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WOODARD MINOR SUBDIVISION
MODIFIED GEOLOGY & SOILS REPORT

Woodard Minor Subdivision is a proposed two lot subdivision of a 14 acre parcel located on the south side of Vessey Road approximately one half mile west of Black Forest Road. The property is within Section 06, T12S, R65W of the 6th P.M. The current zoning is RR-5, permitting minimum 5.0 acre lots. The north boundary of the property adjoins and takes access from Vessey Road. This property has been used as a residential homesite since at least the 1970's. This is an area within which the Black Forest Fire destroyed many homes and unfortunately the Woodard home was one of them. Only one small clump of pines remains.

The property lies at an average elevation of approximately 7500 feet. Topography is moderately sloping down from the northwest with a wide shallow swale that runs southerly down from the northeast property corner, offsite to the east, and back to a point just west of the southeast property corner. Slopes are typically 5% to 10%. There is no mapped 100 year floodplain.

Geology was investigated using commonly available published geologic data. The primary structural feature in the general area is the Rampart Range Fault which lies along the face of the Front Range about 9 miles west, marking the boundary between the Great Plains Province and the Southern Rocky Mountain Province.(1) The Black Forest Quadrangle is located near the western edge of an asymmetrical, oval shaped, geological structural depression called the Denver Basin (Emmons and others, 1896) This structural basin lies immediately east of the Front Range and covers a large part of eastern Colorado north of Pueblo, southeastern Wyoming, and southwestern Nebraska. Bedrock in the Black Forest quadrangle dips gently northeast towards the axis of this basin. Bedrock deposits, Map Symbol (TKda5), are part of the Dawson Formation of early to middle(?) Eocene age.(2). Facies Unit 5 is dominated by very thick-bedded to massive cross-bedded, light colored arkose, pebbly arkose, and arkosic pebble conglomerate. It contains common beds of white to light tan, fine to medium-grained feldspathic, cross-bedded friable sandstone. It is generally permeable, well drained, and has good foundation characteristics.

This property is not undermined and does not contain any identified geologic hazards that would preclude the proposed residential use at this very low density. There can be expansive soils associated with the Dawson, typically in irregular lenses, and soil swelling is perhaps the most significant geological concern for home location and construction. Individual lot and homesite specific geotechnical investigations consisting of drilling, sampling, lab-testing and analysis are

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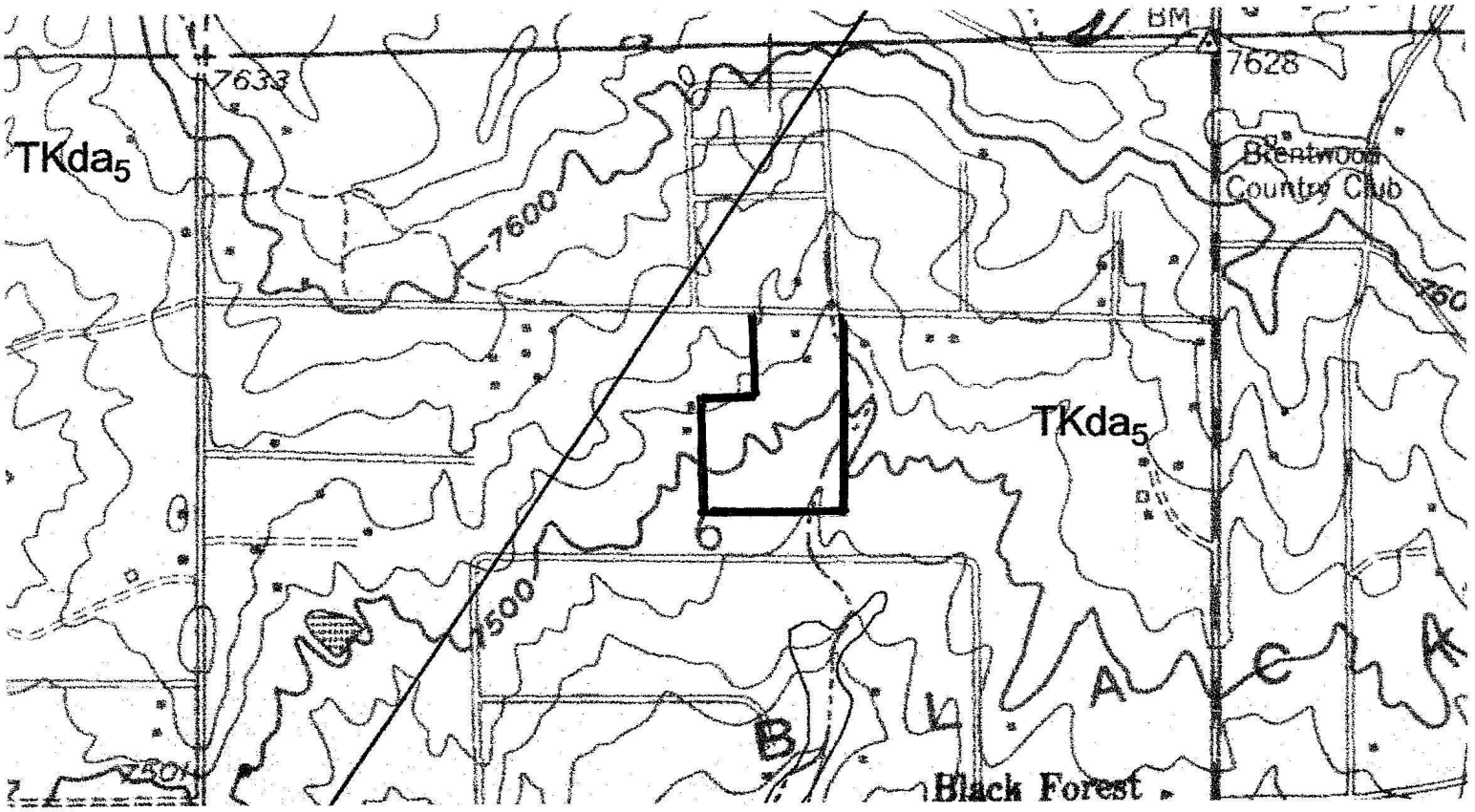
needed to characterize soil and bedrock engineering properties such as density, strength, water content, and swell/consolidation potential; depths to groundwater and bedrock, verifying the feasibility of full depth basements, and to provide earthwork, foundation, floor system, surface and subsurface drainage for design purposes. This testing, completed by a Professional Geologist, is required for home and leach field design purposes on each lot prior to building permit application.

According to the USDA Soil Survey (Issued June 1981) this property is shown on Map Sheet No. 2 as being primarily within soil description area #40, Kettle gravelly loamy sand, 3 to 8 percent slopes. Adjoining that on the western portion of the 5.0 acre lot is Elbeth sandy loam, 8 to 15 percent slopes. (Soil Descriptor #26)

Both soils are deep, well drained and formed in sandy arkosic deposits on uplands. These soils have good potential for use as homesites. The main limitations are steepness of slope, limited ability to support a load and frost action potential. Permeability of the soils is moderate.

Geology Map with this site outlined:



Source: *Geologic Map of the Black Forest Quadrangle* distributed by Colorado Geological Survey. Jon P. Thorson, 2003. CGS Open File Report 03-06.

Geologic Bibliography:

(1): Widmann, Beth L., Compiler, 1997, *Preliminary Quaternary Fault and Fold Map*, Colorado Geological Survey Open File Report 98-08
(2): Thorson, Jon P. 2003. *Geologic Map of the Black Forest Quadrangle, El Paso County, Colorado.* Colorado Geological Survey. Open File Report 03-06.

USDA National Cooperative Soil Survey

Soil Descriptions

United States Department of Agriculture
Soil Conservation Service
Soil Survey of El Paso County Area, Colorado. 1981

United States Department of Agriculture
Natural Resource Conservation Service
Web Soil Survey, 2016

United States Department of Agriculture
Soil Conservation Service
Soil Survey of El Paso County Area, Colorado. 1981

40—Kettle gravelly loamy sand, 3 to 8 percent slopes. This deep, well drained soil formed in sandy arkosic deposits on uplands. Elevation ranges from 7,000 to 7,700 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is about 120 days.

Typically, the surface layer is gray gravelly loamy sand about 3 inches thick. The subsurface layer is light gray gravelly loamy sand about 13 inches thick. The subsoil is very pale brown gravelly sandy loam about 24 inches thick. It consists of a matrix of loamy coarse sand that has thin bands of coarse sandy loam or sandy clay loam. The substratum to a depth of 60 inches or more is light yellowish brown extremely gravelly loamy sand.

Included with this soil in mapping are small areas of Alamosa loam, 1 to 3 percent slopes; Elbeth sandy loam, 3 to 8 percent slopes; Pring coarse sandy loam, 3 to 8 percent slopes; Tomah-Crowfoot loamy sands, 3 to 8 percent slopes; and a few rock outcrops.

Permeability of this Kettle soil is rapid. Effective rooting depth is 60 inches or more. Available water capacity is low to moderate. Surface runoff is slow, and the hazard of erosion is slight to moderate. A few gullies have formed in drainageways.

This soil is used for woodland, livestock grazing, wildlife habitat, recreation, and homesites.

This soil is suited to the production of ponderosa pine. It is capable of producing about 2,240 cubic feet or 4,900 board feet (International rule), of merchantable timber per acre from a fully stocked, even-aged stand of 80-year-old trees. The main limitation for the production or harvesting of timber is the low available water capacity. The low available water capacity also influences seedling survival, especially in areas where understory plants are plentiful. Erosion must be kept to a minimum when harvesting timber.

This soil has good potential for mule deer, tree squirrels, cottontail rabbit, and wild turkey. These animals obtain their food and shelter from pine trees, shrubs, and ground cover, which provide browse, forbs, fruit, and seeds. The presence of ponderosa pine and Gambel oak should encourage wild turkey populations; however, where water is not naturally present, wildlife watering facilities must be provided to attract and maintain wild turkey and other wildlife species. Livestock grazing management is vital on this soil if wildlife populations are to be maintained.

This soil has good potential for use as homesites. Plans for homesite development on this soil should provide for the preservation of as many trees as possible in order to maintain the esthetic value of the sites. During seasons of low precipitation, fire may become a hazard to homesites. This hazard can be minimized by installing firebreaks and reducing the amount of litter on the forest floor. Capability subclass VIe.

A small portion of the property is mapped with Elbeth Sandy Loam. This is located primarily in the western half of the proposed new 5.0 acre lot.

26—Elbeth sandy loam, 8 to 15 percent slopes. This deep, well drained soil formed in material transported from arkose deposits on uplands. Elevation ranges from 7,300 to 7,600 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 120 days.

Typically, the surface layer is very dark grayish brown sandy loam about 3 inches thick. The subsurface layer is light gray loamy sand about 20 inches thick. The subsoil is brown sandy clay loam about 45 inches thick. The substratum is light brown.

Included with this soil in mapping are small areas of Tomah-Crowfoot loamy sand, 8 to 15 percent slopes; Peyton-Pring complex, 8 to 15 percent slopes; Kettle gravelly loamy sand, 8 to 40 percent slopes; and Kettle-Rock outcrop complex.

Permeability of this Elbeth soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Surface runoff is slow to medium, and the hazard of erosion is moderate.

This soil is used for woodland, limited livestock grazing, recreation, wildlife habitat, and homesites.

This soil is suited to the production of ponderosa pine. It is capable of producing about 2,240 cubic feet, or 4,900 board feet (International rule), of merchantable timber per acre from a fully stocked, even-aged stand of 80-year-old trees. Conventional methods can be used for harvesting, but operations may be restricted during wet periods. Reforestation, after harvesting, must be carefully managed to reduce competition of undesirable understory plants.

Woodland wildlife, such as mule deer and wild turkey, is attracted to this soil because of its potential to produce ponderosa pine, Gambel oak, and various grasses and shrubs. Water developments, such as guzzlers, would enhance populations of wild turkey as well as other kinds of wildlife. Where wildlife and livestock share the same range, proper grazing management is needed to prevent overuse and to reduce competition. Livestock watering facilities would also benefit wildlife on this soil.

This soil has good potential for use as homesites. The main limitation is the moderate shrink-swell potential in the subsoil and frost action potential. Special road design is necessary on this soil to overcome these limitations. Slope is also a limitation. Special planning is needed on this soil to minimize site disturbance and tree and seedling damage. During seasons of low precipitation, fire may become a hazard to homesites on this soil. The hazard can be minimized by installing firebreaks and reducing the amount of potential fuel on the forest floor. Capability subclass VIe.

40—Kettle gravelly loamy sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 368g
Elevation: 7,000 to 7,700 feet
Farmland classification: Not prime farmland

Map Unit Composition

Kettle and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kettle

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium derived from arkose

Typical profile

E - 0 to 16 inches: gravelly loamy sand
Bt - 16 to 40 inches: gravelly sandy loam
C - 40 to 60 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.4 inches)

Kettle gravelly loamy sand, 3 to 8 percent slopes (con't)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

Pleasant

Percent of map unit:
Landform: Depressions
Hydric soil rating: Yes

26—Elbeth sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 367y
Elevation: 7,300 to 7,600 feet
Farmland classification: Not prime farmland

Map Unit Composition

Elbeth and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Elbeth

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from arkose

Typical profile

A - 0 to 3 inches: sandy loam
E - 3 to 23 inches: loamy sand
Bt - 23 to 68 inches: sandy clay loam
C - 68 to 74 inches: sandy clay loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

Pleasant

Percent of map unit:
Landform: Depressions
Hydric soil rating: Yes