Soil Investigations for Vineyard Potential on The Hawksnest Property 55.45 Acres Yamhill County, Oregon

For: Mike Wold

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INTRODUCTION

This project was done to provide soil profile information, classification and baseline soil interpretations for viticulture for the Hawksnest property owned by Mike Wold for a 55.45 acre site on Power House Hill Road and Baker Creek that is being sold for a vineyard and scenic home site. Soil borings were made in the area of proposed vineyards of the terrain suited to winegrowing. Soil borings were made from soil cores. Soils were sampled from representative terrain to sample the range of soil properties expressed on the site. Soil profile descriptions were recorded to classify soils and to record soil drainage characteristics, soil depth to bedrock, surface thickness, soil texture of the surface and the subsoil. Boring locations were recorded with a global positioning system (GPS). Interpretations for viticulture are made based on these borings.

BACKGROUND AND METHODS

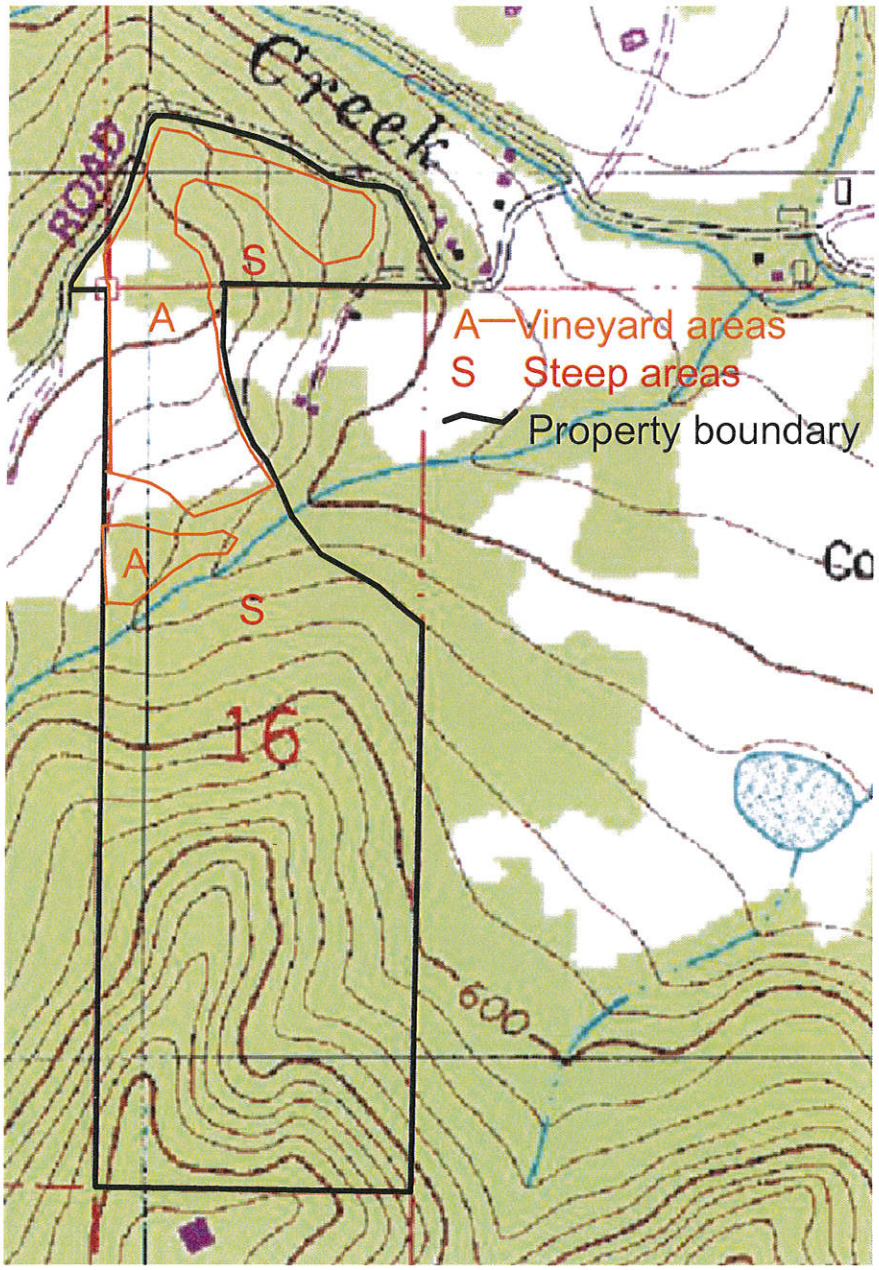
Project Area

The site is divided by a tributary stream of Baker Creek with the vineyard land located on the north side of the stream and steep timber land on the south side of this tributary stream. North of the stream the land cover is mixed pasture, partially cleared forestland. There is a large log home with a newer barn on the ridge top with a view of Happy Valley. .

The Soil Survey of Yamhill County Area delineated Jory, Peavine and Yamhill soils on this property. Jory and Yamhill formed from colluvium and residuum of basalt. Peavine soils formed from colluvium of sedimentary rock, primarily siltstone. All of these soils are well drained. Yamhill is moderately deep, Peavine is deep and Jory is very deep.

The Geology of the site is marine siltstone and basic igneous rocks of the Oregon Coast Range. The area on the north part along Power House Hill Road is moderately to very steeply sloping with slope aspects to the east and north. The slope to the south of the barn is moderately to steeply south sloping. There is a very steep bank along the tributary stream. The very steep slopes south of the stream are predominantly north aspect and that area was not evaluated for vineyard. Elevation of the potential vineyard land is from 400 ft up to 600 feet at the high ground where the log home sits. The forest land south of the creek which was not evaluated rises up to just above 1000 feet above sea level.

Figure 1. Topographic map of the parcel. (Source 1:24,000 USGS)



Methods

This investigation was conducted on December 4, 2007. Soil observations were made to classify soils and to record soil properties including soil drainage, depth to bedrock and rock type, surface thickness, soil texture of the surface and the subsoil. Seven soil borings were made in the survey area that is about 15 acres. Criteria for potential vineyards included slopes that have south, east and west aspect up to 30 percent gradients, and for north-facing slopes up to 12 percent

gradient for Pinot noir and up to 20 percent north aspect for Pinot gris or wine grapes grown for sparkling wine. Low lying and wet soils were excluded from the suitable area. For each boring, soil profiles were observed from soil auger holes to 60 inch depth, shallower where bedrock prevented deep sampling. Borings were located using a GPS receiver to better than 3 m accuracy. Boundaries of suitable areas were delineated based upon soil borings and slope measurements with a clinometer that were located on the ground with a GPS, overlaid on 1:24,000 scale topographic map.

RESULTS

The soil investigation found soils to be very similar to the soils mapped in the county soil survey. There is a minor difference where the Peavine soil has been reclassified as Windygap and Goodin soils at this elevation in side valleys off the of the Willamette Basin. Now Peavine soils are mapped at higher elevations and on cooler sites. Most of the area evaluated for vineyards has very deep Jory soils. The lower slopes just above the creek have soils formed in sedimentary rock soils. All of the soils observed in these samples are well drained and none were shallow.

The key drivers of soil variability on this site are the different parent materials, there is both basic igneous rock gabbro and basalt and sedimentary rocks primarily siltstone. The depth and hardness of the rock contact also vary. Most of the soils sampled were Jory soils with depth to hard igneous rocks greater than 60 inches. On the lower part of the south facing slope the underlying rocks are siltstone Windygap is mapped where soils are reddish clay and a depth 40 to 60 inches and a soil transitional between Windygap and Goodin is mapped where the subsoil is yellowish brown clay and soils are moderately deep to deep to siltstone.

The surface layers of the soils on this property are typically thick and dark with very friable consistency, silty clay loam and clay loam texture. In places there has been significant deposition of dark topsoil at the base of steep slopes and the Jory soil has an over-thickened surface and these tend not to be as red as typical Jory.

The excellent tilth and strong granular structure of the surface horizon make a soil with low bulk density that aids in infiltration capacity and hydraulic conductivity of the soil and further allows for strong root penetration. The current natural condition of the soil is its optimal physical state for vine establishment. The goal is to be able to do site preparation of stump and coarse root removal and disking to smooth the ground surface with minimum soil disturbance and minimal compaction. Erosion control is critical on this site and soils must be under cover crop, preferably grass, during the rainy season.

Table 1. Summary Soil Boring Data

Boring Number	Soil Series	Surface Thickness	Depth to Bedrock	Estimated Available Water Holding Capacity	Drainage Class
1	Jory	12	>60	10	Well
2	Jory	12	>60	10	Well
3	Jory	10	>60	10	Well
4	Jory	12	>60	9	Well
5	Windygap	8	48	8	Well
6	Goodin-Windygap	7	60	7	Well
7	Jory	11	>60	10	Well

Most of the soils that occur on this site are distinctly reddish hue and have high clay content in the subsoil. The upper part of the profile contains silty material that is either loess or old alluvium. The soils at the base of the slope that overlie sedimentary rocks are more yellowish brown and are clayey.

Jory
These soils are well drained, very deep to rock, and formed from colluvium of basalt. These soils are distinctly reddish and have high clay content in the subsoil. The substratum is a deeply weathered reddish clay paleosol. Jory soils have high organic matter content and strong soil structure that provides hydraulic conductivity similar to soils with less clay. These soils can produce high vigor in vines because they are so deep and have high AWHC.

Windygap
These soils are deep to siltstone at a paralithic contact. These soils grade into soils like Goodin, which is a clayey associate of the Willakenzie series. These soils are well suited to vineyards and produce moderate vigor, have deep rooting and moderate to moderately high AWHC. These soils would have been previously classified as Peavine series, which is now correlated to soils at higher elevations that receive more precipitation.

Available Water Holding Capacity (AWHC)

This site ranges from moderate to high available water holding capacity 7 to10 inches of AWHC, and is well suited to dry land viticulture.

Reported AWHC is the amount of the water (inches of water) that can be stored in the soil profile that is available for plant uptake; it represents the amount of water held between field moisture capacity and the permanent wilting point. The value reported is calculated from a model based on the sum of the weighted average AWHC for each soil horizon, using values reported in the literature and measured soil profile data at each numbered point.

The AWHC is a function of soil depth, texture, organic matter, bulk density, porosity, and soil osmotic potential. Root restricting layers decrease the depth of the soil profile and the AWHC. Clay soils hold more total water but have less available water than loamier soils. Clay soils have extremely fine micropores that can retain water at highly negative matric potentials. As soil moisture potentials become more negative (as soils dry), sandy soils hold less total water than finer textured soils, because a larger percentage of the pores are large and are freely drained. Since the majority of grape roots are in the upper soil profile, the AWHC values for the upper root zone provides a useful relative scale of the variability in water supply available to the vine for the classes used here. Soils with moderately high AWHC (8 to 11 inches) will show less moisture stress; these soils tend toward high vine vigor.

Cultural practices can be used to effectively manage soil water. Some of the options available include varying the cover crop mixture, customizing the mowing and tillage treatments and adjusting vine spacing to match the vine vigor potential to provide managed competition towards achieving balanced vine growth. For example: more vigorous grass cover crops can be used to compete with the vines for water in deeper soils. In droughty soils, less competitive cover crops may be more appropriate. Alternate row tillage can be used to further reduce competition in low vigor potential soils. Mulching in the vine row will help conserve soil moisture. Vigorous rootstocks can be used on the soils with moderate AWHC.

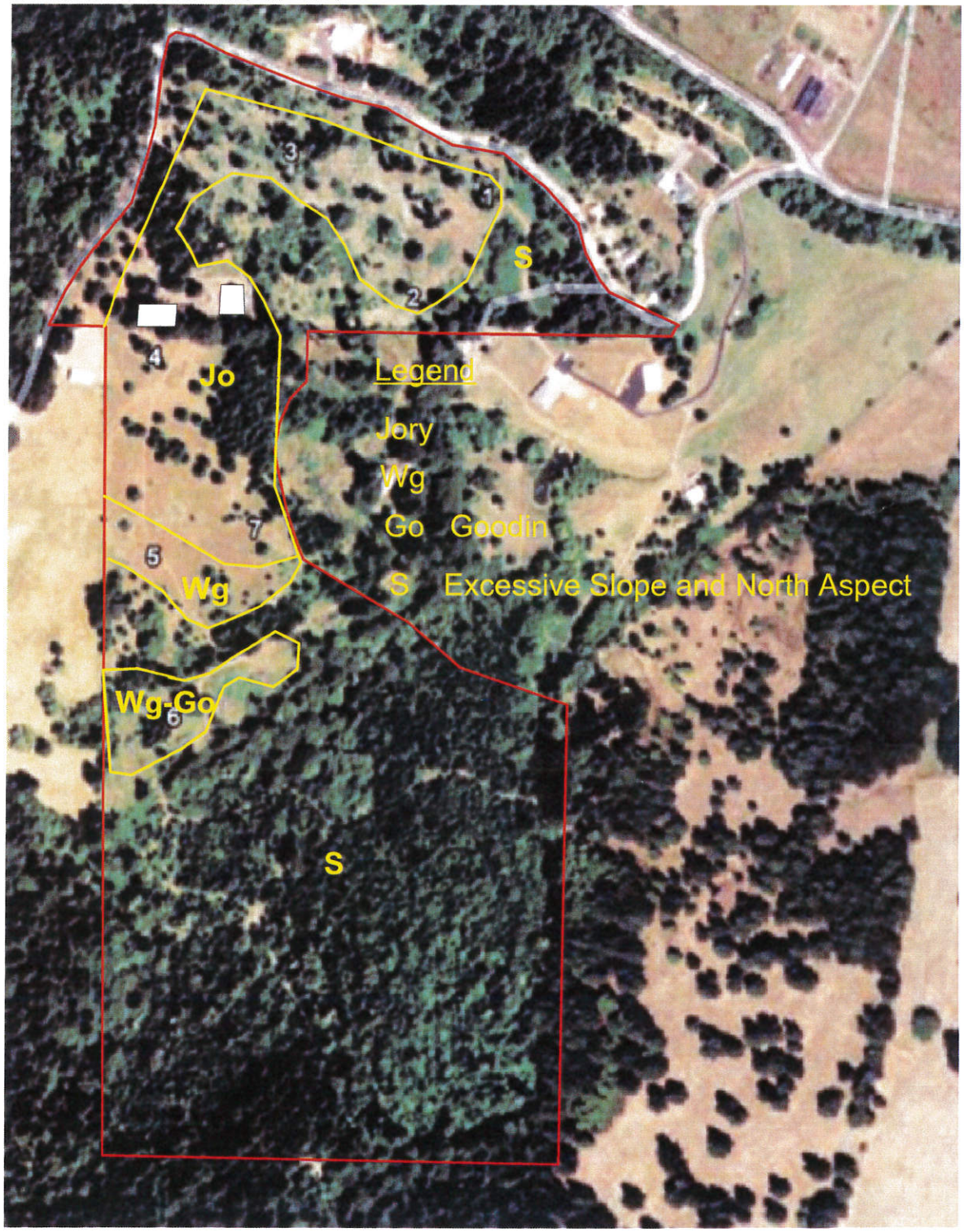
Potential Vineyard Acreage

There are an estimated 14.3 acres of land ideally suited to growing high quality Pinot noir (mapped A on Figure 2). The excluded acres (B on Figure 2) are part of the drainage way with concentrated flow or excessively steep slopes (greater than 30 percent or north aspect slopes with more than 20 percent slope).

Generally Pinot noir grapes are not planted north slopes greater than 12 percent gradient unless it is intended for sparkling wine, but Pinot gris and other white varieties are planted on north slopes up to 20 percent slope gradient, and planting more sloping north aspect slope could potentially add another acre of suitable vineyard land to get up to the 15 planted acres needed for a winery site.

This investigation did not consider the suitability of the forested slopes south of the creek. The 1:24,000 scale topographic map indicates slopes greater than 30 percent on those slopes. There is a narrow ridge that is at about 900 feet that could potentially be planted, though access to this land is difficult the topographic map indicates that some east aspect slopes between 600 and 800 feet elevation may be suitable

Figure 1. Boring locations and potential vineyard acreage shown in "A". Unsuitable areas are in "B".



Recommended Soil Mapping Needs: It is recommended that prior to actual development, important soil properties be precision mapped in finer detail with an emphasis on accurate mapping of parent material types, soil depth classes, and available water holding capacity. This allows more opportunity to strategically design blocks in the vineyard and can serve as a foundation to a more nuanced approach to viticultural soil management. An average recommended intensity in precision mapping is typically one soil observation per acre

In precision soil mapping, borings are located using a global positioning system (GPS). Soil properties including depth, drainage, and available water holding capacity are then mapped using geographic information system (GIS) to produce color thematic maps to guide drainage design, site specific rootstock and clonal selections and irrigation cells. Surface and subsoil fertility mapping is an available option and can be used to guide site specific soil nutrient management and to further refine vineyard blocks.