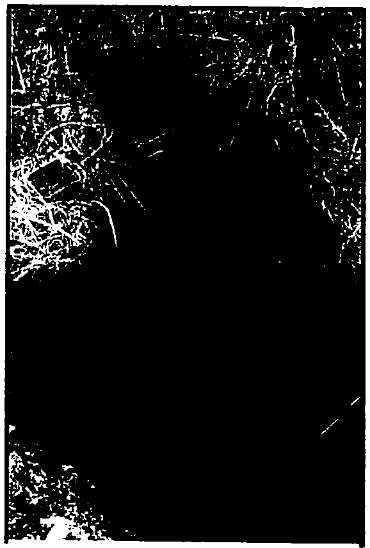


Figure No. 2 Pit No. 2 - Philomath silty clay, Hazelair Inclusion

Figure No. 3 Open Landscape below Pit No. 2

Figure No. 4 Rock Outcrop Present in Philomath silty clay

Figure No. 5 Pit No. 3 Philomath silty clay

Figure No. 6 Landscape Looking West from Pit No. 3. Note absence of young, colonizing trees.

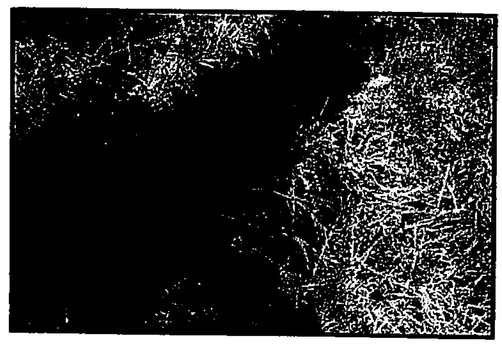


Figure No. 6 Pit No. 5 Philomath silty clay with paleosoil substratum.

Figure No. 7 Pit No. 11 Philomath silty clay with deep inclusion.

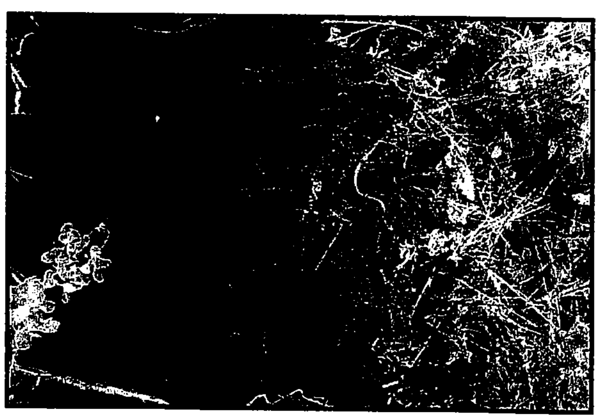
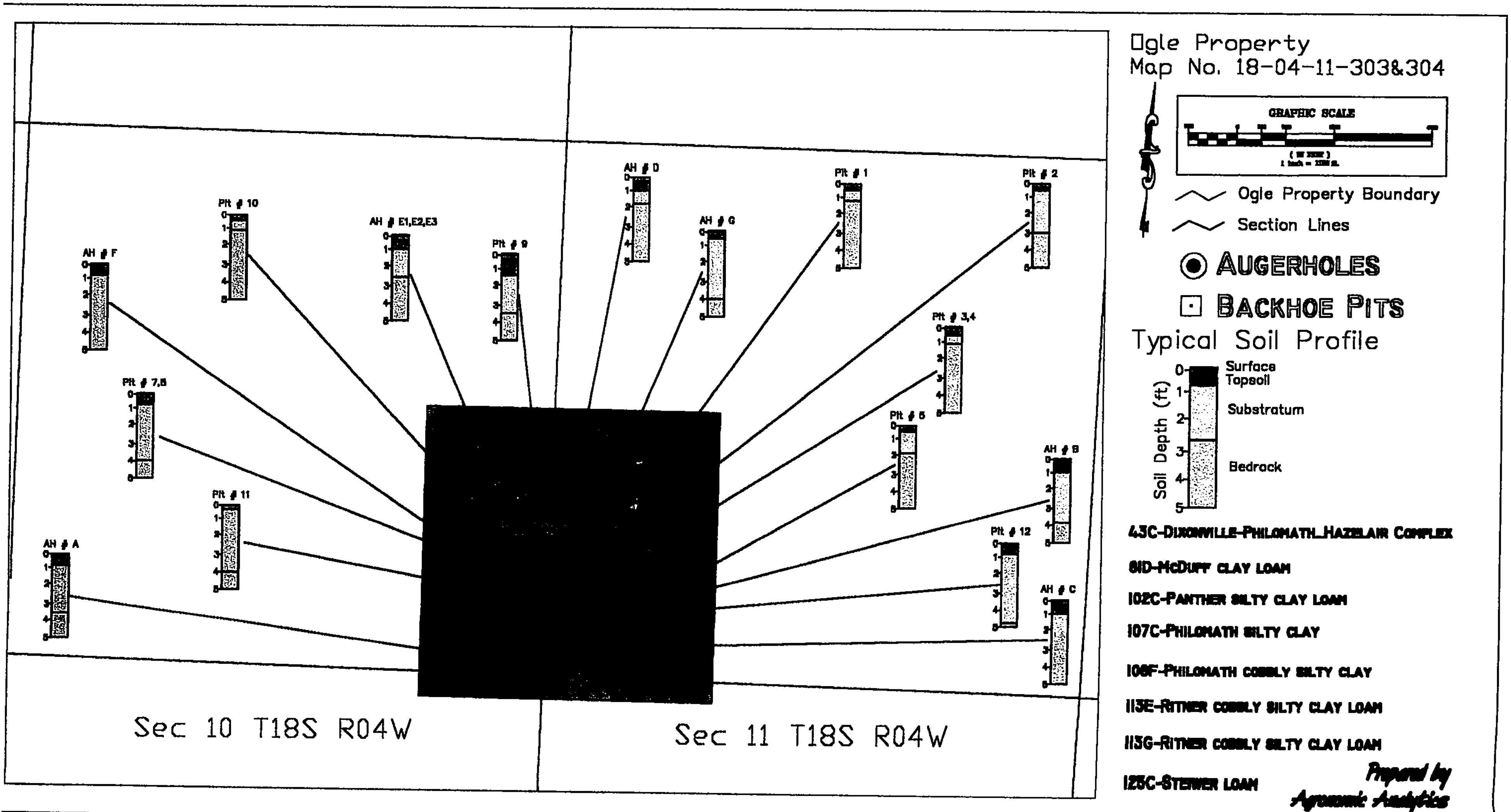
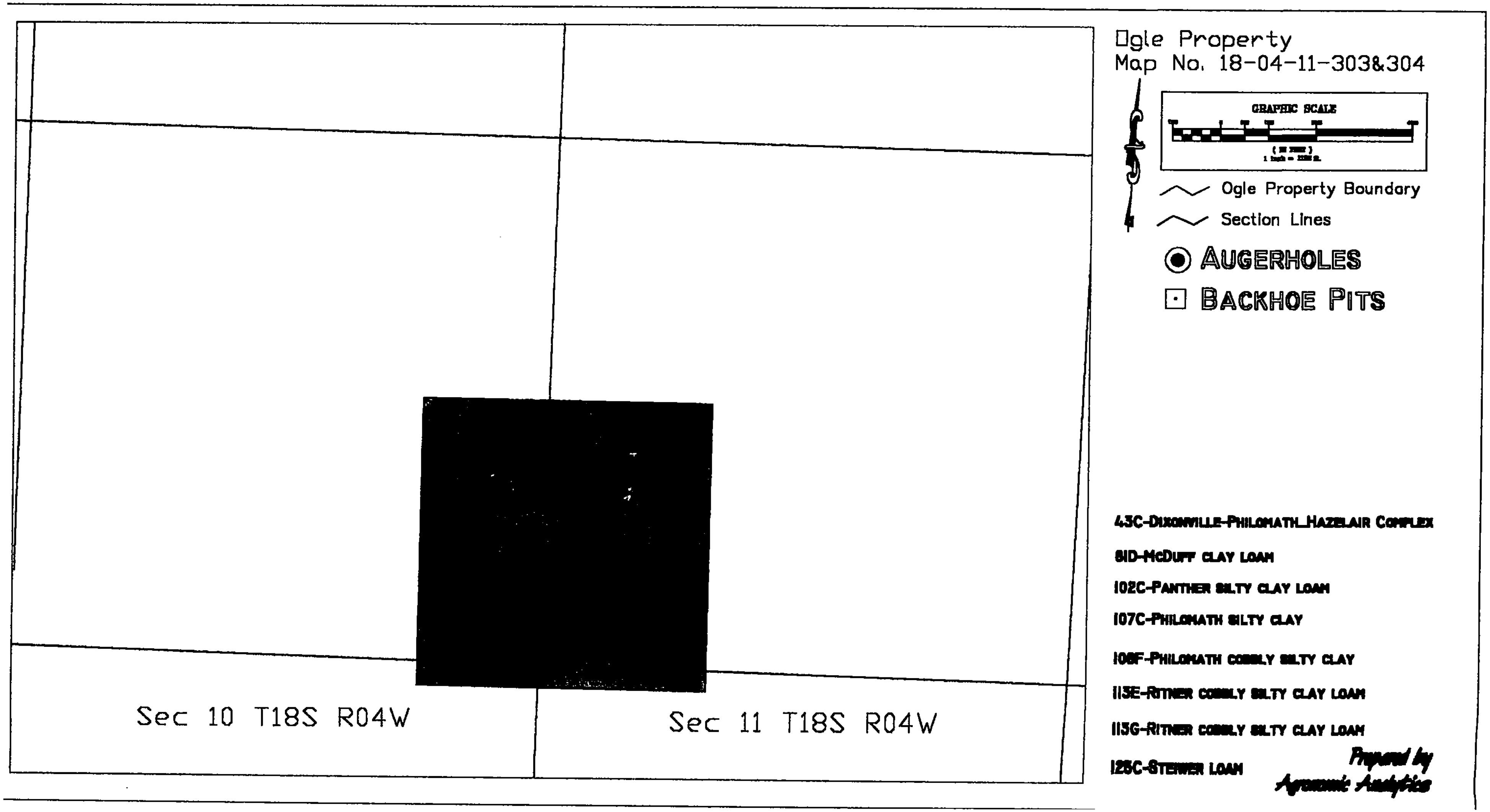
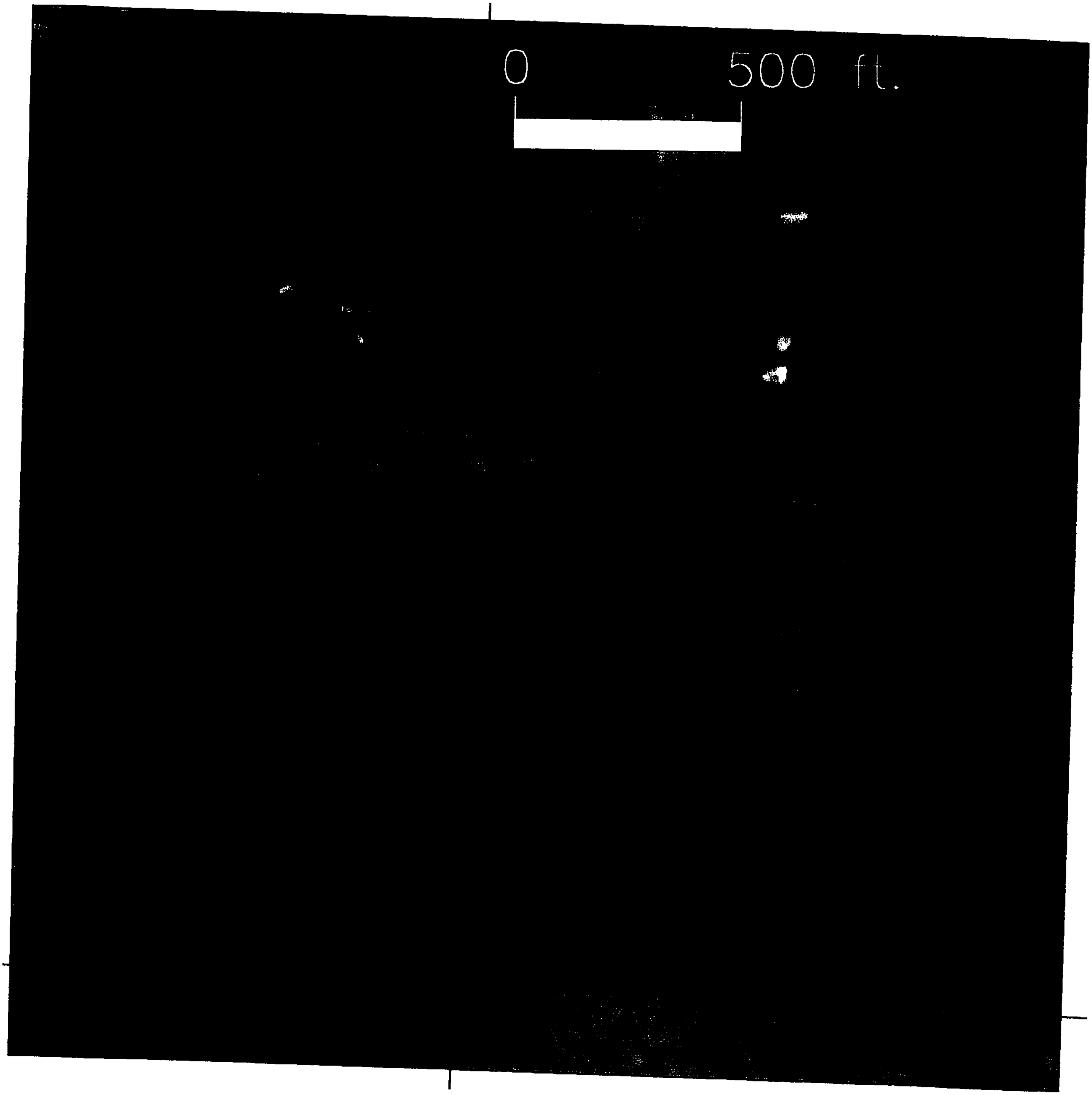


Figure No. 8 Pit No. 12 Mapped as Philomath silty clay, however this is Panther silty clay loam from lower in the landscape.



Ogle Property
Map No. 18-04-11-303&304
GRAPHIC SCALE
Ogle Property Boundary
Section Lines
AUGERHOLES
BACKHOE PITS
Typical Soil Profile
Soil Depth (ft)
Surface Topsoil
Substratum
Bedrock
43C-DIXONVILLE-PHILOMATH_HAZELAIR COMPLEX
81D-McDUFF CLAY LOAM
102C-PANTHER SILTY CLAY LOAM
107C-PHILOMATH SILTY CLAY
108F-PHILOMATH COBBLY SILTY CLAY
113E-RITNER COBBLY SILTY CLAY LOAM
113G-RITNER COBBLY SILTY CLAY LOAM
125C-STEIWER LOAM
Prepared by
Agronomic Analytics
AH # F
Pit # 10
AH # E1,E2,E3
Pit # 9
AH # D
AH # G
Pit # 1
Pit # 2
Pit # 3,4
Pit # 5
AH # B
Pit # 12
AH # C
Pit # 7,8
Pit # 11
AH # A
Sec 10 T18S R04W
Sec 11 T18S R04W

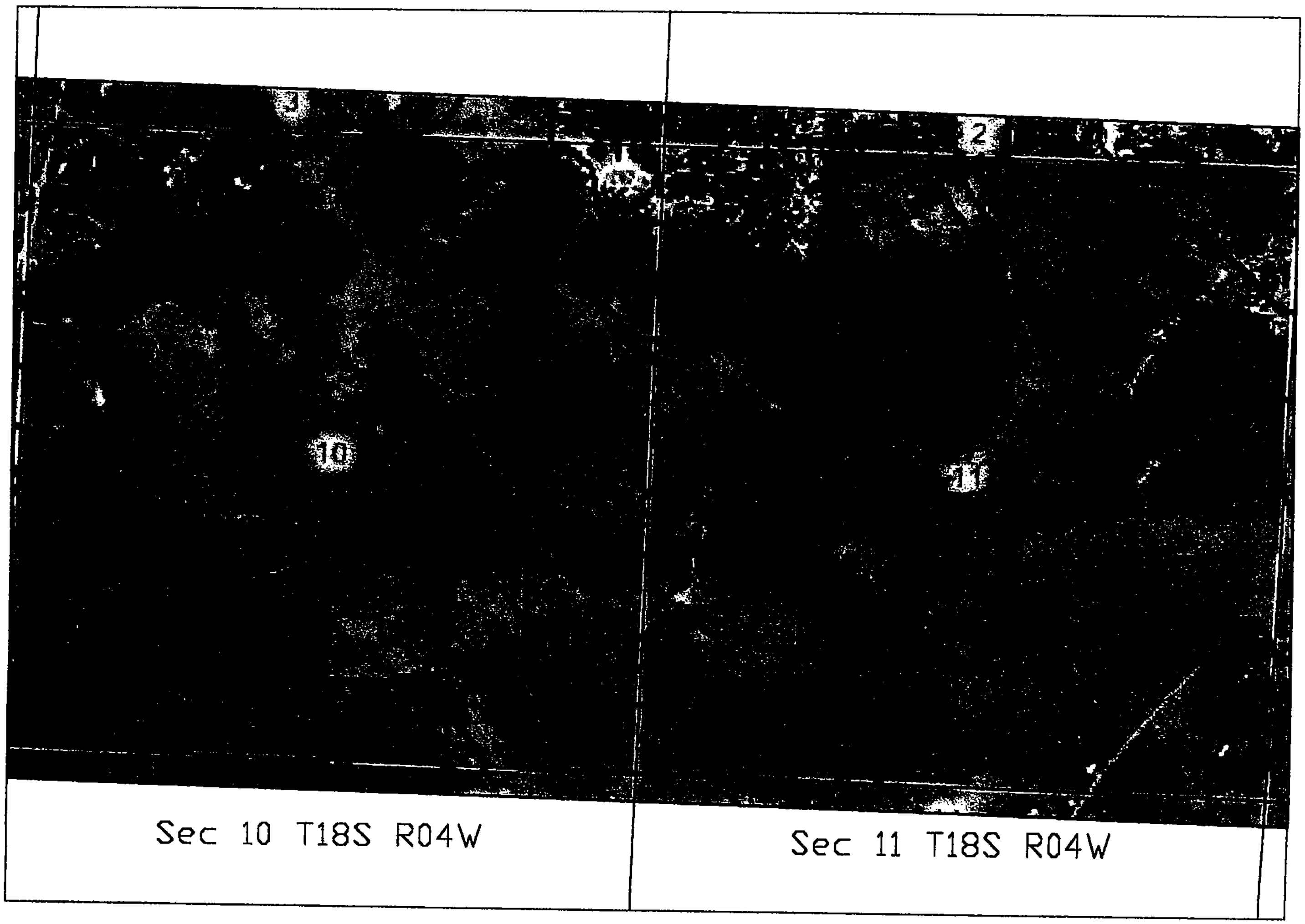

Ogle Property
Map No. 18-04-11-303&304
GRAPHIC SCALE
Ogle Property Boundary
Section Lines
AUGERHOLES
BACKHOE PITS
43C-DIXONVILLE-PHILOMATH_HAZELAIR COMPLEX
81D-MCDUFF CLAY LOAM
102C-PANTHER SILTY CLAY LOAM
107C-PHILOMATH SILTY CLAY
108F-PHILOMATH COBBLY SILTY CLAY
113E-RITNER COBBLY SILTY CLAY LOAM
113G-RITNER COBBLY SILTY CLAY LOAM
125C-STEIWER LOAM
Prepared by
Agronomic Analytics
Sec 10 T18S R04W
Sec 11 T18S R04W


0
500 ft.

Ogle Property
Map No. 18-04-11-303&304

GRAPHIC SCALE

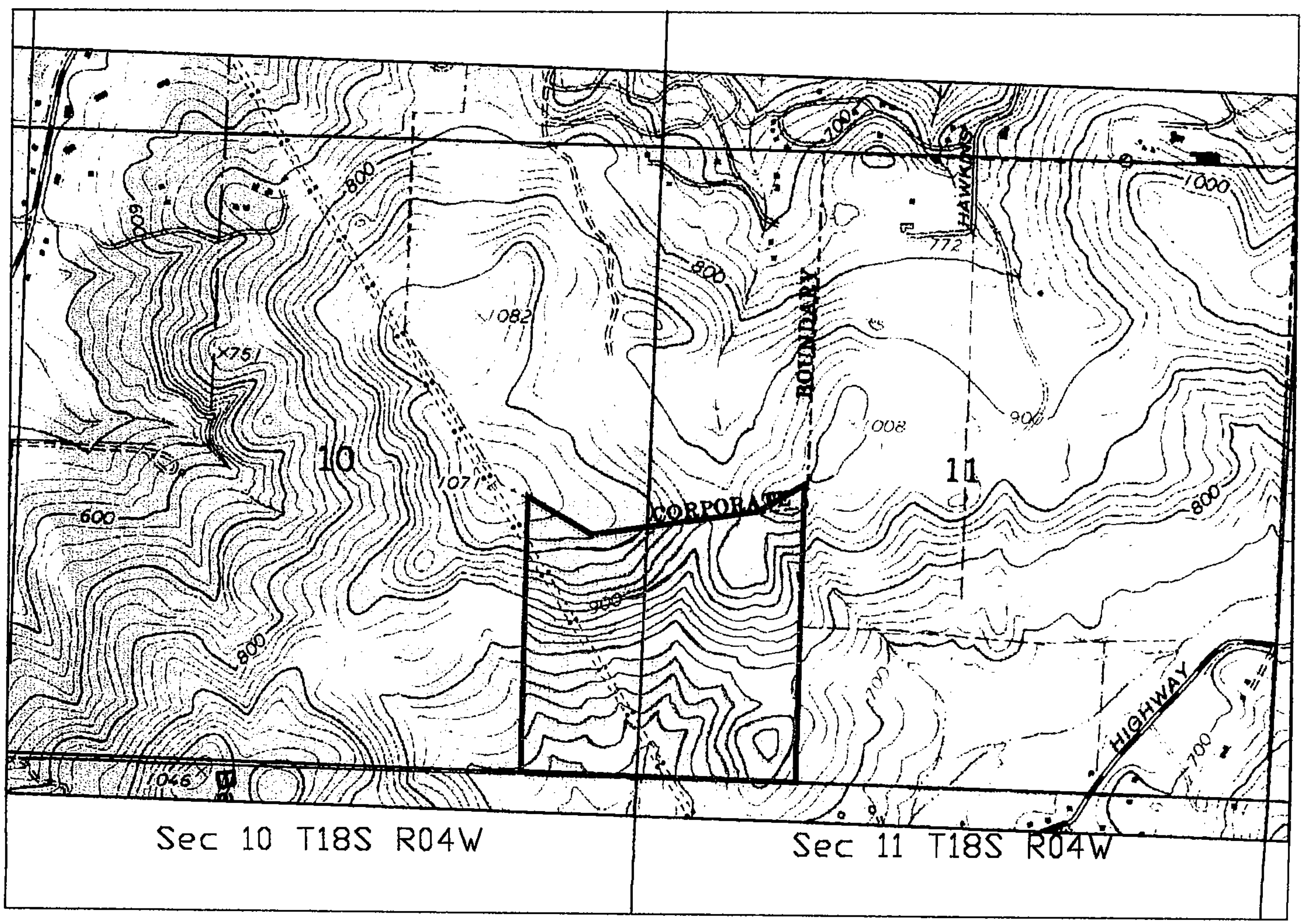
Ogle Property Boundary
Section Lines



Soil Series

81D-McDuff clay loam
102C-Panther silty clay loam
107C-Philomath silty clay
108F-Philomath cobbly silty clay
113E-Ritner cobbly silty clay loam
113G-Ritner cobbly silty clay loam

Prepared by
Agronomic Analytics



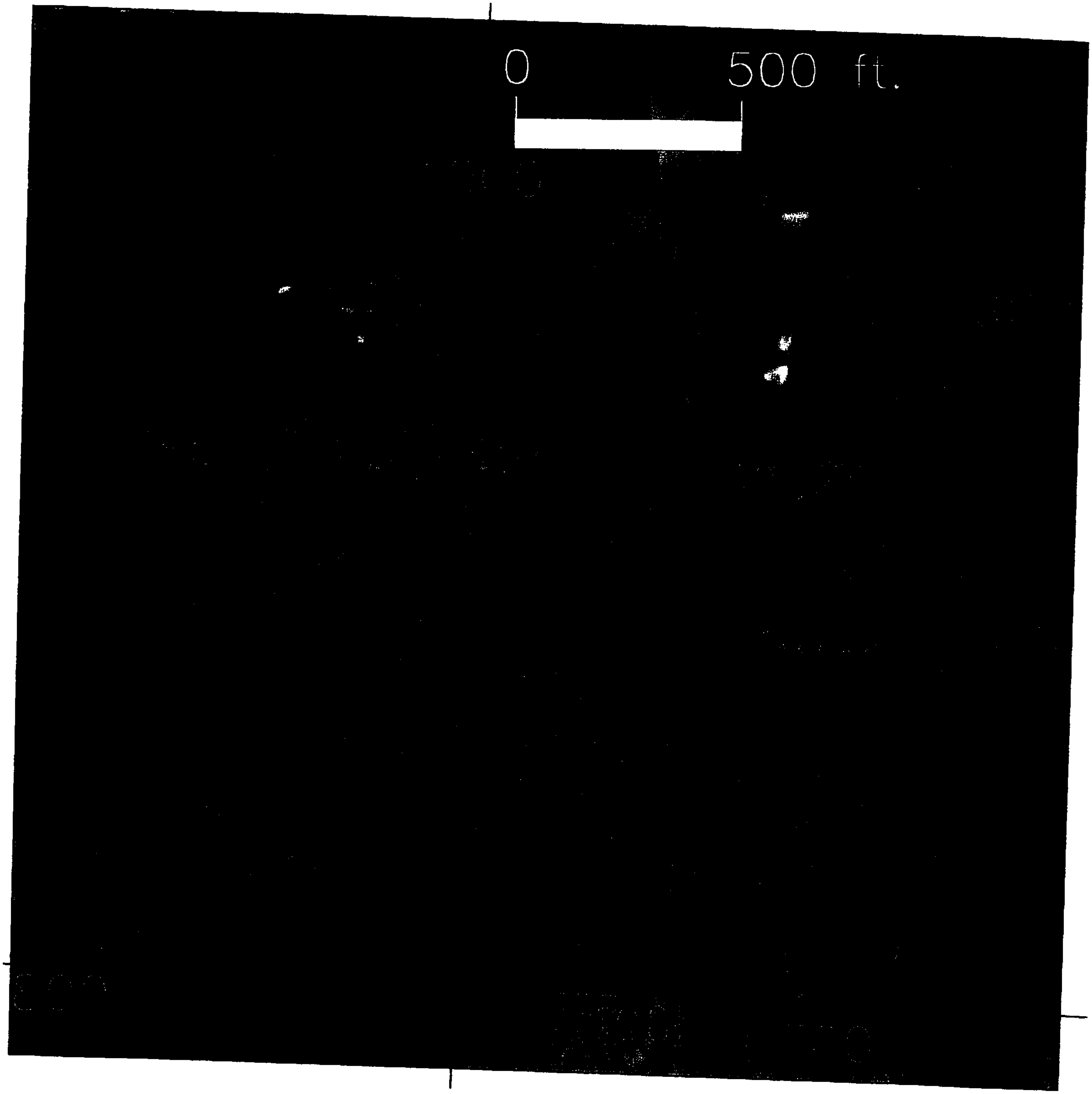
Ogle Property
Map No. 18-04-11-303&304

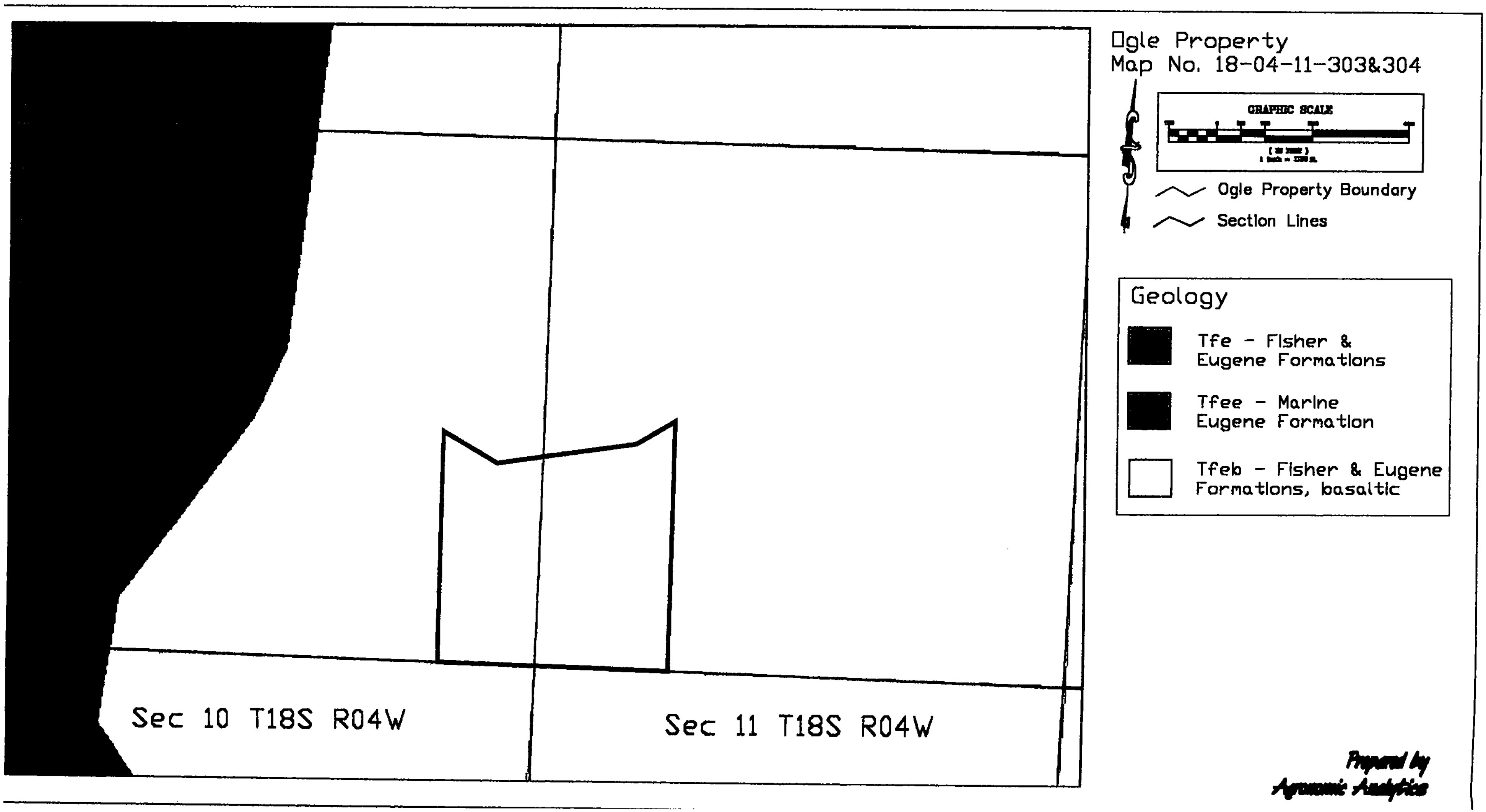
GRAPHIC SCALE

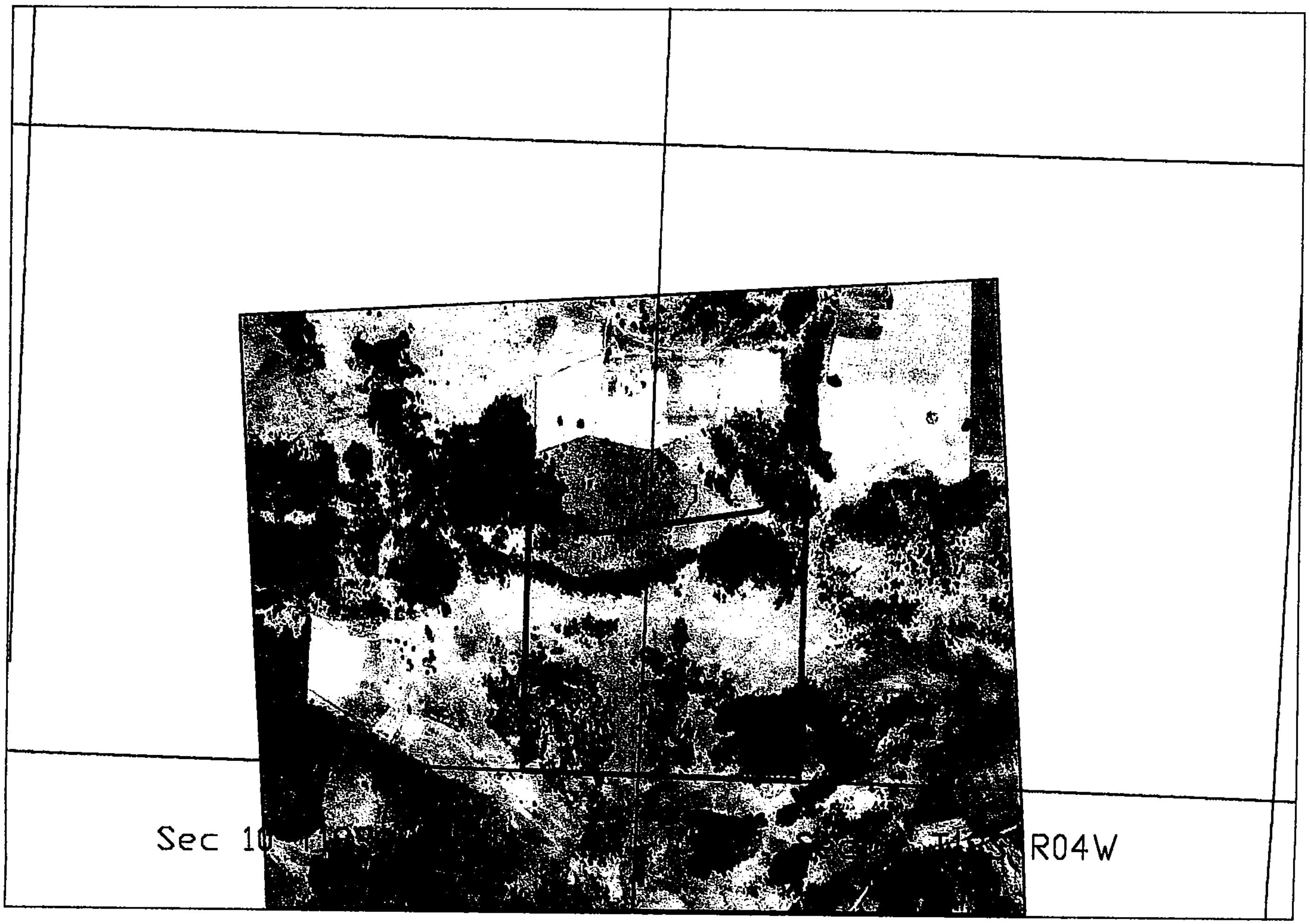
Ogle Property Boundary
Section Lines

Contour Lines
100 Foot Contours
20 Foot Contours

Prepared by
Agronomic Analytics


0
500 ft.


Ogle Property
Map No. 18-04-11-303&304
GRAPHIC SCALE
Ogle Property Boundary
Section Lines
Geology
Tfe - Fisher & Eugene Formations
Tfee - Marine Eugene Formation
Tfeb - Fisher & Eugene Formations, basaltic
Sec 10 T18S R04W
Sec 11 T18S R04W
Prepared by Agronomic Analytics



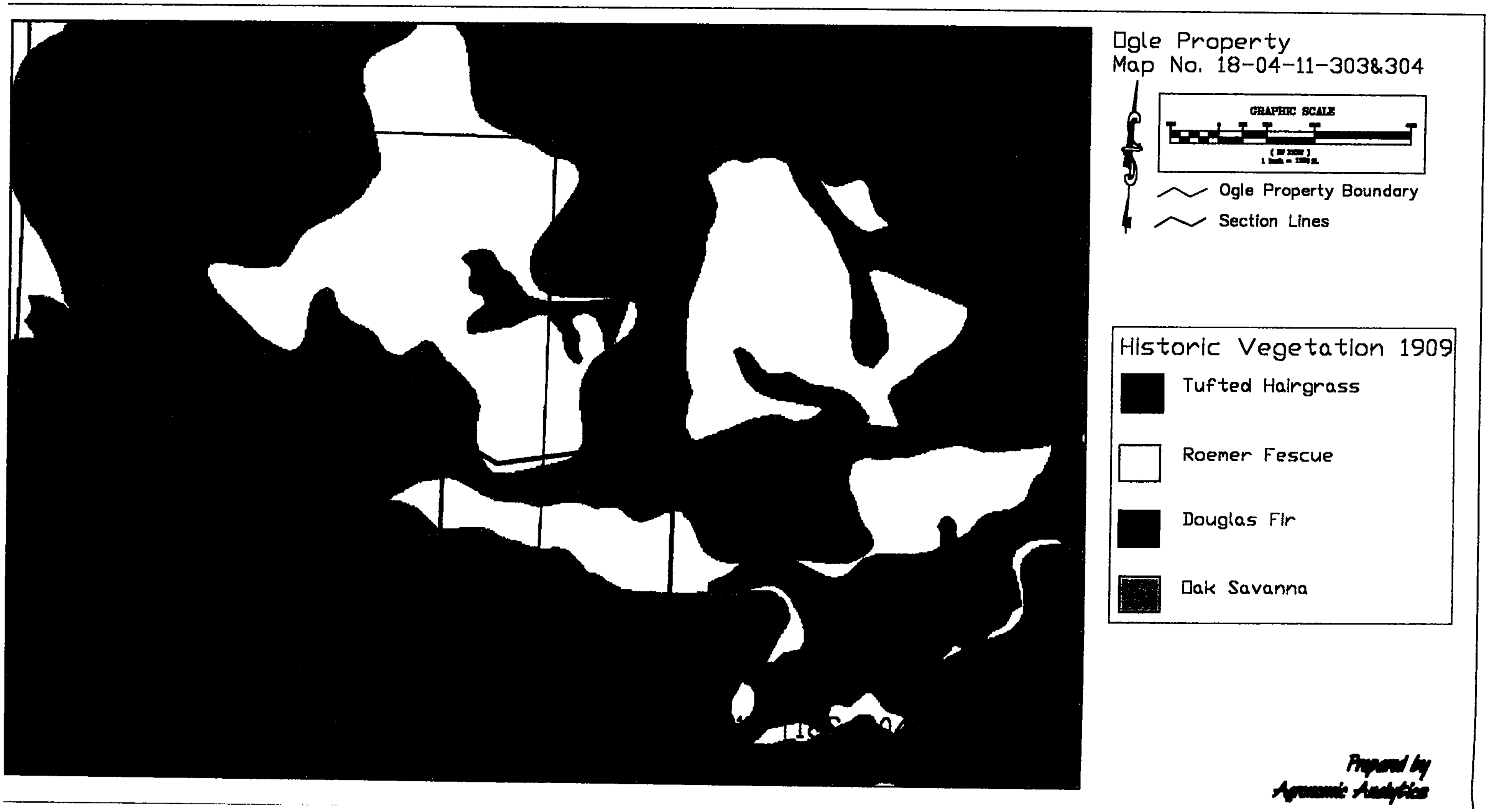
Ogle Property
Map No. 18-04-11-303&304

GRAPHIC SCALE

Ogle Property Boundary
Section Lines

1936 AERIAL PHOTO

Prepared by
Agronomic Analytics


Ogle Property
Map No. 18-04-11-303&304
GRAPHIC SCALE
Ogle Property Boundary
Section Lines
Historic Vegetation 1909
Tufted Hairgrass
Roemer Fescue
Douglas Fir
Oak Savanna
Prepared by
Agronomic Analytics

Agronomic Analytics
3419 Chaucer Way
Eugene, Oregon 97405
541-684-8000

Site Evaluation
Name: Brad Ogle
Field # Large Open Area
Address: Trendsetter Homes Corp.
P.O. Box 25509, Eugene, OR 97402
Phone: 541-485-0661

Climate:
Air Drainage Good Solar Radiation Open Wind W➔NW
Avg. Precipitation 45 in/yr Avg. Temperature 53° F

Site Characteristics:
Topography Steep Elevation 800 – 1000 Ft Aspect S ➔ SW
Microclimate Dry, hot, and droughty

Soil Characteristics:
Series Philomath Variations Hazelair, Dixsonville, and deeper inclusions present
Drainage Moderate Ponding Areas of overflow present, some wet loving plants
Texture Predominantly silty clay and clay Restrictive Layers Clay layers
Soil Depth Average of 14 inches, some areas with deeper soils
Water Holding Capacity Approximately 2 to 3 inches for total soil profile
pH Mildly acid to acid (4.5 – 5.5)
Nutrients Not tested N ___ P ___ K ___ B ___

Water Characteristics:
Irrigation Available No

Vegetation:
Present Vegetation Pasture grasses in poor to fair condition, brush invasion of blackberry, poison oak, and scotch broom
Hydrophyllic Some areas of overflow with rushes

Limiting Factors:
Growth Greatest limiting factor is soil depth and dry, south facing slopes

Notes: These large open areas are evident in the earliest aerial photography (1936) and in the historic vegetation survey. Areas which conform in soil depth (14 in) to the mapped Philomath series show little if any tree growth.

Auger Holes - Field Observation Summary						
Dates:	5/23/05, 5/24/05, 5/26/05					
Sample Site	Depth (in)	Color	Texture	Slope	pH	Notes
AH # A	0 - 8	Very dark brown to black	Silty clay to clay	7% - 150 ft.	5.1	Grass, some young pines encroaching
	8 - 27	Very dark brown/blackish to dark gray	Clay			
	27 - 41	Yellowish brown	Silty clay, small gritty fragments			
	41		Rock fragments, fractured bedrock			
AH # B, (adjacent to Pit # 6)	0 - 12	Dark brown (reddish)	Silty clay	2% - 100 ft	4.8	Trees, oak and fir
	12 - 24	Grayish brown	Silty clay			Black mottles at 19 in
	24 - 36	Light brown	Small red stones			
	36 - 46	Olive tan, variegated				
	46		Bedrock			
AH # C	0 - 12	Dark reddish brown	Silty clay	3% - 75 ft	4.7	Trees, firs, oaks, filberts1/2 inch duff
	12 -18	Lighter reddish brown	Clay			
	18 - 25	Tan, yellowish brown	Clay			
	25	Gray	Bedrock			
AH # D	0 - 12	Dark Brown	Silty clay	26% - 100 ft		Open field, grass, rocks on surface
	12 - 19	Lighter brown to gray	Silty clay to clay, rock fragments			
	22	Grayish	Bedrock			
AH # E1	0 - 12	Dark brown	Silty clay	32% - 150 ft		Trees - oak, firs; convex slope
	14	Dark brown (tan streaks)	Rocks			
AH # E2	0 - 8	Dark brown	Silty clay			15 ft west of E1, near stream, possibly eroded surface
	8		Rocks			
AH # E3	0 - 12	Dark brown	Silty clay		4.7	75 ft west of E2Convex slope
	12 - 18	Light brown	Silty clay			
	18 - 30	Tan, yellowish brown	Clay			
	31		Bedrock			
AH # F	1 - 0	Duff		25% - 100 ft	5.0	Trees, fir, pine; bench at toe of slope
	1-10	Dark brown	Silty clay			
	10 - 20	Dark brown to lighter brown	Clay			
	20 - 50	Brown to grayish	Clay			
	58	Grayish	Clay, few little stones, no bedrock			
AH # G	0 - 7	Dark brown	Silty clay		4.7	Trees, oak, fir
	7 - 48	Dark brown to light brown	Silty clay, clay			
	48	Yellowish brown	Bedrock material			

Backhoe Pits - Field Observation Summary						
Dates:	5/12/05, 5/23/05					
Sample Site	Depth (in)	Color	Texture	Slope	pH	Notes
BH # 1	0 -6	Dark brown	Silty clay	24% - 300 ft	5.0	Open, poor grass and broadleaves
	6 - 14	Dark brown	Silty clay, clay			
	14		Fractured bedrock			
BH # 2	0 - 6	Dark brown	Silty clay	15% - 100ft	5.2	Open, thicker grass than BH # 1
	6 - 30	Dark brown to grayish	Clay			Water flowing along top of clay surface
	30 - 36	Yellowish brown (tan) to olive	Clay			
	36 - 40		Fractured bedrock			
BH #3	0 - 6	Dark brown	Silty clay	14% - 150 ft		Grass
	14		Fractured bedrock			
BH # 4	0 - 6	Very dark brown	Silty clay	9% - 75 ft		Trees, oaks some small firs
	14		Fractured bedrock			
BH # 5	0 - 6	Dark brown	Silty clay	3% - 100 ft	4.8	Grass
	6 - 23	Brown to lighter brown	Silty clay			
	23	Red	Bedrock			Unusual red bedrock, possibly paleosoil
BH # 6	0 - 12	Dark brown	Silty clay			Trees
	12 - 36	Brown to lighter brown	Silty clay			
	36 - 46	Yellowish brown	Silty clay, clay			
	50		Fractured bedrock			
BH # 7	0 - 12	Dark brown	Silty clay			Trees, adjacent to open area
	12 - 48	Reddish brown	Clay			
	48		Weathered bedrock			
BH # 8	0 - 12	Dark brown	Silty clay			Trees, adjacent to open area
	12 - 38	Reddish brown	Clay			
	38		Weathered bedrock			
BH # 9	0 - 6	Dark Brown	Silty clay	18% - 100 ft	4.7	Trees, 1/2 inch duff
	6 - 18	Brown to lighter brown	Silty clay			
	18 - 24	Yellowish brown	Silty clay, some rock fragments			
	24 - 40	Yellowish brown to gray	Clay			
	40		Fractured bedrock			
BH # 10	0 - 6	Dark brown	Silty clay	18% - 100 ft	4.8	Open grassy area surrounded by trees
	6 - 14	Dark brown	Silty clay, clay			
	14	Yellowish brown to tan	Weathered bedrock, tuffaceous			
BH # 11	0 - 4	Very dark brown to blackish	Silty clay, Clay	9% - 100 ft	5.3	Trees, oaks, fir, pine
	4 - 24	Dark gray	Clay			
	24 - 48	Dark gray to lighter gray	Clay			
	48		Fractured bedrock			
BH # 12	0 - 8	Very dark brown, blackish	Silty clay		4.8	Trees, along EWEB right of way
	8 - 14	Dark gray	Clay			
	14 - 56	Gray to light gray, yellowish	Clay			
	56		Weathered bedrock			

Table 6. Soil Properties - 81D McDuff clay loam and inclusions

Soil Series	Horizon	Depth (in)	Texture	Color Name	Color Designation
McDuff clay loam	O1	2 - 0	Duff		
	A1	0 - 6	Clay loam	Very dark brown	10YR 2/2
				Dark grayish brown	10YR 4/2
	B1	6 - 14	Clay loam	Very dark grayish brown	10YR 3/2
				Brown	10YR 4/3
	B21t	14 - 24	Clay loam	Dark brown	10YR 3/3
				Brown	10YR 4/3
	B22t	24 - 33	Clay	Dark brown	10YR 3/3
				Brown	7.5YR 5/4
	B3t	33 - 37	Silty clay	Brown	10YR 4/3
				Dark yellowish brown	10YR 3/4
				Pale brown	10YR 6/3
	Cr	37	Light olive brown, Fractured Tuffaceous Bedrock		2.5YR 5/4
Bonhannon	O1	1 - 0	Duff		
	A1	0 - 4	Gravelly loam	Dark brown	10YR 3/3
				Dark grayish brown	10YR 4/2
	A3	4 - 11	Gravelly loam	Dark brown	10YR 3/3
				Brown	10YR 4/3
	B21	11 - 17	Cobbly loam	Dark brown	10YR 3/4
				Brown	10YR 5/3
	B22	17 - 24	Cobbly loam	Brown	10YR 4/4
				Pale brown	10YR 6/3
	Cr	24	Weathered, fractured sedimentary rock		
Cumley	O1	1 - 0	Duff		
	A11	0 - 4	Silty clay loam	Dark brown	7.5YR 3/2
				Brown	7.5YR 5/2
	A12	4 - 14	Silty clay loam	Dark brown	7.5YR 3/4
				Pinkish gray	7.5YR 5/2
	B1	14 - 20	Clay	Brown	7.5YR 4/4
				Pinkish gray	7.5YR 6/2
	B21t	20 - 33	Clay	Dark brown	10YR 4/3
				Brown	10YR 5/3
				Common faint yellowish brown mottles	10YR 5/6
	B22t	33 - 47	Clay	Grayish brown	2.5Y 5/2
				Pale brown	10YR 6/3
				Common distinct yellowish brown/dark gray mottles	10YR 5/6, 4/1
	C	47 - 60	Clay	Light yellowish brown	2.5Y 6/3
				Light yellowish brown	10YR 6/4
Honeygrove	A1	0 - 9	Silty clay loam	Dark reddish brown	5YR 3/3
				Reddish brown	5YR 4/4
	A3	9 - 14	Clay	Dark reddish brown	5YR 3/4
				Reddish brown	5YR 4/4
	B1	14 - 20	Clay	Yellowish red	5YR 3/6
				Reddish brown	5YR 5/4
	B21t	20 - 30	Clay	Dark red	2.5YR 3/6
				Yellowish red	5YR 5/6
	B22t	30 - 47	Clay	Dark red	2.5YR 3/6
				Yellowish red	5YR 5/8
	B23t	47 - 60	Clay	Dark red	2.5YR 3/6
				Yellowish red	5YR 5/8
Klickitat	O1	1.4 - 0	Duff		
	A11	0 - 6	Stony loam	Dark brown	7.5YR 3/2
				Brown	7.5YR 3/2
	A12	6 - 13	Stony loam	Dark brown	7.5YR 3/2
				Brown	7.5YR 4/4
	B21	13 - 24	Very cobbly clay loam	Dark brown	7.5YR 4/4
				Brown	7.5YR 5/4
	B22	24 - 39	Very cobbly clay loam	Dark brown	7.5YR 4/4
				Brownish yellow	10YR 6/6
	C1	39 - 50	Extremely cobbly loam	Dark brown	7.5YR 4/4
				Brownish yellow	10YR 6/6
	R	50	Slightly fractured basalt		
Peavine	O1	0.5 - 0	Duff		
	A11	0 - 2	Silty clay loam	Dark reddish brown	5YR 3/2
				Brown	7.5YR 4/2
	A12	2 - 8	Silty clay loam	Dark reddish brown	5YR 3/3
				Reddish brown	5TY 4/3
	B1	8 - 15	Clay	Dark reddish brown	5YR 3/4
				Reddish brown	5YR 4/4
	B21t	15 - 25	Clay	Yellowish red	5YR 3/6
				Yellowish red	5YR 4/6
	B22t	25 - 38	Silty clay	Reddish brown	5YR 4/4
				Yellowish red	5YR 4/6
				Reddish brown	5YR 5/4
	Cr	38	Variegated, weathered bedrock		

Table 7. Soil Properties - 102C Panther silty clay loam and Inclusions					
Soil Series	**Horizon**	**Depth (in)**	**Texture**	**Color Name**	**Color Designation**
Panther silty clay loam	A1	0 - 10	Silty clay loam	Very dark brown	10YR 2/2
				Very dark gray	10YR 3/1
	B21g	10 - 16	Clay	Very dark grayish brown	10YR 3/2
				Dark gray	10YR 4/1
	B22g	16 - 29	Clay	Dark grayish brown	2.5Y 4/2
				Grayish brown	2.5YR 5/2
				Common fine distinct strong brown mottles	7.5YR 5/6
	C1g	29 - 42	Clay	Dark grayish brown	2.5Y 4/2
				Grayish brown	2.5Y 5/2
				Common medium distinct light olive brown mottles	2.5Y 5/6
	Cr	42	Weathered, sedimentary rock		
Bashaw	Ap	0 - 7	Clay	Very dark gray	10YR 3/1
				Dark gray	10YR 4/1
	A12	7 - 26	Clay	Black	10YR 2/1
				Very dark gray	10YR 3/1
	A13	24 - 41	Clay	Very dark gray	10YR 3/1
				Dark gray	10YR 4/1
	C1	41 - 63	Silty clay	Variegated olive brown	2.5Y 4/4
				Light brownish gray	10YR 6/2
				Light gray	2.5Y 7/2
				Many medium distinct strong brown mottles	7.5YR 5/6
				Common fine distinct black mottles	10YR 2/1
Dupee	Ap	0 - 5	Silt loam	Very dark grayish brown	10YR 3/2
				Brown	10YR 5/3
	A3	5 - 12	Silt loam	Very dark grayish brown	10YR 3/2
				Brown	10YR 6/3
	B1	12 - 17	Silty clay loam	Dark brown	10YR 3/3
				Pale brown	10YR 6/3
				few fine faint brown mottles	7.5YR 4/2
				few fine faint dark brown mottles	7.5YR 4/4
	B21t	17 - 23	Silty clay	Dark brown	10YR 4/3
				Pale brown	10YR 6/3
				Common fine distinct light brownish gray mottles	10YR 6/2
				Common fine distinct yellowish red mottles	5YR 5/6
	B22t	23 - 40	Silty clay	Brown	7.5YR 4/4
				Light brown	7.5YR 6/4
				Common fine distinct pinkish gray mottles	7.5YR 6/2
				Common fine distinct yellowish red mottles	5YR 5/6
	B3	40 - 51	Clay loam	Brown	7.5YR 5/4
				Pink	7.5YR 7/4
				Common medium prominent pinkish gray mottles	7.5YR 6/2
				Common medium prominent yellowish red mottles	5YR 5/6
	C	51 - 55	Clay loam	Variegated dark brown	7.5YR 3/2
				Pinkish gray	7.5YR 6/2
				Strong brown	7.5YR 5/6
				Light gray	10YR 7/1
	Cr	55	Weathered sandstone		
Hazelair	A1	0 - 4	Silty clay loam	Very dark brown	10YR 2/2
				Dark grayish brown	10YR 4/2
	A3	4 - 11	Silty clay loam	Very dark brown	10YR 2/2
				Dark grayish brown	10YR 4/2
	B2	11 - 15	Silty clay	Dark brown	10YR 3/3
				Brown	10YR 5/3
	IIC1	15 - 21	Clay	Dark brown	10YR 4/3
				Pale brown	10yr 6/3
	IIC2	21 - 36	Clay	Light olive brown	2.5Y 5/4
				Pale yellow	2.5Y 7/4
	IIICr	36	Weathered tuff		
Philomath	A11	0 - 6	Cobbly silty clay	Very dark brown	10YR 2/2
				Very dark grayish brown	10YR 3/2
	A12	6 - 14	Cobbly silty clay	Very dark brown	7.5YR 2/2
				Dark brown	7.5YR 4/2
	IICr	14	Weathered andesitic bedrock		

Table 8. Soil Properties - 107C Philomath silty clay and Inclusions					
Soil Series	**Horizon**	**Depth (in)**	**Texture**	**Color Name**	**Color Designation**
Philomath silty clay	A11	0 - 6	Cobbly silty clay	Very dark brown	10YR 2/2
				Very dark grayish brown	10YR 3/2
	A12	6 - 14	Cobbly silty clay	Very dark brown	7.5YR 2/2
				Dark brown	7.5YR 4/2
	IICr	14	Weathered andesitic bedrock		
Dixonville	A11	0 - 3	Silty clay loam	Very dark brown	7.5YR 2/2
				Dark brown	7.5YR 3/2
	A12	3 - 14	Silty clay loam	Very dark brown	7.5YR 2/2
				Dark brown	7.5YR 3/2
	B21	14 - 23	Silty clay	Dark brown	7.5YR 3/2
				Dark brown	7.5YR 4/4
	B22t	23 - 26	Cobbly clay	Dark brown	7.5YR 3/4
				Brown	7.5YR 4/4
	Cr	26	Weathered bedrock		
Hazelair	A1	0 - 4	Silty clay loam	Very dark brown	10YR 2/2
				Dark grayish brown	10YR 4/2
	A3	4 - 11	Silty clay loam	Very dark brown	10YR 2/2
				Dark grayish brown	10YR 4/2
	B2	11 - 15	Silty clay	Dark brown	10YR 3/3
				Brown	10YR 5/3
	IIC1	15 - 21	Clay	Dark brown	10YR 4/3
				Pale brown	10yr 6/3
	IIC2	21 - 36	Clay	Light olive brown	2.5Y 5/4
				Pale yellow	2.5Y 7/4
	IIICr	36	Weathered tuff		

Table 9. Soil Properties - 108F Philomath cobbly silty clay and Inclusions					
Soil Series	**Horizon**	**Depth (in)**	**Texture**	**Color Name**	**Color Designation**
Philomath silty clay	A11	0 - 6	Cobbly silty clay	Very dark brown	10YR 2/2
				Very dark grayish brown	10YR 3/2
	A12	6 - 14	Cobbly silty clay	Very dark brown	7.5YR 2/2
				Dark brown	7.5YR 4/2
	IICr	14	Weathered andesitic bedrock		
Dixonville	A11	0 - 3	Silty clay loam	Very dark brown	7.5YR 2/2
				Dark brown	7.5YR 3/2
	A12	3 - 14	Silty clay loam	Very dark brown	7.5YR 2/2
				Dark brown	7.5YR 3/2
	B21	14 - 23	Silty clay	Dark brown	7.5YR 3/2
				Dark brown	7.5YR 4/4
	B22t	23 - 26	Cobbly clay	Dark brown	7.5YR 3/4
				Brown	7.5YR 4/4
	Cr	26	Weathered bedrock		
Hazelair	A1	0 - 4	Silty clay loam	Very dark brown	10YR 2/2
				Dark grayish brown	10YR 4/2
	A3	4 - 11	Silty clay loam	Very dark brown	10YR 2/2
				Dark grayish brown	10YR 4/2
	B2	11 - 15	Silty clay	Dark brown	10YR 3/3
				Brown	10YR 5/3
	IIC1	15 - 21	Clay	Dark brown	10YR 4/3
				Pale brown	10yr 6/3
	IIC2	21 - 36	Clay	Light olive brown	2.5Y 5/4
				Pale yellow	2.5Y 7/4
	IIICr	36	Weathered tuff		
Panther silty clay loam	A1	0 - 10	Silty clay loam	Very dark brown	10YR 2/2
				Very dark gray	10YR 3/1
	B21g	10 - 16	Clay	Very dark grayish brown	10YR 3/2
				Dark gray	10YR 4/1
	B22g	16 - 29	Clay	Dark grayish brown	2.5Y 4/2
				Grayish brown	2.5YR 5/2
				Common fine distinct strong brown mottles	7.5YR 5/6
	C1g	29 - 42	Clay	Dark grayish brown	2.5Y 4/2
				Grayish brown	2.5Y 5/2
				Common medium distinct light olive brown mottles	2.5Y 5/6
	Cr	42	Weathered, sedimentary rock		
Witzel	A1	0 - 4	Very cobbly loam	Dark Brown	7.5YR 3/2
				Brown	7.5YR 4/2
	B21	4 - 11	Very cobbly clay loam	Dark reddish brown	5YR 3/2
				Dark reddish gray	5YR 4/2
	B22	11 - 17	Very cobbly clay loam	Dark reddish brown	5YR 3/3
				Reddish brown	5YR 5/3
	IIR	17	Fractured basalt		

Table 10. Soil Properties - 113E Ritner cobbly silty clay loam and Inclusions					
Soil Series	**Horizon**	**Depth (in)**	**Texture**	**Color Name**	**Color Designation**
Ritner cobbly silty clay loam	O1	1 - 0	Duff		
	A1	0 - 7	Cobbly silty clay loam	Dark reddish brown	5YR 3/3
				Reddish brown	5YR 4/3
	B21	7 - 21	Very cobbly silty clay loam	Dark reddish brown	5YR 3/4
				Reddish brown	5YR 4/4
	B22	21 - 32	Very cobbly silty clay loam	Yellowish red	5YR 4/6
	R	32	Fractured basalt		
Jory	A1	0 - 9	Silty clay loam	Dark reddish brown	5YR 3/3
				Brown	7.5YR 4/4
	A3	9 - 17	Silty clay	Dark reddish brown	5YR 3/4
				Reddish brown	5YR 4/4
	B21t	17 - 28	Silty clay	Dark reddish brown	5YR 3/4
				Reddish brown	5YR 4/4
	B22t	28 -47	Silty clay	Dark reddish brown	5YR 3/4
				Reddish brown	5YR 4/4
	B23t	47 - 60	Silty clay	Dark reddish brown	5YR 3/4
				Reddish brown	5YR 4/4
Nekia	O1	0.5 - 0	Duff		
	A11	0 - 6	Silty clay loam	Dark reddish brown	5YR 3/3
				Reddish brown	5YR 4/3
	A12	6 - 10	Silty clay loam	Dark reddish brown	5YR 3/3
				Reddish brown	5YR 4/3
	B1	10 - 14	Clay	Dark reddish brown	5YR 3/3
				Reddish brown	5YR 4/4
	B2t	14 - 28	Clay	Dark reddish brown	5YR 3/4
				Reddish brown	5YR 4/4
	B3t	28 - 35	Clay	Reddish brown	5YR 4/4
				Yellowish red	6YR 5/6
	R	35	Fractured basalt		
Witzel	A1	0 - 4	Very cobbly loam	Dark Brown	7.5YR 3/2
				Brown	7.5YR 4/2
	B21	4 - 11	Very cobbly clay loam	Dark reddish brown	5YR 3/2
				Dark reddish gray	5YR 4/2
	B22	11 - 17	Very cobbly clay loam	Dark reddish brown	5YR 3/3
				Reddish brown	5YR 5/3
	IIR	17	Fractured basalt		

Table 11. Soil Properties - 113G Ritner cobbly silty clay loam and Inclusions					
Soil Series	**Horizon**	**Depth (in)**	**Texture**	**Color Name**	**Color Designation**
Ritner cobbly silty clay loam	O1	1 - 0	Duff		
	A1	0 - 7	Cobbly silty clay loam	Dark reddish brown	5YR 3/3
				Reddish brown	5YR 4/3
	B21	7 - 21	Very cobbly silty clay loam	Dark reddish brown	5YR 3/4
				Reddish brown	5YR 4/4
	B22	21 - 32	Very cobbly silty clay loam	Yellowish red	5YR 4/6
	R	32	Fractured basalt		
Nekia	O1	0.5 - 0	Duff		
	A11	0 - 6	Silty clay loam	Dark reddish brown	5YR 3/3
				Reddish brown	5YR 4/3
	A12	6 - 10	Silty clay loam	Dark reddish brown	5YR 3/3
				Reddish brown	5YR 4/3
	B1	10 - 14	Clay	Dark reddish brown	5YR 3/3
				Reddish brown	5YR 4/4
	B2t	14 - 28	Clay	Dark reddish brown	5YR 3/4
				Reddish brown	5YR 4/4
	B3t	28 - 35	Clay	Reddish brown	5YR 4/4
				Yellowish red	6YR 5/6
	R	35	Fractured basalt		
Witzel	A1	0 - 4	Very cobbly loam	Dark Brown	7.5YR 3/2
				Brown	7.5YR 4/2
	B21	4 - 11	Very cobbly clay loam	Dark reddish brown	5YR 3/2
				Dark reddish gray	5YR 4/2
	B22	11 - 17	Very cobbly clay loam	Dark reddish brown	5YR 3/3
				Reddish brown	5YR 5/3
	IIR	17	Fractured basalt		
Rock Outcrop					

Ogle Property Soil Series Description

PHILOMATH SERIES

The Philomath series consists of shallow, well drained soils that formed in colluvium weathered from basic igneous rock. Philomath soils are on low hills. Slopes are 3 to 70 percent. The mean annual precipitation is about 45 inches and the mean annual temperature is about 53 degrees F.

TAXONOMIC CLASS: Clayey, smectitic, mesic, shallow Vertic Haploxerolls

TYPICAL PEDON: Philomath silty clay, pasture. (Colors are for moist soil unless otherwise noted.)

A1--0 to 4 inches; very dark brown (10YR 2/2) silty clay, very dark grayish brown (10YR 3/2) dry; moderate medium subangular blocky structure; hard, firm, very sticky and very plastic; many very fine roots; many fine tubular pores; slightly acid (pH 6.4); clear wavy boundary. (2 to 6 inches thick)

A2--4 to 13 inches; very dark brown (10YR 2/2) clay, very dark grayish brown (10YR 3/2) dry; moderate medium subangular blocky structure; very hard, very firm, very sticky and very plastic; common fine roots; common very fine tubular pores; 5 percent paragravel; neutral (pH 6.6); clear wavy boundary. (3 to 9 inches thick)

A3--13 to 19 inches; very dark grayish brown (10YR 3/2) clay, dark grayish brown (10YR 4/2) dry; moderate medium subangular blocky structure; very hard, very firm, very sticky and very plastic; few fine roots; common very fine tubular pores; 5 percent paragravel; neutral (pH 6.6); abrupt wavy boundary. (0 to 9 inches thick)

2Cr--19 inches; dark yellowish brown (10YR 4/6) weathered basalt

TYPE LOCATION: Linn County, Oregon; NE1/4 SW1/4 NW1/4 of section 16, T.12S, R.1W. Willamette Meridian; Onehorse Slough, Oregon USGS 7.5 minute topographic quadrangle. Latitude 44 degrees, 31 minutes, 45 seconds N. and Longitude 122 degrees, 49 minutes, 13 seconds W.; NAD 27.

RANGE IN CHARACTERISTICS: These soils are usually moist but are dry between depths of 4 and 12 inches for 60 to 80 consecutive following the summer solstice. The mean annual soil temperature ranges from 50 to 56 degrees F. The depth to a paralithic contact of weakly to moderately cemented igneous rock is 12 to 20 inches. The mollic epipedon is 12 to 20 inches thick. The profile cracks throughout its depth during the summer.

The A1 horizon has value of 2 or 3 moist, 2 to 4 dry and chroma of 1 or 2 moist or dry. Texture is silty clay loam, silty clay or cobbly silty clay with 30 to 55 percent clay. It has 0 to 15 percent gravel and 0 to 20 percent cobbles. Reaction is moderately acid or slightly acid.

The A2 horizon has hue of 10YR or 7.5YR, value of 2 or 3 moist, 2 to 4 dry and chroma of 1 or 2 moist or dry. Texture is silty clay loam, clay, silty clay, cobbly silty clay or cobbly clay with 35 to 55 percent clay. It has 0 to 15 percent gravel, 0 to 20 percent cobbles and 0 to 5 percent paragravel. Reaction is moderately acid to neutral.

The A3 horizon, when present, has hue of 10YR or 7.5YR, value of 2 or 3 moist, 2 to 4 dry and chroma of 1 or 2 moist or dry. Texture is silty clay, clay, cobbly silty clay or cobbly clay with 40 to 60 percent clay. It has 0 to 20 percent gravel, 0 to 20 percent cobbles and 0 to 10 percent paragravel. Reaction is moderately acid to neutral.

COMPETING SERIES: There are no other series in this family.

GEOGRAPHIC SETTING: The Philomath soils are on convex hills at elevations of 300 to 2,000 feet. These soils formed in fine textured residuum or colluvium weathered from basic igneous rock. Slopes are 3 to 70 percent. The climate is characterized by warm, wet winters and hot, dry summers. The mean annual precipitation is 30 to 60 inches. The mean annual temperature is 49 to 55 degrees F. The mean January temperature is 38 to 40 degrees F. and the mean July temperature is 64 to 68 degrees F. The frost-free season is 160 to 235 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Dixonville, Gellatly (T), Hazelair, Ritner, Witham, and Witzel soils. Dixonville, Gellatly, Hazelair, Ritner and Witham soils are greater than 20 inches to bedrock. Dixonville soils occur on linear or convex parts of the hillslope. Gellatly soils occur on linear or concave parts of the hillslope. Hazelair soils occur on the concave parts of the hillslope. Ritner soils occur on convex parts of the hillslope at higher elevations. Witham soils occur on fans, footslopes, or toeslopes. Withzel soils are skeletal and occur on convex parts of the hillslope.

DRAINAGE AND PERMEABILITY: Well drained; slow permeability.

USE AND VEGETATION: About 80 percent of this soil is in natural and unimproved pasture. It is also used for water supply and for wildlife habitat. The native vegetation is grass, baldhip rose, and Pacific poison-oak with a few patches of Oregon white oak.

DISTRIBUTION AND EXTENT: Foothills of the Coast Range and the Cascade Mountains in Western Oregon; MLRA 2, 5. This series is of moderate extent.

MLRA OFFICE RESPONSIBLE: Portland, Oregon

SERIES ESTABLISHED: Benton County (Benton Area), Oregon, 1970.

REMARKS: Diagnostic horizons and features recognized in this pedon include:

Mollic epipedon - the zone from the soil surface to 19 inches (A1, A2, and A3 horizons)
Vertic feature - the zone from 0 to 19 inches having an assumed COLE of greater than 6.0.

Particle-size control section - the zone from 10 to 19 inches.

ADDITIONAL DATA; Characterization data for 4 pedons with Soil Survey Laboratory soil survey sample numbers S00OR-003-004, S00OR-039-001, S00OR-039-002, and S00OR-043-003.

MCDUFF SERIES

McDuff series consists of moderately deep, well drained soils that formed in fine textured colluvium and residuum weathered from siltstone and sandstone. McDuff soils occur on summits, shoulder slopes, and backslopes of mountains. Slopes are 0 to 75 percent. The mean annual precipitation is about 95 inches and the mean annual temperature is about 51 degrees F.

TAXONOMIC CLASS: Fine, isotic, mesic Typic Haplohumults

TYPICAL PEDON: McDuff silty clay loam, forested. (Colors are for moist soil unless otherwise noted.)

Oi--0 to 1 inch; duff and litter, salal, fern leaves, and twigs.

A1--1 to 7 inches; very dark brown (10YR 2/2) silty clay loam, dark grayish brown (10YR 4/2) dry; strong fine granular structure; hard, firm, moderately sticky and moderately plastic; many very fine to medium roots; many very fine pores; strongly acid (pH 5.2); clear smooth boundary.

A2--7 to 12 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate very fine subangular blocky and granular structure; hard, firm, very sticky and moderately plastic; many very fine to medium roots; many very fine pores; strongly acid (pH 5.2); clear smooth boundary. (Combined thickness of the A horizon is 3 to 17 inches).

BA--12 to 20 inches; dark brown (10YR 3/3) silty clay, brown (10YR 4/3) dry; moderate medium and fine subangular blocky structure; very hard, very firm, very sticky and very plastic; many very fine to medium roots; few very fine pores; very strongly acid (pH 4.7); clear wavy boundary. (0 to 12 inches thick)

Bt1--20 to 27 inches; dark brown (10YR 3/3) silty clay, brown (10YR 4/3) dry; moderate fine and medium subangular blocky structure; very hard, very firm, very sticky and very plastic; common very fine and fine roots; common very fine pores; few distinct clay films; very strongly acid (pH 4.7); clear wavy boundary.

Bt2--27 to 33 inches; dark yellowish brown (10YR 4/4) silty clay, strong brown (7.5YR 5/6) dry; moderate fine and medium subangular blocky structure; very hard, very firm, very sticky and very plastic; common very fine and fine roots; few very fine pores; common distinct clay films; few fine weathered siltstone fragments; very strongly acid (pH 4.6); clear wavy boundary. (Combined thickness of the Bt horizon is 5 to 17 inches)

BCt--33 to 39 inches; variegated strong brown (7.5YR 5/6) and pale brown (10YR 6/3) silty clay; moderate medium subangular blocky structure; very hard, firm, very sticky and very plastic; few very fine roots; few very fine pores; common distinct clay films; 30 percent fine weathered siltstone fragments; very strongly acid (pH 4.6); clear wavy boundary. (4 to 16 inches thick)

Cr--39 to 45 inches; partially weathered pale brown (10YR 6/3) siltstone bedrock; reddish brown (5YR 4/4) coatings on siltstone fragments.

TYPE LOCATION: Polk County, Oregon; about 0.5 mile east of Lincoln County line; SW1/4 SE1/4 section 6, T. 6 S., R. 8 W.; Midway, OR 7.5 minute USGS quadrangle; NAD 1927.

RANGE IN CHARACTERISTICS: The mean annual soil temperature is 47 to 56 degrees F. The soil is usually moist and is dry between depths of 4 and 12 inches for less than 45 consecutive days in the four-month period following the summer solstice in most years. The umbric epipedon is 20 to 30 inches thick and may include the upper part of the Bt horizon. The depth to bedrock is 20 to 40 inches. Content of rock fragments in the particle-size control section is 0 to 10 percent gravel, 0 to 25 percent paragravel, and 0 to 5 percent paracobbles. Reaction is very strongly acid or strongly acid.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 moist, 4 or 5 dry, and chroma of 2 or 3 moist and dry. Texture is silty clay loam or clay loam in the upper part, and silty clay loam, clay loam, paragravelly silty clay loam or paragravelly clay loam in the lower part with 27 to 35 percent clay. It has 0 to 10 percent gravel, 0 to 5 percent cobbles, and 0 to 20 percent paragravel.

The Bt horizon has hue of 2.5Y, 10YR or 7.5YR, value of 3 or 4 moist, 4 to 6 dry, and chroma of 3 to 6 moist and dry. Texture is silty clay, paragravelly silty clay, clay, and paragravelly clay with 40 to 60 percent clay. It has 0 to 10 percent gravel, 0 to 25 percent paragravel, and 0 to 5 percent paracobbles.

The BCt horizon has hue of 2.5Y, 10YR or 7.5YR, value of 4 or 5 moist, 4 to 6 dry, and chroma of 4 to 6 moist and dry. Texture of the fine-earth fraction is silty clay or clay with 40 to 60 percent clay. It has 0 to 10 percent gravel, 10 to 50 percent paragravel, and 0 to 5 percent paracobbles.

COMPETING SERIES: These are the Apt, Peavine, and Wintley series in the same family, and the Absaquil, Hazelcamp, and Skookumhouse soils in a similar family. Absaquil, Apt, Skookumhouse, and Wintley soils are deeper than 40 inches to bedrock. In addition, Wintley soils have very gravelly 2C horizon at a depth of 40 inches or more. Hazelcamp and Peavine soils have Bt horizons with hue of 5YR or 2.5YR. Absaquil, Hazelcamp, and Skookumhouse soils are currently in a mixed mineralogy class.

GEOGRAPHIC SETTING: McDuff soils occur on summits, shoulder slopes, and backslopes of mountains. Elevations are 300 to 3,300 feet. Where these soils are mapped in the Oregon Coast Range elevations are typically 300 to 1,800 feet and reach heights of 2,600 feet in the more southern portions of the range in SW Oregon. Where these soils are mapped in the Oregon Cascade Range the typical elevations are 700 to 2,400 feet, and range up to 3,300 feet in the most southern geographic extent of the Cascades. Slopes are 0 to 75 percent. The soils formed in fine textured colluvium and residuum derived from siltstone, sandstone, tuffaceous agglomerate, and metasedimentary rock types. The climate is characterized by warm, wet winters and hot, moist summers. The mean annual precipitation is typically 55 to 90 inches, but ranges to 130 inches in the most southern geographic extent of the soil. The mean annual temperature is 45 to 55 degrees F. The frost-free period is 120 to 240 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the competing Absaquil, Apt and Peavine soils and the Bohannon, Digger, Honeygrove, Klickitat, Orford, Preacher, Slickrock, and Trask soils. All of these soils occur on mountains. Bohannon, Digger, Klickitat, Preacher, Slickrock, and Trask soils have less than 35 percent clay and lack argillic horizons. Honeygrove and Peavine soils have Bt horizons with hue of 2.5YR or 5YR. Absaquil soils are greater than 40 inches deep to bedrock. Apt, Orford, and Honeygrove soils are greater than 60 inches deep to bedrock.

DRAINAGE AND PERMEABILITY: Well drained; moderately slow permeability.

USE AND VEGETATION: The McDuff soils are used for timber production, recreation, wildlife habitat, and watersheds, with minor acreage used in Christmas tree production. The potential native vegetation is Douglas-fir, bigleaf maple, red alder, creambush oceanspray, salal, western hazel, vine maple, cascade Oregongrape, western swordfern, western brackenfern, baldhip rose, Pacific dogwood, violet, and trailing blackberry. A minor amount of western hemlock and western redcedar may also be present in some areas.

DISTRIBUTION AND EXTENT: Coast Range and western foot slopes of the Cascade Range; MLRA 1, 3. The series is of moderate extent.

MLRA OFFICE RESPONSIBLE: Portland, Oregon

SERIES ESTABLISHED: Polk County, Oregon, 1977.

REMARKS: Diagnostic horizons and features of this pedon include:

Umbric epipedon - from 1 to 27 inches (A1, A2, BA, and Bt1 horizons)
Argillic horizon - from 20 to 39 inches (Bt1, Bt2, and BCt horizons)
Particle-size control section - from 20 to 39 inches
Paralithic contact - 39 inches (Cr)

Depths to diagnostic horizons and features are measured from the top of the first mineral horizon.

Classification revised 01/2000 to Fine, isotic, mesic Typic Haplohumults based on changes in the Keys To Soil Taxonomy, 8th edition.

PANTHER SERIES

The Panther series consists of deep and very deep, poorly drained soils that formed in weathered sedimentary and tuffaceous rock. Panther soils are in swales and concave slopes on low hills. Slopes are 2 to 20 percent. The mean annual precipitation is 50 inches and the mean annual temperature is 53 degrees F.

TAXONOMIC CLASS: Very-fine, smectitic, mesic Vertic Epiaquolls

TYPICAL PEDON: Panther silty clay loam, pasture. (Colors are for moist soil unless otherwise noted.)

Ap--0 to 8 inches; black (10YR 2/1) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate and strong very fine and fine subangular blocky structure; slightly hard, firm, moderately sticky and moderately plastic; many fine roots; many very fine irregular and tubular pores; few fine shale paragravel; moderately acid (pH 5.7); abrupt smooth boundary.

A--8 to 14 inches; very dark brown (10YR 2/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak medium prismatic structure parting to strong medium subangular blocky; hard, firm, moderately sticky and moderately plastic; many fine roots; many very fine irregular pores; few fine distinct dark yellowish brown (10YR 3/4) masses of iron accumulation; moderately acid (pH 5.7); abrupt smooth boundary. (Combined thickness of the A horizon is 10 to 24 inches)

2Bgss1--14 to 24 inches; dark grayish brown (2.5Y 4/2) clay, light brownish gray (2.5Y 6/2) dry; weak very coarse prismatic structure parting to weak coarse subangular blocky; very hard, very firm, very sticky and very plastic; common fine roots; many very fine tubular pores; many fine distinct gray (5Y 5/1) iron depletions and many fine prominent yellowish brown (10YR 5/6) masses of iron accumulation; slickenside and pressure faces or films on faces of prisms; 2 percent fine siltstone paragravel; very strongly acid (pH 4.8); gradual smooth boundary.

2Bgss2--24 to 36 inches; olive brown (2.5Y 4/3) clay, light brownish gray (2.5Y 6/2) dry; weak very coarse prismatic structure; very hard, very firm, very sticky and very plastic; few fine roots; common very fine tubular pores; many fine prominent yellowish brown (10YR 5/6) masses of iron accumulation; some slickensides and pressure faces or films on faces of prisms; 2 percent fine siltstone paragravel; very strongly acid (pH 4.5); gradual smooth boundary. (Combined thickness of the 2Bgss horizon is 13 to 40 inches)

2Cg--36 to 44 inches; brown, yellowish brown and grayish brown (10YR 5/3, 5/8, and 5/2) extremely paragravelly clay; massive; very hard, very firm, very sticky and very plastic; few very fine pores; the areas with brown (10YR 5/3) and yellowish brown (10YR 5/6) color are iron accumulations and the areas of grayish brown (10YR 5/2) are iron depletions; 45 percent strongly weathered sandstone and siltstone paragravel and 15 percent paracobbles; extremely acid (pH 4.2); clear smooth boundary. (0 to 20 inches thick)

2Cr--44 inches; light brownish gray (2.5Y 6/2), yellowish brown (10YR 5/6), and brownish yellow (10YR 6/6) partially weathered siltstone; very firm, few thin brown (7.5YR 4/4) films on the surfaces of some fractures.

TYPE LOCATION: Yamhill County, Oregon; 10 yards south of the County Road; 150 feet west of a field road junction with the County Road in the NE1/4 SE1/4 SW1/4 section 36, T, 3 S., R. 5 W. Willamette Meridian. Carlton, Oregon USGS 7.5 minute topographic quadrangle. Latitude 45 degrees, 15 minutes, 48 seconds N. and Longitude 123 degrees, 14 minutes, 59 seconds W. NAD 27.

RANGE IN CHARACTERISTICS: The soils are usually moist and are saturated with water during the winter season. The soil is dry for 45 to 60 consecutive days following the summer solstice within MLRA 2 but ranges to 90 days within MLRA 5. The mean annual soil temperature ranges from 47 to 55 degrees F. The solum ranges from 24 to 50 inches thick. The depth to siltstone, shale, or sandstone ranges from 40 to 60 inches or more. The mollic epipedon is 10 to 24 inches thick.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 moist, 3 to 5 dry and chroma of 1 or 2 moist and dry. Texture is silty clay loam with 27 to 40 percent clay. It has 0 to 2 percent basalt gravel and 0 to 3 percent basalt cobbles. It has few to many distinct or prominent masses of iron accumulation in the lower part. Reaction is moderately acid or slightly acid.

The 2Bgss horizon has hue of 5Y to10YR, value of 3 to 5 moist, 4 to 6 dry and chroma of 1 to 4 moist and dry. Texture is clay with 60 to 70 percent clay. It has 1 to 10 percent paragravel in the upper part and 1 to 20 percent paragravel in the lower part. It has 0 to 2 percent basalt gravel and 0 to 3 percent basalt cobbles. It has distinct or prominent masses of iron accumulation and depletions. Reaction is very strongly acid to slightly acid.

The 2Cg horizon has hue of 10YR to 5Y, value of 4 to 6 moist and dry, and chroma of 1 to 4moist and dry. Texture is clay with 55 to 70 percent clay. It has 0 to 50 percent paragravel and 0 to 25 percent paracobbles. It has distinct or prominent masses of iron accumulation and depletions. Reaction is extremely acid to slightly acid.

COMPETING SERIES: There are no competing series.

GEOGRAPHIC SETTING: Panther soils are in swales, concave slopes and slump benchs on low rolling hills. Elevations are 200 to 2,000 feet. Slopes are 2 to 20 percent. The soils formed in colluvium from basalt and sedimentary rock and residuum weathered from tuffaceous and sedimentary rock. The climate is characterized by warm, wet winters and hot, dry summers. The mean annual precipitation is 30 to 60 inches. The average July temperature is 66 degrees F. The average January temperature is 38 degrees F. and the mean annual temperature is 50 to 55 degrees F. The frost-free period is 160 to 235 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Dixonville, Dupee, Hazelair, Philomath, and Willakenzie soils. Dixonville soils are 20 to 40 inches to a paralithic contact, have argillic horizons and are on linear or convex hillslopes. Dupee soils have an argillic horizon, do not have a mollic epipedon and are on linear to concave positions. Hazelair soils have a paralithic contact at a depth of 20 to 40 inches, do not have masses of iron accumulation in the lower part of the mollic epipedon and are on linear to convex hillslopes. Philomath soils are 12 to 20 inches to a paralithic contact and are on convex hillslopes. Willakenzie soils are fine-loamy and are on linear to convex hillslopes.

DRAINAGE AND PERMEABILITY: Poorly drained; very slow permeability. A perched water table is at its uppermost limit from December to April.

USE AND VEGETATION: These soils are used for hay, pasture, wildlife, and watershed. Native vegetation is Oregon white oak, rosebush, poison-oak, grasses, and sedges.

DISTRIBUTION AND EXTENT: On low hills along the eastern part of the Willamette Valley and the Coast Range foot slopes in northwestern Oregon and the interior valleys of southwestern Oregon; MLRA 2, 5. The series is moderately extensive.

MLRA OFFICE RESPONSIBLE: Portland, Oregon

SERIES ESTABLISHED: Yamhill County, Oregon, 1974.

REMARKS: Diagnostic horizons and features recognized in this pedon include:

Mollic epipedon - the zone from 0 to 14 inches (Ap and A horizons)
Aquic feature - the zone from 8 to 44 inches having aquic conditions for some time in most years and chroma of 2 and redox concentrations from 8 to 14 inches (lower part of the mollic epipedon A horizon)
Episaturation feature - the soil is saturated with water in all layers from the upper boundary of saturation to the bedrock contact.
Vertic feature - the zone from 14 to 36 inches having slickensides and an assumed linear extensibility of 6.0 or more between depths of 0 and 40 inches.

The classification was changed from Typic Haplaquolls to Vertic Epiaquolls in 5/94.

ADDITIONAL DATA: Characterization data on 2 profiles (S62OR-071-011 and S62OR-071-012) by SCS Riverside Laboratory. Profile S62OR-071-011 reported in the Soil Survey, Yamhill Area, Oregon.

RITNER SERIES

The Ritner series consists of moderately deep, well drained soils formed in fine textured cobbly colluvial materials weathered from basalt. Ritner soils occur on broad ridgetops and side slopes of foothills and mountains. Slopes are 2 to 90 percent. The mean annual precipitation is about 50 inches and the mean annual temperature is about 52 degrees F.

TAXONOMIC CLASS: Clayey-skeletal, mixed, superactive, mesic Typic Haploxerepts

TYPICAL PEDON: Ritner gravelly silty clay loam, woodland, on a 52 percent southwest-facing slope at an elevation of 1,100 feet. (Colors are for moist soil unless otherwise noted.)

Oi--0 to 1 inch; slightly decomposed litter of needles, leaves, and twigs; abrupt smooth boundary. (0 to 3 inches thick)

A--1 to 6 inches; dark reddish brown (5YR 3/4) gravelly silty clay loam, reddish brown (5YR 4/4) dry; strong fine granular structure; hard, friable, moderately sticky and moderately plastic; many very fine and fine roots; many very fine irregular pores; 20 percent fine and medium gravel; moderately acid (pH 5.8); clear smooth boundary. (4 to 9 inches thick)

BA--6 to 16 inches; dark reddish brown (2.5YR 3/4) gravelly silty clay loam, reddish brown (2.5YR 4/4) dry; strong fine subangular blocky structure; hard, friable, moderately sticky and moderately plastic; many very fine and fine roots; many very fine tubular pores; 30 percent gravel; moderately acid (pH 5.6); clear smooth boundary. (0 to 10 inches thick)

Bw1--16 to 25 inches; dark reddish brown (2.5YR 3/4) very cobbly silty clay, reddish brown (2.5YR 4/4) dry; moderate fine subangular blocky structure; hard, firm, moderately sticky and very plastic; many fine roots; common very fine tubular pores; 25 percent gravel and 15 percent cobbles; strongly acid (pH 5.2); clear smooth boundary. (5 to 16 inches thick)

Bw2--25 to 39 inches; dark reddish brown (2.5YR 3/4) very cobbly silty clay, reddish brown (2.5YR 4/4) dry; moderate medium subangular blocky structure; hard, firm, moderately sticky and very plastic; few very fine roots; few very fine tubular pores; 25 percent cobbles and 30 percent gravel; strongly acid (pH 5.2); abrupt wavy boundary. (0 to 15 inches thick)

R--39 inches; fractured basalt with few thin tongues of above horizon in fractures; red clay coatings on surface of rock fragments.

TYPE LOCATION: Benton County, Oregon; 5 miles north of Corvallis in Oregon State University's McDonald Forest; located about 1,980 feet north and 2,200 feet east of the southwest corner of section 3, T.11S. R.5W., Willamette Meridian, Airlie South, Oregon USGS 7.5 minute topographic quadrangle (Latitude 44 degrees, 38 minutes, 29 seconds N.; Longitude 123 degrees, 16 minutes, 55 seconds W. NAD 27);.

RANGE IN CHARACTERISTICS: The mean annual soil temperature ranges from 51 to 55 degrees F. The soils are usually moist but are dry between depths of 4 and 12 inches for 45 to 60 consecutive days following the summer solstice within MLRA 2 but ranges to 90 days in MLRA 5. Depth to the fractured bedrock range from 20 to 40 inches. The particle-size control section is 35 to 50 percent clay and has 35 to 75 percent total rock fragments. The amount of rock fragments ranges from 15 to 35 percent in the upper part of the solum to between 35 and 75 percent in the lower part of the Bw horizon, increasing with depth. Rock fragments range in size from gravel to stones. An ochric epipedon that has a moist chroma of 4 is at a depth of less than 10 inches.

The A horizon has hue of 5YR to 10YR, value of 2 or 3 moist, 3 or 4 dry and chroma of 2 to 4 moist and dry. This horizon, in pedons with chroma of 2 or 3 moist is less than 1/3 thickness of the solum. Texture is silty clay loam with 27 to 40 percent clay. It has 10 to 25 percent gravel, 0 to 25 percent cobbles and 0 to 5 percent stones. Reaction is moderately acid.

The BA horizon, when present, has hue of 2.5YR to 7.5YR, value of 3 or 4 moist, 4 or 5 dry and chroma of 3 or 4 moist and dry. Texture is silty clay loam with 30 to 40 percent clay. It has 10 to 35 percent gravel, 0 to 25 percent cobbles and 0 to 5 percent stones. Reaction is moderately acid.

The Bw horizon has hue of 2.5YR to 7.5YR, value of 3 or 4 moist, 4 or 5 dry and chroma of 4 to 6 moist and dry. Texture is silty clay, clay or heavy silty clay loam with 35 to 50 percent clay. It has 15 to 35 percent gravel, 15 to 45 percent cobbles, and 0 to 20 percent stones. Reaction is strongly acid or moderately acid.

COMPETING SERIES: This is the MacDunn series. MacDunn soils are 40 to 60 inches deep to a paralithic contact.

GEOGRAPHIC SETTING: Ritner soils occur on summit (interfluve component), shoulder (nose slope component), and backslope positions (head slope and side slope components) on broad rolling ridgetops to steep and very steep side slopes of foothills and mountains along the margins of the Willamette Valley in Oregon. Slopes are 2 to 90 percent. Elevation is 240 to 2,200 feet. The soils formed in fine textured very cobby colluvium weathered from basalt. The climate is characterized by warm, wet winters and hot, dry summers. The mean annual precipitation is 40 to 70 inches. The mean annual temperature is 48 to 54 degrees F. The January temperature is 38 to 40 degrees F. and the July temperature is 64 to 67 degrees F. The frost-free period is 160 to 210 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Gelderman (T), Jory, MacDunn(T), Nekia, Price, Saum, Witzel, and Yamhill soils. Gelderman, Jory, Nekia and Yamhill soils occur on foothills along the margins of the Willamette Valley, Oregon. Gelderman, Jory and Nekia soils have argillic horizons. Price, MacDunn, and Witzel soils occur on steep to very steep side slopes of foothills and mountains. MacDunn soils are fine textured, have more than 35 percent total rock fragments in the particle-size control section and are 40 to 60 inches deep to a paralithic contact. Price soils are fine textured, have less than 35 percent total rock fragments in the particle-size control section, and are greater than 60 inches deep to bedrock. Saum soils are greater than 40 inches to bedrock and are on linear or concave parts of the hillslope. Witzel soils are less than than 20 inches to a lithic contact and have more than 35 percent total rock fragments in the particle-size control section. Yamhill soils have mollic epipedons and are 20 to 40 inches deep to a lithic contact.

DRAINAGE AND PERMEABILITY: Well drained; moderately slow permeability.

USE AND VEGETATION: These soils are used for timber production, hay and pasture, limited homesite development, wildlife, and watersheds. Native vegetation is Douglas fir, grand fir, ponderosa pine, bigleaf maple, Oregon white oak, western brackenfern, common snowberry, western hazel, Pacific poison oak, baldhip rose, trailing blackberry, evergreen blackberry, western swordfern, American trail plant, fragrant
bedstraw, coolwort foamflower, Oregon iris, common whipplea, mountain brome, western fescue, and white hawkweed..

DISTRIBUTION AND EXTENT: Foothills and mountains bordering the margins of the Willamette Valley in Oregon; MLRA 2, 5. The series is of moderate extent.

MLRA OFFICE RESPONSIBLE: Portland, Oregon

SERIES ESTABLISHED: Benton County (Benton Area), Oregon, 1970. The source of the name is Ritner Creek and the community of Ritner in southern Polk County, Oregon.

REMARKS: Diagnostic horizons and features recognized in this pedon are:

Ochric epipedon - from 1 to 16 inches (A, BA horizons)
Cambic horizon - from a depth of 16 to 39 inches (Bw1, Bw2 horizons)
Particle-size control section - from 11 to 39 inches (part of the BA horizon, and all of the Bw1 and Bw2 horizons)

All depths to diagnostic features within the range of characteristics are measured from the top of the first mineral horizon.

Ritner soils occur on the Looney geomorphic surface.

Classification revision 12/02 from active Typic Dystroxerepts to superactive Typic Haploxerepts based on lab data from associated Price and MacDunn series.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Official Soil Series Descriptions [Online WWW]. Available URL: "http://soils.usda.gov/technical/classification/osd/index.html" [Accessed 10 February 2004]

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FOREST PRODUCTIVITY AND INCOME ANALYSIS
for Brad Ogle and Mark Childs

SUBJECT PARCEL: ASSESSORS MAP NO. 18-04-11
Tax Lots 303 & 304, totaling 113.74 acres.

SUPPLEMENT TO ORIGINAL REPORT DATED JULY 7, 2005, including response to issues raised by Jim Just in February 1, 2006 letter to Lane County Planning Commission (presented by page number).

Page 2 (Table 1 at bottom of page): Mr. Just shows a Site Index of 125 for Ponderosa Pine with a growth rate of 154 cf/ac/yr, then cites *Establishing and Managing Ponderosa Pine in the Willamette Valley* as the source for these figures. The table in this publication shows a Site Index of 104 and a growth of 110 cf/ac/yr, then cautions against putting to much weight on these figures due to the small sample size from which these figures were obtained. The latter figures shown were presented by Mr. Just in a previous presentation, and used by me in my analysis.

Page 3 (discussion of soils with zero productivity): Mr. Just states that I have excluded approximately one third of the property from my analysis, assuming "zero" productivity for tree growth. He further states that SCS and NRCS soil maps show these areas as being underlain by the Philomath soils. He then states that I have "invented" a new soil. All I have done is make the observation that no trees have grown in these areas for decades (as shown on the attached aerial photos) and the soil is too thin to for trees to establish root systems in; therefore, no trees are growing.

I am basing my analysis on 30 years of experience, as a certified professional forester, and years of personal experience on similar properties. The most recent example of personal experience with this type of property is one that I owned with a partner until 2004. The property had similar soil types to the Ogle property, thin soils over rock with exposed rock, a southwest aspect, and grass. We planted ponderosa pine in this area (≈15 acres) **three** times; to date only a handful of trees have survived. Just because the soil map says a certain soil exists in an area does not mean it is deep enough to support trees. Soil temperatures in the surface layer on soil, particularly on a south to southwest slope, can reach lethal temperatures, sometimes reaching above 140°F in the summer months (see page 7 and 8 of soils report by Mr. Caruana). With little moisture retention, and hot soil temperatures, these thin soils (on top of rock), will not support tree growth. This same soil, with a deeper soil depth, on a north slope, may support trees very well. Trees grow well on north slopes because of natural shading, which helps moisture retention and keeps soil temperatures low, which dramatically improves a tree's chance of surviving and establishing itself.

All of these factors have a huge influence on tree growth. The same soil will have radically different growth rates, depending on the aspect, soil depth, elevation and latitude. A north aspect will have much better growth than a south aspect, trees grow better in deeper soils and higher moisture conditions. The further north (in latitude) you go, the better trees grow, because the rainfall increases. The only case where this is not so is when you get to the far north (Alaska and the Arctic Circle), because the extreme cold and harsh conditions inhibit growth.

In short: **soil type** is only **one** environmental factor influencing growth. Mr. Caruana will discuss all of these factors in detail; I am simply stating what I have observed during 30 years as a practicing forester.

Page 6 (under Prices): Mr. Just has stated that I assume no grades higher than 2S (2 saw). He questions why I do not include peelers and special mill logs. I have included a description of Douglas-fir log grades which are better than 2S. Pay particular attention to the tree ages required for these grades. All of these grades require substantially older trees (see Exhibit 1). If anything I have erred on the high side. A 50 year old, fully stocked stand of Douglas-fir will not even reach an average diameter of 12" at breast height (see Exhibit 2), let alone at the top of the first 32' log (inside bark). Since this table shows the **average** diameter for the stand, it means that a portion of the logs are larger and some are smaller. From 30 years of timber cruising experience, I can state that using 40% 2S for a 50 year old stand on this site (even assuming it is Site III ground) is extremely optimistic.

Page 9: Mr. Just has pointed out that harvesting 16' logs would result in substantially more yield. This is true. The mills price the logs accordingly. Most mills pay top dollar for 36'-40' logs; some pay top dollar for 32'-40' logs. Shorter lengths drop off dramatically in price. If you can get a "camp run" price (meaning every log gets paid the same), there are parameters to follow. A standard in the industry is 70% of all delivered volume shall be in long logs. A log buyer will adjust his "camp run" price according to how much short wood they think will be delivered.

In summation: the mills have taken the scaling rules into account when stating a delivered log price. The standard has been 32' logs for years, now the most sought after logs are 36'-40'. The standard in eastern Oregon has been 16', primarily because of different trees species (i.e., products) and much shorter trees in this portion of the state. Mr. Just states that "reasonable management practices" would include selecting a log length that would maximize income. In western Oregon, cutting long logs maximizes income.

Final Paragraph Page 9: Mr. Just states again that I have assumed that only grades 2S, 3S and 4S exist on the Ogle property. He then states that 32' logs would generally be expected to result in higher grading, and thus higher prices. I am not sure what this means. Why would a longer log be a higher grade, just because of length? Grades are based on characteristics of the log, primarily surface characteristics, not length. Today's biggest price determinant is **length, not diameter**. And looking at Exhibit 1 shows that the higher grades cannot be obtained in a 50 year rotation.

He then states that the two assumptions - lower grades and 32' logs - are not consistent. This is very confusing, because the two have very little to do with each other. Grades are not determined by length, lengths were established by grading/scaling bureaus to accurately reflect the products being produced. For years 8' foot studs were the norm, hence 32' logs (because this is 4 X 8'). Today the 9' stud is becoming standard in many homes, hence 36' logs (because this is 4 X 9').

In other words: the current marketplace has changed the desired log lengths, but the scale books still use 32' as the standard west of the Cascades and 16' as the standard east of the Cascades.

To conclude this response I would like to discuss the concept of "reasonable management practices", which Mr. Just **repeatedly** brings up. The majority of his proposals to land owners would be horribly expensive up front, with very little return in the future. Ponderosa pine will be used as an example. Establishing ponderosa pine (while easier than Douglas-fir) on harsh, low site ground, would be difficult, if not impossible. I know this from years of experience, regardless of what a soil table says. Planting a property three or more times to establish a tree species would be extremely expensive, regardless of the tree planted. On top of that you would need to pay for brush control, otherwise you will not get the growth rates expected during the early years of a fully stocked, "free to grow" stand of trees. Brush control is expensive.

To spend this much money (this could exceed $1000/acre), establishing a tree worth very little on today's market, would not be prudent or "reasonable" from a landowner's perspective. This would be equivalent to buying a "hot" stock, betting that it will increase in value. Financial planners shudder at this, they want the money in dependable funds. As a practicing professional forester I would not recommend this course of action to a client of mine. I like to stick with tried and true forest practices, i.e., dependable.

The proposals Mr. Just makes are anything but "reasonable management practices". They are unsound from a financial standpoint and difficult to achieve from a forestry standpoint. As a consultant it is my job to help the landowner choose a course of action which is financially prudent and above all "doable". The last thing I would recommend is multiple plantings of a low value tree, on ground that has not grown trees in the past and will in all likelihood not grow trees in the future.

Sincerely,

Marc E Setchell

April 24, 1980

A CRUISER'S GUIDE TO WEST SIDE LOG GRADE SPECIFICATIONS

DOUGLAS-FIR

GRADE	*MINIMUM SIZE (DIB)	TREE AGE	PROBABLE POSITION IN THE TREE	INDICATORS AND/OR KNOTS ALLOWED	REQUIRED PRODUCT RECOVERY
#1 Peeler	30"	300 Yrs.+ (Old Growth)	Butt or second log, rarely above. nearly always adjacent to another graded peeler	Indicators on up to 10% of log surface, and not more than one deductible knot (3"+). No smaller knots allowed.	50% or more of NET volume in clear veneer ("A" grade face stock).
#2 Peeler	30"	275 Yrs.+ (Old Growth)	Butt or second log, sometimes third log in older trees.	Indicators on up to 25% of log surface, and not more than one deductible knot. No smaller knots allowed.	35% or more of NET volume in clear veneer ("A" grade face stock). 10% of dia will give 35% of vol
#3 Peeler	24"	100 Yrs.+ (Red Fir or Old Growth)	Old Growth - any of first four logs, rarely above. Red Fir - usually Butt or second log, rarely above.	Indicators from ½" to 1½" in diameter, limited to one per foot of log length. Smaller indicators are not counted. Not more than two knots of any size.	100% of NET volume in center core, cross core, backs and better veneer ("C - D" grade).
Special Mill	16"	70 Yrs.+	Old Growth - any of first four logs, rarely above. Red Fir - 1st, 2nd or 3rd logs, rarely above. Second Growth - Butt or second logs, rarely above.	Indicators and sound tight knots up to 1½" in diameter, limited to one per foot of log length. Indicators up to ½" in diameter are not counted. Not more than two knots larger than 1½" in diameter	65% of NET volume in Select Merchantable and better lumber, and/or 100% of NET volume in center core, cross core, backs and better veneer ("C - D" grade).
#1 Sawmill	30"	300 Yrs.+	Butt or second logs, rarely above.	Same as #1 Peeler Grade.	50% or more of NET volume in B and Better grade lumber. (Highest grade of clear lumber.)
#2 Sawmill	12"	40 Yrs.+	Any, but very rare in top logs.	Sound, tight knots 2½" in diameter and smaller. Larger knots must be widely scattered or confined to one or two faces, with distribution to allow the required recovery.	65% or more of NET volume in Construction & Better grades of lumber, or 25% of NET volume in B & Better grade lumber.

*Minimum size is GROSS diameter for all grades except Douglas Fir Special Cull, which has an ADJUSTED GROSS diameter.

TABLE 2.—*Yield tables for Douglas fir on fully stocked acre, total stand*

TOTAL NUMBER OF TREES

Age (years)	Site Class V		Site Class IV			Site Class III			Site Class II			Site Class I		
	Site index 80	Site index 90	Site index 100	Site index 110	Site index 120	Site index 130	Site index 140	Site index 150	Site index 160	Site index 170	Site index 180	Site index 190	Site index 200	Site index 210
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
20	6,920	5,500	4,150	3,009	2,324	1,815	1,460	1,210	1,012	880	756	654	571	490
30	2,700	2,200	1,800	1,472	1,210	1,030	865	735	640	555	483	406	350	300
40	1,530	1,275	1,000	927	708	680	585	510	445	385	335	282	240	203
50	1,050	890	764	659	572	496	430	377	331	290	248	206	176	150
60	780	670	580	500	439	380	337	296	261	228	195	164	138	116
70	625	537	468	405	352	310	274	242	214	186	160	135	113	95
80	525	455	394	345	303	266	232	207	182	159	136	115	97	81
90	451	398	347	304	266	235	205	180	158	138	118	100	84	71
100	403	352	311	271	230	209	184	161	142	123	106	89	75	64
110	362	319	281	247	217	188	166	146	128	111	95	81	69	58
120	331	292	259	224	197	173	152	134	116	101	87	74	63	53
130	305	271	240	209	184	161	141	124	108	94	80	69	59	49
140	284	252	224	195	171	149	131	115	101	88	75	64	55	45
150	266	238	211	184	160	141	123	108	95	82	71	60	51	42
160	250	225	200	175	152	133	117	102	90	78	67	57	48	40

DIAMETER OF AVERAGE TREE AT BREASTHEIGHT

Age (years)	Site index 80	Site index 90	Site index 100	Site index 110	Site index 120	Site index 130	Site index 140	Site index 150	Site index 160	Site index 170	Site index 180	Site index 190	Site index 200	Site index 210
	Inches	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
20	1.3	1.5	1.8	2.2	2.6	3.0	3.4	3.8	4.2	4.5	4.9	5.3	5.7	6.2
30	2.6	3.0	3.4	3.9	4.4	4.9	5.5	6.0	6.5	7.0	7.6	8.3	9.0	9.8
40	3.8	4.4	4.9	5.5	6.1	6.8	7.4	8.0	8.7	9.4	10.2	11.2	12.2	13.3
50	4.9	5.6	6.3	7.0	7.7	8.5	9.3	10.1	10.9	11.8	12.8	14.0	15.3	16.7
60	6.0	6.8	7.6	8.5	9.3	10.2	11.1	12.0	12.9	14.0	15.2	16.6	18.2	19.9
70	7.0	7.9	8.8	9.8	10.8	11.8	12.8	13.8	14.8	16.0	17.5	19.1	20.9	22.8
80	7.9	8.9	9.9	10.9	12.0	13.1	14.3	15.4	16.6	17.9	19.6	21.3	23.3	25.5
90	8.7	9.7	10.8	11.9	13.1	14.3	15.6	16.9	18.2	19.6	21.4	23.3	25.6	28.0
100	9.4	10.5	11.6	12.8	14.2	15.5	16.9	18.2	19.7	21.2	23.1	25.1	27.6	30.1
110	10.1	11.3	12.4	13.7	15.2	16.6	18.0	19.5	21.0	22.6	24.6	26.9	29.4	32.2
120	10.7	11.9	13.2	14.6	16.1	17.6	19.1	20.7	22.3	24.0	26.1	28.5	31.1	34.2
130	11.3	12.5	13.9	15.3	16.9	18.5	20.1	21.7	23.5	25.3	27.5	30.0	32.7	36.0
140	11.9	13.1	14.5	16.0	17.7	19.4	21.1	22.8	24.5	26.5	28.8	31.4	34.3	37.8
150	12.4	13.7	15.1	16.7	18.4	20.2	22.0	23.8	25.6	27.7	30.0	32.8	35.8	39.4
160	12.9	14.2	15.7	17.4	19.1	21.0	22.8	24.7	26.6	28.9	31.2	34.1	37.2	41.0

TOTAL BASAL AREA

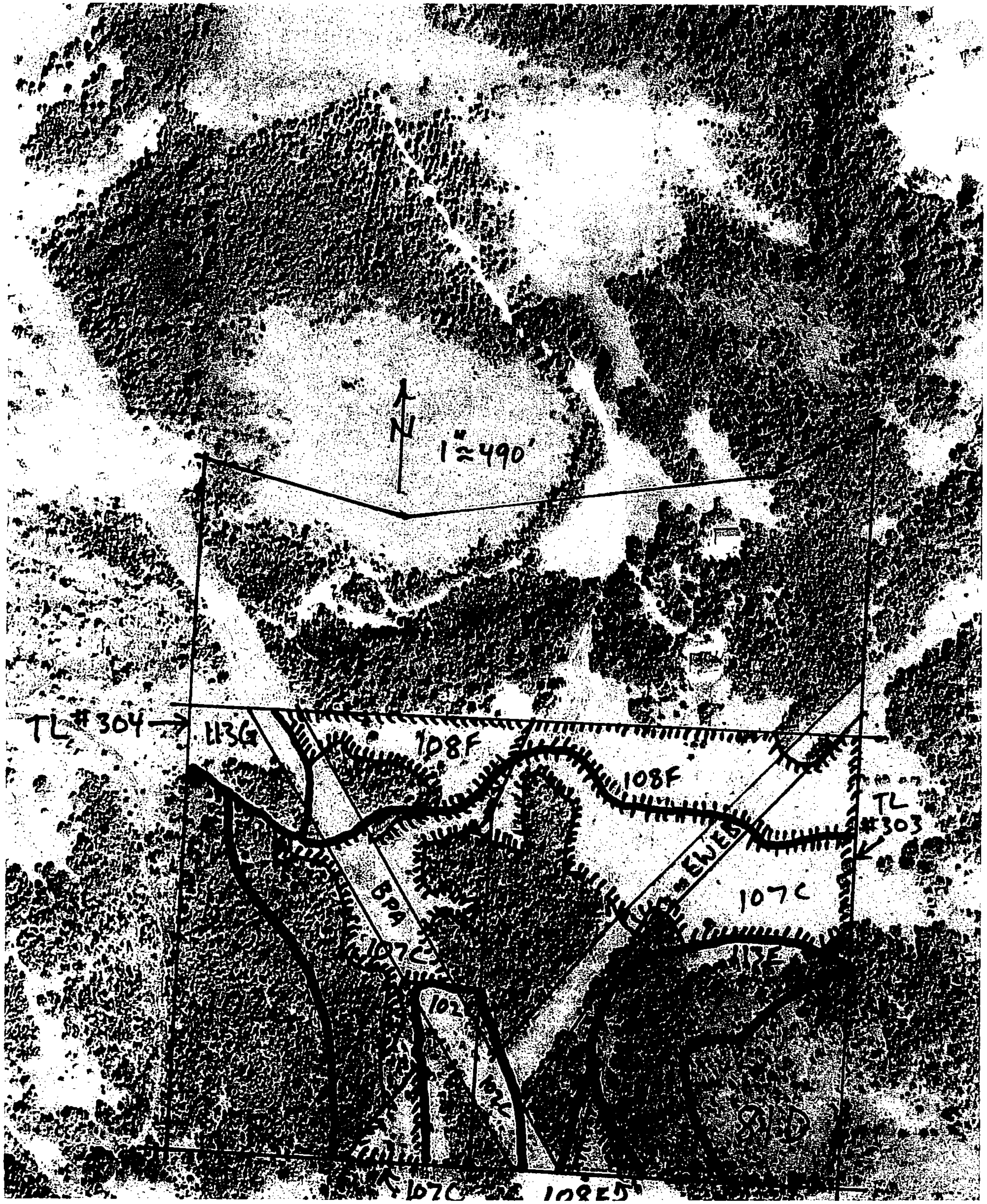
Age (years)	Site index 80	Site index 90	Site index 100	Site index 110	Site index 120	Site index 130	Site index 140	Site index 150	Site index 160	Site index 170	Site index 180	Site index 190	Site index 200	Site index 210
	Sq. ft.	*Sq. ft.*	*Sq. ft.*	*Sq. ft.*	*Sq. ft.*	*Sq. ft.*	*Sq. ft.*	*Sq. ft.*	*Sq. ft.*	*Sq. ft.*	*Sq. ft.*	*Sq. ft.*	*Sq. ft.*	*Sq. ft.*
20	64	70	76	81	86	89	92	95	97	98	99	100	101	102
30	96	105	114	122	129	135	140	144	147	150	152	153	154	155
40	121	132	143	153	162	170	177	182	186	189	191	193	195	196
50	140	153	165	177	187	196	204	210	214	217	220	222	224	226
60	154	169	182	195	207	217	226	232	237	241	244	246	248	250
70	166	183	197	211	224	235	244	251	256	260	264	266	268	270
80	177	194	210	224	238	249	259	266	271	276	280	283	285	287
90	185	204	220	235	249	262	272	279	285	290	294	297	299	301
100	193	212	229	245	260	273	283	291	297	302	306	309	312	314
110	200	220	238	254	269	282	292	301	307	313	317	320	323	325
120	206	226	245	261	277	290	301	310	316	322	326	329	332	335
130	213	233	251	268	284	298	309	318	325	331	335	338	341	344
140	218	238	257	275	291	305	317	326	333	338	343	347	350	353
150	223	243	263	281	298	312	324	333	340	346	351	354	357	360
160	227	248	268	287	304	318	331	340	347	353	357	361	364	367

TOTAL YIELD IN CUBIC FEET

Age (years)	Site index 80	Site index 90	Site index 100	Site index 110	Site index 120	Site index 130	Site index 140	Site index 150	Site index 160	Site index 170	Site index 180	Site index 190	Site index 200	Site index 210
	Cu. ft.	*Cu. ft.*	*Cu. ft.*	*Cu. ft.*	*Cu. ft.*	*Cu. ft.*	*Cu. ft.*	*Cu. ft.*	*Cu. ft.*	*Cu. ft.*	*Cu. ft.*	*Cu. ft.*	*Cu. ft.*	*Cu. ft.*
20	520	620	730	870	990	1,120	1,250	1,380	1,490	1,550	1,650	1,730	1,830	1,920
30	1,330	1,610	1,930	2,270	2,630	2,980	3,300	3,610	3,880	4,110	4,330	4,530	4,750	4,990
40	2,110	2,520	3,020	3,560	4,150	4,690	5,250	5,750	6,160	6,550	6,900	7,220	7,500	7,830
50	2,840	3,410	4,080	4,780	5,540	6,300	7,050	7,730	8,300	8,840	9,320	9,770	10,150	10,560
60	3,500	4,200	5,010	5,880	6,880	7,760	8,700	9,490	10,200	10,860	11,450	12,000	12,500	12,960
70	4,090	4,920	5,820	6,830	8,000	9,100	10,150	11,060	11,900	12,660	13,300	13,950	14,500	15,080
80	4,580	5,510	6,530	7,690	9,000	10,240	11,350	12,400	13,360	14,220	14,990	15,700	16,350	16,970
90	5,000	6,010	7,120	8,400	9,810	11,160	12,390	13,500	14,600	15,540	16,400	17,190	17,880	18,500
100	5,350	6,420	7,620	9,000	10,510	11,940	13,270	14,460	15,600	16,610	17,550	18,370	19,140	19,820
110	5,640	6,780	8,050	9,500	11,080	12,610	14,000	15,290	16,500	17,560	18,510	19,390	20,200	20,940
120	5,900	7,080	8,410	9,920	11,580	13,180	14,600	15,990	17,240	18,340	19,320	20,220	21,090	21,870
130	6,130	7,340	8,720	10,290	12,000	13,650	15,140	16,560	17,870	19,000	20,000	20,980	21,840	22,660
140	6,340	7,600	9,020	10,620	12,370	14,080	15,610	17,090	18,410	19,590	20,640	21,610	22,520	23,360
150	6,520	7,810	9,280	10,920	12,710	14,490	16,080	17,560	18,910	20,130	21,270	22,250	23,170	24,030
160	6,670	8,000	9,500	11,200	13,040	14,850	16,490	18,010	19,380	20,650	21,820	22,830	23,780	24,660

OGLE PARCEL

ENTIRE PARCEL SHOWN WITHIN RED BOUNDARY LINES. SOIL TYPES SHOWN WITHIN AREA BEING LOOKED AT FOR MARGINAL LANDS DESIGNATION.



ONLY AREAS WITHIN THE 107C & 108F SOIL TYPES HAVE BEEN DEDUCTED

THE POWERLINE BOUNDARIES ARE CLEARLY DEFINED.

EXHIBIT J
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2-3-06
JLMD.

Lane County Planning Commission
125 E. 8th Avenue
Eugene, OR 97401

February 1, 2006

RE: Ogle-Childs marginal lands application, PA 05-5985

Dear Members of the Commission,

The Goal One Coalition (Goal One) is a nonprofit organization whose mission is to provide assistance and support to Oregonians in matters affecting their communities. Goal One is appearing in these proceedings at the request of and on behalf of its membership residing in Lane County. This testimony is presented on behalf of Goal One and its membership; LandWatch Lane County, 1192 Lawrence, Eugene OR 97401; LandWatch's membership in Lane County, specifically to include LandWatch President Mona Linstromberg, 87140 Territorial Rd, Veneta OR 97487; and Jim Just, 39625 Almen Drive, Lebanon OR 97355, as an individual.

I. Introduction

This application for a plan amendment and zone change to Marginal Lands involves the same property that was the subject of a similar application (PA 02-5838) that was withdrawn in December 2004 after a preliminary denial by the Board of Commissioners.

This proposal would redesignate 73.74 acres of land on two parcels, identified as Tax Lot 304 and Tax Lot 303 (parcels #1 and #2 of Plat No. 94-PO510, respectively) totaling 113.74 acres, from "Agricultural Land" to "Marginal Land," and change the zoning from E-40/ Exclusive Farm Use to ML/Marginal Land. The northern portions of both TL 304 and TL 303, totaling 40 acres, were redesignated and rezoned Marginal Land in 1992 (PA 0221-92). The subject property is located just south of the Metro UGB in southwest Eugene. It is accessed from the southern end of Timberline Drive.

The subject lands are adjacent to F2-zoned land to the west and south, and to E40-zoned lands to the east. ORS 215.237 and LC 16.214 require a minimum parcel size of 20 acres if the parcel is adjacent to land zoned for farm or forest use that would not qualify as marginal land, and otherwise require that parcels be at least 10 acres in size.

The criteria for the designation of marginal land are set out in ORS 197.247 (1991 edition). The Staff Report refers also to Lane County guidelines for interpreting and administering marginal lands provisions, issued by the Board of Commissioners in March 1997. Because the provisions being applied are provisions of state statute, no deference is due or will be given to local interpretations of ORS 197.247.

BCC #5 - 55pp.

ORS 197.247 establishes a two-part test for the designation of marginal land. Any proposal for a marginal land designation must first comply with the "income test" requirement of ORS 197.247(1)(a), which requires that the applicant prove that the subject land was not managed, during three of the five calendar years preceding January 1, 1983, as part of a farm operation producing $20,000 in annual gross income or as part of a forest operation capable of producing an average of $10,000 in annual gross income over the growth cycle.

The second part of the marginal land test contains three options. ORS 197.247(1)(b)(A) and (B) are "parcelization" tests, which look at parcel sizes of adjacent and nearby lands. ORS 197.247(1)(b)(C) is the "productivity" test, which requires the applicant to demonstrate that the land is predominantly comprised of soils in capability classes V through VIII and is not capable of producing 85 cf/ac/yr of merchantable timber.

The applicant has submitted a Forest Productivity Analysis prepared by Marc. E. Setchko, Consulting Forester (Setchko Report). The Setchko Report indicates that the applicant has again chosen to address the "productivity" option of the second prong of the marginal lands test.

Because calculation of average income over the growth cycle depends upon assumptions and evidence related to productivity of the proposed marginal lands, this letter will first address issues concerning the "productivity" test of ORS 197.247(1)(b)(C) and then address "income" test issues relating to ORS 197.247(1)(a).

II. Analysis

A. Productivity test

The productivity test must be based on the potential forest productivity of the proposed marginal lands. In this case, this includes a total of 73.74 acres of the combined total of 113.74 acres of TLs 303 and 304.

Soils on the proposed marginal lands and their potential productivity for forest production are shown in the table below. Soils are as given in the Soil Survey of Lane County Area, Oregon. Forest productivity is for Douglas-fir except for the Philomath soil units, for which productivity is for Ponderosa pine.

Table 1: Productivity using published data[1]

#	Soil Name	Acres	Site Index	cf/ac/yr	total growth
81D	McDuff clay loam 3-25% slopes	5.60	112	158	884.8
102C	Panther silty clay loam2-12%	14.69	-	45	661.1
107C	Philomath silty clay 3-12%	31.13	125	154	4794.0
108F	Philomath cobbly silty clay 12-45%	12.67	125	154	1951.2
113E,G	Ritner cobbly silty clay loam 12-60%	9.65	107	149	1437.9
	Totals	**73.74**			**9,729.0**

[1] Source: *Establishing and Managing Ponderosa Pine in the Willamette Valley*, Oregon State University Extension Service, EM 8805, May 2003. See Exhibit 1.

Average growth potential = 9,729.0 cf/yr ÷ 73.74 acres = 131.94 cf/ac/yr.

The following table is identical to the preceding table except that it uses the on-site productivity data for Ponderosa pine produced by the applicant's forestry consultant.

Table 2: Productivity using applicant's published data and site data

#	Soil Name	Acres	Site Index	cf/ac/yr	total growth
81D	McDuff clay loam 3-25% slopes	5.60	112	158	884.8
102C	Panther silty clay loam2-12%	14.69	-	45	661.1
107C	Philomath silty clay 3-12%	31.13	104*	110	3424.3
108F	Philomath cobbly silty clay 12-45%	12.67	104*	110	1393.7
113E & G	Ritner cobbly silty clay loam	9.65	107	149	1437.9
	Totals	**73.74**			**7,801.8**

* Ponderosa pine

Average growth potential = 7,801.8 cf/yr ÷ 73.74 acres = 105.80 cf/ac/yr.

The applicant's forestry consultant has calculated that the cf/ac/yr productivity of the proposed marginal land is only 69.327 cf/ac/yr. However, in arriving at this result, the forestry consultant excluded approximately one-third of the property from consideration, assuming that it has "zero" productivity for forestry. According to SCS and NRCS soil maps, the excluded areas have the same Philomath soils as those containing the ponderosa pine that the applicant's forestry consultant measured. The applicant's forestry consultant explains that no trees grow on these soils.

In determining forest productivity, generally accepted methodology requires, if no trees are available or if the site index cannot be determined accurately from existing trees, that soil survey methodology rather than site measurement methodology be used to assess site productivity. This requires the employment of a soils scientist. The generally accepted qualifications and procedures are contained in OAR 603-080-0040(3).[2]

The applicant's forestry consultant has in essence "invented" a new soil he calls "Grassland with exposed rock," assigned a forest productivity of "zero" to that new soil unit, and determined that 24.46 acres or 33.2 percent of the proposed marginal land is comprised of this "Grassland with exposed rock" soil unit.

Mr. Setchko is not a soils scientist and is not credentialed or otherwise qualified to either determine that a new soil type exists in Lane County or to conduct the higher intensity soil survey necessary to delineate the location and extent of any such new soil type on the proposed marginal lands. A soil scientist may be certified as a soils classifier by ARCPACS (A Federation of Certifying Boards in Agronomy, Biology, Earth and Environmental Sciences); or must otherwise document an understanding of the physical, chemical, mineralogical and biological properties that apply to pedology, and proficiency in the practice of applying pedology to soil investigation, classification, education, and consultation on the effect of measured, observed and inferred soil properties and their use. Mr. Setchko is

[2] See Exhibit 2, *Land Use Planning Notes*, ODF Technical Bulletin Number 3, April 1998, p. 5.

qualified neither to identify a "new" soil not found in the NRCS Soil Survey of Lane County Area, Oregon, nor to determine the potential productivity of any such "new" soil or to base a determination of the productivity of any subset of an existing soil unit on soil characteristics rather than measurement of site trees.

OAR 660-006-0010 requires that governing bodies inventory forest lands using forest site class methodology. Site class can be expressed as cf/ac/yr productivity as shown in the table below:

Site Class	Potential Yield, Mean Annual Increment
1	225 or more cubic feet per acre
2	165 to 225 cubic feet per acre
3	120 to 165 cubic feet per acre
4	85 to 120 cubic feet per acre
5	50 to 85 cubic feet per acre
6	20 to 50 cubic feet per acre

Source: USDA Forest Service. See also OAR 629-610-0020.

LUBA has held that OAR 660-006-0010 requires that Goal 4 inventory decisions be based on objective measures of productivity and that OAR 660-066-0010 applies when making inventory decisions regarding forest lands. *Wetherell v. Douglas County,* __ Or LUBA __ (LUBA No. 2005-075, 09/30/2005), slip op 10-12.

OAR 660-006-0010 further provides:

> "If site information is not available then an equivalent method of determining forest land suitability must be used."

In this instance, site information is available. There is no need to utilize any other method to determine land suitability. Under such circumstances OAR 660-006-0010 does not allow for an applicant to challenge NRCS soils information or productivity data. Unlike OAR 660-006-0050(2), which explicitly authorizes the use of alternative data "[w]here NRCS data are not available or are shown to be inaccurate," OAR 660-006-0010 does not authorize the use of alternative methodology for determining productivity. The forestry consultant in this case has improperly failed to use NRCS site information where it is available.

If NRCS information is not to be relied on, OAR 660-006-0010 requires the use of an "equivalent method." The methodology used to make the Soil Survey of Lane County Area, Oregon is discussed at pp. 4-5 of that document, and states, in relevant part:

> "Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. * * *
>
> "The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind or segment of the landscape. By observing the soils and miscellaneous areas in the

survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, or how they were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

"* * *

"To show the detail significant to farm planning and to the application of agricultural science to farms, the soils in the survey area have been mapped at a scale of 4 inches to the mile. At this scale, a map unit includes small areas of other soils that must be included because of the limitations imposed by this scale and by the number of points that can be examined in the field.

"The soil boundary lines delineated on the aerial photographs encompass the soil identified by the map symbol plus a small proportion of other soils – as much as about 15 percent of contrasting soils (no more than 10 percent of one kind of soil) that cannot be excluded in practical soil cartography. * * *

"Individual soils on the landscape commonly merge gradually onto one another as their characteristics gradually change. To construct an accurate map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

"Soil scientists recorded the characteristics of the soil profiles that they studied. * * * Soil scientists [then] assigned the soils to taxonomic classes (units). * * * The classes are used as a basis for comparison to classify soils systematically. * * * They compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research. * * *

"* * * Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and soil properties to determine the expected behavior of the soils under different uses. * * *"[3]

The applicant's forestry consultant has reclassified 24.45 of the 43.83 acres of 107 and 108 Philomath soils as ""Grassland with exposed rock," and has asserted that these soils are too shallow, rocky, and dry to support and tree growth whatsoever. The Soil Survey states that the Philomath units are "shallow and well drained." Soil Survey, pp. 122-23. Ponderosa pine commonly grows on shallow, rocky clay soils in the Valley foothills.[4]

The applicant's forestry consultant failed to use an "equivalent method" of determining the forest suitability of the 24.46 acre area he describes as "grassland with exposed rock." No holes were dug. No soils were examined, described or classified; nor did examination of the soils serve as a basis for the mapping that was done. The characteristics of the soils did not

[3] See Exhibit 10, excerpt from *Soil Survey of Lane County Area, Oregon.*

[4] See Exhibit 1, *Establishing and Managing Ponderosa Pine in the Willamette Valley*, p. 3.

serve as basis for determining the expected behavior of the soils in support of forest productivity.

Neither did the forestry consultant's qualifications or methodology meet the commonly accepted standards of soil science methodology. Acceptable standards are laid out at OAR 603-080-0040(3). No soils report was prepared. The level of order of survey used in the field survey was not identified. The scale and type of maps used for field investigation, the number of sample locations and observation points were not identified. The points of agreement or disagreement with NRCS mapping units were not identified. The date of the field investigation was not identified. The methods used for observation and documentation were not identified. No notations concerning any limitations encountered during field investigation were made.

The applicant's forestry consultant has also included an alternative computation of productivity which excludes the area beneath the powerline easements. The presence of a power line easement does not affect the *capability* of the land, which is the focus of the inquiry required by ORS 197.247(1)(b)(C). LUBA has held that, for purposes of inventorying parcels that are crossed by power line easements, such easement restrictions are not a proper consideration in determining the land's potential for forest productivity. *Wetherell v. Douglas County*, __ Or LUBA __ (LUBA No. 2005-075, 09/30/2005), slip op 17.

B. Income test

The income test asks whether the proposed marginal land was part of a forest operation in at least three of five years during the period 1978-82 that was capable of producing an average, over the growth cycle, of $10,000 in annual gross income.

It is the "forest operation" that is the subject of inquiry. As the proposed marginal land was part of a larger 113.74 acre parcel during the relevant time period, the income potential of the entire 113.74-acre parcel must be considered.

1. Prices

The applicant's forestry consultant has used 1983 prices in computing potential income. LUBA has held that legislature intended the gross income test under ORS 197.247(1) to be applied based on the five-year period proceeding January 1, 1983. *Just v. Lane County*, __ Or LUBA __ (LUBA No. 2005-029, 06/08/05), slip op 8. Douglas fir prices rose substantially beginning in 1979, peaking in 1981; and then declined dramatically – more than 16% - by 1983. Prices over the 1978-1982 period averaged about 19.4% higher than in 1983. Using 1983 prices substantially underestimates income potential over the relevant time period. See Exhibit 1.

The Setchko Report assumes that none of the timber harvested would be in grades higher than 2S – 1P, 2P, 3P, or SM. This assumption is not explained or justified.

2. Growth cycle

The Setchko Report assumes a 50-year growth cycle. The Setchko Report does not explain why forest management practices would dictate assuming a 50-year growth cycle except to refer to Lane County's March 1997 Supplement to the Marginal Lands Information Sheet, which states that a 50-year growth cycle should be used. The Supplement to the Marginal Lands Information Sheet is not adopted as law, and cannot trump statute. In addition, the Supplement to the Marginal Lands Information Sheet offers the option that another standard could be used if substantiated by compelling scientific evidence presented by the applicant. The applicant's forestry consultant has presented such evidence in the previous application involving the subject property. Additional compelling scientific evidence accompanies this letter.

ORS 197.247 does not specify the number of years to be used to determine the "growth cycle." However, LUBA has held that ORS 197.242 presumes the use of "reasonable management practices." *DLCD v. Lane County (Ericcson)*, 23 Or LUBA 33, 36 (1992). "Reasonable management practices" would include selecting a growth and harvest cycle that would maximize average income over that cycle.

"Technical Note No. 2" published by the USDA Soil Conservation Service in June 1986 discusses "culmination of mean annual increment," and explains:

> "The attached tables express site index in such a way it can be related to volumes. It is necessary, for comparative purposes, to use a method that expresses one value for each site index. The method chosen is culmination of mean annual increment (CMAI).
>
> "This age or point may be thought of as the most efficient time to harvest as far as tree growth is concerned. Other factors, such as stumpage values, taxes, interest rates, and management objectives affect the 'art' of choosing when to harvest."

The tables show that CMAI for Douglas-fir, for site indices of 90 and above, is 60 years. Less productive soils have an even longer CMAI of 70 years.[5]

The applicant's forestry consultant's previous income calculations for this very same 113.74 acres show that assuming a 50-yr cycle would yield an average gross annual income over the growth cycle of $5,099 per year, while assuming a 60-year cycle would yield an average annual gross income over the growth cycle of $6,487 per year. Thus harvesting at culmination of mean annual increment, or at the end of a 60-year growth cycle, would result in 27.2% greater average annual income over the growth cycle.[6]

The calculations used in this letter assume a growth cycle corresponding to CMAI as reported by the Soil Conservation Service.

3. Calculation of potential income

The Setchko Report's table showing lumber volumes for the entire 113.74 acres does not reveal the methodology or assumptions used for determining the productivity of the Dixonville-Philomath-Hazelair complex or for the Philomath units. It appears that zero

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[5] See Exhibit 3.

[6] See Exhibit 4 for Setchko's calculations based on a 60-year growth cycle, Exhibit 5 for Setchko's calculations based on a 50-year cycle.

productivity was assumed for the Philomath and Hazelair components of the DPH complex.[7] For the Philomath units, it appears that "grassland with exposed rock" areas were not excluded

[7] The *LC Ratings* gives a cf/ac/yr rating of 54 for the 43C unit and 63 for the 43E unit. Entrees for the Dixonville/Philomath/Hazelair units are noted with three asterisks. A footnote at p. 6 of that document notes:

> "*** Indicates soil complexes with multiple site indices, refer to the CuFt/Acre/Year column for a composite volume rating for the complex."

The *Soil Survey of Lane County Area, Oregon (Soil Survey)* was published in 1987. The fieldwork for that publication was completed in 1980 and on soil names and descriptions approved in 1981. This information is found in the "green sheets" that were available and in use in 1983.[7] Neither the green sheets nor current NRCS data indicate forest productivity for the 43C or the 43E complexes; rather, productivity is given for the individual soil units which comprise the complexes. Productivity data is available only for the Dixonville component. See Exhibit 1, Appendix 1-1 – 1-11; and Exhibit 5, Appendix 5-1. Since no site indices were available for the Philomath and Hazelair units, site indices for those soils could not have been included in any calculation of a composite rating for the complex.

The *Soil Survey* states that the 43C unit is "30 percent Dixonville silty clay loam, 30 percent Philomath cobbly silty clay, and 25 percent Hazelair silty clay loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used. Included in this unit are small areas of Panther, Ritner, and Witzel soils and Rock outcrop. Included areas make up about 15 percent of the total acreage."[7]

The Dixonville soil is given a cf/ac/yr rating of 152 in both the *Soil Survey* and the *LC Ratings*. The Ritner soil unit is listed in the *LC Ratings* as having a cf/ac/yr capability of 149. How was the *LC Ratings* productivity for the 43C complex derived? The following calculation gives a result which approximates the results found in the *LC Ratings*, and which probably approximates the methodology used.

The productivity of the complex can be approximated by calculating the productivity of the area for the individual components of the complex and then adding them together to arrive at a total for the complex: multiply 0.3 (area) x 152 (productivity) = 46 cf/ac/yr for the Dixonville soils within the complex; 0.0375 (0.15/4 = 0.0375) x 149 = 6 cf/ac/yr for the Ritner component. Adding the two together gives 46 + 6 = 52 cf/ac/yr, which gives a composite productivity for the complex which is very nearly the same as the 54 cf/ac/yr found in the *LC Ratings*. The small discrepancy could possibly be explained by a difference in the way the inclusions were allocated.

A similar calculation can be done for the 43E unit. The *Soil Survey* states: "This unit is 35 percent Dixonville silty clay loam, 30 percent Philomath cobbly silty clay, and 20 percent Hazelair silty clay loam. * * * Included in this unit are small areas of Ritner and Witzel soils and Rock outcrop. Included areas make up about 15 percent of the total acreage."[7] 0.35 x 152 = 53.2; 0.05 x 149 = 7.45; 53.2 + 7.45 = 61, which again is very close to the 64 site index reported in the *LC Ratings*.

As illustrated above, the *LC Ratings* results for the Dixonville/Philomath/Hazelair complexes can only be achieved by assuming zero productivity for the nonrated soils in the complex.

The methodology purportedly used in the *Lane County Ratings* is explained at p. 8 of the *Lane County Ratings* as follows:

> "The methodology used in this table to calculate forest productivity volume ratings for soil complexes involves applying a weighted average to each component of the complex and then normalizing to base it on 100% excluding the inclusions. The following example illustrates this calculation for a soil complex which has a site index for only one of the two components."

The example given is for the 43C Dixonville/Philomath/Hazelair complex. The text has erroneously described this complex as having only two components. The table computes a "normalized" cf/ac/yr capability of 46. This differs from the capability given in the ratings themselves, in which this unit is listed as having a cf/ac/yr capability of 54.

from consideration. This inconsistency with the treatment of those areas in regard to the "productivity" test is not explained or justified, or supported with any evidence.

The Setchko Report's calculations also assume that logs would be cut and processed in lengths of 32 feet. Harvesting logs in 16 foot lengths rather than 32 foot lengths would result in substantially more yield in Scribner board feet[8]. Reasonable management practices would include selecting a log length that would maximize income.

Volume total for the entirely of the 113.74 acre area, based on growth cycles of 60 years for Douglas-fir and 40 years for Ponderosa pine based on CMAIs established are shown in the table below. Yields in board feet per acre are from Exhibit 4, *The Yield Table for Douglas Fir*; and *The Yield Table for Ponderosa Pine*.[9] This table provides information for site indices in increments of 5 (e.g., 100, 105, 100, etc.) Values are rounded up or down to the nearest site index (e.g. 107 = 105; 109 = 110).

The Setchko Report assumes that the forest operation would produce only logs of grades 2S, 3S and 4S. It is not explained why the assumption that no logs of higher grades (1P, 2P, 3P, or SM) would be harvested is a reasonable assumption, particularly given the fact that the "board foot" tables used are for 32 foot logs, which would generally be expected to result in higher grading and thus pricing. The two assumptions – lower grades and 32 foot logs – are not consistent.

The discrepancy between the computation of cf/ac/yr in the example and the capability as reported in the ratings is nowhere explained. What is clear is that the methodology assumes zero cf/ac/yr capability for soil components that do not have NRCS productivity ratings for forest productivity.

OAR 660-006-0010 provides, in relevant part:

> "Governing bodies shall include an inventory of 'forest lands' as defined by Goal 4[.] * * * If site information is not available then an equivalent method of determining forest site suitability must be used."

As LUBA explained in *Wetherell v. Douglas County*, __ Or LUBA __ (2005-045, September 8, 2005), OAR 660-006-0010 requires that any inventory of forest land requires objective measures of productivity:

> "Goal 4 and the Goal 4 rule strongly suggest that determinations of suitability for commercial forestry must be made based on published productivity data or, in the absence of such data, on an 'equivalent method of determining forest land suitability.' OAR 660-006-0010. An expert opinion that is not based on published productivity data or equivalent data, but instead relies heavily on the absence of such data, is not a sufficient basis for concluding that land is not subject to Goal 4." Slip op 31.[7]

LUBA concluded that OAR 660-006-0010 requires that Goal 4 inventory decisions be based on objective measures of productivity and that OAR 660-066-0010 applies when making inventory decisions regarding forest lands. *Wetherell v. Douglas County*, __ Or LUBA __ (LUBA No. 2005-075, September 30, 2005), slip op 10-12.

LUBA has rejected the argument that soils lacking a NRCS productivity rating will produce zero cf/ac/yr. *Wetherell* (2005-045), slip op 31-34; *Wetherell* (2005-075), slip op 12.

[8] See <u>The Yield Table of Douglas Fir, Base 50 Years</u>, Exhibit 6.
[9] See <u>The Yield Table of Ponderosa Pine, Base 100 Years</u>, Exhibit 7.

#	Soil Name	Acres	Site Index	bd.ft./ac.	total volume (board feet) DF	PP
43C	DPH Complex	6.64				
	Dixonville (30%)	1.99	109	40,211	80,020	
	Philomath (30%)	1.99	104*	18,760		37,332
	Hazelair (25%)	1.66	120**	28,889		47,956
43E	DPH Complex	0.44				
	Dixonville (35%)	0.15	109	40,211	6,032	
	Philomath (30%)	0.13	104*	18,760		244
	Hazelair (25%)	0.11	120**	28,889		3,178
81D	McDuff	5.60	112	40,211	225,182	
102C	Panther	14.68	-	11,266***	165,385	
107C	Philomath	39.61	104*	18,760		743,084
108F	Philomath	30.20	104*	18,760		566,552
113E F & G	Ritner	13.38	107	36,691	490,926	
125C	Steiwer	3.19	-	7,498***	23,919	
	Totals	**73.74**			**991,455**	**1,398,346**

* Ponderosa pine, as measured in Setchko Report.

** Ponderosa pine, from *Establishing and Managing Ponderosa Pine in the Willamette Valley,* p. 3.

*** The methodology used in the Setchko Report is adopted here: productivity in bd.ft/ac/yr for the Panther unit is computed as .293 x [average productivity of McDuff and Ritner units, or (40,211+36,691)/2 or 38,451] = 11,266; for the Steiwer unit, .195 x 38,451 = 7,498.

Price calculations are shown in the table below, using average prices for the relevant 1978-1982 period.[10] Assumptions of the Setchko Report are used regarding the distribution of Douglas-fir grades. For Ponderosa pine, in the absence of any information regarding grading, average prices across grades are assumed. "MBF" = thousand board feet.

Douglas Fir					
2S	.40 x 991.455 mbf =	396.582 x $ 316 =	$ 125,320		
3S	.50 x 991.455 mbf =	495.728 x $ 268 =	132,855		
4S	.10 x 991.455 mbf =	99.146 x $ 235 =	23,299		
			$ 281,474	$ 281,474	
Ponderosa pine					
	1,398.346 mbf =	1,398.346 x $ 309 =	$ 432,089	432,089	
				$ 713,563	

$ 713,563 (income over a 60 year growth cycle) ÷ 60 years = **$ 11,893 per year**

[10] For Douglas-fir prices, see Exhibit 8, Douglas-fir Log Prices 1978-1982, 1983. For Ponderosa pine prices, see Exhibit 9, Ponderosa Pine Log Prices 1978-1982, 1983.

III. Conclusion

The average growth potential of the proposed marginal lands is 7,8028 cf/yr ÷ 73.74 acres = 106 cf/ac/yr., assuming the reasonable management practice of growing Douglas-fir on soils best suited for Douglas-fir and Ponderosa pine on soils best suited for Ponderosa pine. The proposed marginal land is capable of producing well in excess of 85 cf/ac/yr, if reasonable management practices concerning planting and harvesting are followed. This is far in excess of the 85 cf/ac/r standard established by ORS 197.247(1)(b)(C). The productivity test is not met.

The forest operation of which the proposed marginal lands were a part was, during the 1978-82 period, capable of producing an average of $ 11,893 per year in annual gross income over a 60-year growth cycle, assuming the reasonable management practice of growing Douglas-fir on soils best suited for Douglas-fir and Ponderosa pine on soils best suited for Ponderosa pine and assuming prices prevailing during the relevant 1978-1982 period. This is substantially greater than the $10,000 threshold established by ORS 197.247(1). The forest operation was capable of producing well in excess of 85 cf/ac/yr, if reasonable management practices concerning planting and harvesting were followed. The income test is not met.

The request to redesignate the subject lands to marginal lands must be denied if either of the tests established by ORS 197.247 are not met. As neither the income nor the productivity test is met, the request must be denied.

Goal One and other parties whose addresses appear in the first paragraph of this letter request notice and a copy of any decision and findings regarding this matter.

Respectfully submitted,

Jim Just
Executive Director