

# Memo

**Adaptive Resources, Inc.**

To: Don Blankenau – Blankenau Wilmoth Jarecke, LLP  
From: Thad Kuntz, P.G., Heath Kuntz, and Zane Engelbert  
CC:  
Date: 5/17/2017  
Re: Privileged and Confidential: Highly Erodible Soil Characterization of Proposed Keystone XL Pipeline Routes

**INTRODUCTION**

The Nebraska Public Service Commission (NPSC) requested Adaptive Resources, Inc. (ARI) complete an erodible soil characterization survey of the three proposed routes that the Keystone XL pipeline traverses. The survey classified potential highly erodible soils using a wind and water erodible soils index dataset, completed by the Rainwater Basin Joint Venture (RWBJV), and the U.S. General Soil Map (STATSGO2) dataset of the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS).

**HIGHLY ERODABLE SOIL CHARACTERIZATION**

The RWBJV completed an analysis that resulted in a raster (pixel-based) dataset that characterized the soils within Nebraska classified as being potentially highly erodible to wind and water. The RWBJV classification was completed using the USDA NRCS Soil Survey Geographic (SSURGO) database. Modified versions of the Wind Erosion Equation (WEQ) and Universal Soil Loss Equation (USLE) were used to create wind and water erosion indexes, respectively (RWBJV, 2014).

The WEQ and USLE utilize soil characteristics from the SSURGO database such as the susceptibility of soils to wind erosion, county-specific climate characterization of wind speed and surface moisture values, slope of the soil, slope length, susceptibility of the soil to water erosion, soil loss tolerance, the county-specific rainfall and runoff values (RWBJV, 2014). These two equations were calculated for all areas throughout the state and provided a range of soil erodible indexes for both wind and water (RWBJV, 2014). They organized the dataset to soils with an index of less than or equal to 7 and greater than or equal to 8. The soils having an index of 8 or greater are considered to be potentially highly erodible to wind and water as described by the USDA NRCS and are converted into a raster value of 1 (RWBJV, 2014). Any soil with an index of 7 or less was converted into a raster value of 0 (RWBJV, 2014).

The RWBJV wind and water erodibility index with a raster value of 1 was joined to the STATSGO2 dataset to provide a spatially distributed potentially highly erodible soils from wind or water throughout Nebraska. Geographic Information System (GIS) information of the proposed preferred and alternative Keystone XL pipeline routes were obtained from NPSC staff to determine the location of the routes throughout Nebraska. Maps were generated for each of the 23 counties that the routes cross combined with the potentially highly erodible soils from wind and water (see MAPS section). Also included on each map are the statistics including the total length of each proposed pipeline route within a county, the total length that traverses the potentially highly erodible soils from wind and water, and a percentage calculation for that county. Additionally, Appendix A provides a detailed description of each potentially highly erodible soil from wind and water from the SSURGO database that the routes intersect.

# Memo

## REFERENCES

Bishop, A., Dominy, N, Grosse, R., Jorgensen, C., Klenke, K., and Shurtliff, D., May 2014, The Development and Use of Spatially Explicit Erodible Soil Indices for Nebraska, Rainwater Basin Joint Venture (RWBJV)

**MAPS**

**Legend**

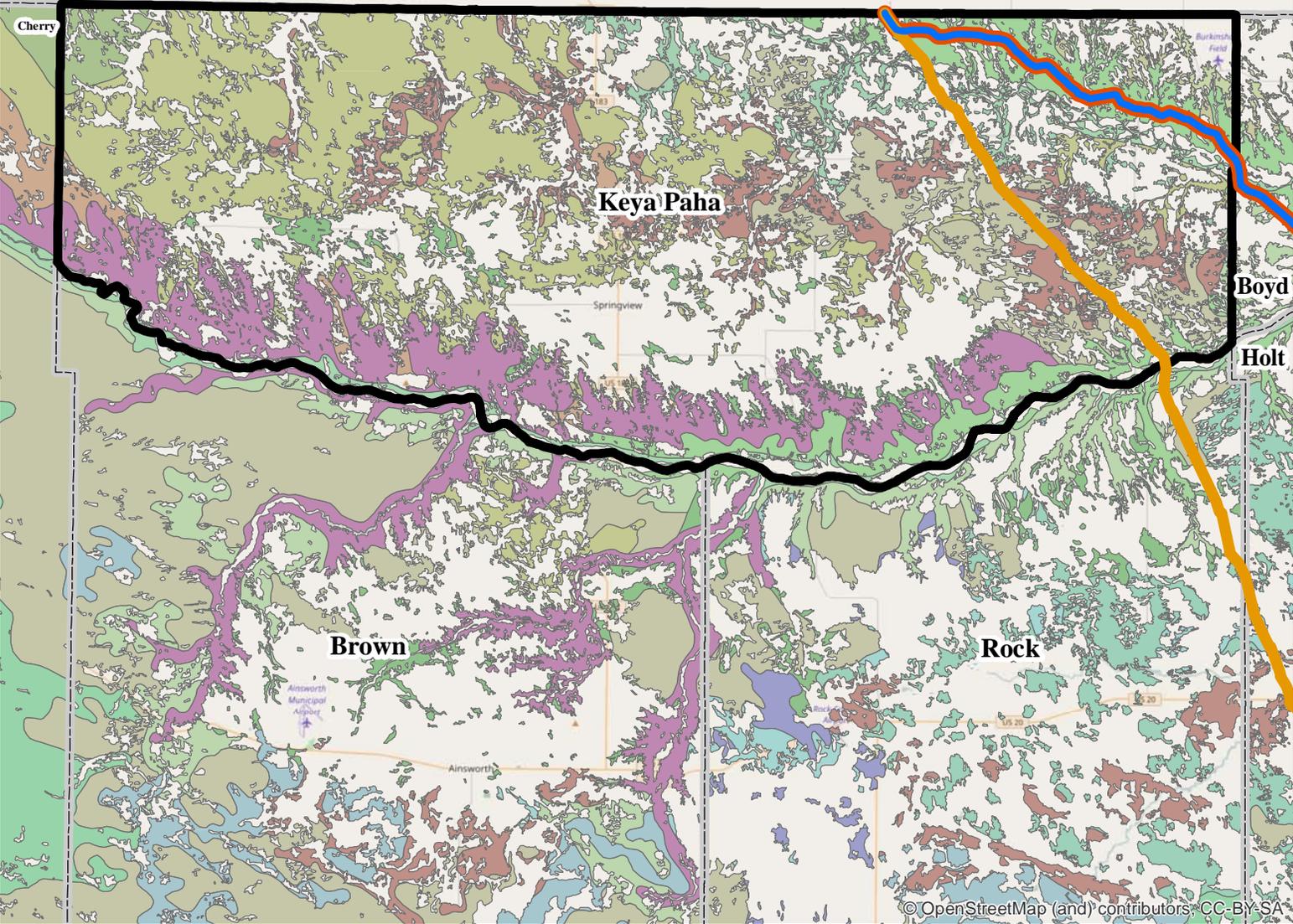
**Routes**

- Preferred Route
- Sandhills Alt. Route
- Mainline Alt. Route

**Counties**

**Highly Erodible Soil Type**

- Loup-Ipage-Elsmere
- Loup-Leshara-Inavale-Boel-Barney-Almeria
- O'Neill-Meadin-Jansen
- Ree-Meadin-Jansen
- Reliance-Ree-Onita
- Sansarc-Labu-Boyd
- Tassel-Ronson-McKelvie-Duda
- Valentine
- Valentine-Kolls-Elsmere-Anselmo
- Valentine-Simeon-Dunday
- Valentine-Tassel
- Vetal-Tassel-Manter-Holt-Anselmo
- Wewela-Valentine-O'Neill-Ipage-Anselmo

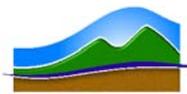
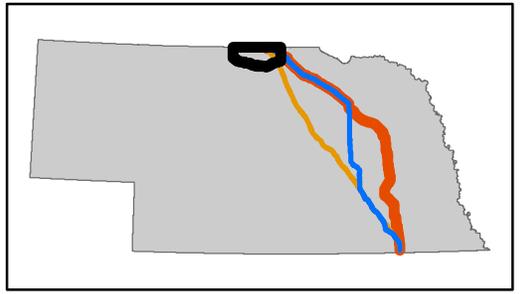


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**County: Keya Paha**



Page 1	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	64,797	24,049	88,846	72.9%
Mainline Alt. Route	64,725	24,100	88,824	72.9%
Sandhills Alt. Route	60,415	38,091	98,507	61.3%



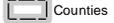
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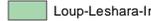
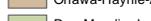
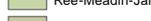
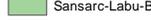
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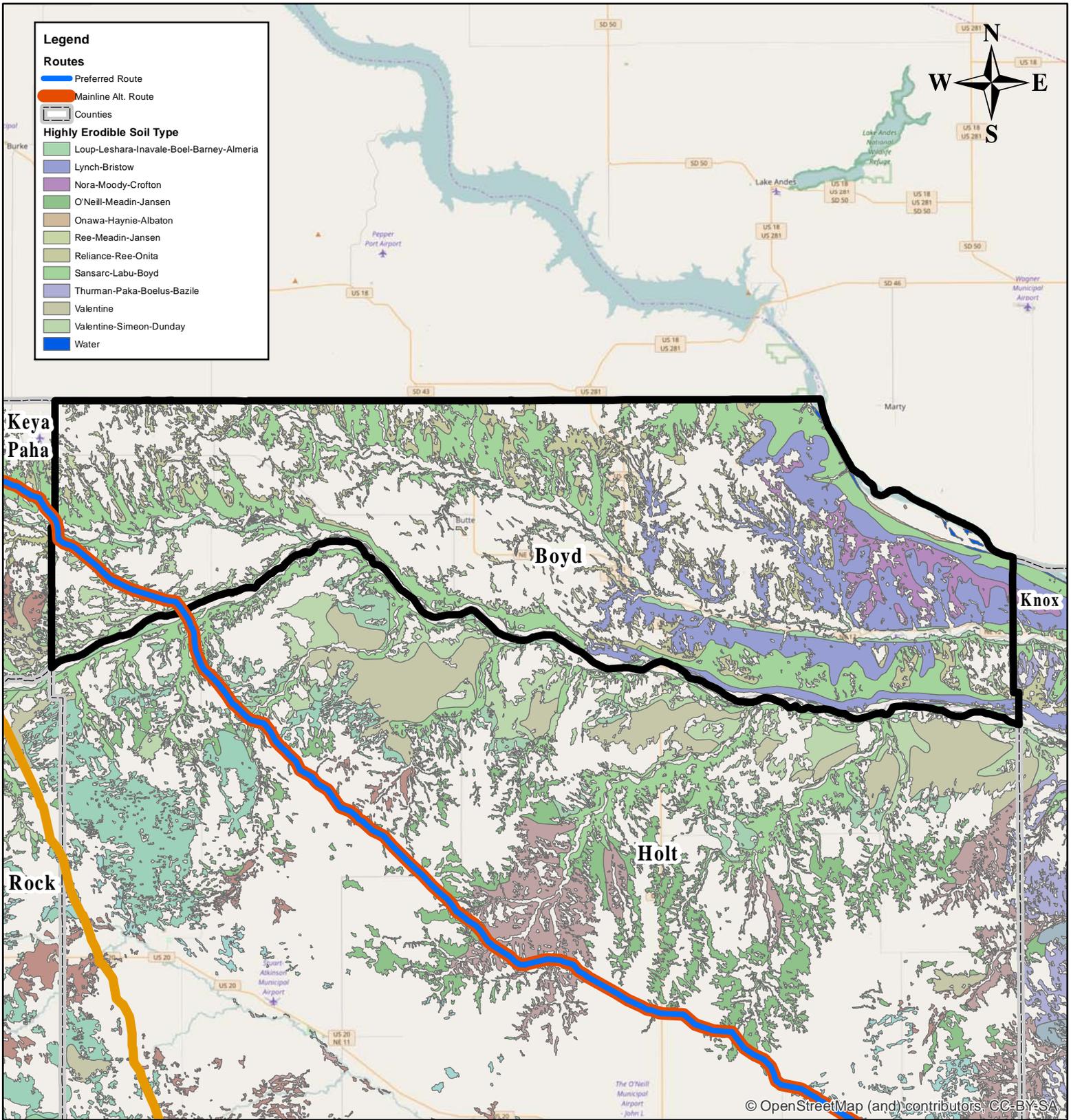
**Routes**

-  Preferred Route
-  Mainline Alt. Route

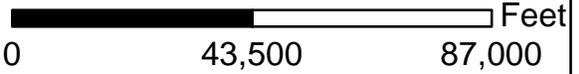
 Counties

**Highly Erodible Soil Type**

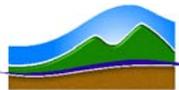
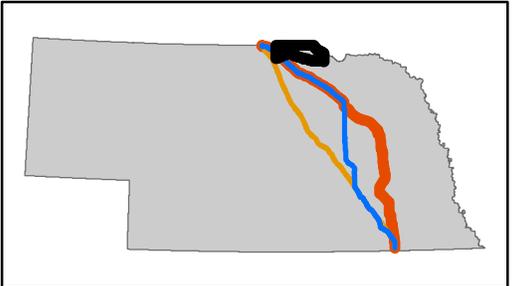
-  Loup-Leshara-Inavale-Boel-Barney-Almeria
-  Lynch-Bristow
-  Nora-Moody-Crofton
-  O'Neill-Meadin-Jansen
-  Onawa-Haynie-Albaton
-  Ree-Meadin-Jansen
-  Reliance-Ree-Onita
-  Sansarc-Labu-Boyd
-  Thurman-Paka-Boelus-Bazile
-  Valentine
-  Valentine-Simeon-Dunday
-  Water



**County: Boyd**



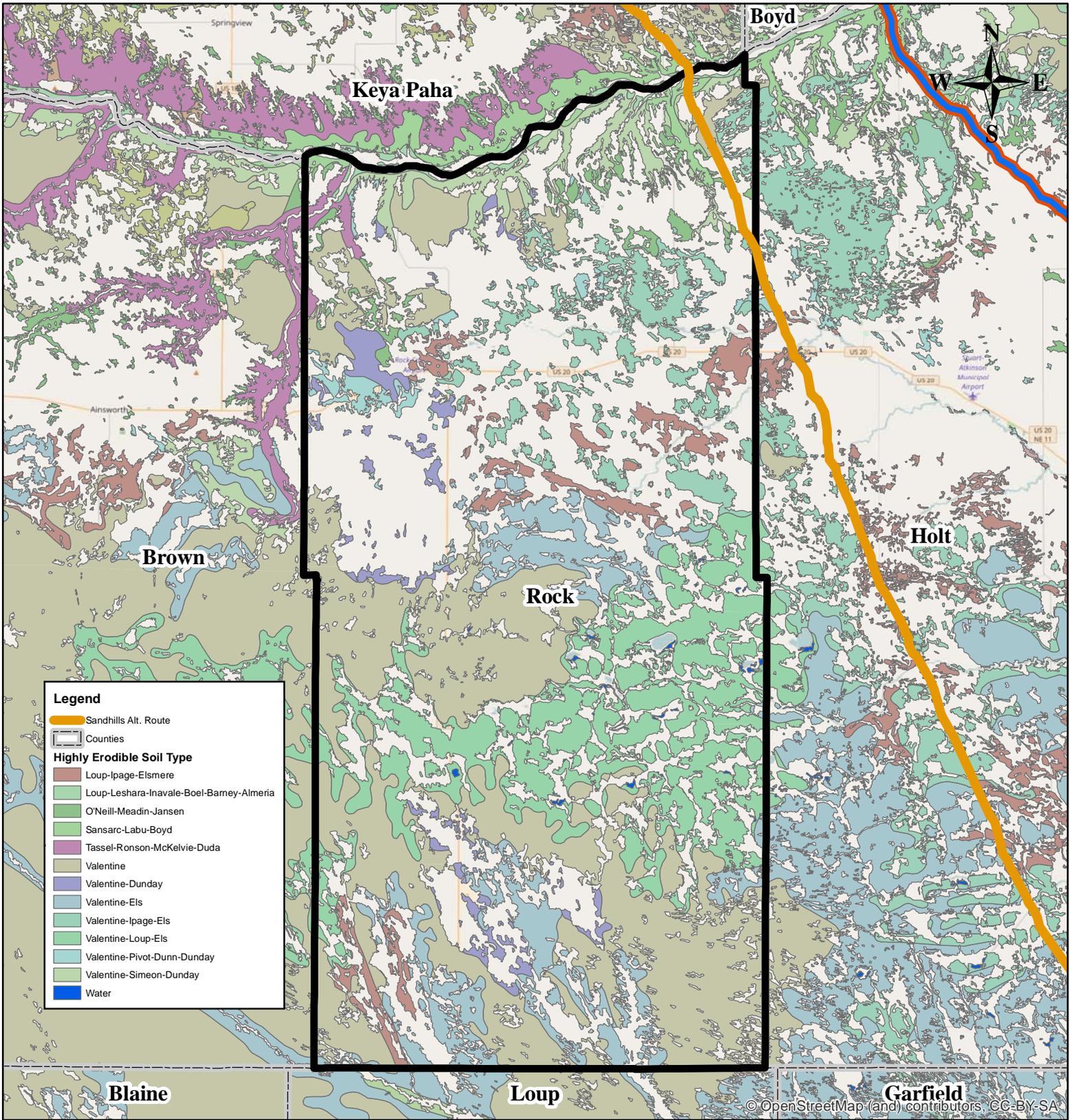
Page 2	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	15,588	29,211	44,798	34.8%
Mainline Alt. Route	15,588	29,211	44,798	34.8%
Sandhills Alt. Route	0	0	0	NA



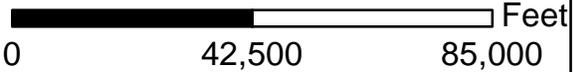
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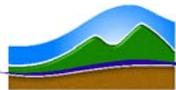
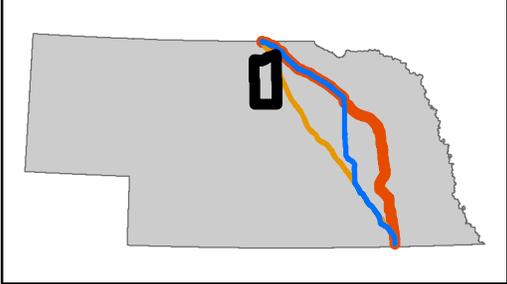
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**County: Rock**

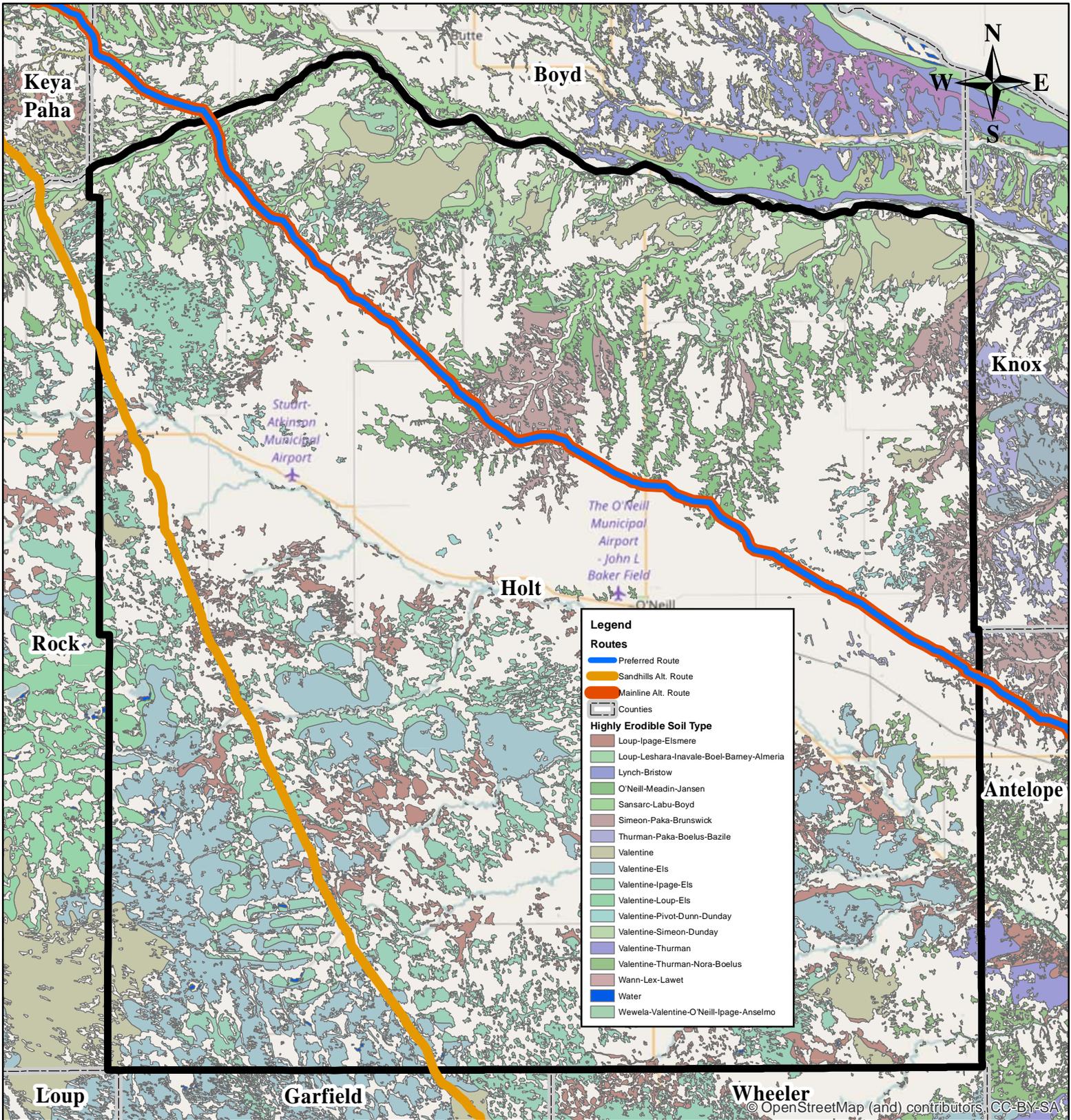


Page 3	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	0	0	0	NA
Mainline Alt. Route	0	0	0	NA
Sandhills Alt. Route	19,565	30,320	49,884	39.2%

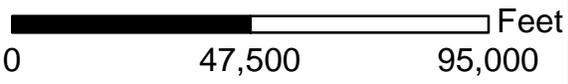


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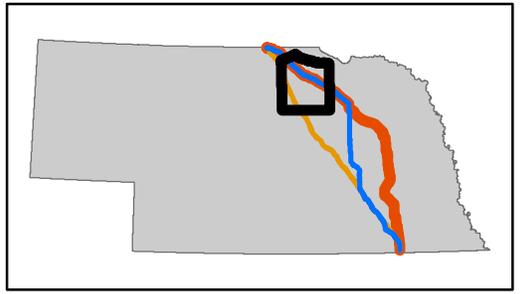
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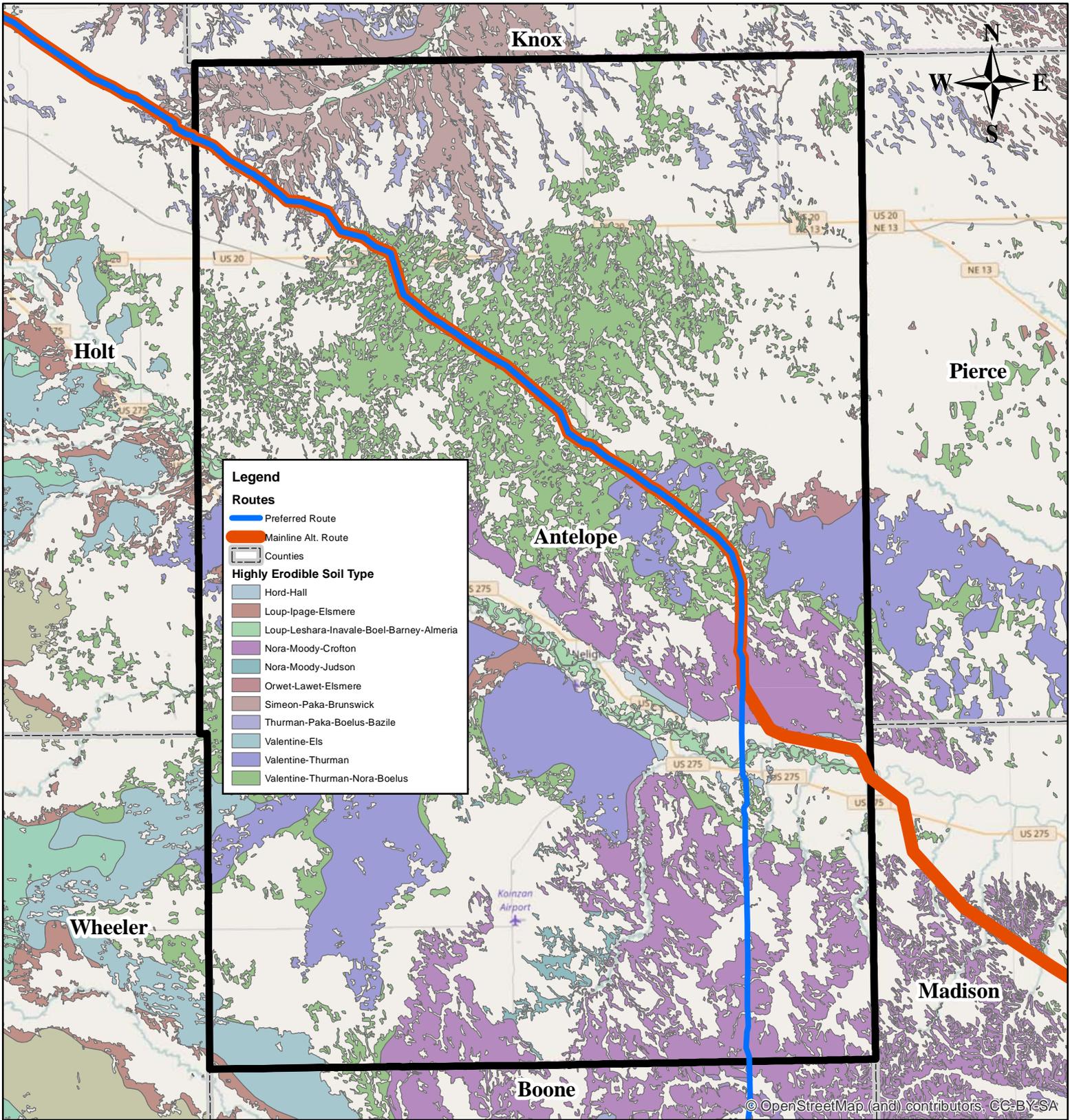


**County: Holt**

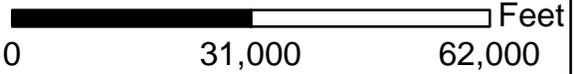


Page 4	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	56,654	233,106	289,760	19.6%
Mainline Alt. Route	56,654	233,106	289,760	19.6%
Sandhills Alt. Route	95,201	140,153	235,353	40.5%

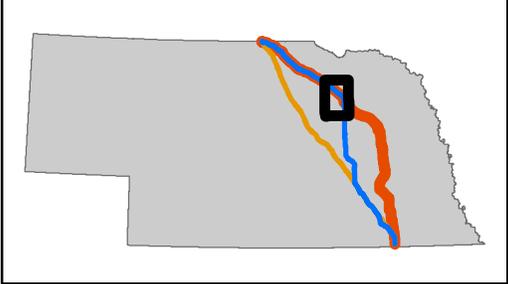


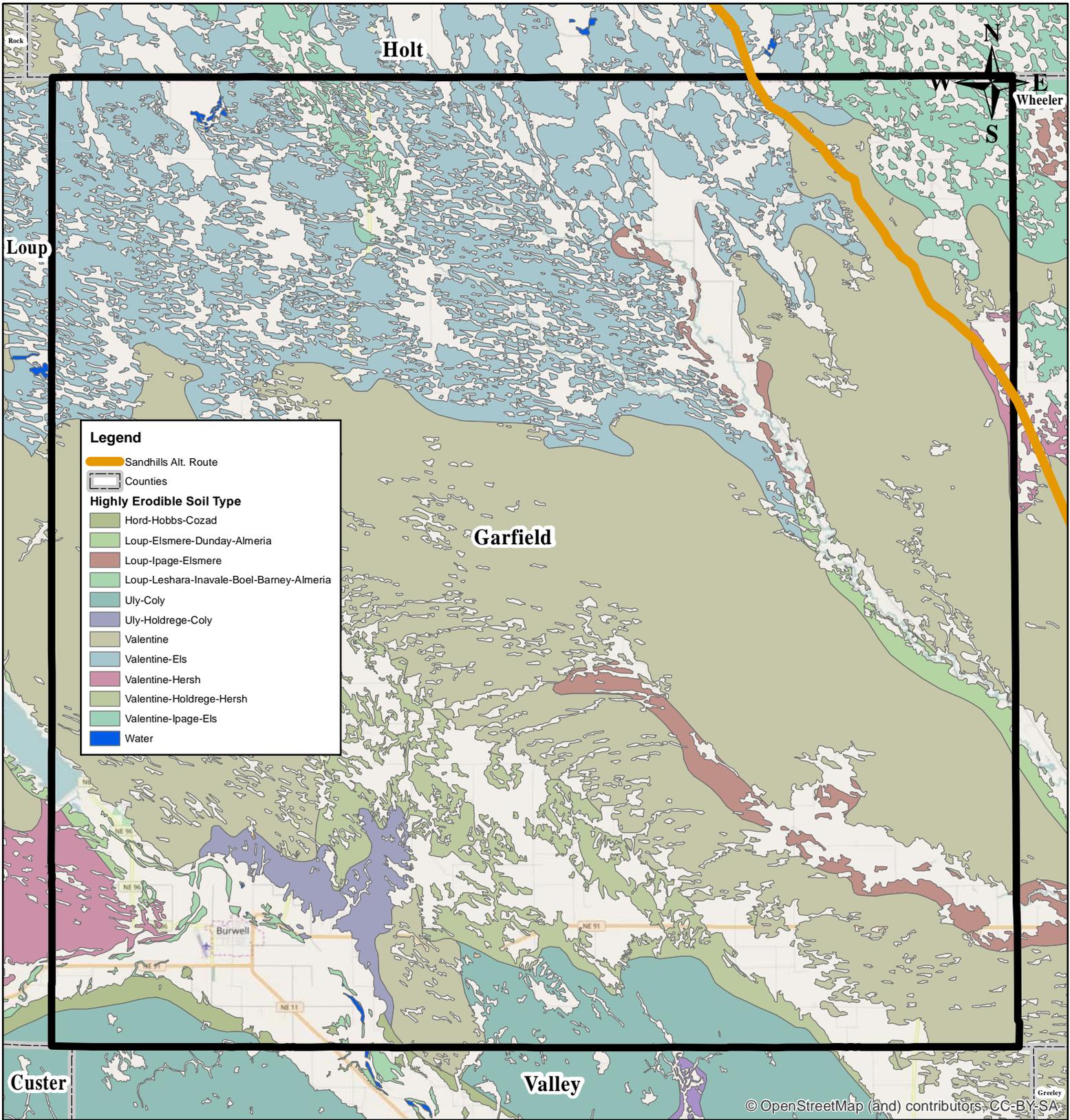


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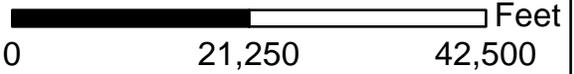


Page 5	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	122,017	103,713	225,730	54.1%
Mainline Alt. Route	92,334	96,227	188,561	49.0%
Sandhills Alt. Route	0	0	0	NA

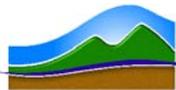
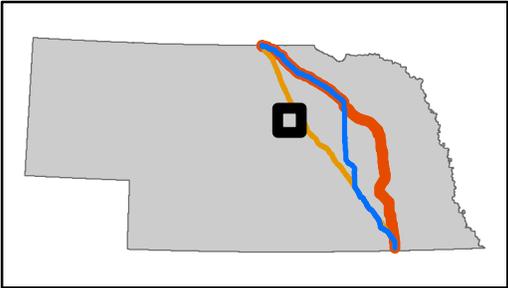




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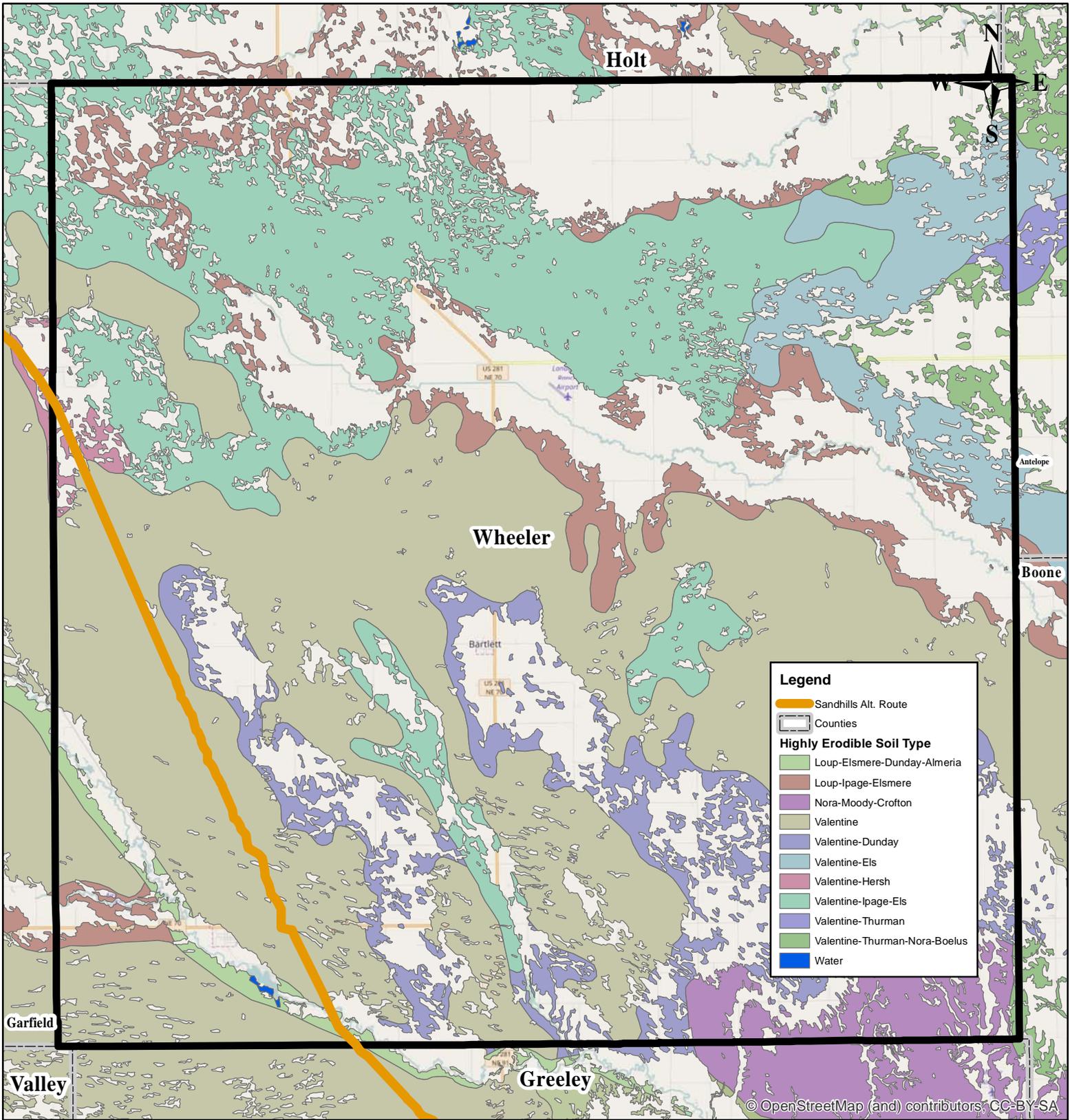


Page 6	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	0	0	0	NA
Mainline Alt. Route	0	0	0	NA
Sandhills Alt. Route	46,371	8,650	55,021	84.3%

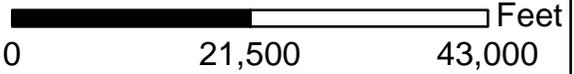


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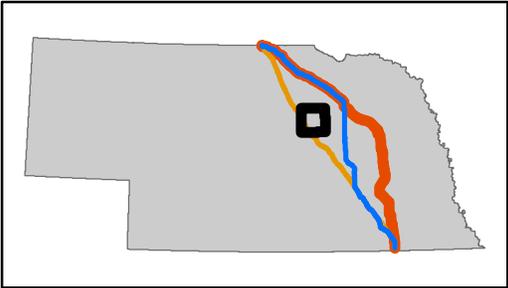
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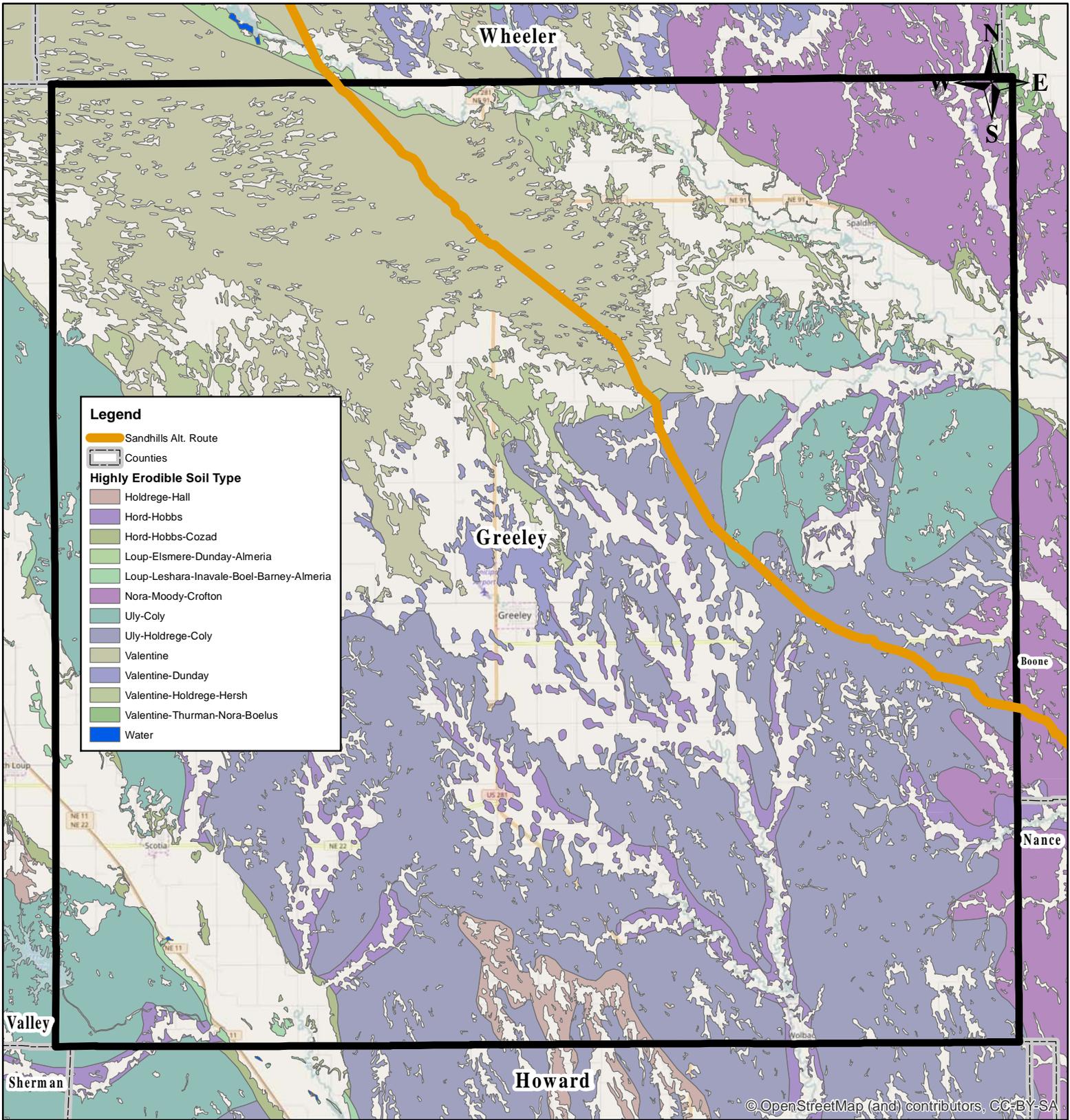


Page 7	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	0	0	0	NA
Mainline Alt. Route	0	0	0	NA
Sandhills Alt. Route	87,835	8,087	95,923	91.6%

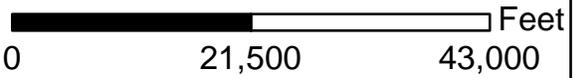


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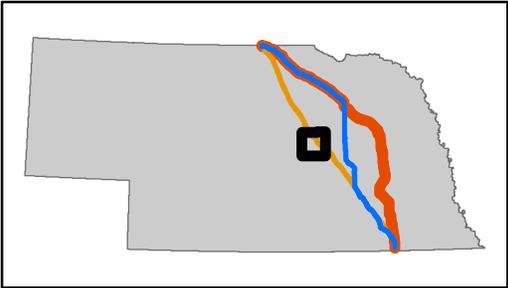
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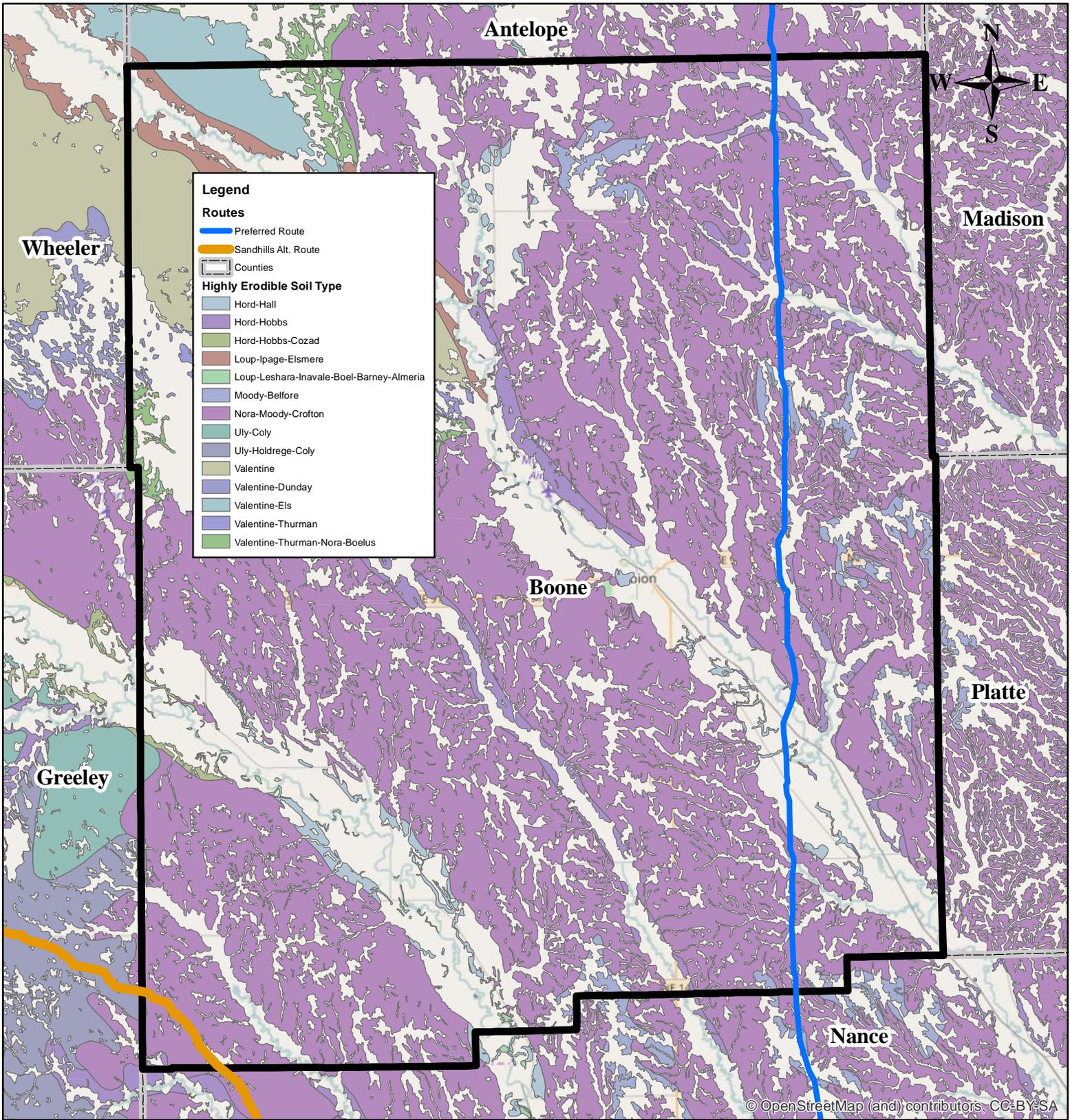


**County: Greeley**



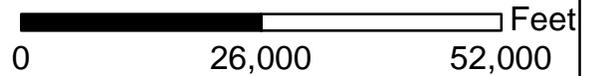
Page 8	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	0	0	0	NA
Mainline Alt. Route	0	0	0	NA
Sandhills Alt. Route	117,329	9,180	126,509	92.7%



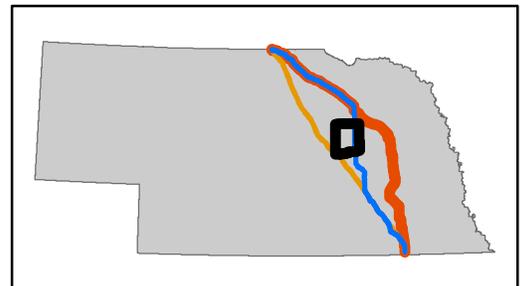


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## County: Boone

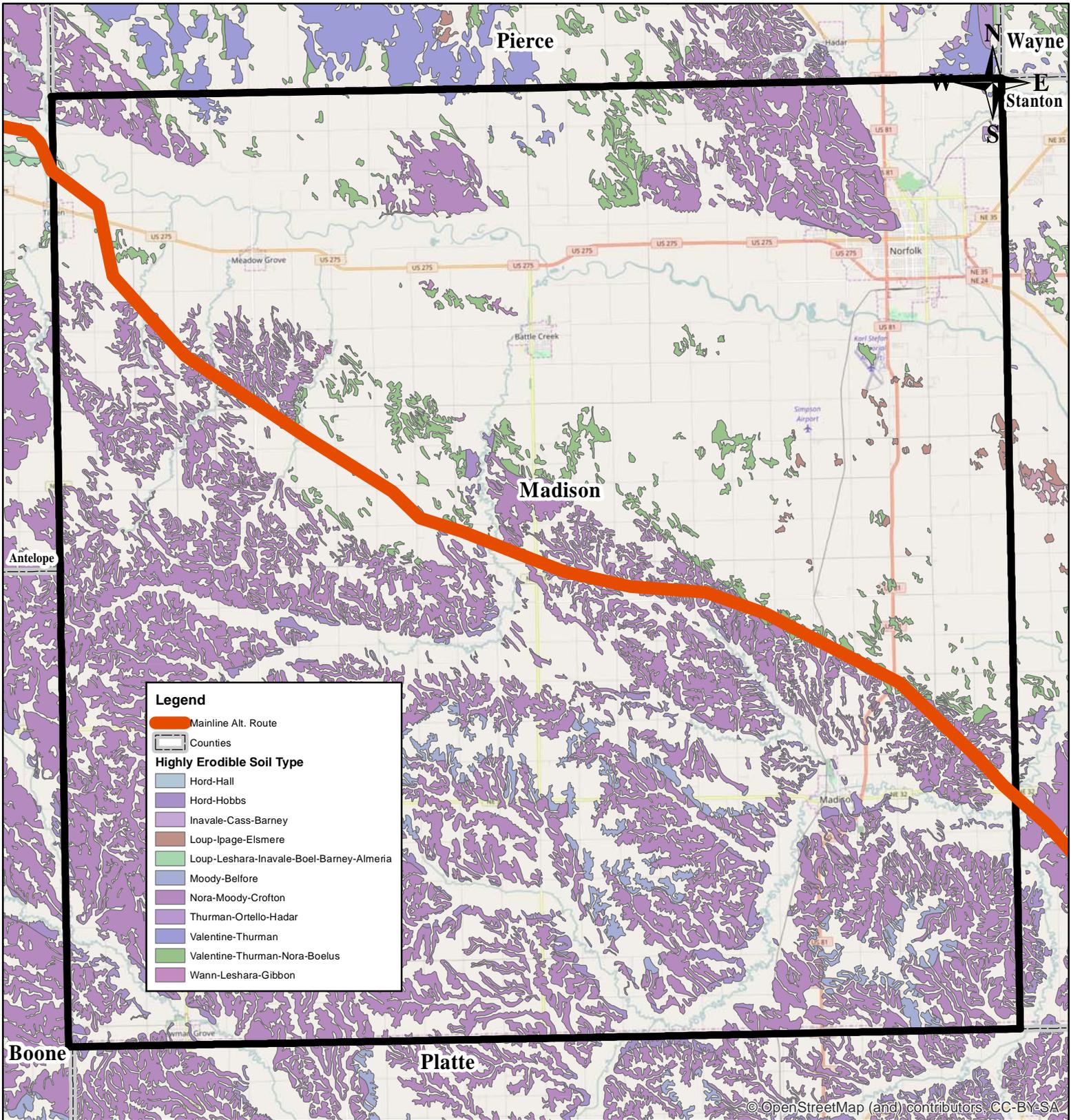


Page 9	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	78,492	70,821	149,313	52.6%
Mainline Alt. Route	0	0	0	NA
Sandhills Alt. Route	12,380	5,782	18,161	68.2%



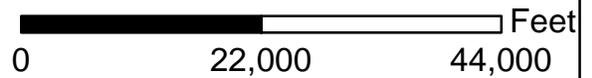
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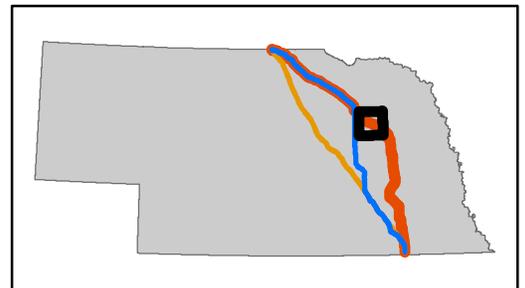


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## County: Madison

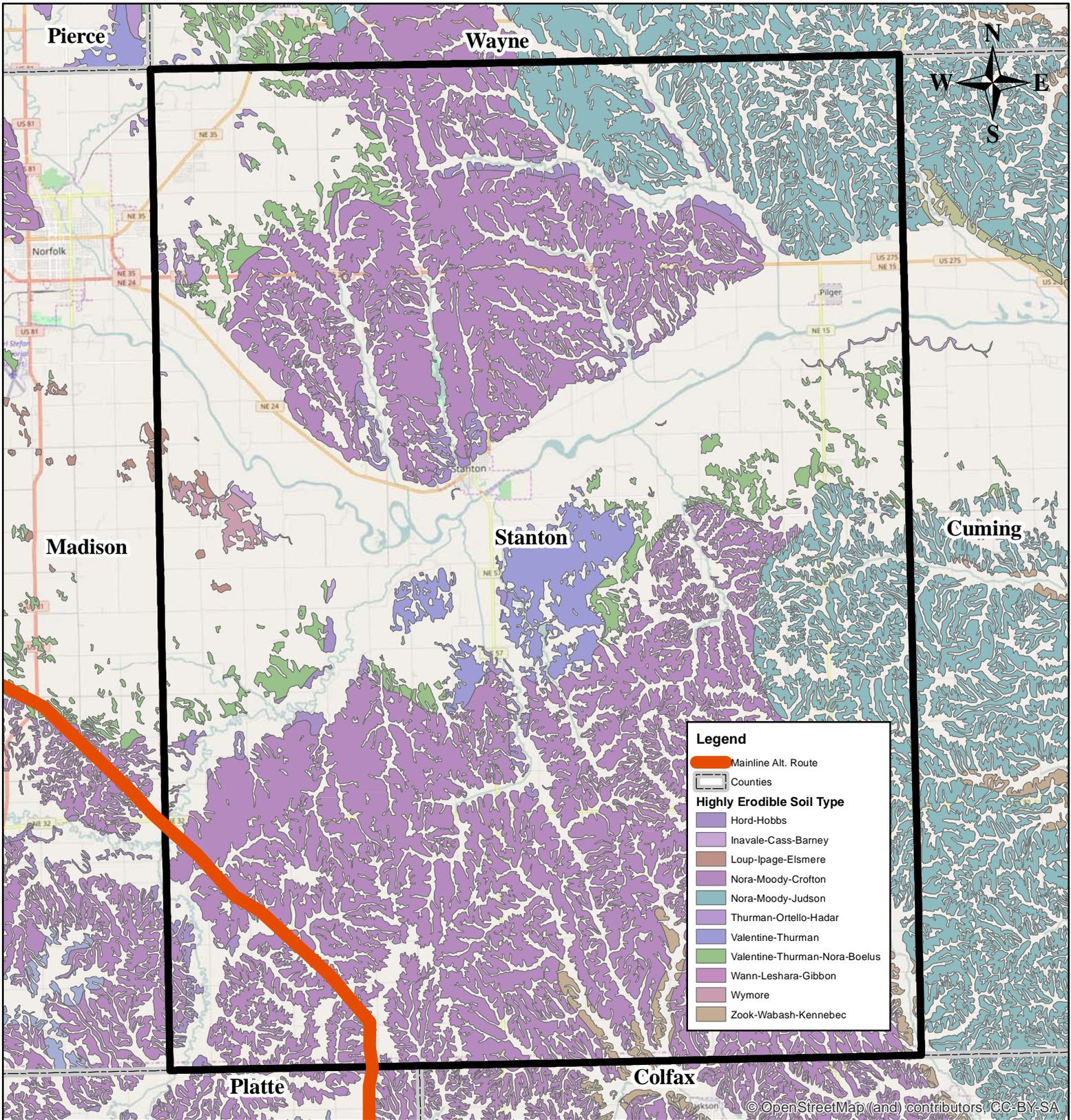


Page 10	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	0	0	0	NA
Mainline Alt. Route	56,107	103,493	159,600	35.2%
Sandhills Alt. Route	0	0	0	NA

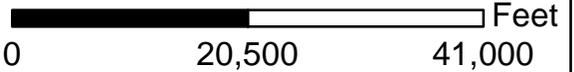


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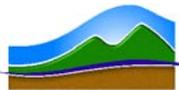
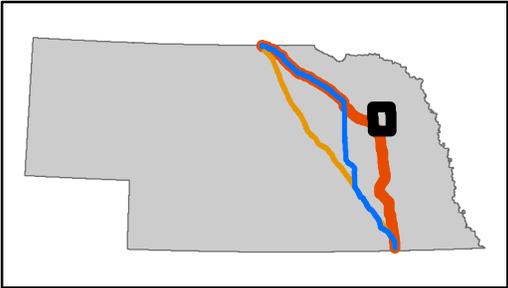
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**County: Stanton**



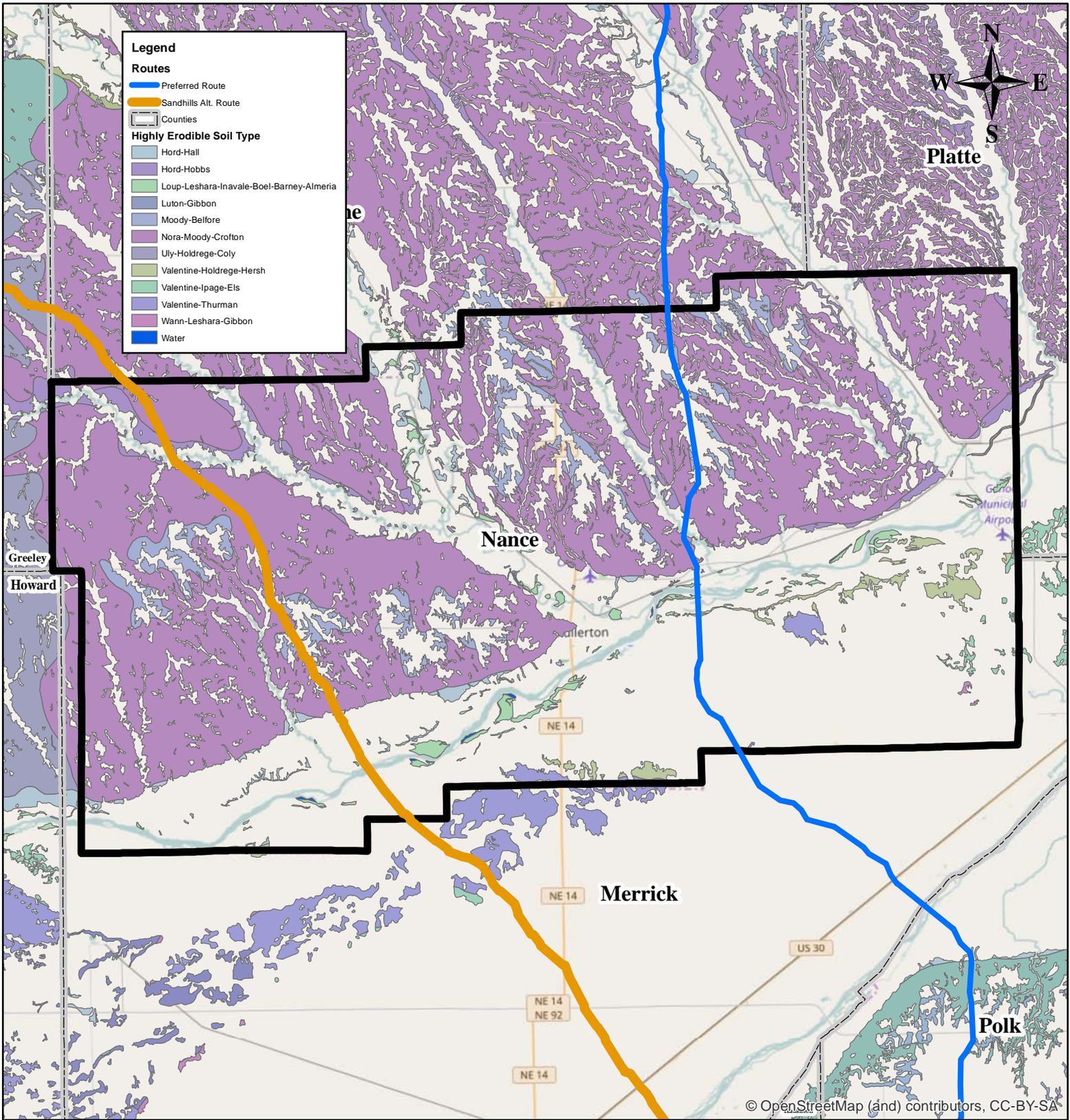
Page 11	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	0	0	0	NA
Mainline Alt. Route	23,864	17,721	41,585	57.4%
Sandhills Alt. Route	0	0	0	NA



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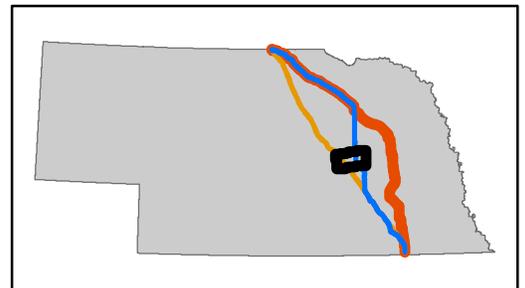


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## County: Nance

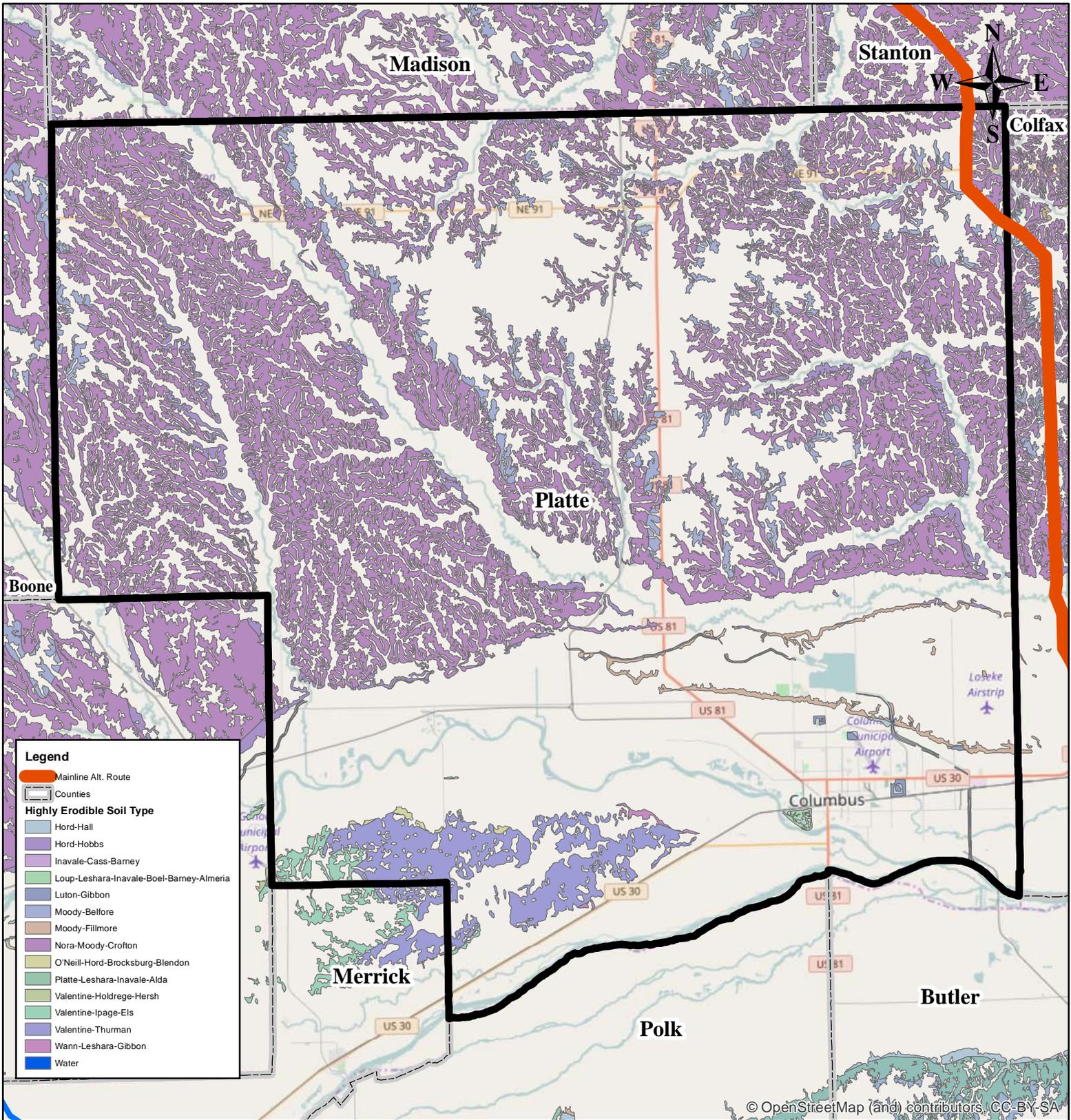


Page 12	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	17,792	59,411	77,203	23.0%
Mainline Alt. Route	0	0	0	NA
Sandhills Alt. Route	50,284	39,957	90,241	55.7%



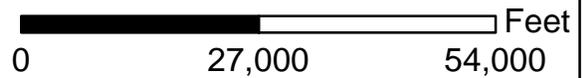
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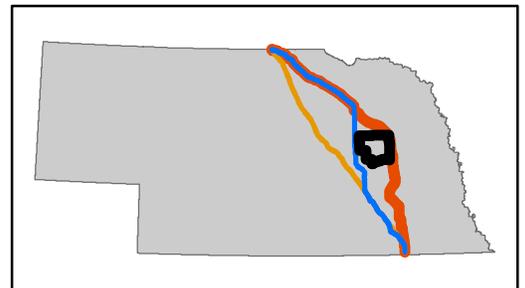


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## County: Platte

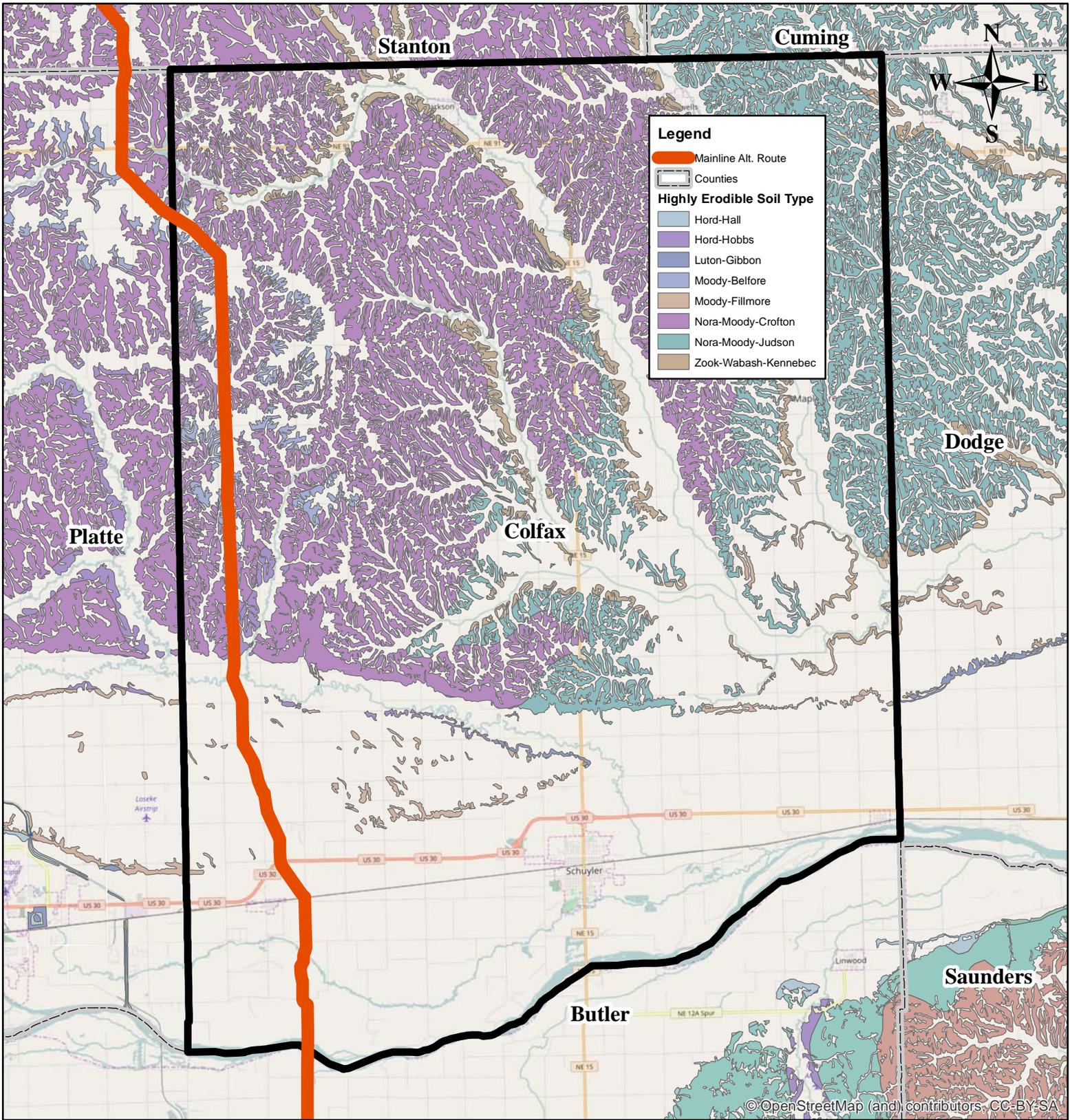


Page 13	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	0	0	0	NA
Mainline Alt. Route	4,909	16,765	21,674	22.6%
Sandhills Alt. Route	0	0	0	NA

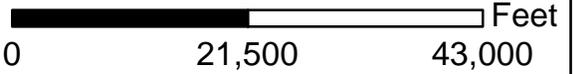


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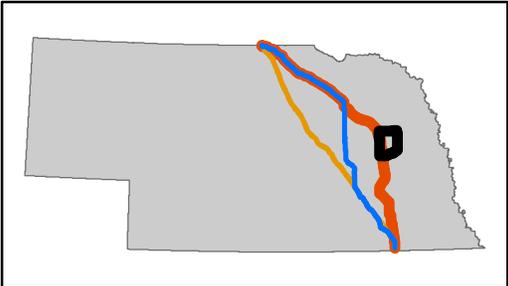
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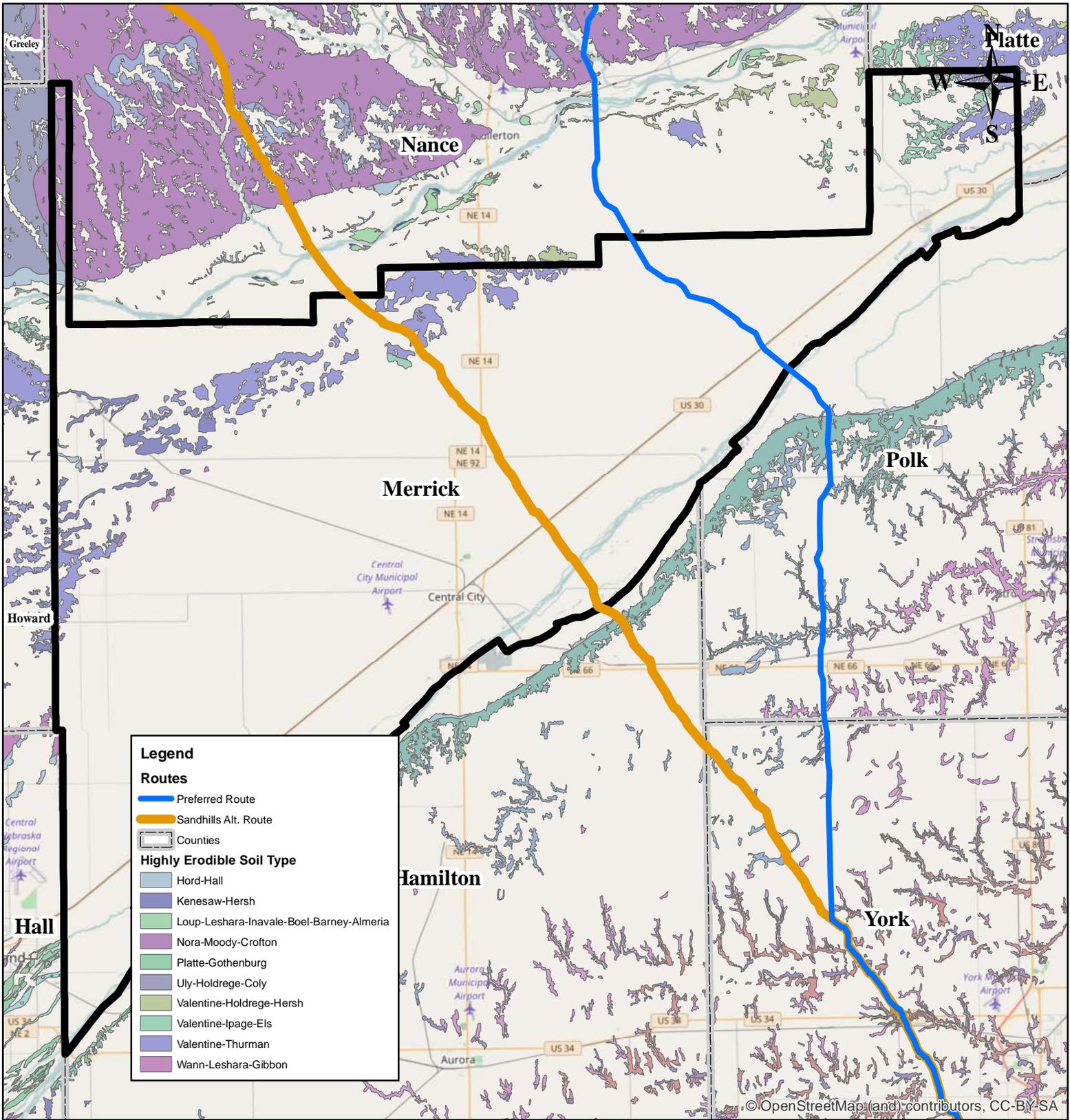


**County: Colfax**

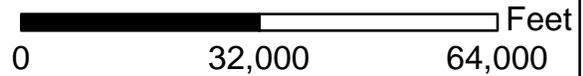


Page 14	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	0	0	0	NA
Mainline Alt. Route	23,978	90,142	114,120	21.0%
Sandhills Alt. Route	0	0	0	NA

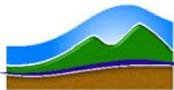
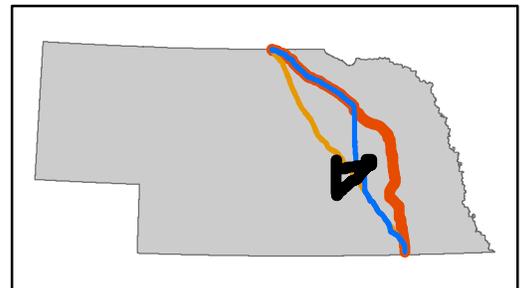




**County: Merrick**

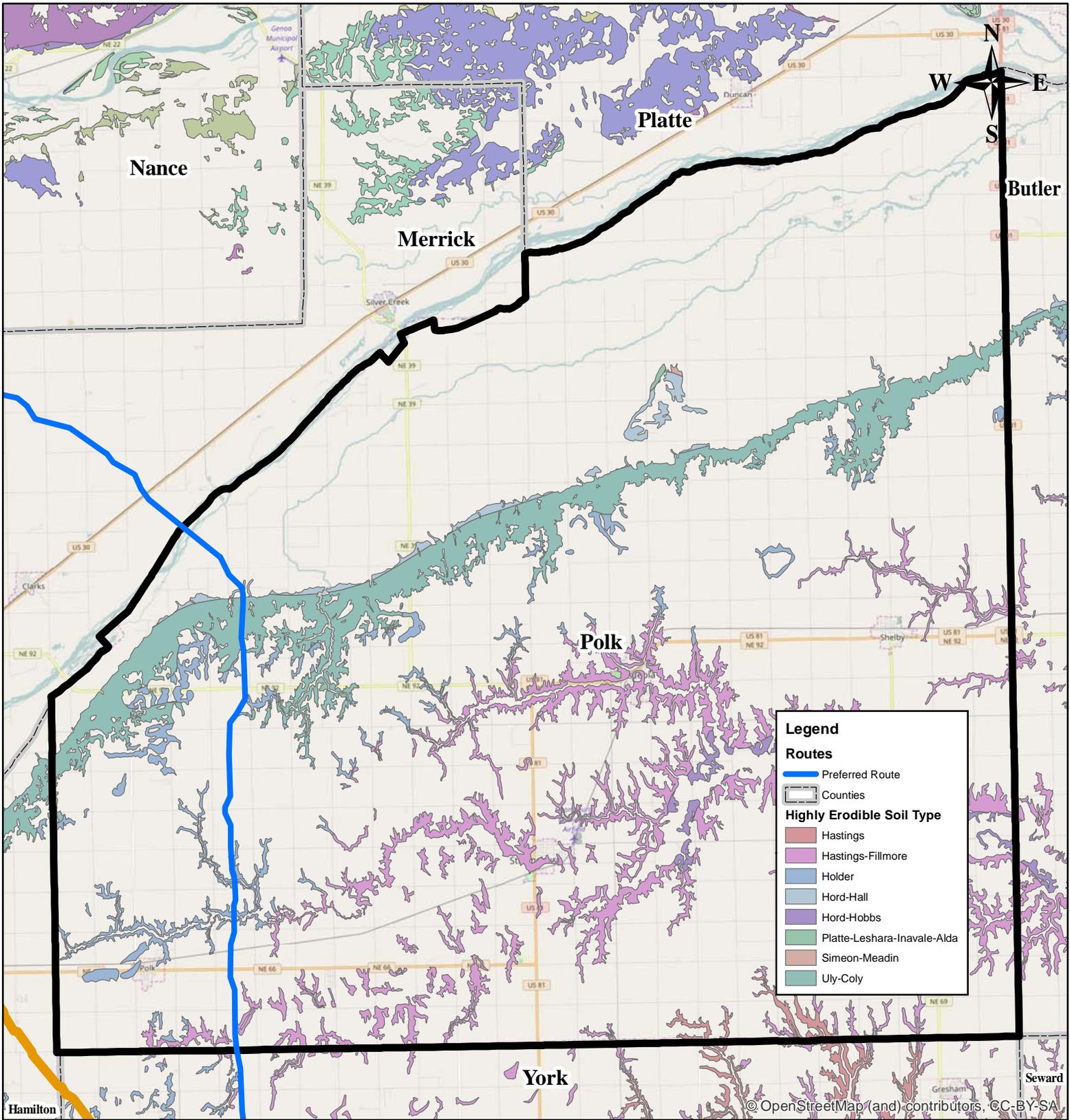


Page 15	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	0	41,831	41,831	0.0%
Mainline Alt. Route	0	0	0	NA
Sandhills Alt. Route	2,245	79,220	81,465	2.8%

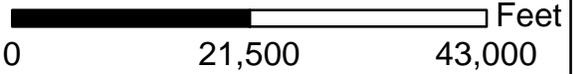


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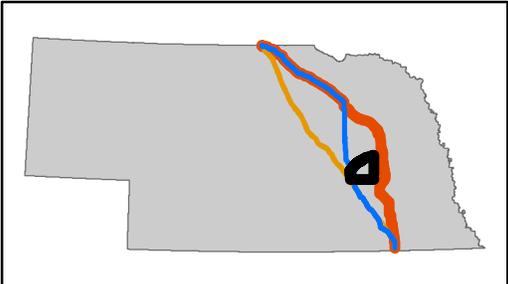
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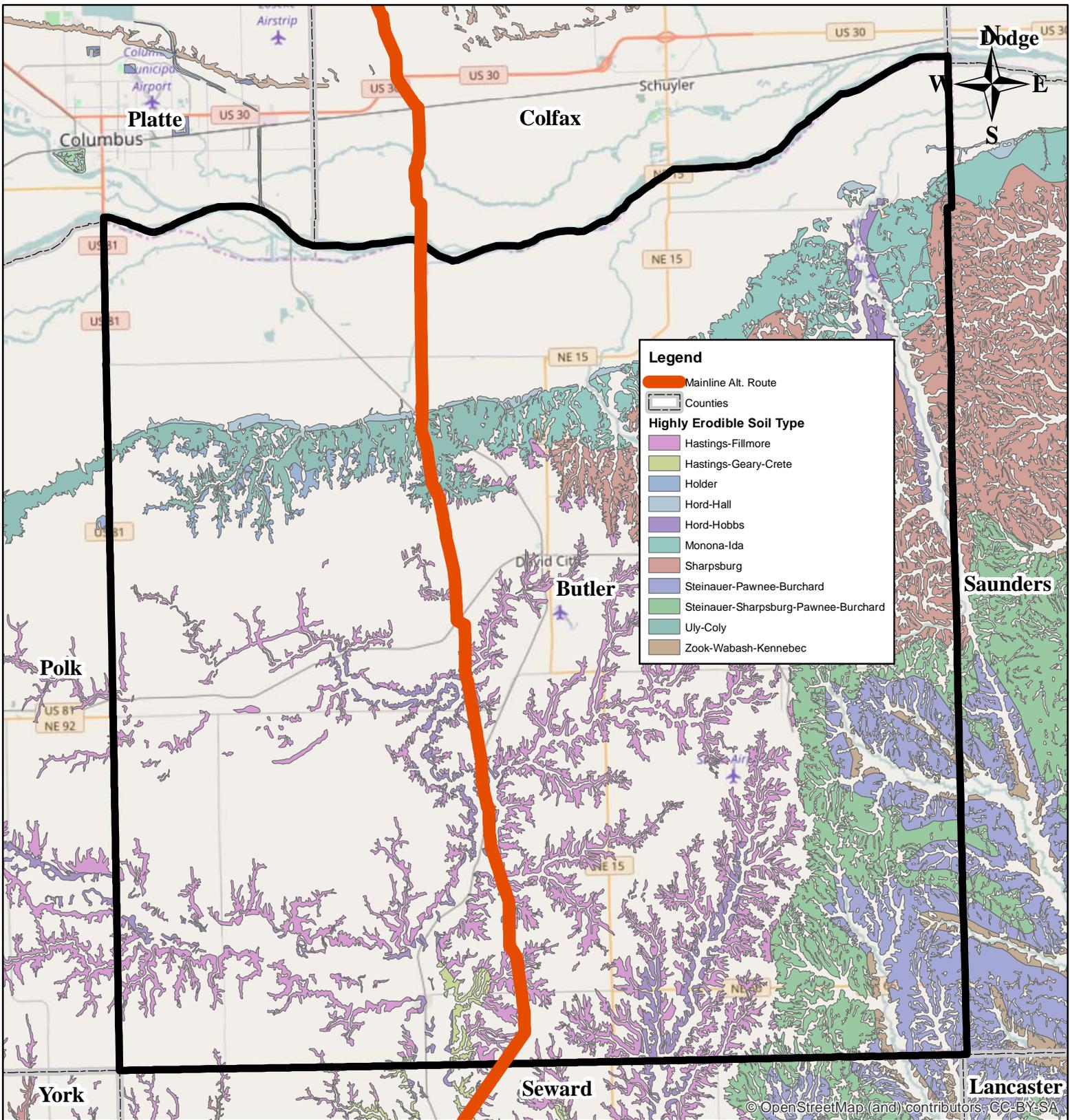


**County: Polk**



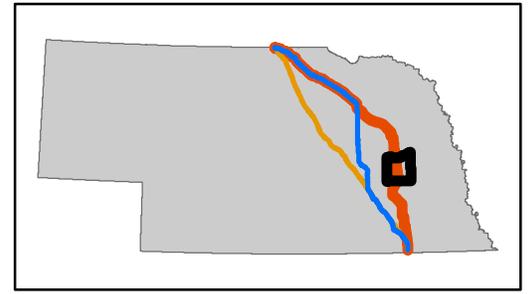
Page 16	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	10,165	61,450	71,615	14.2%
Mainline Alt. Route	0	0	0	NA
Sandhills Alt. Route	0	0	0	NA

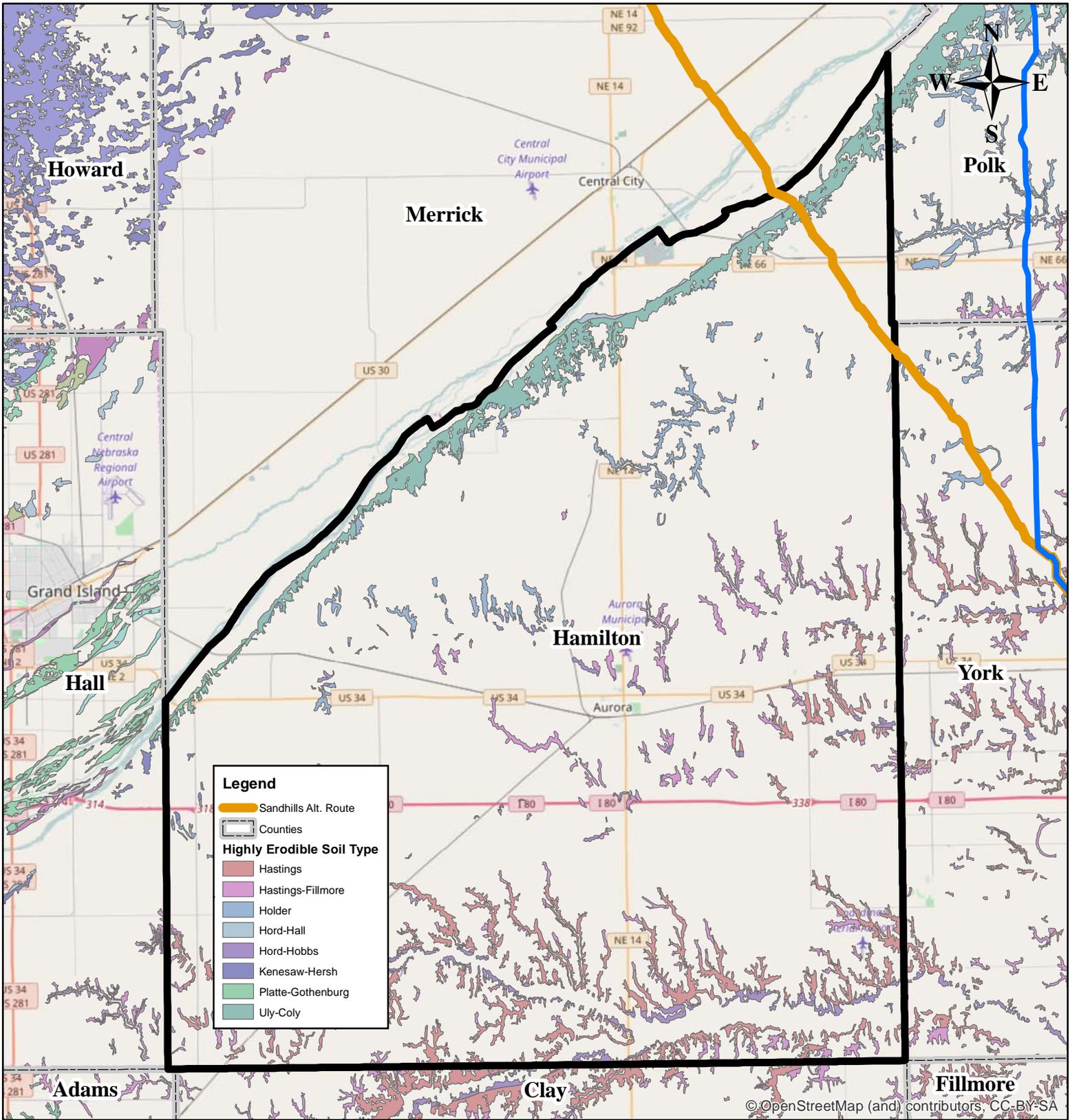




**County: Butler**

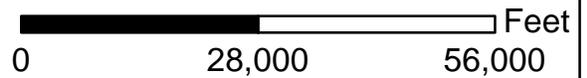
Page 17	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	0	0	0	NA
Mainline Alt. Route	29,762	95,559	125,321	23.7%
Sandhills Alt. Route	0	0	0	NA



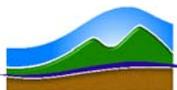


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## County: Hamilton

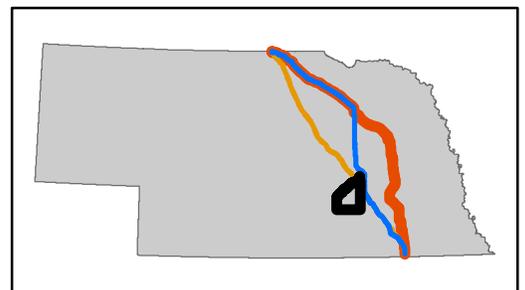


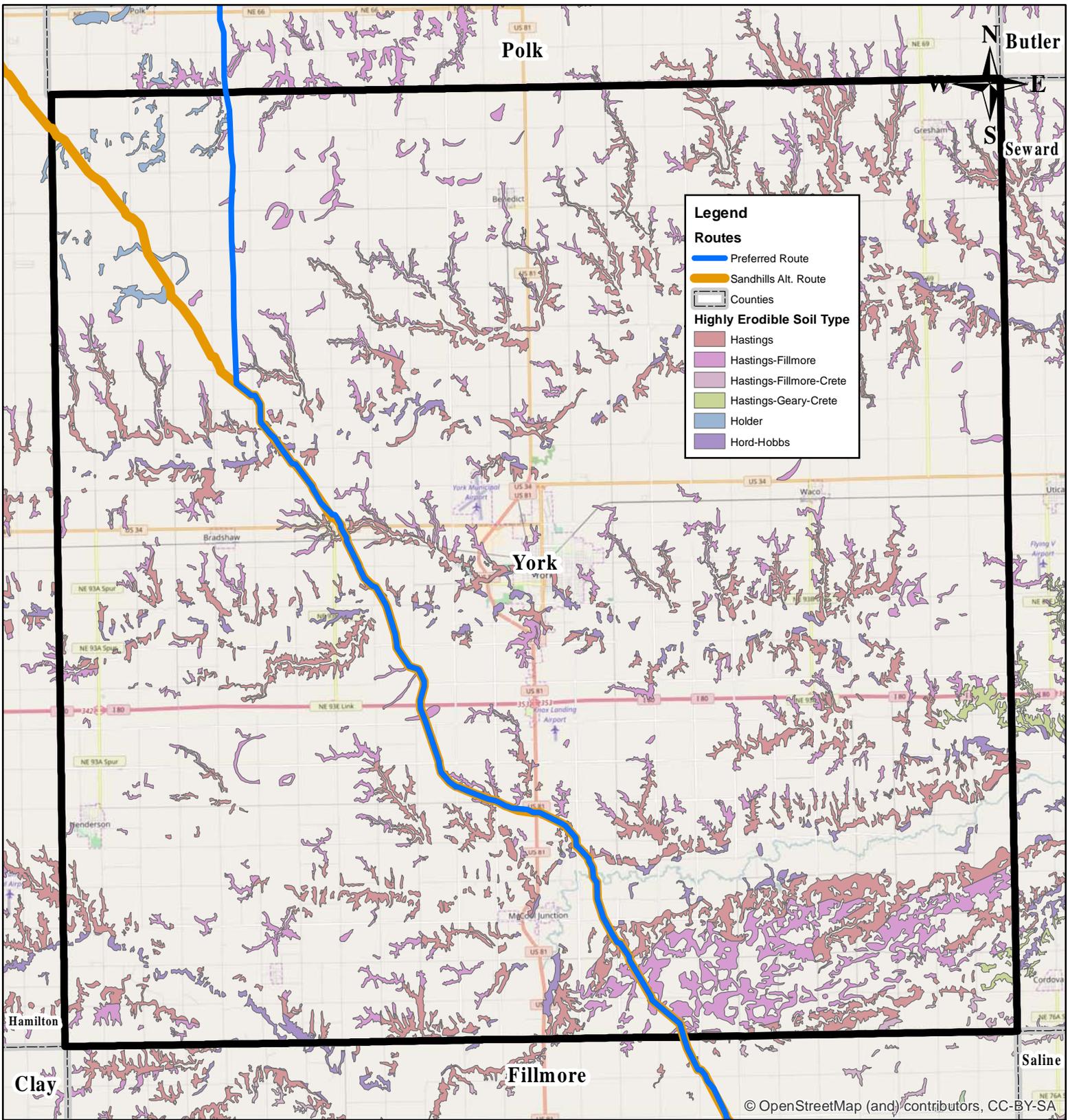
Page 18	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	0	0	0	NA
Mainline Alt. Route	0	0	0	NA
Sandhills Alt. Route	3,581	31,654	35,235	10.2%



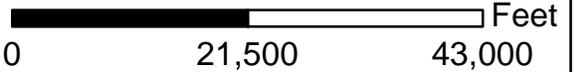
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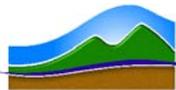
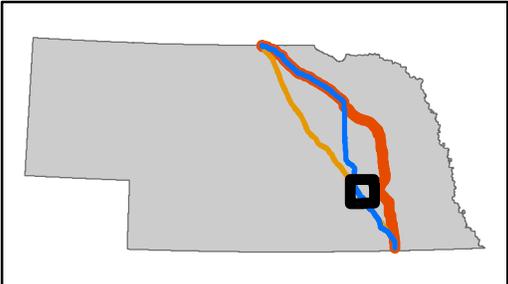




**County: York**



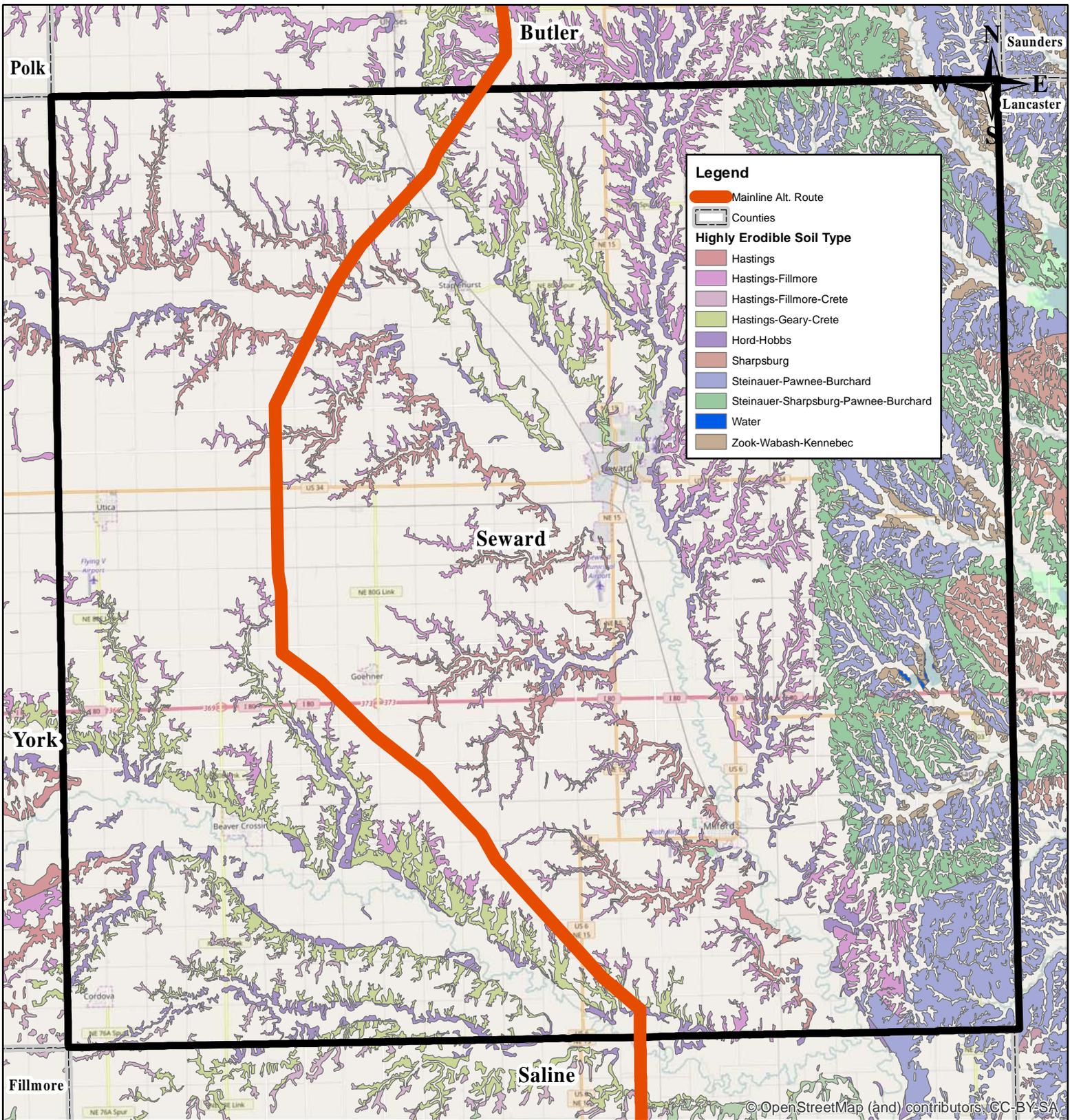
Page 19	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	16,459	135,407	151,866	10.8%
Mainline Alt. Route	0	0	0	NA
Sandhills Alt. Route	15,995	140,397	156,392	10.2%



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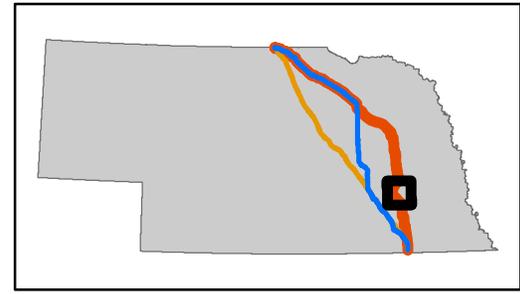
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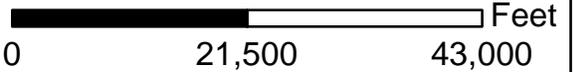
**County: Seward**

Page 20	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	0	0	0	NA
Mainline Alt. Route	12,224	142,907	155,130	7.9%
Sandhills Alt. Route	0	0	0	NA

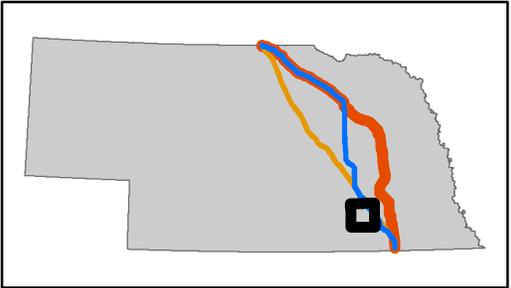


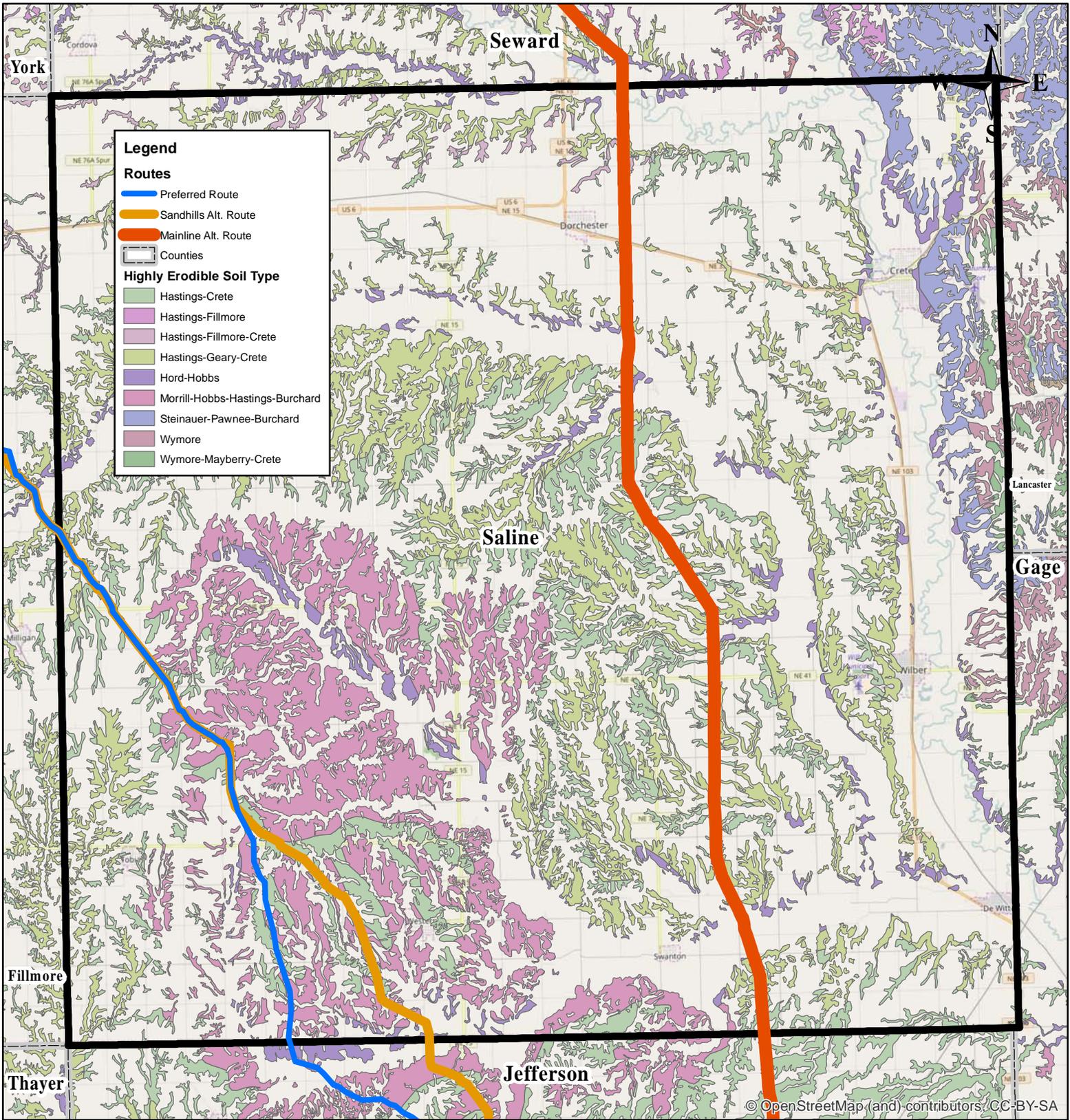


**County: Fillmore**



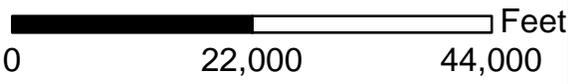
Page 21	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	6,503	71,453	77,956	8.3%
Mainline Alt. Route	0	0	0	NA
Sandhills Alt. Route	5,942	71,574	77,516	7.7%



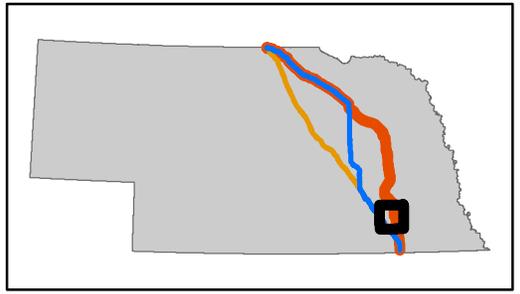


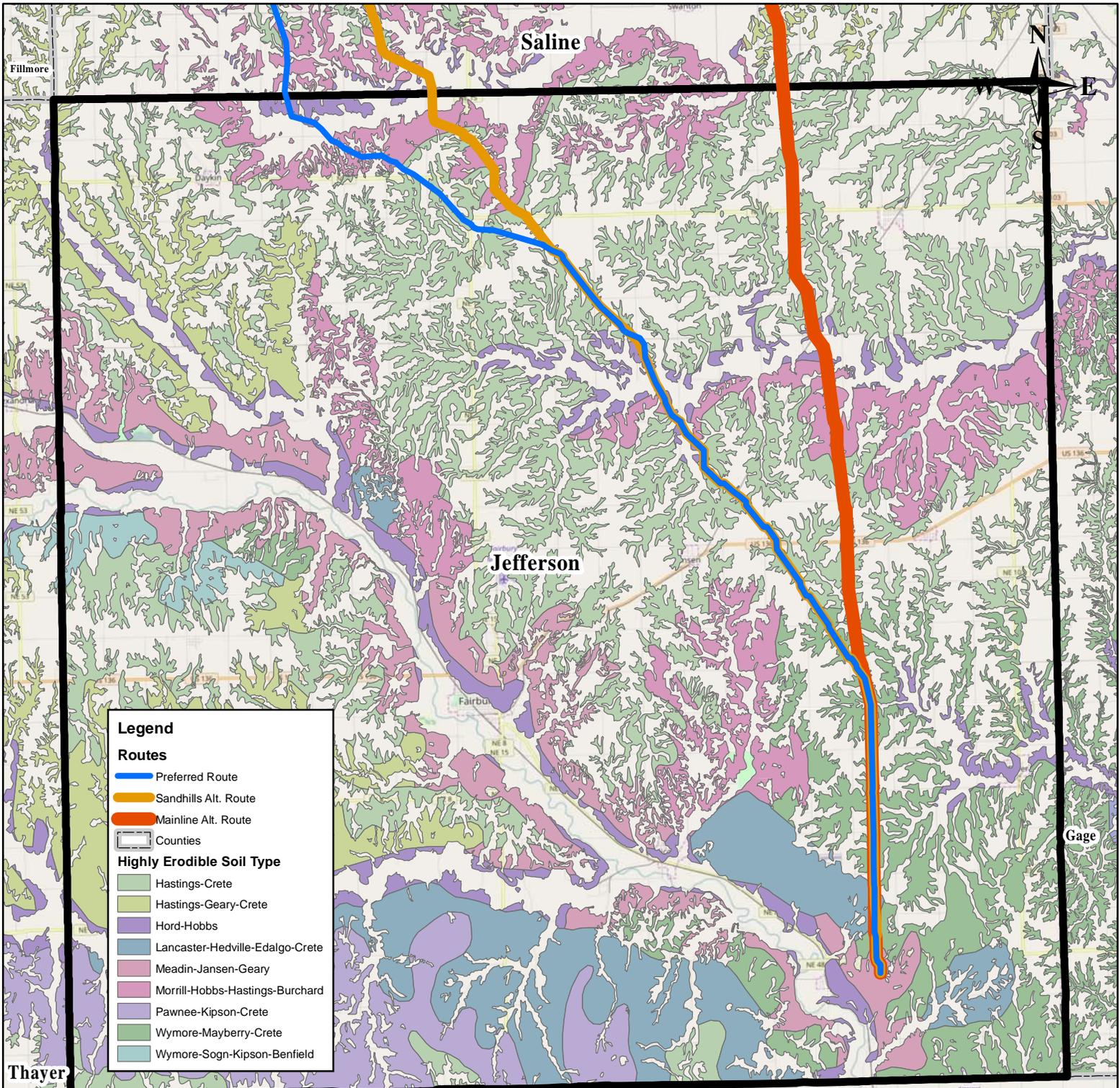
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## County: Saline



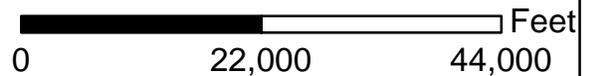
Page 22	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	32,527	45,556	78,083	41.7%
Mainline Alt. Route	41,341	89,833	131,174	31.5%
Sandhills Alt. Route	44,323	44,654	88,976	49.8%



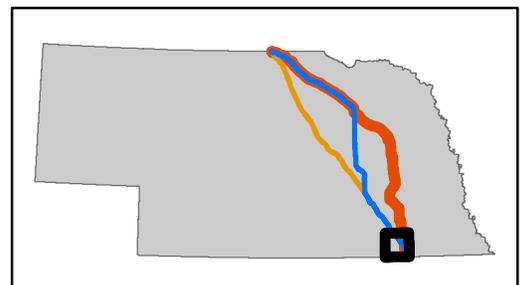


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## County: Jefferson



Page 23	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	69,609	78,753	148,362	46.9%
Mainline Alt. Route	58,117	55,510	113,627	51.1%
Sandhills Alt. Route	68,038	67,047	135,085	50.4%



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## **APPENDIX A**

# Appendix A

<b>SSURGO Database Potentially Highly Erodible Soil Type Descriptions</b>
<b>Alcester silty clay loam, 0 to 2 percent slopes</b>
<b>Alcester silty clay loam, 2 to 6 percent slopes</b>
<b>Alda loam, occasionally flooded</b>
<b>Alda sandy loam, occasionally flooded</b>
<b>Almeria-Calamus complex, channeled, frequently flooded</b>
<b>Almeria-Inavale complex, channeled, frequently flooded</b>
<b>Anselmo-O'Neill sandy loams, 0 to 3 percent slopes</b>
<b>Anselmo-O'Neill sandy loams, 3 to 6 percent slopes</b>
<b>Anselmo fine sandy loam, 0 to 1 percent slopes</b>
<b>Anselmo fine sandy loam, 3 to 6 percent slopes</b>
<b>Anselmo loam, 0 to 1 percent slopes</b>
<b>Aquolls</b>
<b>Barney-Boel-Calamus complex, channeled</b>
<b>Barney fine sandy loam, frequently flooded</b>
<b>Barney loam, frequently flooded</b>
<b>Barney silt loam, channeled, frequently flooded</b>
<b>Bazile complex, 0 to 3 percent slopes</b>
<b>Bazile complex, 3 to 6 percent slopes</b>
<b>Bazile loam, 0 to 2 percent slopes</b>
<b>Bazile loam, 2 to 6 percent slopes</b>
<b>Bazile silt loam, 0 to 2 percent slopes</b>
<b>Bazile silt loam, 2 to 6 percent slopes</b>
<b>Before silty clay loam, 0 to 2 percent slopes</b>
<b>Before silty clay loam, terrace, 0 to 2 percent slopes</b>
<b>Blackloup loam, rarely flooded</b>
<b>Blendon-Muir complex, 0 to 2 percent slopes</b>
<b>Blendon fine sandy loam, 0 to 2 percent slopes</b>
<b>Blendon fine sandy loam, 2 to 6 percent slopes</b>
<b>Blendon loam, 2 to 6 percent slopes</b>
<b>Blendon variant fine sandy loam, 0 to 2 percent slopes</b>
<b>Boel-Alda complex, occasionally flooded</b>
<b>Boel-Inavale complex, channeled, frequently flooded</b>
<b>Boel fine sandy loam, occasionally flooded</b>
<b>Boel loamy fine sand, occasionally flooded</b>
<b>Boel silty clay loam, overwash, occasionally flooded</b>
<b>Boelus fine sand, 0 to 6 percent slopes</b>
<b>Boelus loamy fine sand, 0 to 2 percent slopes</b>
<b>Boelus loamy sand, 6 to 11 percent slopes</b>
<b>Boelus loamy sand, gravelly substratum, 0 to 3 percent slopes</b>

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<b>SSURGO Database Potentially Highly Erodible Soil Type Descriptions</b>
<b>Brocksburg loam, 0 to 2 percent slopes</b>
<b>Brunswick-Longpine fine sandy loams, 11 to 40 percent slopes</b>
<b>Brunswick-Paka complex, 11 to 30 percent slopes</b>
<b>Brunswick-Pivot complex, 11 to 30 percent slopes</b>
<b>Burchard-Steinauer clay loams, 11 to 30 percent slopes</b>
<b>Burchard clay loam, 11 to 30 percent slopes</b>
<b>Burchard clay loam, 2 to 6 percent slopes</b>
<b>Burchard clay loam, 6 to 11 percent slopes</b>
<b>Burchard clay loam, 6 to 11 percent slopes, eroded</b>
<b>Butler-Olbut complex, 0 to 1 percent slopes</b>
<b>Butler silt loam, 0 to 1 percent slopes</b>
<b>Butler silt loam, terrace, 0 to 1 percent slopes</b>
<b>Calamus-Boel complex, channeled, rarely flooded</b>
<b>Caruso-Gayville complex, 0 to 1 percent slopes</b>
<b>Cass fine sandy loam, occasionally flooded</b>
<b>Cass fine sandy loam, rarely flooded</b>
<b>Cass loam, channeled, frequently flooded</b>
<b>Cass loam, occasionally flooded</b>
<b>Cass loam, rarely flooded</b>
<b>Cass silt loam, occasionally flooded</b>
<b>Cass soils, rarely flooded</b>
<b>Coly-Hobbs silt loams, 0 to 30 percent slopes</b>
<b>Coly silt loam, 11 to 30 percent slopes</b>
<b>Coly silt loam, 30 to 60 percent slopes</b>
<b>Coly silt loam, 6 to 11 percent slopes, eroded</b>
<b>Coly soils, 3 to 6 percent slopes, severely eroded</b>
<b>Coly soils, 6 to 11 percent slopes, severely eroded</b>
<b>Cozad loam, wet substratum, 0 to 1 percent slopes</b>
<b>Cozad silt loam, 0 to 1 percent slopes</b>
<b>Cozad silt loam, 1 to 3 percent slopes</b>
<b>Cozad silt loam, wet substratum, rarely flooded</b>
<b>Crete silt loam, 0 to 1 percent slopes</b>
<b>Crete silt loam, 1 to 3 percent slopes</b>
<b>Crete silt loam, terrace, 0 to 1 percent slopes</b>
<b>Crete silt loam, terrace, 1 to 3 percent slopes</b>
<b>Crete silty clay loam, 1 to 3 percent slopes</b>
<b>Crete silty clay loam, 3 to 7 percent slopes, eroded</b>
<b>Crofton-Nora complex, 11 to 17 percent slopes, eroded</b>
<b>Crofton-Nora complex, 17 to 30 percent slopes</b>
<b>Crofton-Nora complex, 2 to 6 percent slopes, eroded</b>

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<b>SSURGO Database Potentially Highly Erodible Soil Type Descriptions</b>
<b>Crofton-Nora complex, 6 to 11 percent slopes, eroded</b>
<b>Crofton silt loam, 17 to 30 percent slopes, eroded</b>
<b>Crofton silt loam, 2 to 6 percent slopes, eroded</b>
<b>Crofton silt loam, 6 to 11 percent slopes, eroded</b>
<b>Crofton silt loam, 8 to 17 percent slopes, eroded</b>
<b>Crofton silt loam, coarse, 8 to 17 percent slopes, eroded</b>
<b>Deroin silty clay loam, 6 to 11 percent slopes, eroded</b>
<b>Detroit silt loam, 0 to 1 percent slopes</b>
<b>Doger fine sand, 0 to 6 percent slopes</b>
<b>Doger loamy fine sand, 0 to 2 percent slopes</b>
<b>Doger loamy fine sand, 2 to 6 percent slopes</b>
<b>Dunday-Duda loamy fine sands, 0 to 3 percent slopes</b>
<b>Dunday loamy fine sand, 0 to 3 percent slopes</b>
<b>Dunday loamy fine sand, 3 to 6 percent slopes</b>
<b>Dunday loamy fine sand, 3 to 9 percent slopes slopes, moist</b>
<b>Dunday loamy fine sand, loamy substratum, 0 to 3 percent slopes</b>
<b>Dunday loamy sand, 0 to 3 percent slopes</b>
<b>Dunday loamy sand, 3 to 6 percent slopes</b>
<b>Dunn loamy sand, 0 to 3 percent slopes</b>
<b>Edalgo silty clay loam, 7 to 11 percent slopes</b>
<b>Els-lpage complex, 0 to 3 percent slopes</b>
<b>Els-lpage fine sands, 0 to 3 percent slopes</b>
<b>Els fine sand, 0 to 3 percent slopes</b>
<b>Els loamy sand, 0 to 3 percent slopes</b>
<b>Elsmere-lpage loamy fine sands, 0 to 3 percent slopes</b>
<b>Elsmere-Selia loamy fine sands, 0 to 3 percent slopes</b>
<b>Elsmere fine sandy loam, rarely flooded</b>
<b>Elsmere loamy fine sand, 0 to 3 percent slopes</b>
<b>Elsmere loamy fine sand, clayey substratum, 0 to 3 percent slopes</b>
<b>Fillmore silt loam, drained, 0 to 1 percent slopes</b>
<b>Fillmore silt loam, frequently ponded</b>
<b>Fillmore silt loam, occasionally ponded</b>
<b>Fluvaquents, sandy-Fluvaquents, loamy complex, frequently flooded</b>
<b>Fonner sandy loam, rarely flooded</b>
<b>Fonner variant loamy sand, occasionally flooded</b>
<b>Fonner variant loamy sand, rarely flooded</b>
<b>Gannett loam, 0 to 1 percent slopes</b>
<b>Gannett mucky peat</b>
<b>Gates-Hersh complex, 0 to 3 percent slopes</b>
<b>Gates silt loam, 3 to 6 percent slopes, eroded</b>

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<b>SSURGO Database Potentially Highly Erodible Soil Type Descriptions</b>
<b>Gayville-Carusio complex, occasionally flooded</b>
<b>Geary-Hobbs silt loams, 0 to 30 percent slopes</b>
<b>Geary and Jansen soils, 7 to 11 percent slopes</b>
<b>Geary and Jansen soils, 7 to 11 percent slopes, severely eroded</b>
<b>Geary silty clay loam, 11 to 30 percent slopes</b>
<b>Geary silty clay loam, 3 to 7 percent slopes, eroded</b>
<b>Geary silty clay loam, 7 to 11 percent slopes, eroded</b>
<b>Gibbon-Gayville silty clay loams, occasionally flooded</b>
<b>Gibbon loam, occasionally flooded</b>
<b>Gibbon silt loam, occasionally flooded</b>
<b>Gibbon silty clay loam, occasionally flooded</b>
<b>Gothenburg fine sandy loam, frequently flooded</b>
<b>Gothenburg loamy sand, frequently flooded</b>
<b>Gothenburg soils, frequently flooded</b>
<b>Gravel pit</b>
<b>Grigston silt loam, occasionally flooded</b>
<b>Grigston silt loam, rarely flooded</b>
<b>Hall-Gayville complex, 1 to 3 percent slopes</b>
<b>Hall-Gayville variant silt loams, 0 to 1 percent slopes</b>
<b>Hall-Olbut complex, 1 to 3 percent slopes</b>
<b>Hall silt loam, 0 to 1 percent slopes</b>
<b>Hall silt loam, 1 to 3 percent slopes</b>
<b>Hall silt loam, 3 to 6 percent slopes, eroded</b>
<b>Hall silty clay loam, sandy substratum, 0 to 1 percent slopes</b>
<b>Hastings silt loam, 0 to 1 percent slopes</b>
<b>Hastings silt loam, 1 to 3 percent slopes</b>
<b>Hastings silt loam, 3 to 7 percent slopes</b>
<b>Hastings silt loam, 7 to 11 percent slopes</b>
<b>Hastings silty clay loam, 1 to 3 percent slopes, eroded</b>
<b>Hastings silty clay loam, 11 to 17 percent slopes, severely eroded</b>
<b>Hastings silty clay loam, 3 to 11 percent slopes, severely eroded</b>
<b>Hastings silty clay loam, 3 to 7 percent slopes, eroded</b>
<b>Hastings silty clay loam, 3 to 7 percent slopes, severely eroded</b>
<b>Hastings silty clay loam, 7 to 11 percent slopes, eroded</b>
<b>Hastings silty clay loam, 7 to 11 percent slopes, severely eroded</b>
<b>Hastings silty clay loam, terrace, 3 to 7 percent slopes, eroded</b>
<b>Hastings soils, 3 to 7 percent slopes, severely eroded</b>
<b>Hastings soils, 7 to 11 percent slopes, severely eroded</b>
<b>Hedville loam, 30 to 50 percent slopes</b>
<b>Hersh-Gates complex, 0 to 3 percent slopes</b>

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<b>SSURGO Database Potentially Highly Erodible Soil Type Descriptions</b>
<b>Hersh-Gates complex, 17 to 30 percent slopes</b>
<b>Hersh fine sandy loam, 6 to 11 percent slopes</b>
<b>Hobbs silt loam, channeled, frequently flooded</b>
<b>Hobbs silt loam, frequently flooded</b>
<b>Hobbs silt loam, occasionally flooded</b>
<b>Hobbs silt loam, occasionally flooded, cool</b>
<b>Holdrege silt loam, 0 to 1 percent slopes, cool</b>
<b>Holdrege silt loam, 1 to 3 percent slopes</b>
<b>Holdrege silt loam, 3 to 7 percent slopes</b>
<b>Holdrege silty clay loam, 3 to 7 percent slopes, eroded</b>
<b>Holt-Longpine fine sandy loams, 6 to 11 percent slopes</b>
<b>Holt variant fine sandy loam, 3 to 6 percent slopes</b>
<b>Hord-Uly complex, 0 to 6 percent slopes</b>
<b>Hord fine sandy loam, 1 to 3 percent slopes</b>
<b>Hord silt loam, 0 to 1 percent slopes</b>
<b>Hord silt loam, 0 to 1 percent slopes, warm</b>
<b>Hord silt loam, 1 to 3 percent slopes</b>
<b>Hord silt loam, rarely flooded</b>
<b>Hord silt loam, sandy substratum, 0 to 1 percent slopes</b>
<b>Hord very fine sandy loam, 0 to 1 percent slopes</b>
<b>Hord very fine sandy loam, 1 to 3 percent slopes</b>
<b>Inavale fine sand, 3 to 11 percent slopes</b>
<b>Inavale fine sand, channeled, frequently flooded</b>
<b>Inavale fine sand, occasionally flooded</b>
<b>Inavale fine sand, rarely flooded</b>
<b>Inavale fine sandy loam, occasionally flooded</b>
<b>Inavale loamy fine sand, 0 to 3 percent slopes</b>
<b>Inavale loamy fine sand, 3 to 11 percent slopes, rarely flooded</b>
<b>Inavale loamy fine sand, occasionally flooded</b>
<b>Inavale loamy sand, 3 to 6 percent slopes, rarely flooded</b>
<b>Inavale sand, channeled, frequently flooded</b>
<b>Inavale soils, frequently flooded</b>
<b>Inglewood-Boel complex, channeled, occasionally flooded</b>
<b>lpage fine sand, 0 to 3 percent slopes</b>
<b>lpage loamy fine sand, 0 to 3 percent slopes</b>
<b>Jansen-Meadin loams, 2 to 6 percent slopes</b>
<b>Jansen loam, 0 to 2 percent slopes</b>
<b>Jansen loam, 2 to 6 percent slopes</b>
<b>Janude sandy loam, very rarely flooded</b>
<b>Josburg fine sandy loam, 0 to 2 percent slopes</b>

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<b>SSURGO Database Potentially Highly Erodible Soil Type Descriptions</b>
Josburg loam, 0 to 2 percent slopes
Judson silt loam, 2 to 6 percent slopes
Kennebec silt loam, rarely flooded
Kezan silt loam, frequently flooded
Kezan silt loam, occasionally flooded
Labu-Sansarc silty clays, 9 to 35 percent slopes
Labu silty clay, 2 to 6 percent slopes
Labu silty clay, 6 to 11 percent slopes
Lamo-Saltine complex, occasionally flooded
Lamo clay loam, sandy substratum, 0 to 1 percent slopes
Lamo silt loam, moderately saline, occasionally flooded
Lamo silty clay loam, 0 to 2 percent slopes, occasionally flooded
Lancaster and Edalgo soils, 11 to 30 percent slopes
Lancaster loam, 7 to 11 percent slopes
Lawet silt loam, occasionally flooded
Lawet silt loam, rarely flooded
Lawet silty clay loam, occasionally flooded
Lawet soils, wet, occasionally flooded
Lawet variant fine sandy loam, frequently flooded
Leshara silt loam, occasionally flooded
Lex clay loam, occasionally flooded
Lex loam, occasionally flooded
Lex variant loam, occasionally flooded
Libory loamy fine sand, 0 to 3 percent slopes
Lockton loam, rarely flooded
Longford complex, 1 to 7 percent slopes
Longford silty clay loam, 3 to 7 percent slopes
Longford silty clay loam, 3 to 7 percent slopes, eroded
Longford silty clay loam, 7 to 11 percent slopes, eroded
Longpine-Duda complex, 3 to 15 percent slopes
Longpine loamy fine sand, 3 to 30 percent slopes
Loretto fine sandy loam, 0 to 2 percent slopes
Loretto fine sandy loam, 2 to 6 percent slopes
Loretto loam, 0 to 2 percent slopes
Loretto loam, 2 to 6 percent slopes
Loretto sandy loam, 3 to 6 percent slopes
Loup fine sandy loam, 0 to 1 percent slopes
Loup fine sandy loam, frequently ponded
Loup loamy fine sand, frequently ponded
Loup silt loam, occasionally flooded

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<b>SSURGO Database Potentially Highly Erodible Soil Type Descriptions</b>
<b>Malcolm silt loam, 6 to 11 percent slopes, eroded</b>
<b>Malmo clay, 3 to 11 percent slopes, eroded</b>
<b>Malmo silty clay loam, 3 to 6 percent slopes, eroded</b>
<b>Malmo silty clay loam, 6 to 11 percent slopes, eroded</b>
<b>Marlake fine sandy loam, frequently ponded</b>
<b>Mayberry silty clay loam, 3 to 6 percent slopes, eroded</b>
<b>Mayberry silty clay loam, 6 to 11 percent slopes</b>
<b>Meadin loam, 0 to 2 percent slopes</b>
<b>Meadin sandy loam, 0 to 2 percent slopes</b>
<b>Meadin sandy loam, 2 to 30 percent slopes</b>
<b>Moody-Nora silt loams, 3 to 6 percent slopes, eroded</b>
<b>Moody silty clay loam, 0 to 2 percent slopes</b>
<b>Moody silty clay loam, 2 to 6 percent slopes</b>
<b>Moody silty clay loam, 2 to 6 percent slopes, eroded</b>
<b>Moody silty clay loam, 6 to 11 percent slopes</b>
<b>Moody silty clay loam, 6 to 11 percent slopes, eroded</b>
<b>Moody silty clay loam, terrace, 0 to 2 percent slopes</b>
<b>Morrill clay loam, 11 to 30 percent slopes</b>
<b>Morrill clay loam, 3 to 6 percent slopes</b>
<b>Morrill clay loam, 3 to 6 percent slopes, eroded</b>
<b>Morrill clay loam, 6 to 11 percent slopes</b>
<b>Morrill soils, 6 to 11 percent slopes, severely eroded</b>
<b>Muir silt loam, 0 to 1 percent slopes</b>
<b>Muir silt loam, 1 to 3 percent slopes</b>
<b>Muir silt loam, 3 to 7 percent slopes</b>
<b>Muir silt loam, rarely flooded</b>
<b>Muir silty clay loam, rarely flooded</b>
<b>Nenzel loamy fine sand, very rarely flooded</b>
<b>Nodaway silt loam, channeled, occasionally flooded</b>
<b>Nodaway silt loam, occasionally flooded</b>
<b>Nora-Crofton complex, 11 to 17 percent slopes, eroded</b>
<b>Nora-Crofton complex, 2 to 6 percent slopes, eroded</b>
<b>Nora-Crofton complex, 6 to 11 percent slopes, eroded</b>
<b>Nora-Moody complex, 2 to 6 percent slopes, eroded</b>
<b>Nora silt loam, 11 to 17 percent slopes</b>
<b>Nora silt loam, 2 to 6 percent slopes</b>
<b>Nora silt loam, 2 to 6 percent slopes, eroded</b>
<b>Nora silt loam, 6 to 11 percent slopes, eroded</b>
<b>Nora silt loam, 6 to 11 percent slopes, severely eroded</b>
<b>Nora silty clay loam, 11 to 17 percent slopes</b>

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<b>SSURGO Database Potentially Highly Erodible Soil Type Descriptions</b>
<b>Nora silty clay loam, 6 to 11 percent slopes</b>
<b>Novina sandy loam, rarely flooded</b>
<b>O'Neill-Meadin fine sandy loams, 11 to 30 percent slopes</b>
<b>O'Neill-Meadin fine sandy loams, 2 to 6 percent slopes</b>
<b>O'Neill-Meadin fine sandy loams, 6 to 11 percent slopes</b>
<b>O'Neill fine sandy loam, 0 to 2 percent slopes</b>
<b>O'Neill fine sandy loam, 2 to 6 percent slopes</b>
<b>O'Neill loam, 0 to 2 percent slopes</b>
<b>O'Neill loamy sand, 0 to 2 percent slopes</b>
<b>O'Neill sandy loam, 0 to 2 percent slopes</b>
<b>O'Neill sandy loam, 2 to 6 percent slopes</b>
<b>Obert silt loam, occasionally flooded</b>
<b>Obert silty clay loam, frequently ponded</b>
<b>Obert soils, occasionally flooded</b>
<b>Olbut-Butler silt loams, 0 to 1 percent slopes</b>
<b>Onita silt loam, 0 to 1 percent slopes</b>
<b>Ord-Lute fine sandy loams, rarely flooded</b>
<b>Ord fine sandy loam, occasionally flooded</b>
<b>Ord fine sandy loam, rarely flooded</b>
<b>Ord loam, occasionally flooded</b>
<b>Ord loam, rarely flooded</b>
<b>Ortello fine sandy loam, 1 to 3 percent slopes</b>
<b>Ortello fine sandy loam, 1 to 3 percent slopes, eroded</b>
<b>Ortello fine sandy loam, 2 to 6 percent slopes</b>
<b>Ortello loam, 0 to 1 percent slopes</b>
<b>Ortello very fine sandy loam, 1 to 3 percent slopes</b>
<b>Paka complex, 0 to 2 percent slopes</b>
<b>Paka complex, 2 to 6 percent slopes</b>
<b>Paka complex, 6 to 11 percent slopes</b>
<b>Paka fine sandy loam, 2 to 6 percent slopes</b>
<b>Paka loam, 0 to 2 percent slopes</b>
<b>Paka loam, 2 to 6 percent slopes</b>
<b>Paka loam, 6 to 11 percent slopes, eroded</b>
<b>Pivot loamy sand, 0 to 3 percent slopes</b>
<b>Pivot loamy sand, 3 to 9 percent slopes</b>
<b>Platte-Gothenburg complex, channeled, frequently flooded</b>
<b>Platte-Inavale complex, channeled, frequently flooded</b>
<b>Platte fine sandy loam, occasionally flooded</b>
<b>Platte loam, occasionally flooded</b>
<b>Platte loam, wet, occasionally flooded</b>

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<b>SSURGO Database Potentially Highly Erodible Soil Type Descriptions</b>
<b>Pohocco silty clay loam, 11 to 17 percent slopes, eroded</b>
<b>Ree loam, 0 to 2 percent slopes</b>
<b>Reliance silt loam, 2 to 6 percent slopes</b>
<b>Ronson-Anselmo fine sandy loams, 6 to 11 percent slopes</b>
<b>Ronson-Anselmo fine sandy loams, 6 to 30 percent slopes</b>
<b>Sansarc silty clay, 9 to 35 percent slopes</b>
<b>Schamber gravelly sandy loam, 9 to 30 percent slopes</b>
<b>Scott silty clay loam, drained, frequently ponded</b>
<b>Shell silt loam, clayey substratum, occasionally flooded</b>
<b>Shell silt loam, occasionally flooded</b>
<b>Shell silt loam, rarely flooded</b>
<b>Shell silty clay loam, 0 to 1 percent slopes</b>
<b>Simeon-Holt variant-Ronson complex, 6 to 17 percent slopes</b>
<b>Simeon-Meadin complex, 0 to 9 percent slopes</b>
<b>Simeon-Valentine loamy sands, 0 to 3 percent slopes</b>
<b>Simeon-Valentine loamy sands, 0 to 6 percent slopes</b>
<b>Simeon-Valentine sands, 11 to 60 percent slopes, eroded</b>
<b>Simeon loamy sand, 0 to 3 percent slopes</b>
<b>Steinauer clay loam, 11 to 30 percent slopes, eroded</b>
<b>Steinauer clay loam, 6 to 11 percent slopes, eroded</b>
<b>Thurman-Crofton complex, 11 to 30 percent slopes</b>
<b>Thurman-Moody complex, 2 to 6 percent slopes, eroded</b>
<b>Thurman-Moody complex, 6 to 11 percent slopes, eroded</b>
<b>Thurman fine sand, 6 to 11 percent slopes</b>
<b>Thurman fine sandy loam, 11 to 30 percent slopes</b>
<b>Thurman loamy fine sand, 0 to 2 percent slopes</b>
<b>Thurman loamy fine sand, 1 to 3 percent slopes</b>
<b>Thurman loamy fine sand, 1 to 3 percent slopes, eroded</b>
<b>Thurman loamy fine sand, 2 to 6 percent slopes</b>
<b>Thurman loamy fine sand, 6 to 11 percent slopes</b>
<b>Thurman loamy fine sand, terrace, 0 to 2 percent slopes</b>
<b>Trent silt loam, 0 to 2 percent slopes</b>
<b>Tryon-Ipage complex, 0 to 3 percent slopes</b>
<b>Tryon loamy fine sand, frequently ponded, 0 to 3 percent slopes</b>
<b>Tryon loamy fine sand, rarely flooded</b>
<b>Uly-Coly silt loams, 11 to 17 percent slopes, eroded</b>
<b>Uly-Coly silt loams, 17 to 30 percent slopes, eroded</b>
<b>Uly-Coly silt loams, 17 to 30 percent slopes, eroded, moist</b>
<b>Uly-Coly silt loams, 6 to 11 percent slopes, eroded</b>
<b>Uly-Hobbs silt loams, 0 to 30 percent slopes</b>

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<b>SSURGO Database Potentially Highly Erodible Soil Type Descriptions</b>
<b>Uly-Hobbs silt loams, 0 to 30 percent slopes, eroded</b>
<b>Uly-Hobbs silt loams, 11 to 30 percent slopes</b>
<b>Uly-Holdrege silt loams, 7 to 11 percent slopes, eroded</b>
<b>Uly silt loam, 11 to 17 percent slopes, eroded</b>
<b>Uly silt loam, 11 to 30 percent slopes, eroded</b>
<b>Uly silt loam, 3 to 6 percent slopes</b>
<b>Uly silt loam, 6 to 11 percent slopes, eroded</b>
<b>Valentine-Boelus loamy fine sands, 0 to 3 percent slopes</b>
<b>Valentine-Boelus loamy fine sands, 3 to 9 percent slopes</b>
<b>Valentine-Dunday loamy fine sands, 0 to 3 percent slopes</b>
<b>Valentine-Dunday loamy fine sands, moist, 3-9 percent slopes</b>
<b>Valentine-Els complex, moist, 0 to 9 percent slopes</b>
<b>Valentine-Simeon complex, moist, 0 to 9 percent slopes</b>
<b>Valentine-Simeon sands, 3 to 9 percent slopes</b>
<b>Valentine-Simeon sands, 9 to 30 percent slopes, eroded</b>
<b>Valentine-Wewela loamy fine sands, 3 to 6 percent slopes</b>
<b>Valentine-Wewela loamy fine sands, 6 to 30 percent slopes</b>
<b>Valentine fine sand, 0 to 3 percent slopes</b>
<b>Valentine fine sand, 0 to 3 percent slopes, moist</b>
<b>Valentine fine sand, 0 to 6 percent slopes</b>
<b>Valentine fine sand, 3 to 17 percent slopes</b>
<b>Valentine fine sand, 3 to 9 percent slopes, moist</b>
<b>Valentine fine sand, 9 to 17 percent slopes</b>
<b>Valentine fine sand, hilly</b>
<b>Valentine fine sand, rolling</b>
<b>Valentine fine sand, rolling and hilly, 9 to 60 percent slopes , moist</b>
<b>Valentine fine sand, rolling, 9 to 24 percent slopes, moist</b>
<b>Valentine fine sand, rolling, moist</b>
<b>Valentine fine sand, undulating</b>
<b>Valentine loamy fine sand, 0 to 3 percent slopes</b>
<b>Valentine loamy fine sand, 3 to 9 percent slopes, moist</b>
<b>Valentine loamy fine sand, gently rolling</b>
<b>Valentine loamy sand, 0 to 3 percent slopes</b>
<b>Valentine severely eroded-Valentine complex, moist 0 to 60 percent slopes</b>
<b>Verdel silty clay loam, 0 to 2 percent slopes</b>
<b>Verdel silty clay loam, 2 to 6 percent slopes</b>
<b>Vetal loam, 0 to 1 percent slopes</b>
<b>Vetal loam, 1 to 3 percent slopes</b>
<b>Wann loam, occasionally flooded</b>
<b>Wann sandy loam, occasionally flooded</b>

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<b>SSURGO Database Potentially Highly Erodible Soil Type Descriptions</b>
<b>Wann silt loam, occasionally flooded</b>
<b>Water</b>
<b>Wewela fine sandy loam, 0 to 3 percent slopes</b>
<b>Wewela fine sandy loam, 3 to 6 percent slopes</b>
<b>Wewela loam, 0 to 2 percent slopes</b>
<b>Zook silt loam, occasionally flooded</b>
<b>Zook silty clay loam, 0 to 2 percent slopes, occasionally flooded</b>