

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).

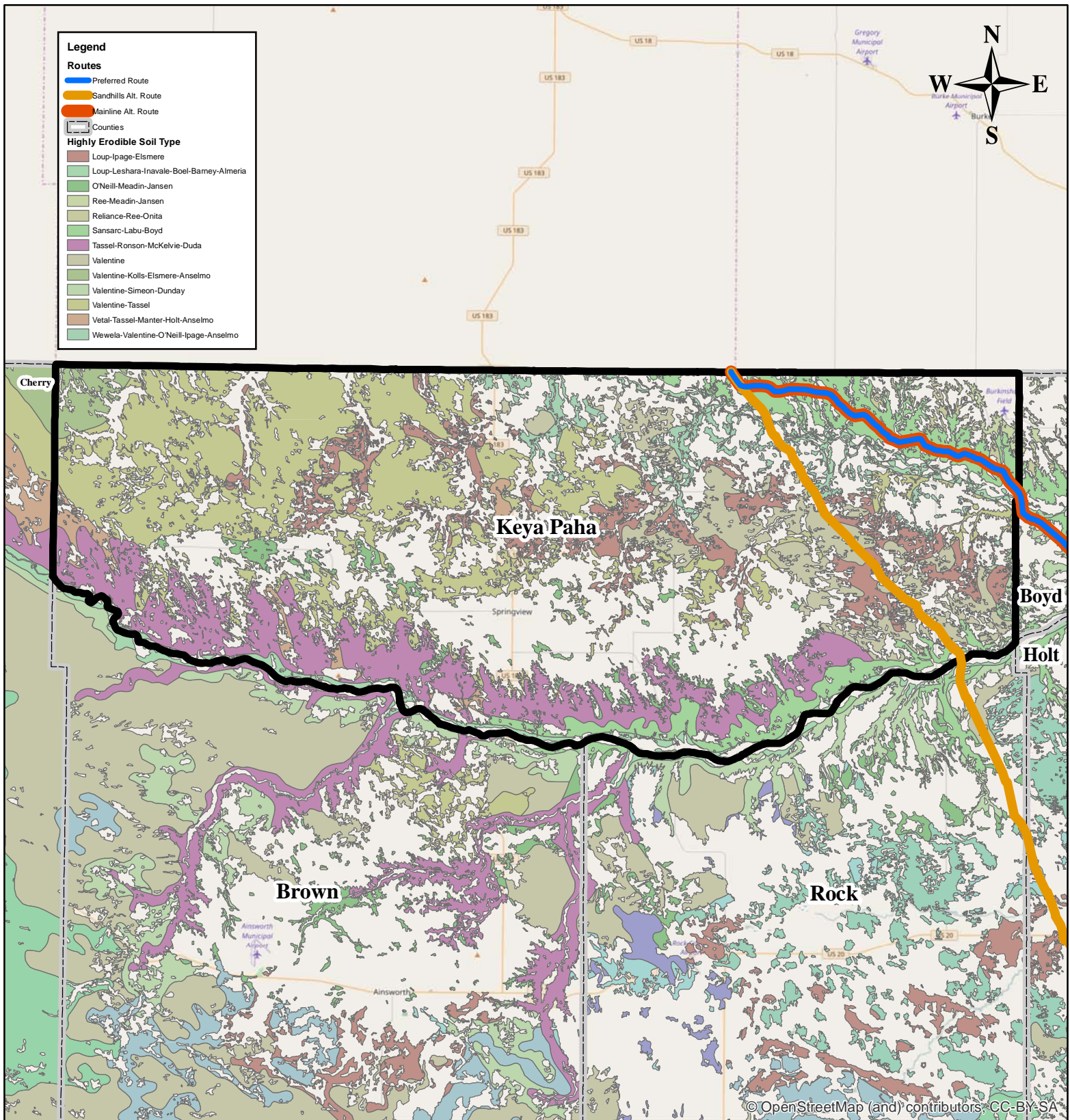
The RWBJV wind and water erodibility index with a raster value of 1 was joined to the STATSGO2 dataset to provide a spatially distributed potentially highly erodible soils from wind or water throughout Nebraska. Geographic Information System (GIS) information of the proposed preferred and alternative 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.

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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)

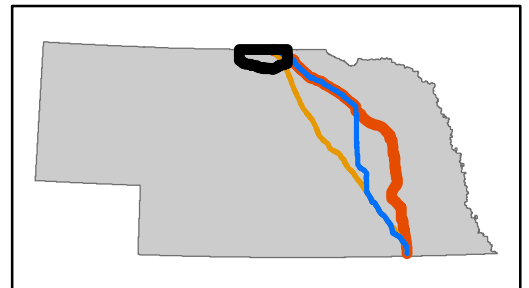
MAPS



County: Keya Paha

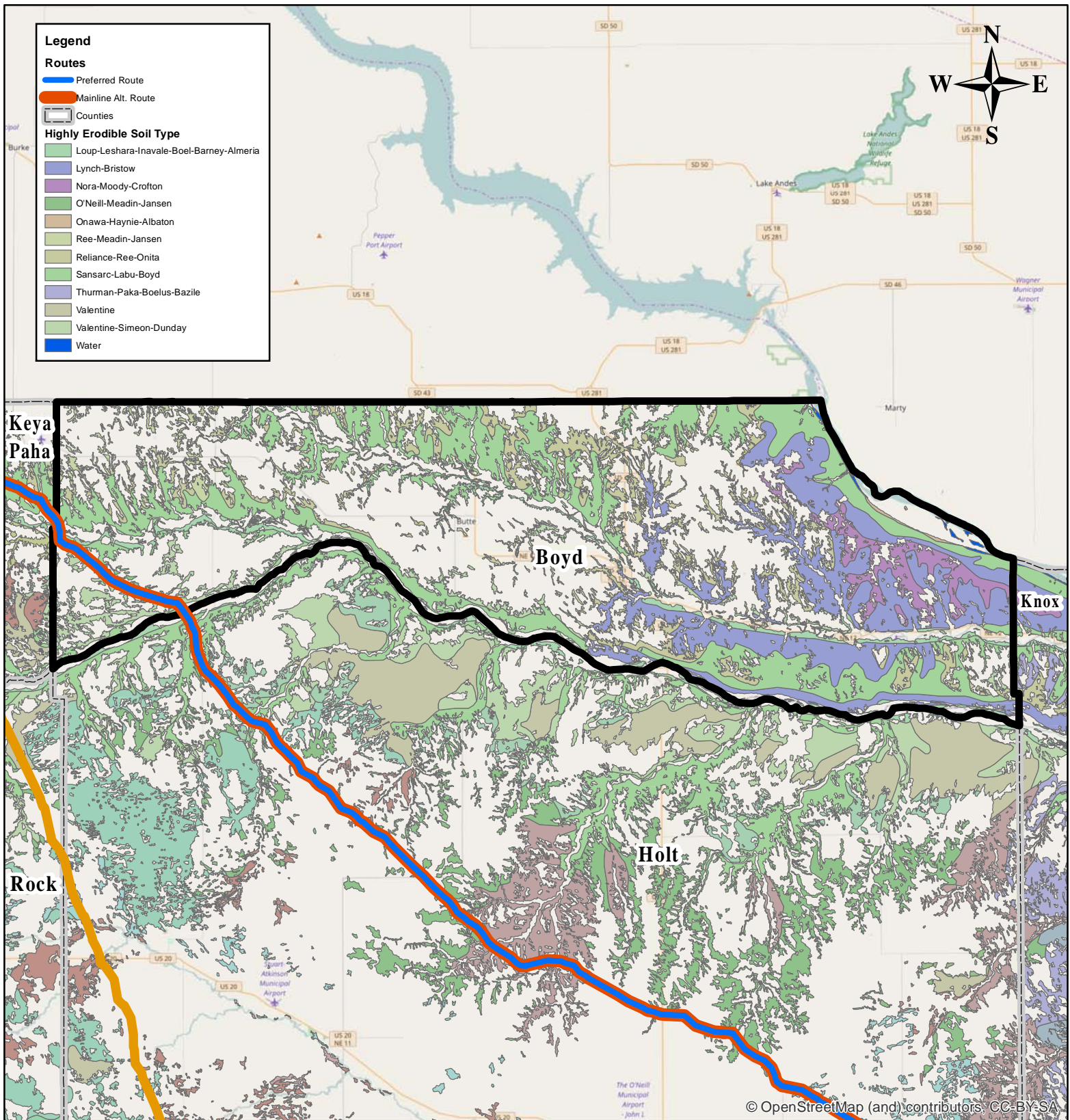
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Page 1	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	64,797	24,049	88,846	72.9%
Mainline Alt. Route	64,725	24,100	88,824	72.9%
Sandhills Alt. Route	60,415	38,091	98,507	61.3%



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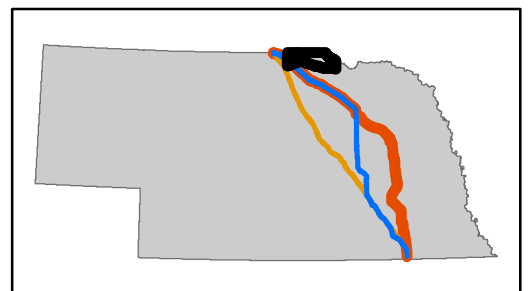
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County: Boyd

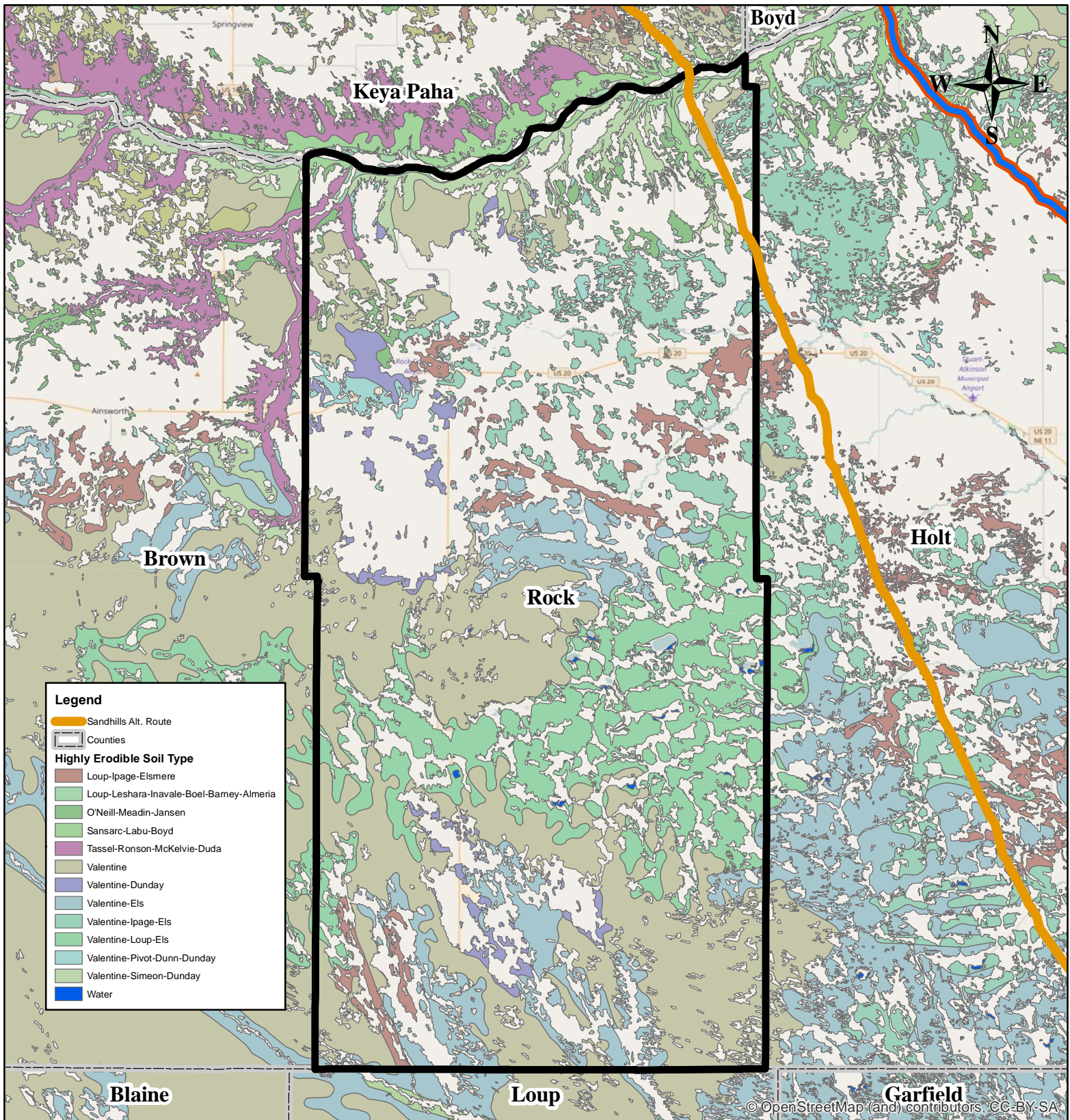
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Page 2	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	15,588	29,211	44,798	34.8%
Mainline Alt. Route	15,588	29,211	44,798	34.8%
Sandhills Alt. Route	0	0	0	NA



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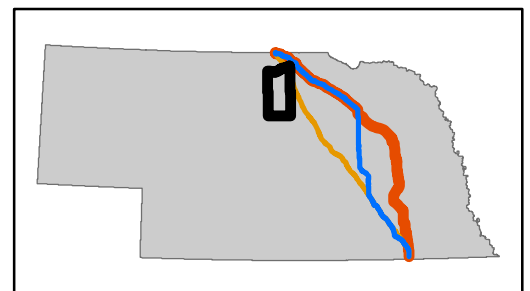
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County: Rock

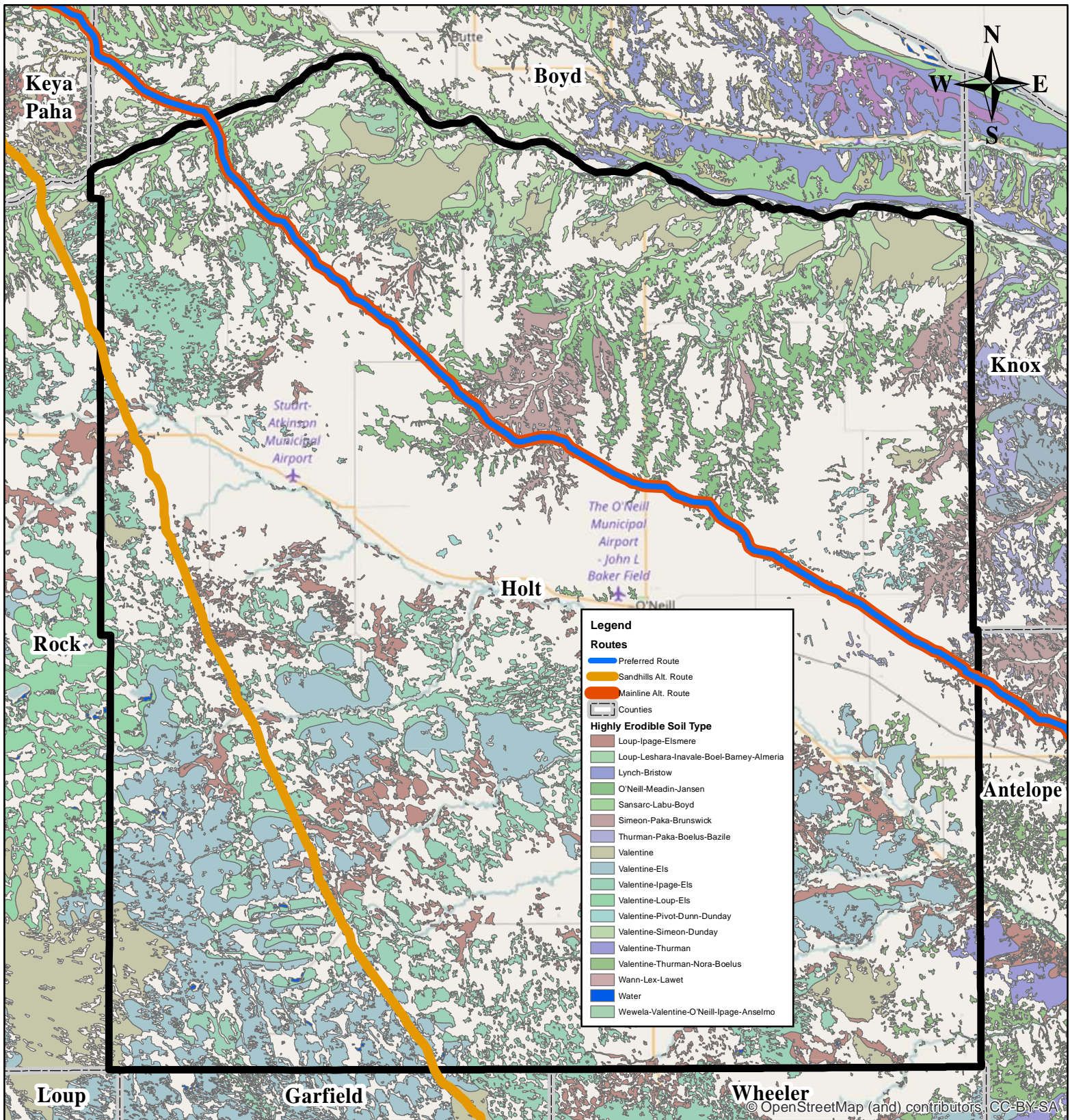
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Page 3	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	0	0	0	NA
Mainline Alt. Route	0	0	0	NA
Sandhills Alt. Route	19,565	30,320	49,884	39.2%



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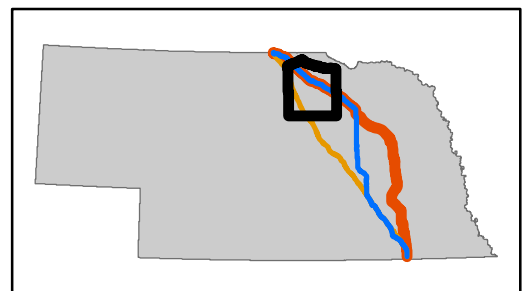
County: Holt

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%

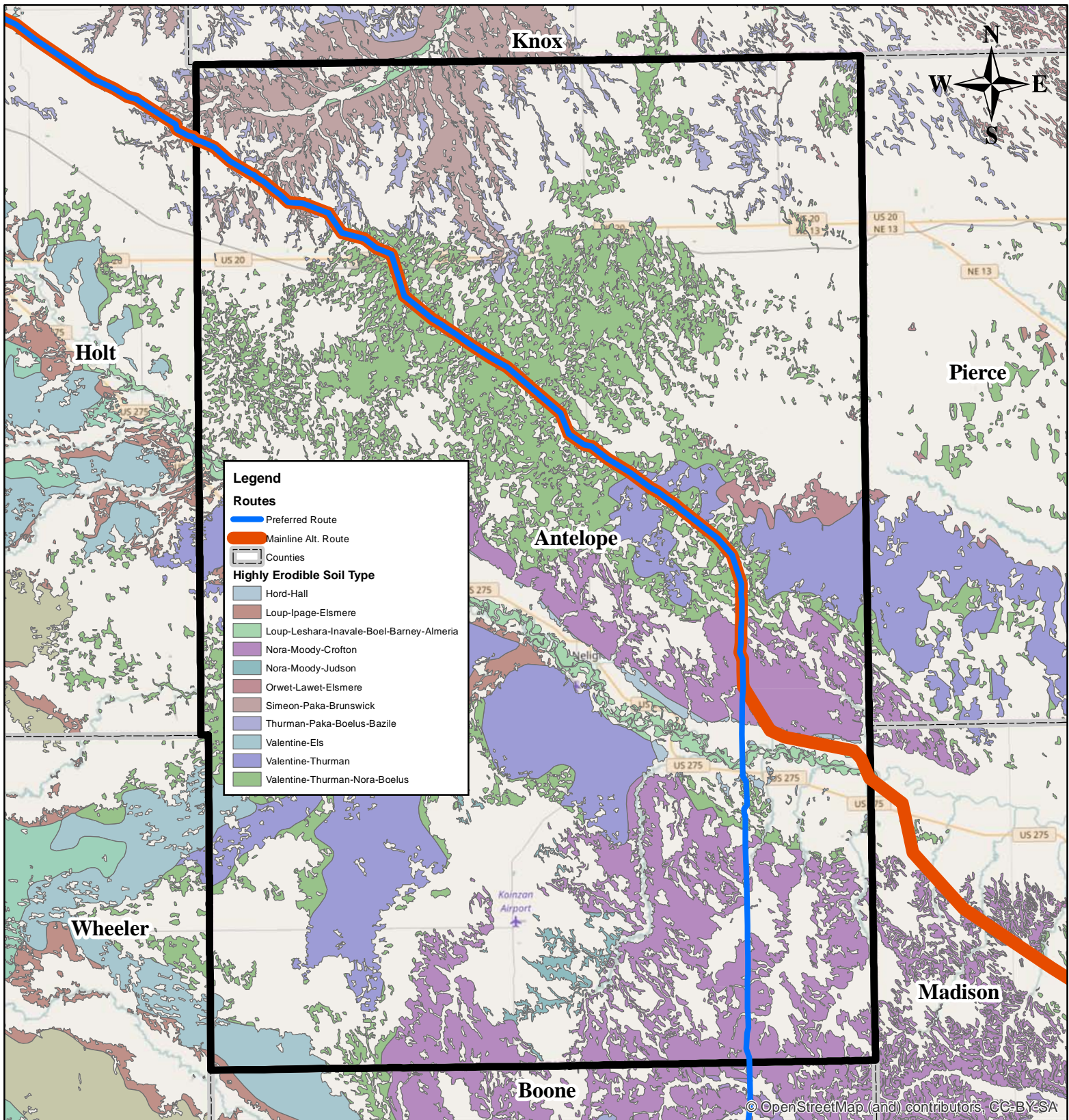


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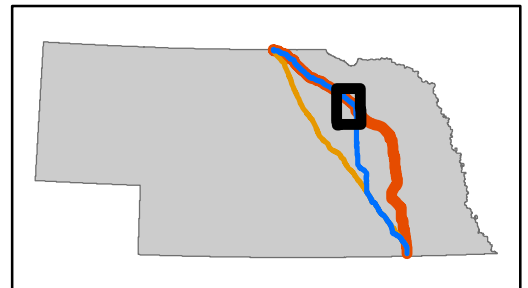
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County: Antelope

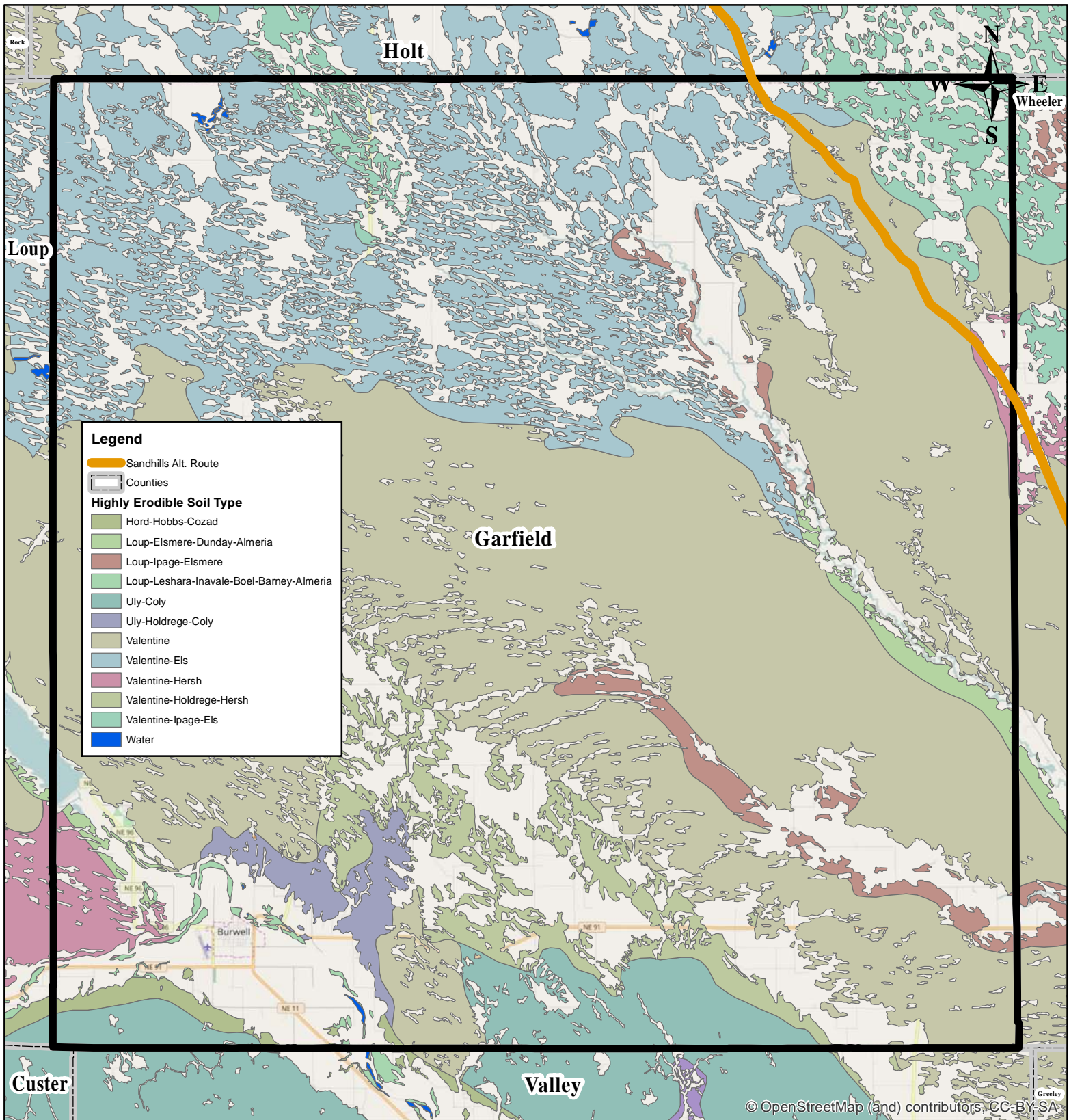
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Page 5	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	122,017	103,713	225,730	54.1%
Mainline Alt. Route	92,334	96,227	188,561	49.0%
Sandhills Alt. Route	0	0	0	NA



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County: Garfield

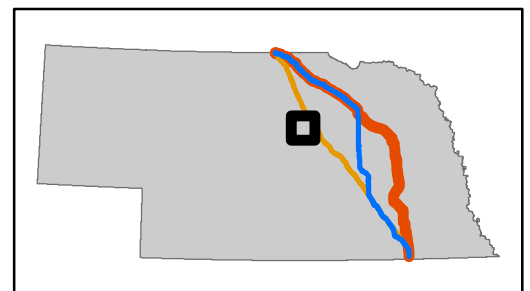
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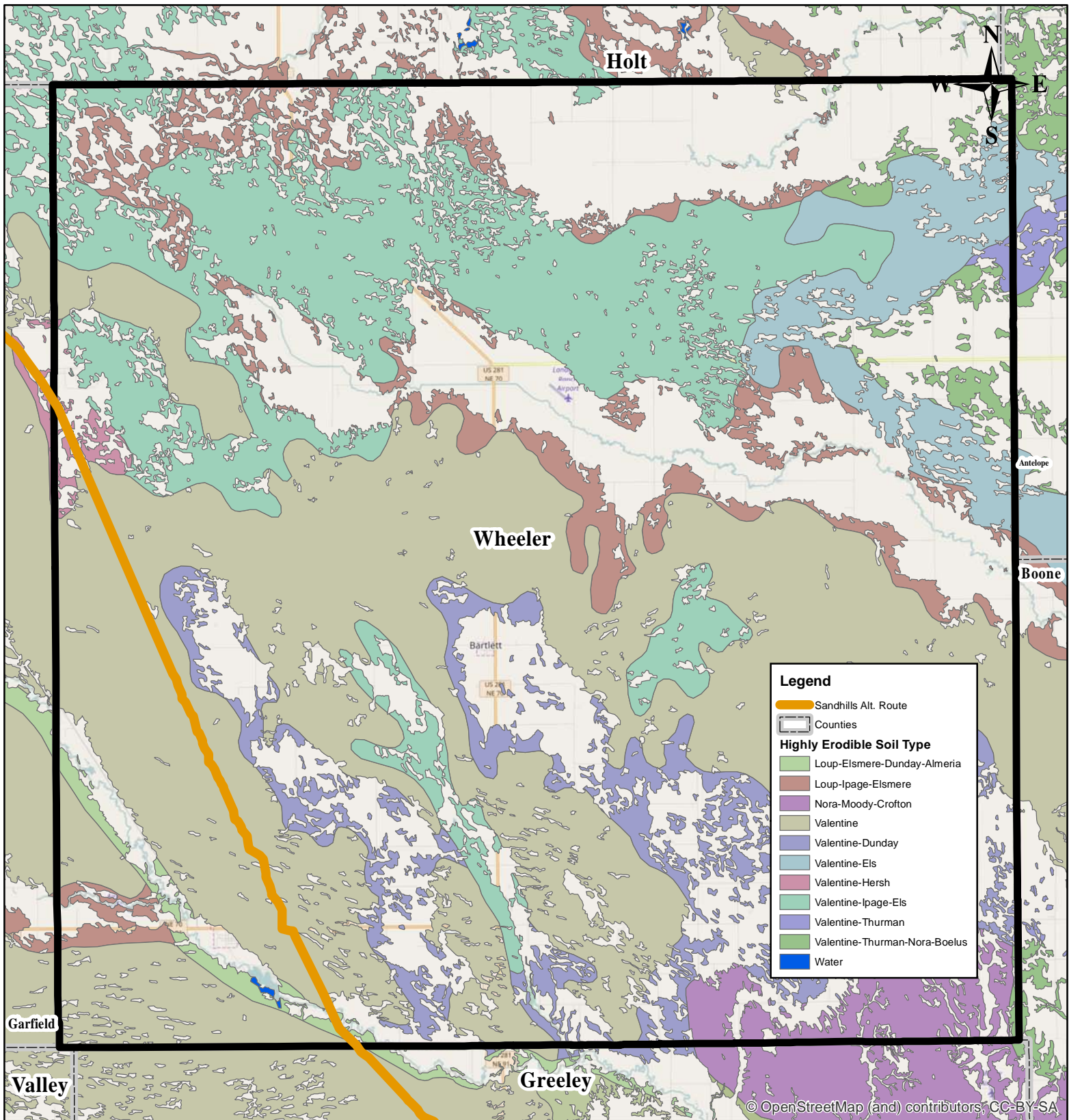
Page 6	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	0	0	0	NA
Mainline Alt. Route	0	0	0	NA
Sandhills Alt. Route	46,371	8,650	55,021	84.3%



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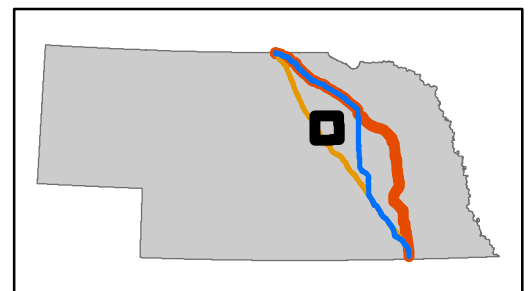




County: Wheeler

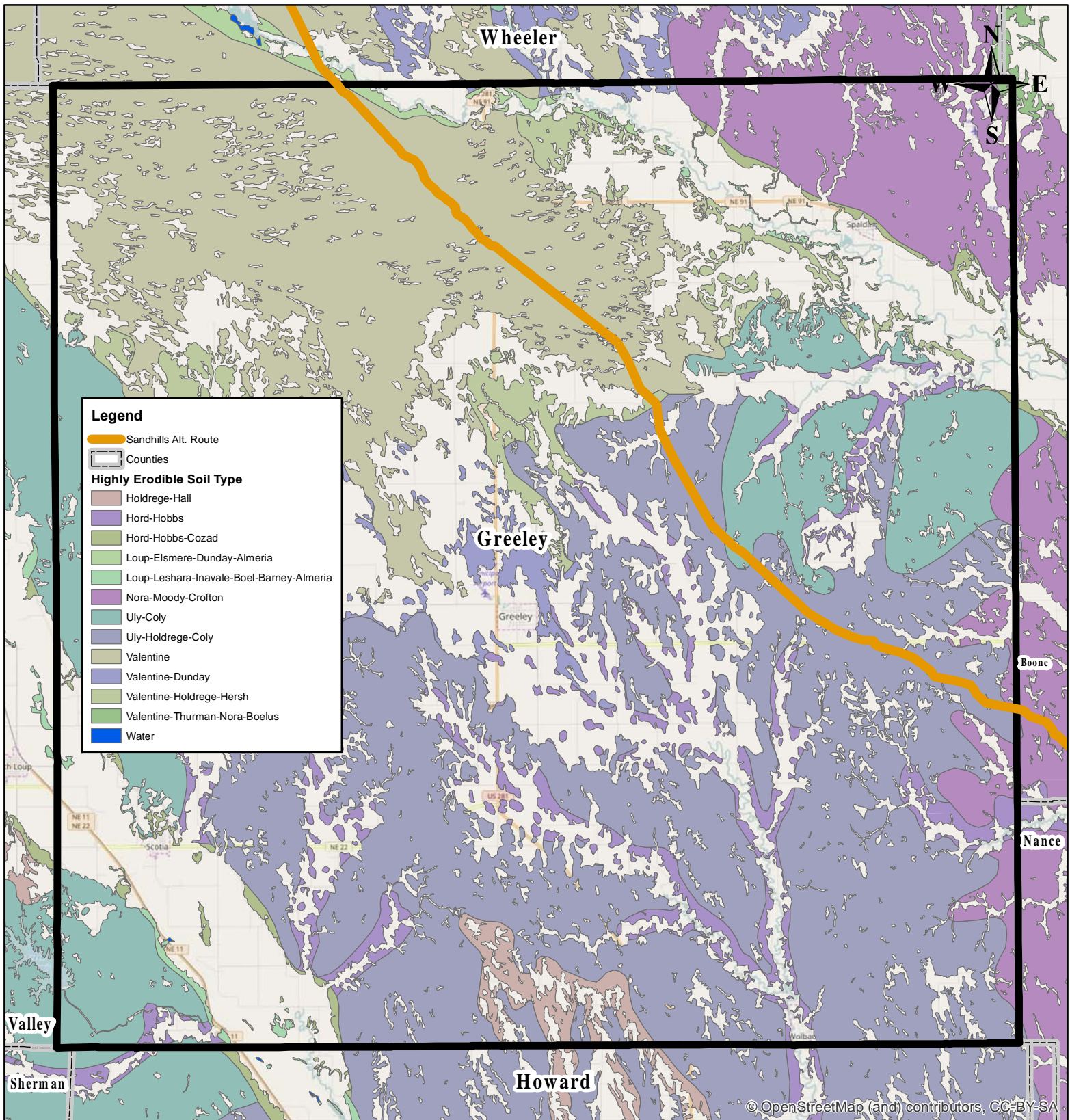
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Page 7	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	0	0	0	NA
Mainline Alt. Route	0	0	0	NA
Sandhills Alt. Route	87,835	8,087	95,923	91.6%



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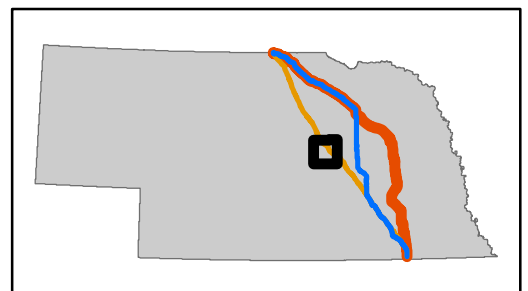
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County: Greeley

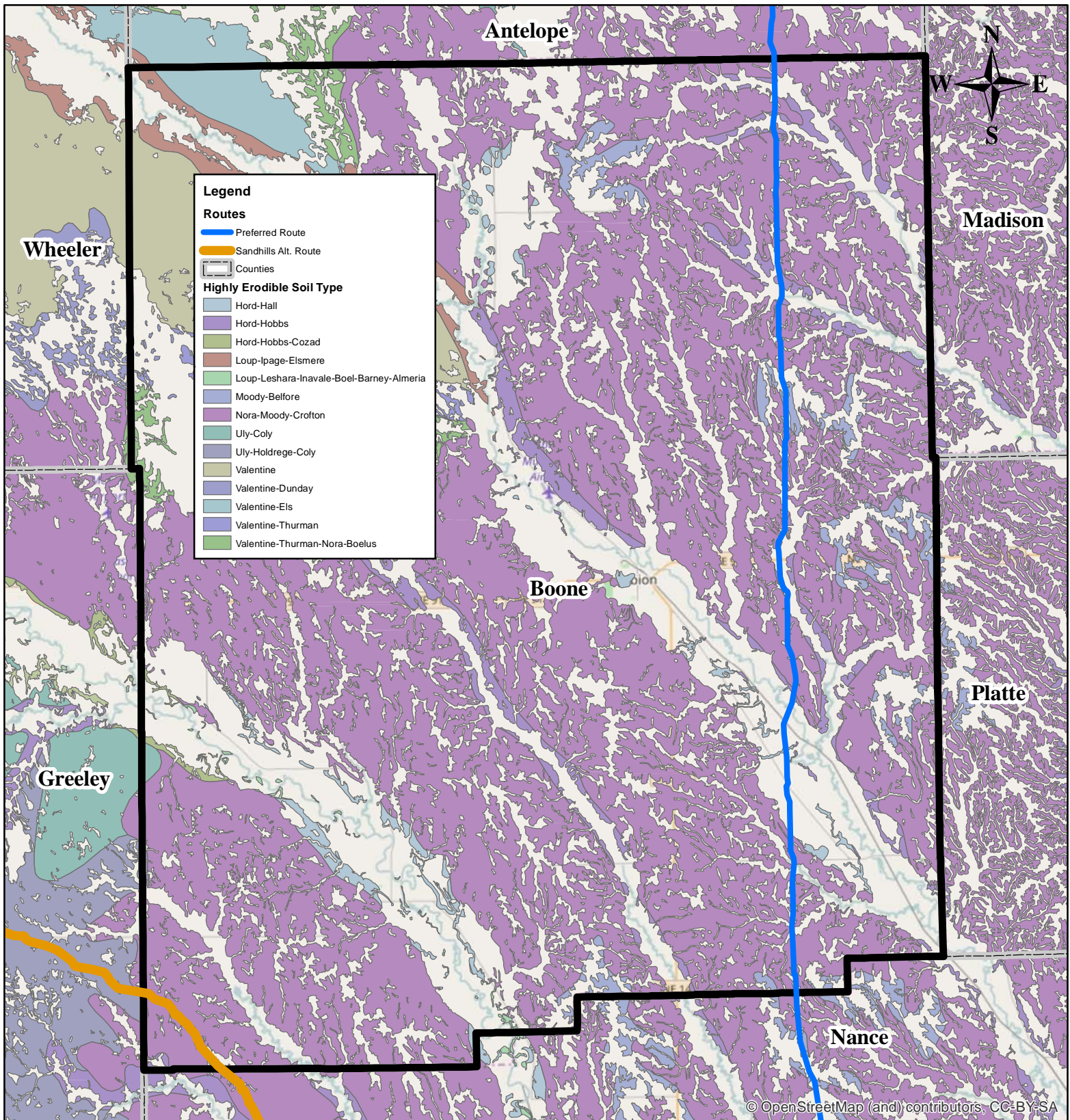
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Page 8	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	0	0	0	NA
Mainline Alt. Route	0	0	0	NA
Sandhills Alt. Route	117,329	9,180	126,509	92.7%



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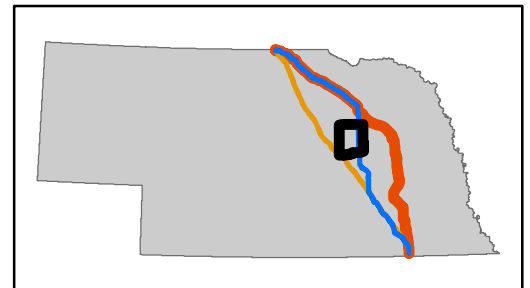
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County: Boone

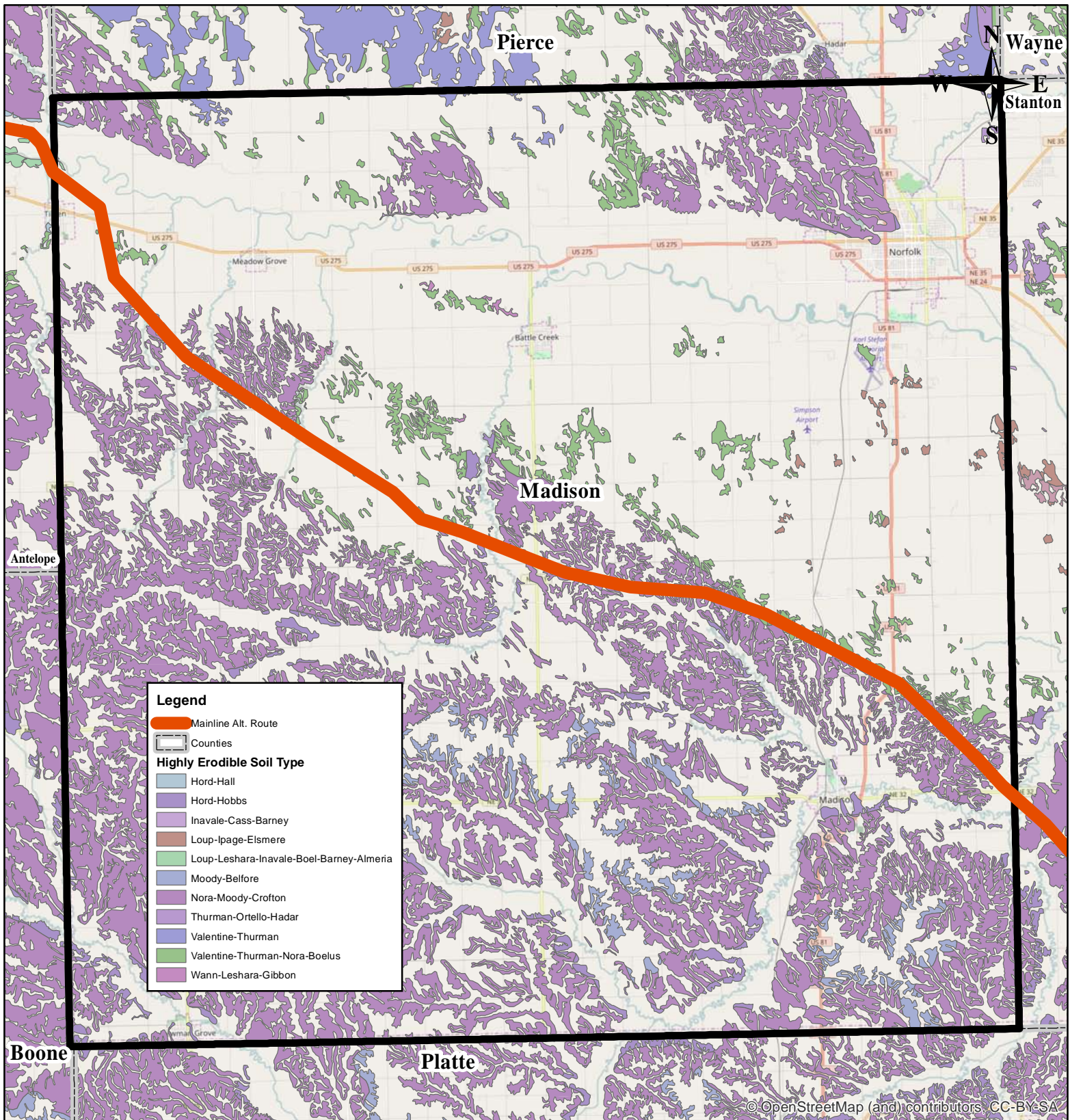
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Page 9	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	78,492	70,821	149,313	52.6%
Mainline Alt. Route	0	0	0	NA
Sandhills Alt. Route	12,380	5,782	18,161	68.2%



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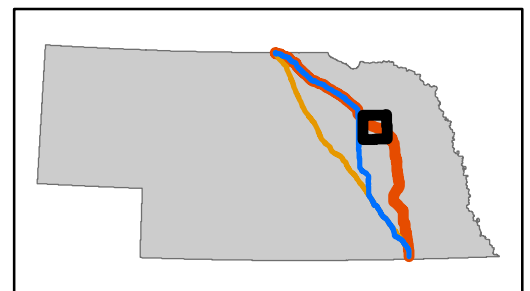
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County: Madison

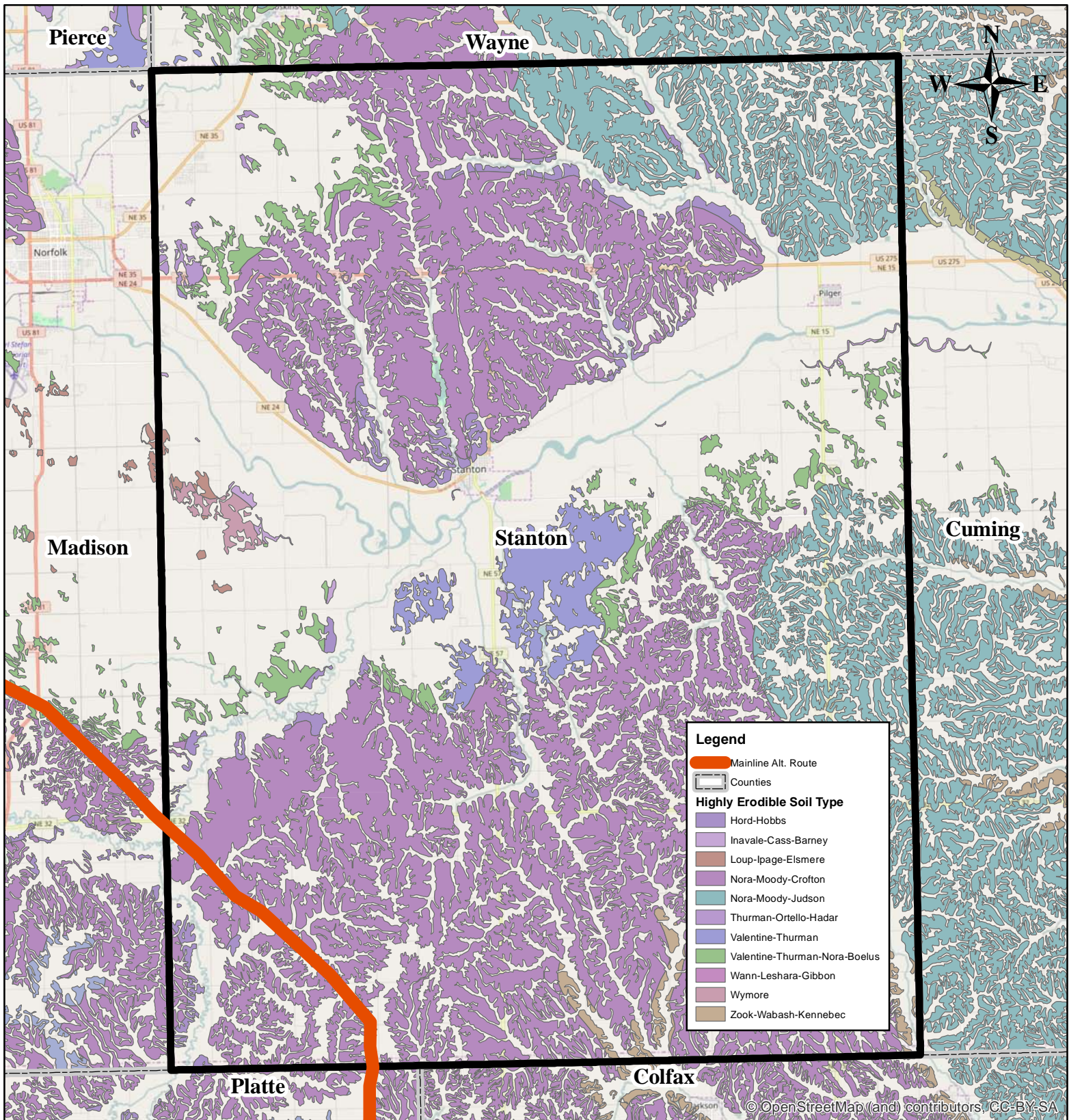
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Page 10	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	0	0	0	NA
Mainline Alt. Route	56,107	103,493	159,600	35.2%
Sandhills Alt. Route	0	0	0	NA



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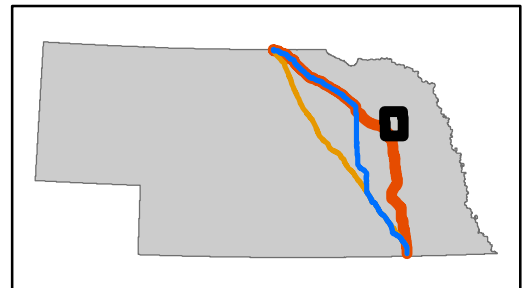
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County: Stanton

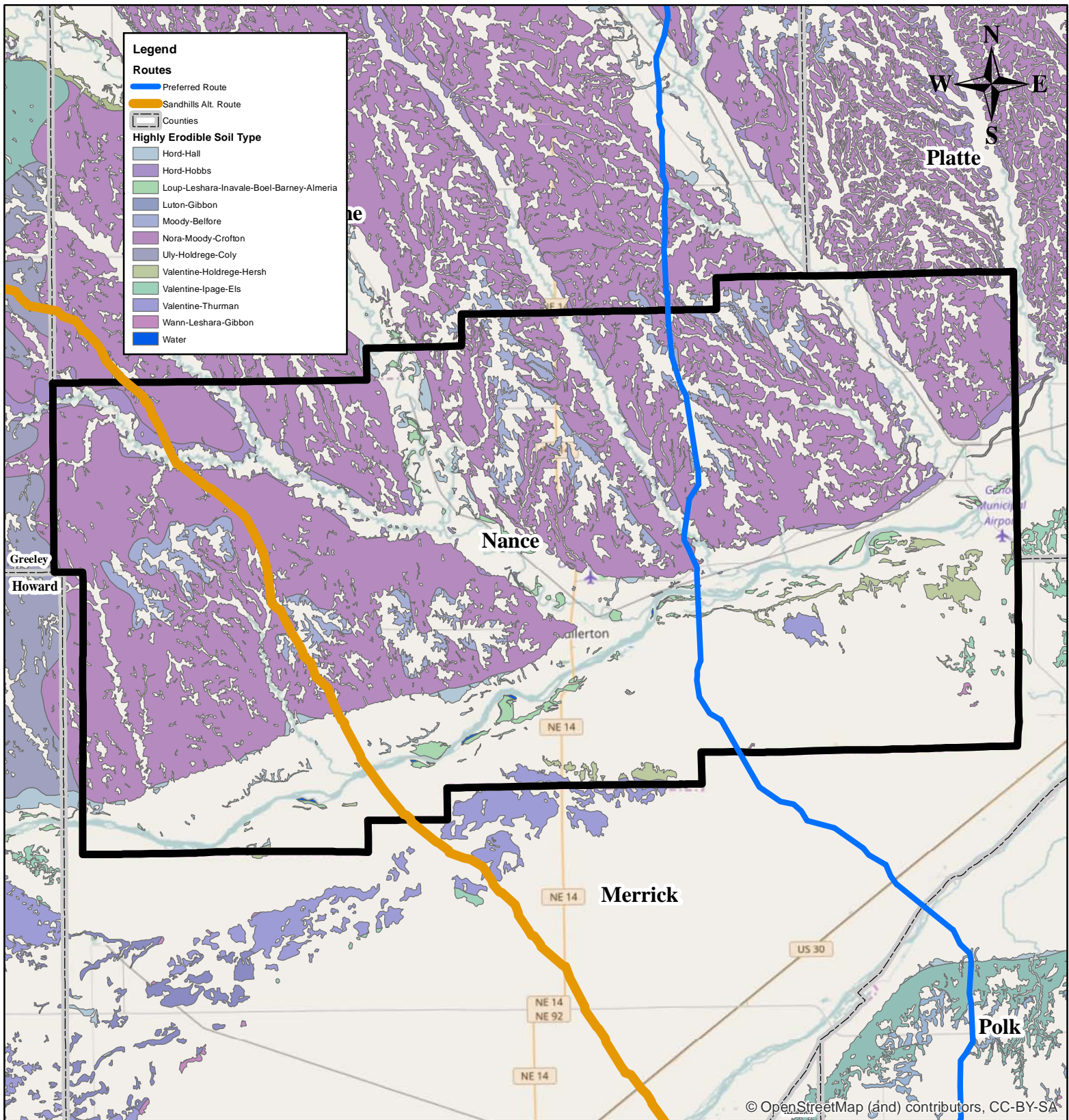
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Page 11	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	0	0	0	NA
Mainline Alt. Route	23,864	17,721	41,585	57.4%
Sandhills Alt. Route	0	0	0	NA



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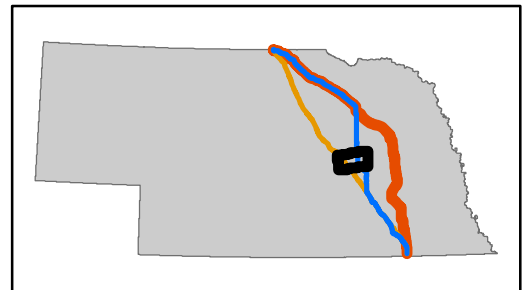
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County: Nance

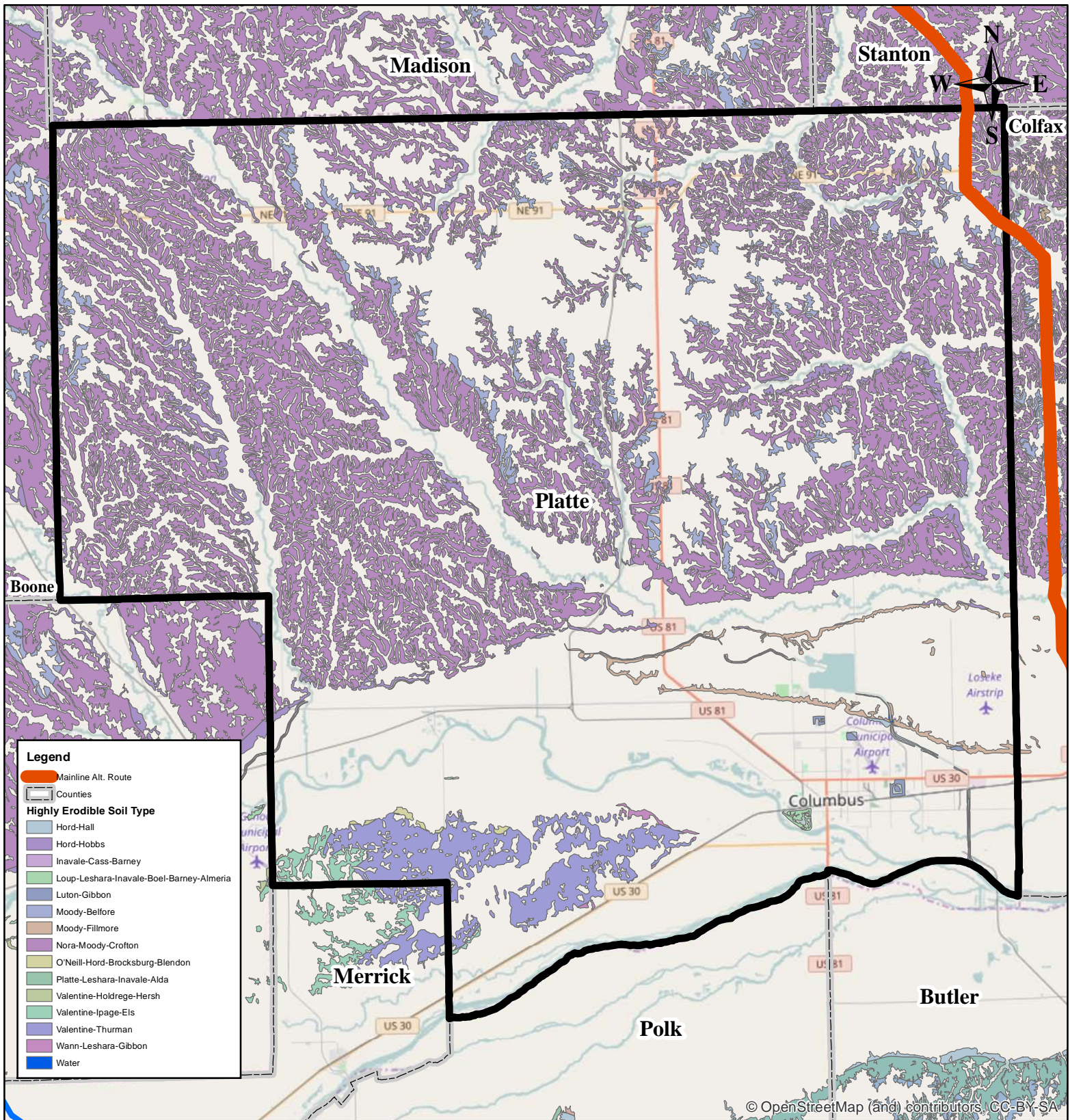
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Page 12	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	17,792	59,411	77,203	23.0%
Mainline Alt. Route	0	0	0	NA
Sandhills Alt. Route	50,284	39,957	90,241	55.7%



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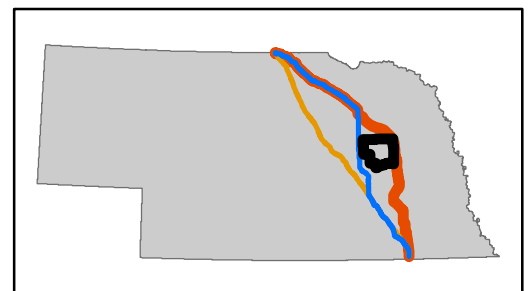
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County: Platte

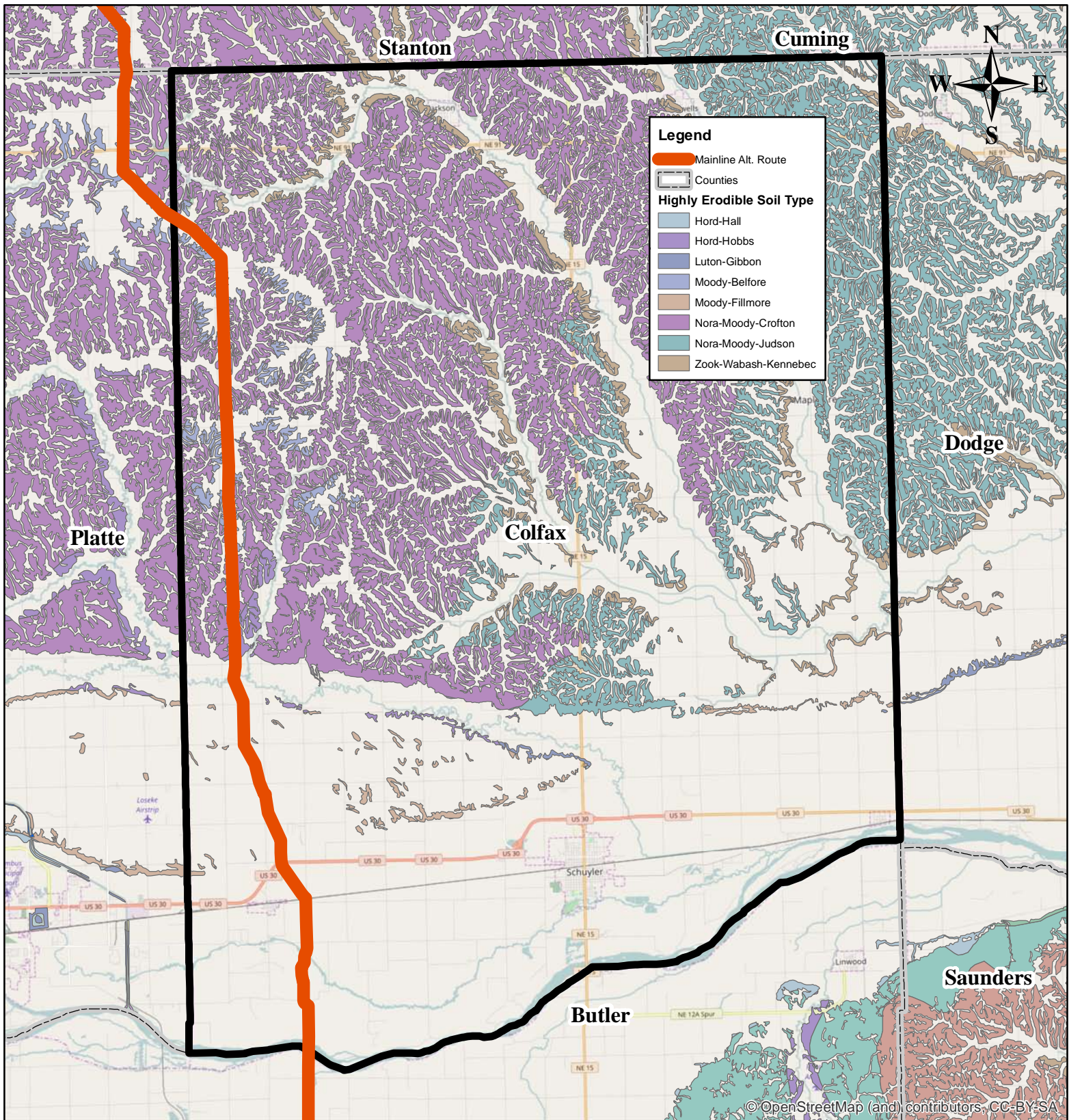
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Page 13	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	0	0	0	NA
Mainline Alt. Route	4,909	16,765	21,674	22.6%
Sandhills Alt. Route	0	0	0	NA



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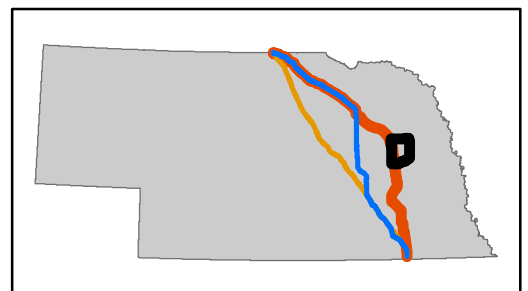
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County: Colfax

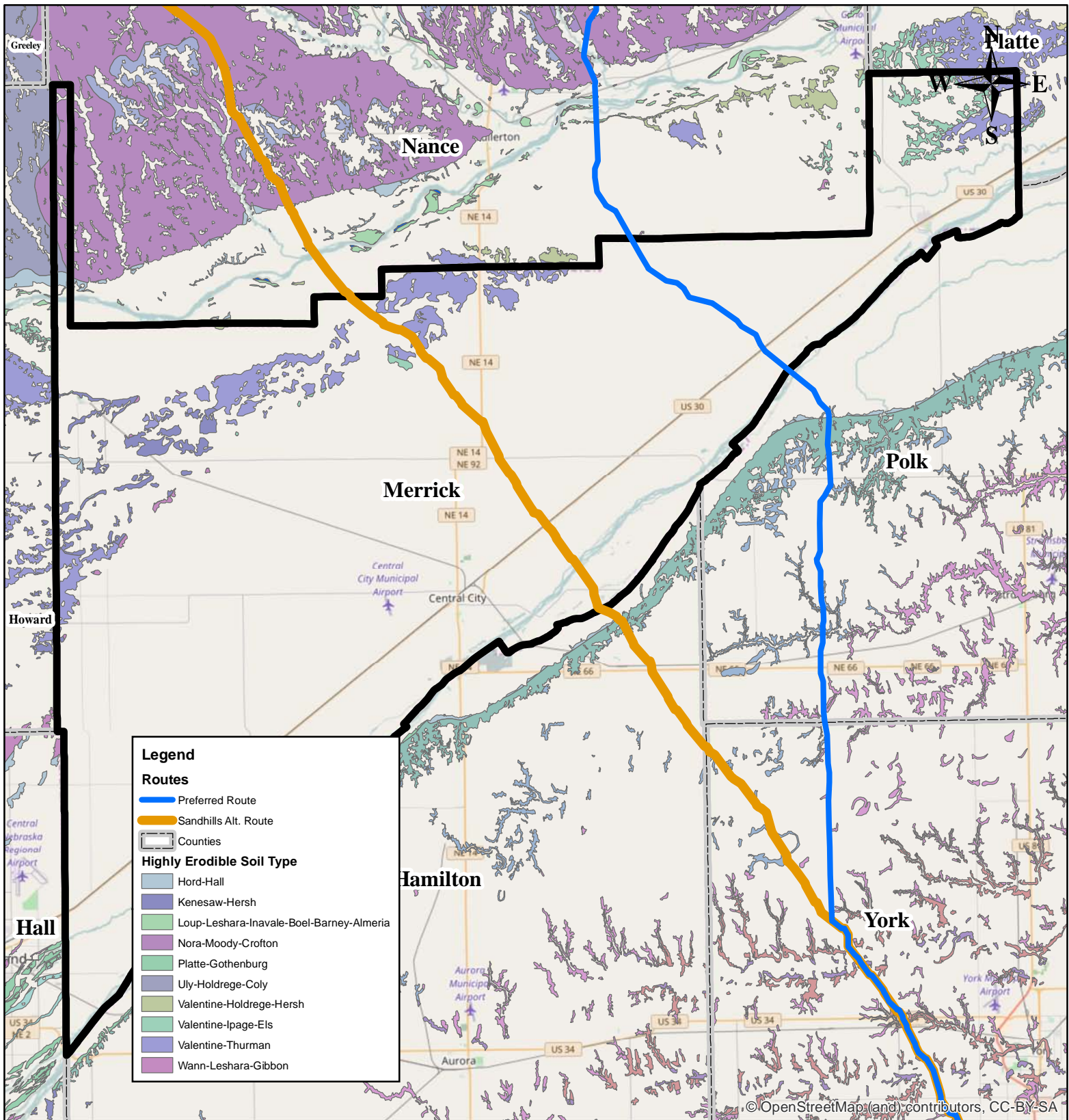
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Page 14	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	0	0	0	NA
Mainline Alt. Route	23,978	90,142	114,120	21.0%
Sandhills Alt. Route	0	0	0	NA



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County: Merrick

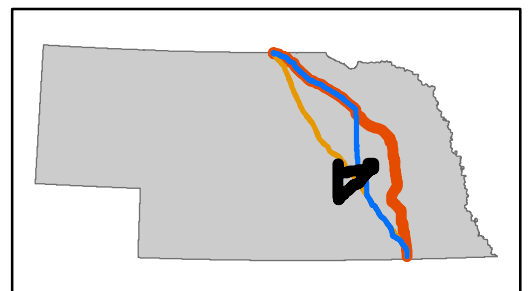
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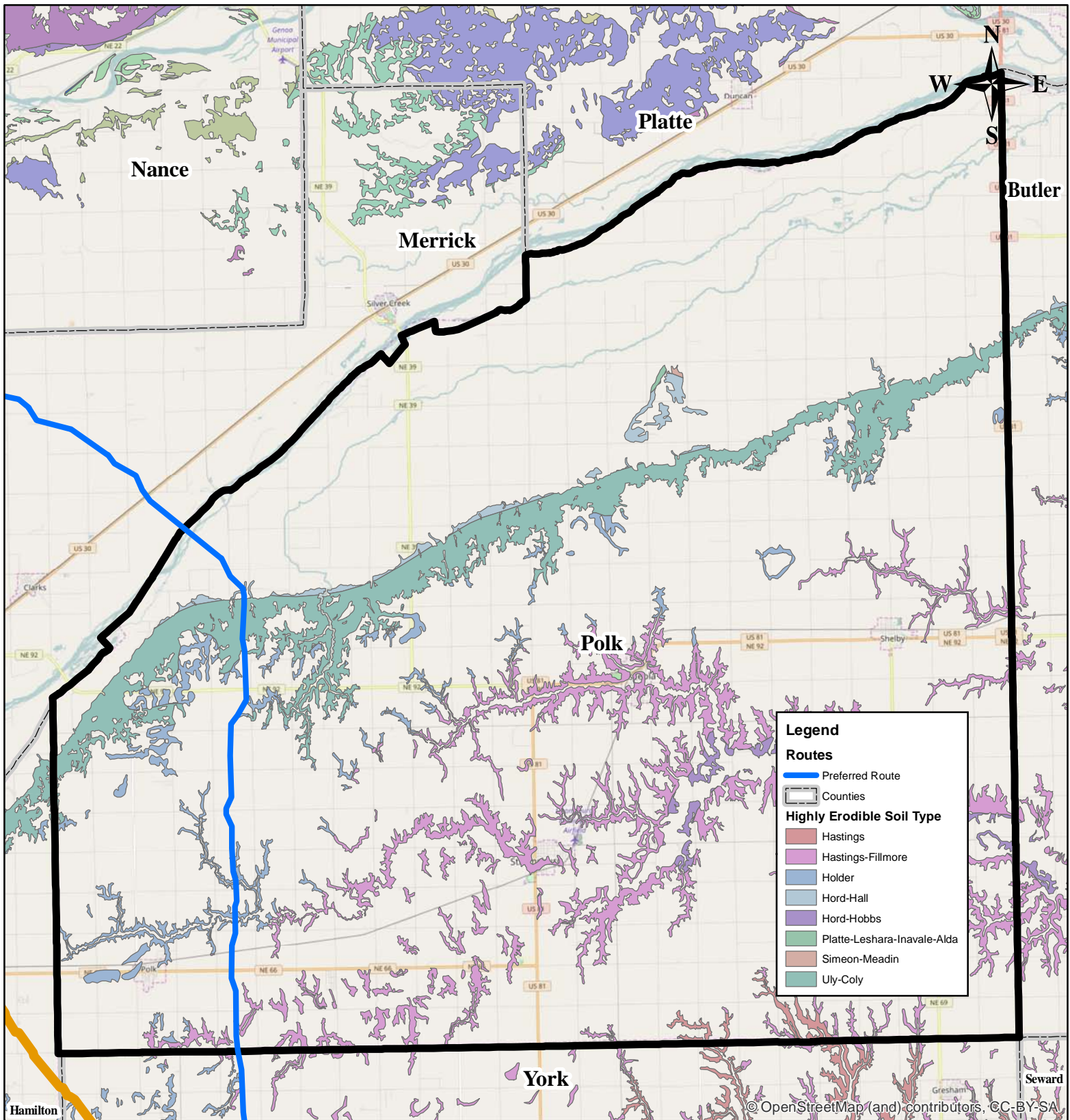
Page 15	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	0	41,831	41,831	0.0%
Mainline Alt. Route	0	0	0	NA
Sandhills Alt. Route	2,245	79,220	81,465	2.8%



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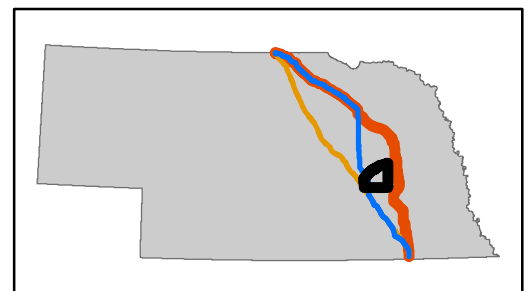


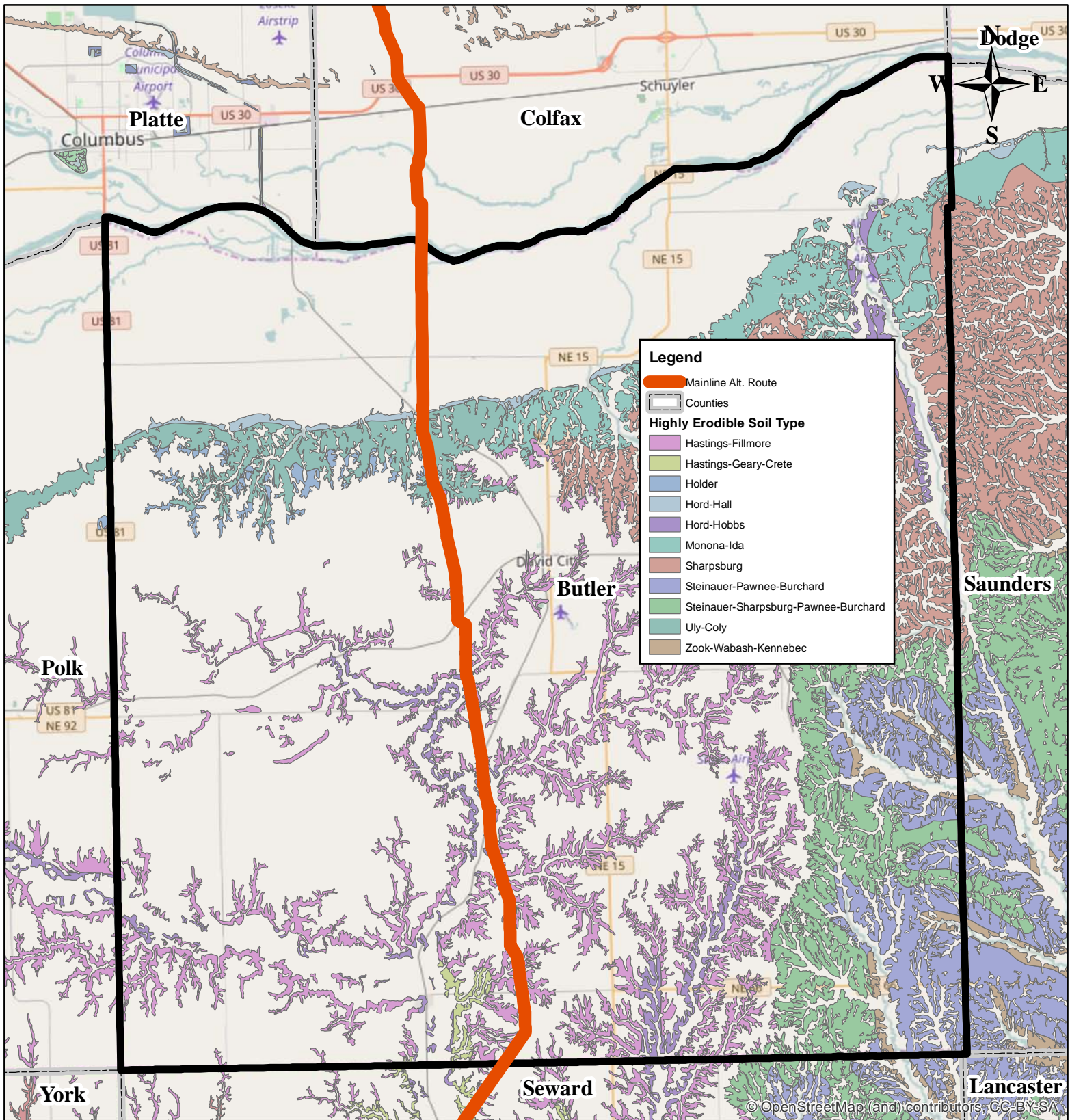
Page 16	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	10,165	61,450	71,615	14.2%
Mainline Alt. Route	0	0	0	NA
Sandhills Alt. Route	0	0	0	NA



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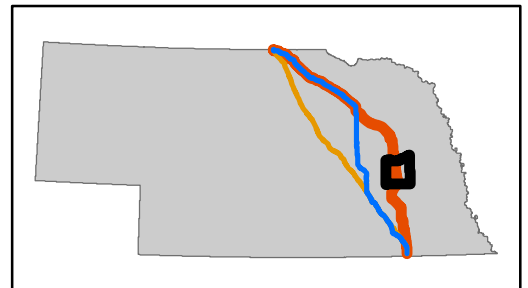




County: Butler

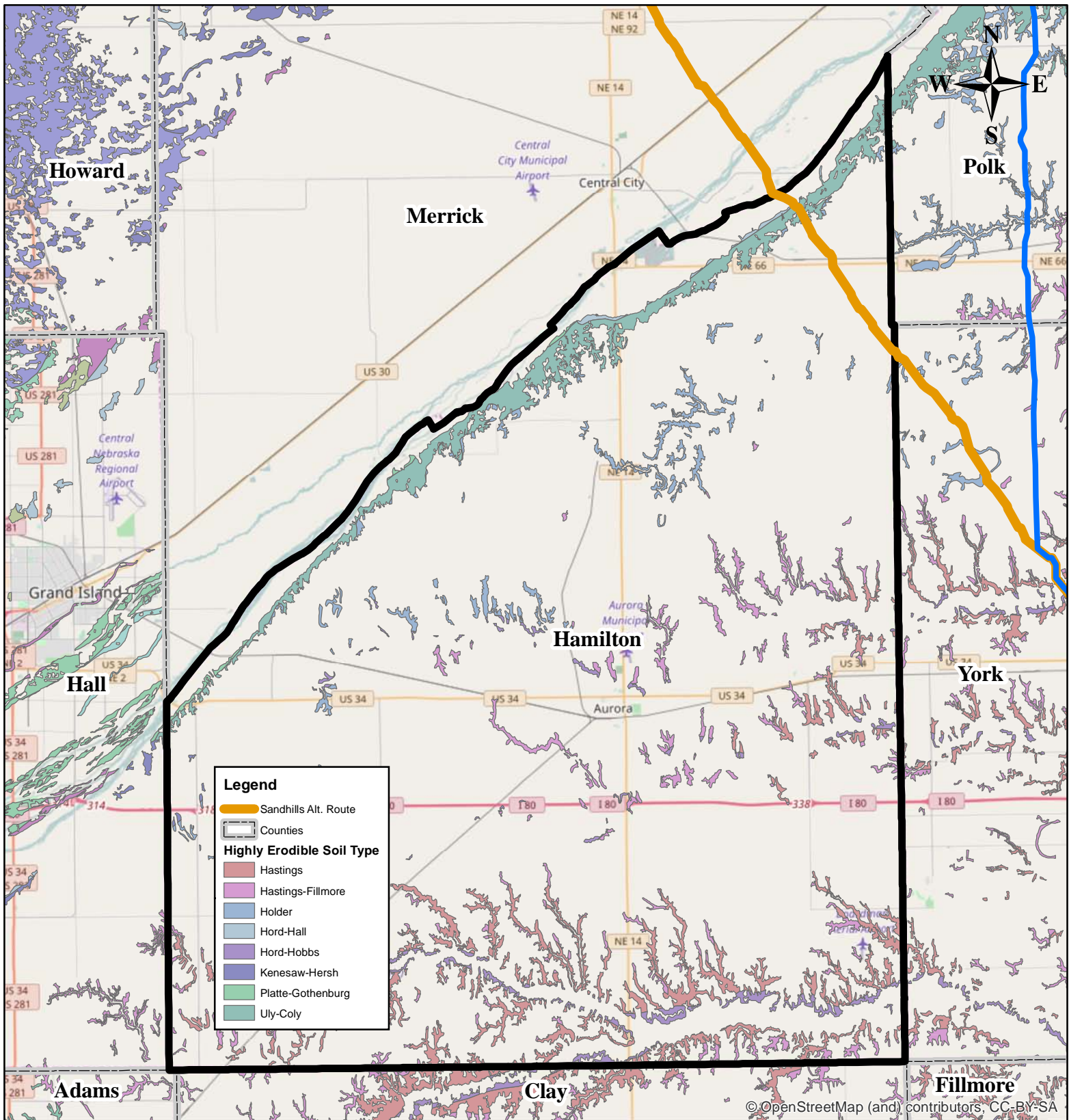
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Page 17	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	0	0	0	NA
Mainline Alt. Route	29,762	95,559	125,321	23.7%
Sandhills Alt. Route	0	0	0	NA



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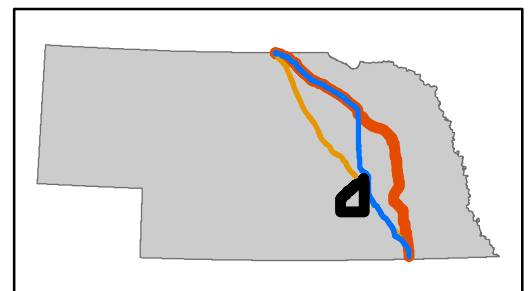
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County: Hamilton

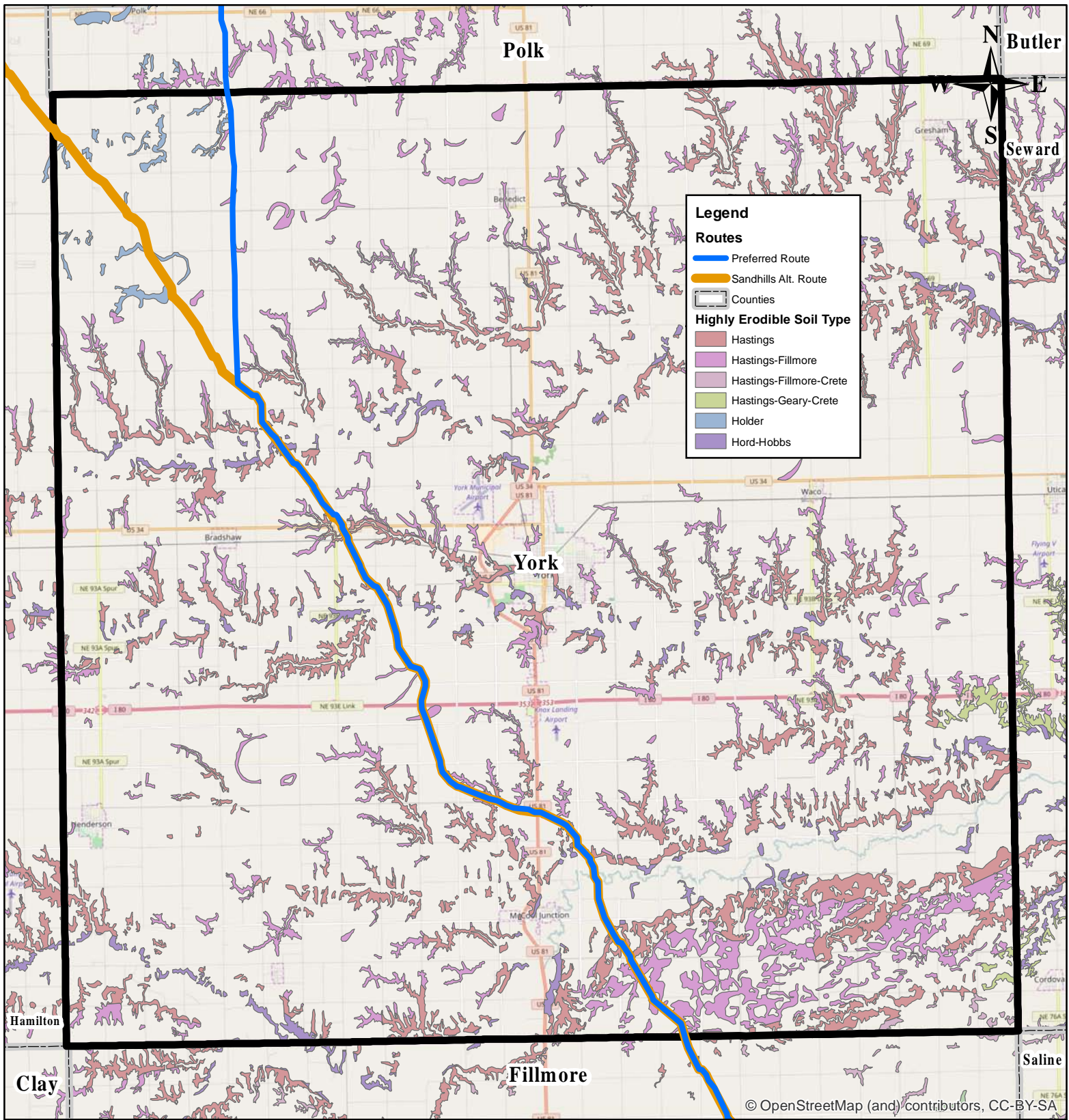
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Page 18	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	0	0	0	NA
Mainline Alt. Route	0	0	0	NA
Sandhills Alt. Route	3,581	31,654	35,235	10.2%



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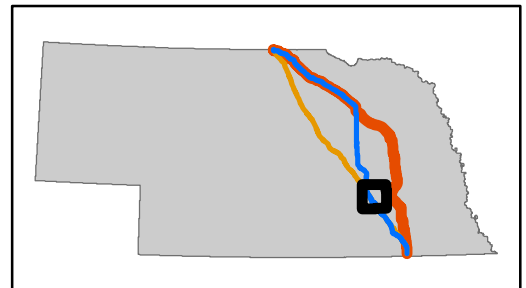
County: York

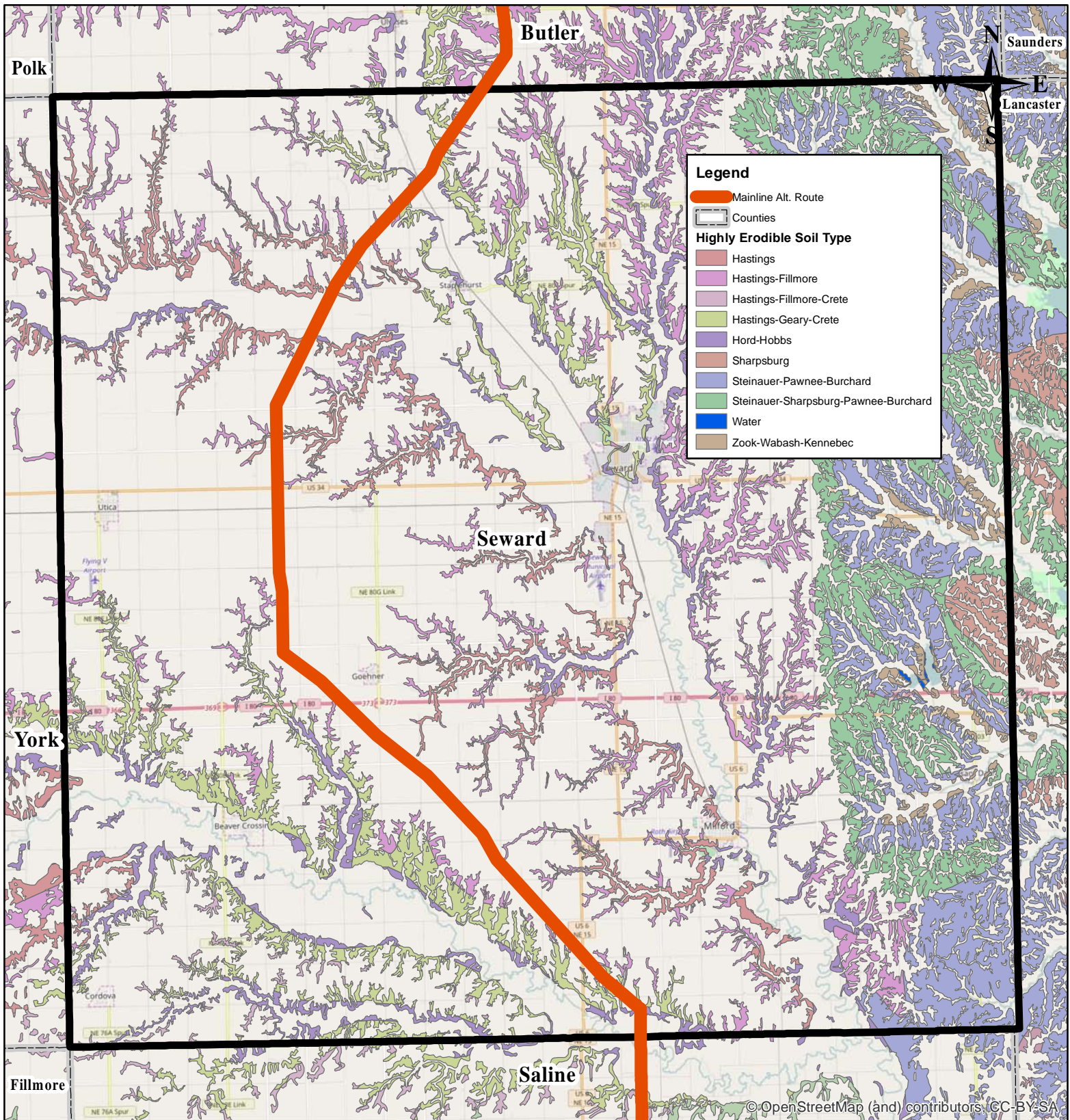
Page 19	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	16,459	135,407	151,866	10.8%
Mainline Alt. Route	0	0	0	NA
Sandhills Alt. Route	15,995	140,397	156,392	10.2%



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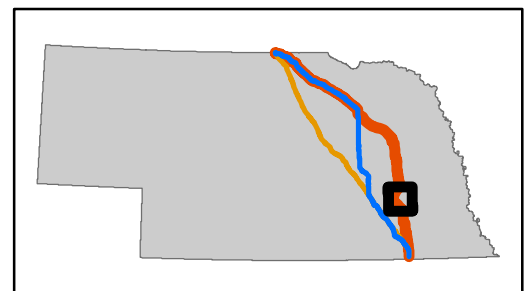
County: Seward

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



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County: Fillmore

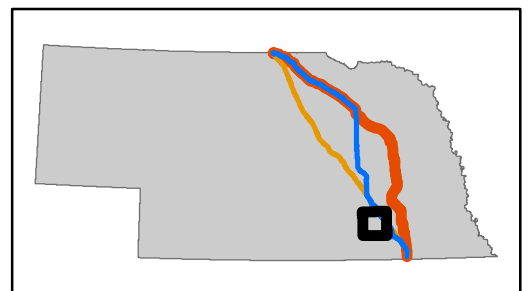
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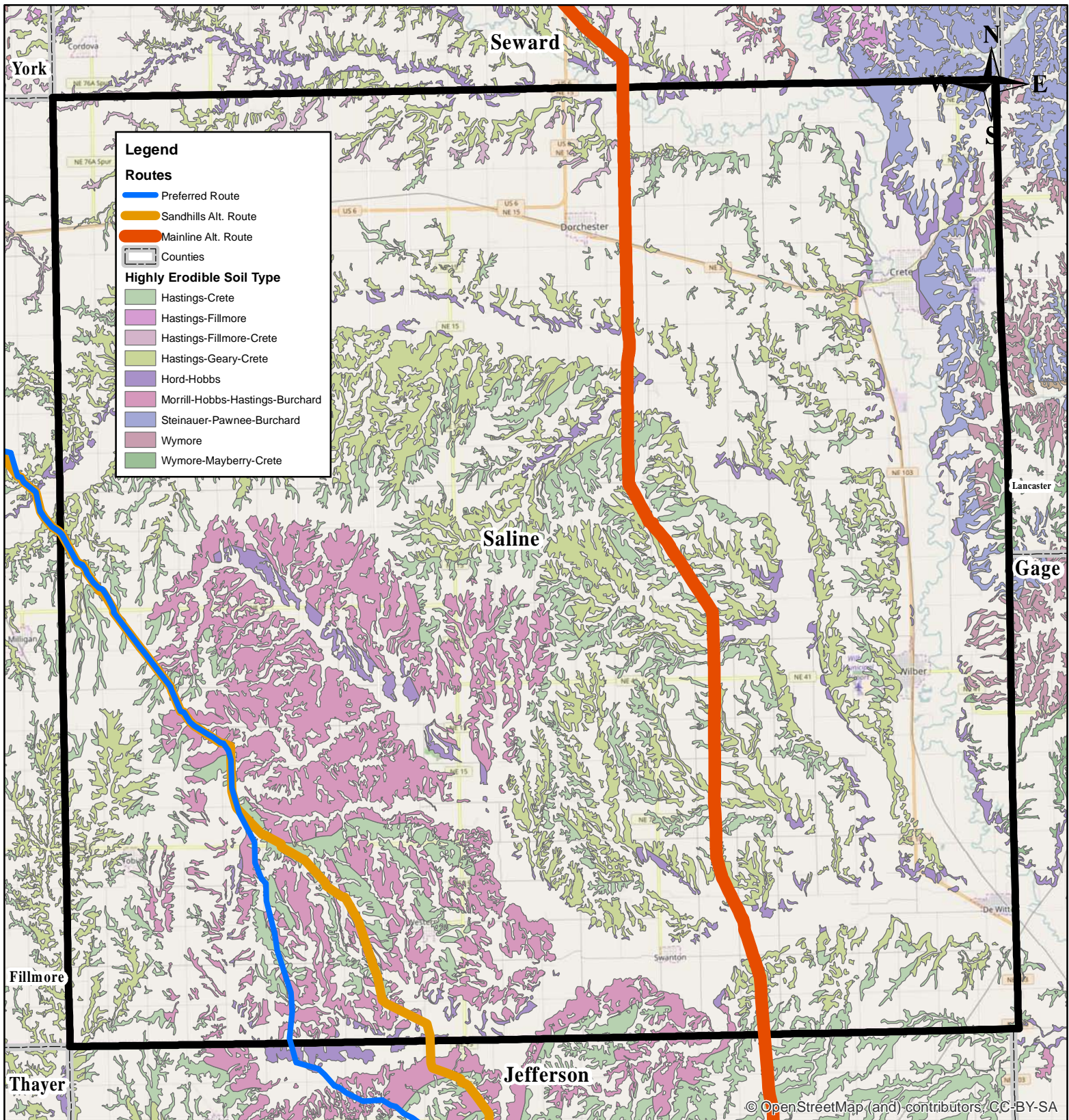
Page 21	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	6,503	71,453	77,956	8.3%
Mainline Alt. Route	0	0	0	NA
Sandhills Alt. Route	5,942	71,574	77,516	7.7%



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County: Saline

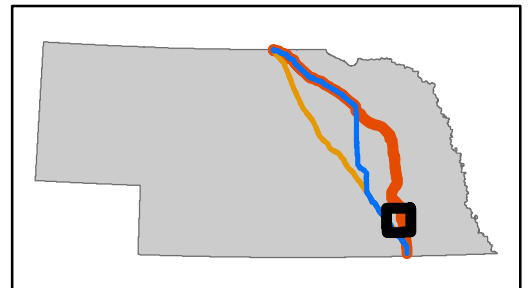
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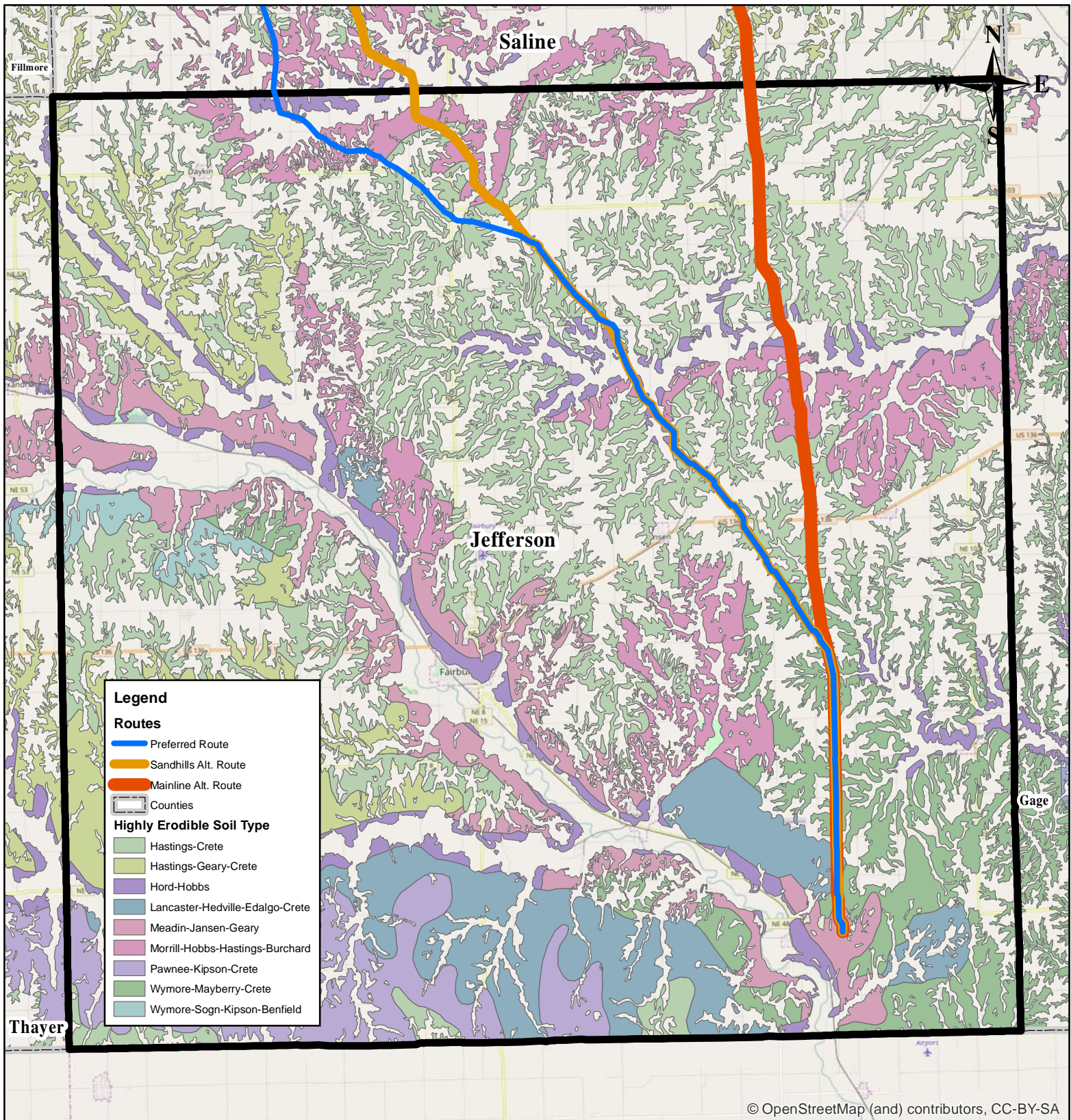
Page 22	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	32,527	45,556	78,083	41.7%
Mainline Alt. Route	41,341	89,833	131,174	31.5%
Sandhills Alt. Route	44,323	44,654	88,976	49.8%



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County: Jefferson

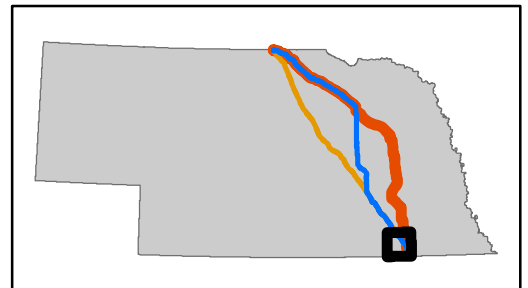
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Page 23	Highly Erodible Ft.	Non-Highly Erodible Ft.	Total Ft.	Percent Highly Erodible
Preferred Route	69,609	78,753	148,362	46.9%
Mainline Alt. Route	58,117	55,510	113,627	51.1%
Sandhills Alt. Route	68,038	67,047	135,085	50.4%



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APPENDIX A

Appendix A

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

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

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

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

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Hersh-Gates complex, 17 to 30 percent slopes
Hersh fine sandy loam, 6 to 11 percent slopes
Hobbs silt loam, channeled, frequently flooded
Hobbs silt loam, frequently flooded
Hobbs silt loam, occasionally flooded
Hobbs silt loam, occasionally flooded, cool
Holdrege silt loam, 0 to 1 percent slopes, cool
Holdrege silt loam, 1 to 3 percent slopes
Holdrege silt loam, 3 to 7 percent slopes
Holdrege silty clay loam, 3 to 7 percent slopes, eroded
Holt-Longpine fine sandy loams, 6 to 11 percent slopes
Holt variant fine sandy loam, 3 to 6 percent slopes
Hord-Uly complex, 0 to 6 percent slopes
Hord fine sandy loam, 1 to 3 percent slopes
Hord silt loam, 0 to 1 percent slopes
Hord silt loam, 0 to 1 percent slopes, warm
Hord silt loam, 1 to 3 percent slopes
Hord silt loam, rarely flooded
Hord silt loam, sandy substratum, 0 to 1 percent slopes
Hord very fine sandy loam, 0 to 1 percent slopes
Hord very fine sandy loam, 1 to 3 percent slopes
Inavale fine sand, 3 to 11 percent slopes
Inavale fine sand, channeled, frequently flooded
Inavale fine sand, occasionally flooded
Inavale fine sand, rarely flooded
Inavale fine sandy loam, occasionally flooded
Inavale loamy fine sand, 0 to 3 percent slopes
Inavale loamy fine sand, 3 to 11 percent slopes, rarely flooded
Inavale loamy fine sand, occasionally flooded
Inavale loamy sand, 3 to 6 percent slopes, rarely flooded
Inavale sand, channeled, frequently flooded
Inavale soils, frequently flooded
Inglewood-Boel complex, channeled, occasionally flooded
Ipaga fine sand, 0 to 3 percent slopes
Ipaga loamy fine sand, 0 to 3 percent slopes
Jansen-Meadin loams, 2 to 6 percent slopes
Jansen loam, 0 to 2 percent slopes
Jansen loam, 2 to 6 percent slopes
Janude sandy loam, very rarely flooded
Josburg fine sandy loam, 0 to 2 percent slopes

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

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

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

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

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Wann silt loam, occasionally flooded
Water
Wewela fine sandy loam, 0 to 3 percent slopes
Wewela fine sandy loam, 3 to 6 percent slopes
Wewela loam, 0 to 2 percent slopes
Zook silt loam, occasionally flooded
Zook silty clay loam, 0 to 2 percent slopes, occasionally flooded