

William Teachout Land Management Consulting, LLC

PREPARED FOR: Teachout Family Ranch: Mission South Dakota

SUBJECT: Soil Properties, Interpretations, and Land Use Report

December 6th, 2018

Dear Sir or Madam:

Enclosed please find a report on the soil properties, interpretations and suitability of a 934.6-acre Project Area in Todd county, South Dakota, as constrained by your management interests in Agricultural Field Crop cultivation and Cattle Ranching. This report and the land use recommendations contained herein are based upon publicly accessible data from the National Cooperative Soil Survey, accessed through Web Soil Survey, an application maintained and hosted by the United States Department of Agriculture – Natural Resources Conservation Service (USDA-NRCS).

The report outlines basic information on the soils of the Project Area and makes site-specific recommendations on the best use of these soils for your purposes. The original soil survey data and interpretations have been provided to you as a separate appendix.

Respectfully,

William Teachout

Enclosures:

- 1) Land Use Report
- 2) Web Soil Survey Auto-Generated Report

Land-Use Report

Location:

The area that was chosen for this Land-Use Report is the Teachout Family Ranch in Todd County South Dakota. The ranch is located between the South Dakota – Nebraska Border and the town of Mission South Dakota on the Rosebud Indian Reservation. One of the major attractions in the area is the Rosebud Casino, which is along Highway 88 south of the ranch.

Soil Parent Material and Genesis:

Most of the soil types located on the ranch are sandy loams (72.8%), which signifies that the parent material is glacial till deposits because of the unsorted nature of the glacial till. Loamy soils are the result of glacial till because of the mixture of coarse and fine-grained materials that the glacier collected and deposited. Some of the soils (10.3%) are classified as loamy sands, which has a parent material of alluvium. Alluvium is created from water transported sands from glacial outwash. The Eolian sand parent material of the Valentine-Dunday complex (9.6%) was formed from the transportation of fine sands via wind which would be classified as a loess parent material.

Suitability for Proposed Land Use:

The client's proposed land usage is ranching of beef cattle as well as the potential for beginning farming practices on the land. The soil areas that need to be explored are: Farmland Classification, Erosion Hazard (off-road, off trail), and Fencing (post-depth 36 inches or less).

Farmland Classification:

Overall the area is not suitable for farming practices. Most of the land (87.5%) is labelled as not prime farmland and only a small portion of the land (12.5%) is labelled as prime farmland if irrigated with another small amount (6.8%) being Farmland of Statewide Importance. Because of the majority of the area being unsuitable for the production of major field crops and with only a small amount being suitable farmland with irrigation, the probability of an efficient farming practice being put in place on the ranch is low because of the low amount of usable area and the large amount of costs for irrigating a small portion of the land for use.

Erosion Hazard (off-road, off-trail)

Erosion hazard had to be considered because of the continued presence of grazing cattle on the slopes and hills of Northern section of the area. Most of the land area (93.1%) only has a slight erosion hazard with only a small portion (6.3%) having a moderate erosion hazard. The moderate erosion areas are caused by the 3 to 30 percent slopes that are present. Erosion hazard is very important for cattle grazing because the cattle could potentially be injured by the formation of cliffs and the possibility of injury from moving soils.

Fencing (post-depth 36 inches or less)

Fencing is important in ensuring the safety and security of the cattle at the ranch. Maintaining the structural stability of the fences on the ranch and having the ability to make repairs when needed. Most of the land (49.5%) was labelled as very limited with the construction and maintenance of fencing. A smaller portion of the land (37.5%) is labelled as limited with the remainder (12.9%) being not limited or null/not rated. The issues behind these fencing problems are slopes, flooding, ponding, high water tables, shrink-swell clays, high bedrock, and too sandy of a soil. Even though much of the area along the road is labelled under very limited or limited it is known that these difficulties in the soil can be easily overcome with certain management practices and with installation. We would just need to be aware of these difficulties when doing repairs and maintenance on the fences along the perimeter and the ranch road.

Summary:

The land is not suitable for farming practices because of the high amounts of well drained and sandy soils make it difficult for water retention in agriculture and would require a massive amount of irrigation work that would not be worth investing in to make a small portion of the land arable with irrigation. The continued practice of ranching would be recommended as the presence of cattle on the land would have only slight impacts on the erosion of the land if they tend to avoid the areas of steeper slopes, which they tend to do.

I recommend that the client should continue to participate in ranching because the land does not have enough suitable land to create any incentive to pursuing farming of major field crops. The ranching would not create any more erosion impacts than the slight impacts that are already present there, and the fencing wouldn't be much of a problem due to the already existing fences and the methodology of creating

suitable conditions for reparations and maintenance of fences. So, it is in the best interests of the Teachout Family Ranch to continue ranching and not go into cultivating crops on farmland.

Soil Series

Soil Map Unit	Soil Name	Typical Profile	Suborder	Topography and Landform
AtE	Anselmo-Longpine	<p>Anselmo: Ap--0 to 5 inches, fine sandy loam A--5 to 11 inches, fine sandy loam Bw-- 11 to 29 inches, fine sandy loam C - 29 to 60 inches, fine sandy loam</p> <p>Longpine: Ap--0 to 5 inches, fine sandy loam C--5 to 16 inches, gravelly fine sandy loam Cr--16 to 80 inches, sandstone</p>	<p>Anselmo: Ustolls</p> <p>Longpine: Orthents</p>	<p>Anselmo: 9-17% slopes Backslope Well Drained</p> <p>Longpine: 9 to 21% slopes Shoulder/summit Well drained</p>
AvA	Anselmo-Vetal	<p>Anselmo: Ap--0 to 5 inches, fine sandy loam A--5 to 11 inches, fine sandy loam Bw-- 11 to 29 inches, fine sandy loam C - 29 to 60 inches, fine sandy loam</p> <p>Vetal: A1--0 to 8 inches, fine sandy loam A2--8 top 23 inches, fine sandy loam AC1--23 to 36 inches, fine sandy loam AC2--36 to 42 inches, fine sandy loam C--42 to 60 inches, fine sandy loam</p>	<p>Anselmo: Ustolls</p> <p>Vetal: Ustolls</p>	<p>Anselmo: 9-17% slopes Backslope Well Drained</p> <p>Vetal: 0 to 2% slopes Footslope Well drained</p>
HfA	Holt	<p>A--0 to 6 inches, fine sandy loam Bt1--6 to 11 inches, fine sandy loam Bt2--11 to 17 inches, fine sandy loam BC--17 to 22 inches, sandy loam Cr1--22 to 27 inches, weathered soft sandstone Cr2 - 27 to 60 inches, moderately cemented sandstone</p>	Ustolls	<p>0 to 3% slopes Shoulder/summit Well drained</p>
HIC	Holt-Vetal	<p>Holt: A--0 to 6 inches, fine sandy loam Bt1--6 to 11 inches, fine sandy loam Bt2--11 to 17 inches, fine sandy loam BC--17 to 22 inches, sandy loam Cr1--22 to 27 inches, weathered soft sandstone</p>	<p>Holt: Ustolls</p>	<p>Holt: 0 to 3% slopes Shoulder/summit Well drained</p>

		Cr2 – 27 to 60 inches, moderately cemented sandstone Vetal: A1—0 to 8 inches, fine sandy loam A2—8 top 23 inches, fine sandy loam AC1—23 to 36 inches, fine sandy loam AC2—36 to 42 inches, fine sandy loam C—42 to 60 inches, fine sandy loam	Vetal: Ustolls	Vetal: 0 to 2% slopes Footslope Well drained
Le	Loup-Elsmere	Loup: A – 0 to 10 inches, fine sandy loam ACg – 10 to 15 inches, fine sand Cg1 – 15 to 25 inches, fine sand Cg2 – 25 to 48 inches, sand Ab – 48 to 79 inches, loamy fine sand Elsmere: A1 – 0 to 6 inches, loamy fine sand A2 – 6 to 14 inches Loamy fine sand AC – 14 to 23 inches, fine sand Cg – 23 to 79 inches, fine sand	Loup: Aquolls Elsmere: Ustolls	Loup: 0 to 2% slope Toeslope Poorly drained Elsmere: 0 to 2% slope Footslope Somewhat poorly drained
T172B	Anselmo	Ap—0 to 5 inches, fine sandy loam A--5 to 11 inches, fine sandy loam Bw-- 11 to 29 inches, fine sandy loam C – 29 to 60 inches, fine sandy loam	Ustolls	9-17% slopes Backslope Well Drained
T172D	Anselmo	Ap—0 to 5 inches, fine sandy loam A--5 to 11 inches, fine sandy loam Bw-- 11 to 29 inches, fine sandy loam C – 29 to 60 inches, fine sandy loam	Ustolls	9-17% slopes Backslope Well Drained
TfE	Longpine-Ronson	Longpine: Ap—0 to 5 inches, fine sandy loam C—5 to 16 inches, gravelly fine sandy loam Cr—16 to 80 inches, sandstone Ronson Ap – 0 to 4 inches, fine sandy loam A – 4 to 12 inches, fine sandy loam AC – 12 to 15 inches, fine sandy loam C—15 to 35 inches, sandy loam Cr– 35 to 60 inches, weakly cemented sandstone	Longpine: Orthents Ronson: Ustolls	Longpine: 9 to 21% slopes Shoulder/summit Well drained Ronson: 3 to 30% slopes Backslope Well drained
VdC	Valentine-Dunday	Valentine: A1 – 0 to 1 inch, fine sand A2 – 1 to 5 inches, fine sand	Valentine: Samments	Valentine: 3 to 9% slopes

		AC – 5 to 10 inches, fine sand C1 – 10 to 18 inches, fine sand C2 – 18 to 33 inches, fine sand C3 – 33 to 50 inches, fine sand C4 – 50 to 80 inches – fine sand Dunday: A1 – 0 to 10 inches, loamy fine sand A2 – 10 to 14 inches, loamy fine sand AC – 14 to 24 inches, loamy fine sand C – 24 to 72 inches, loamy fine sand	Dunday: Ustolls	Backslope/shoulder/summit Excessively drained Dunday: 3 to 6% slopes Footslope/backslope Somewhat excessively drained
We	Wann	Ap – 0 to 6 inches, fine sandy loam A – 6 to 16 inches, fine sandy loam C – 16 to 50 inches, sandy loam Cg – 50 to 60 inches, sandy loam	Ustolls	0 to 1% slopes Toeslope Somewhat poorly drained