

Areas of Landslides

Leonard Quadrangle, North Dakota

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UNIT DESCRIPTIONS

QUATERNARY SYSTEM

RECENT/PLEISTOCENE

Qlsa Areas of Recently Active Landslides

Landslide areas showing movement between 2008 and 2019.

Qls Landslide Deposits

A mass of material that has moved downslope. Includes earth flows, slumps, and areas of soil creep.

Landslides identified on this quadrangle were mapped from stereo pairs, black and white 1:20,000 scale aerial photographs flown in September 1962 by the United States Department of Agriculture (USDA). Additional data sources include digital orthophotography from the USDA National Agriculture Imagery Program (NAIP) flown in August to September 2021 and the North Dakota Geological Survey LiDAR Map Series, which compiles raw data flown in June 2019 from the North Dakota State Water Commission.

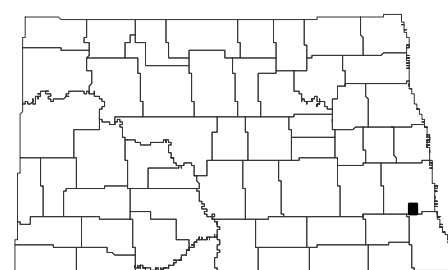
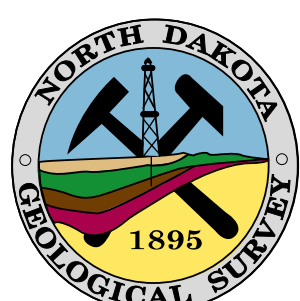
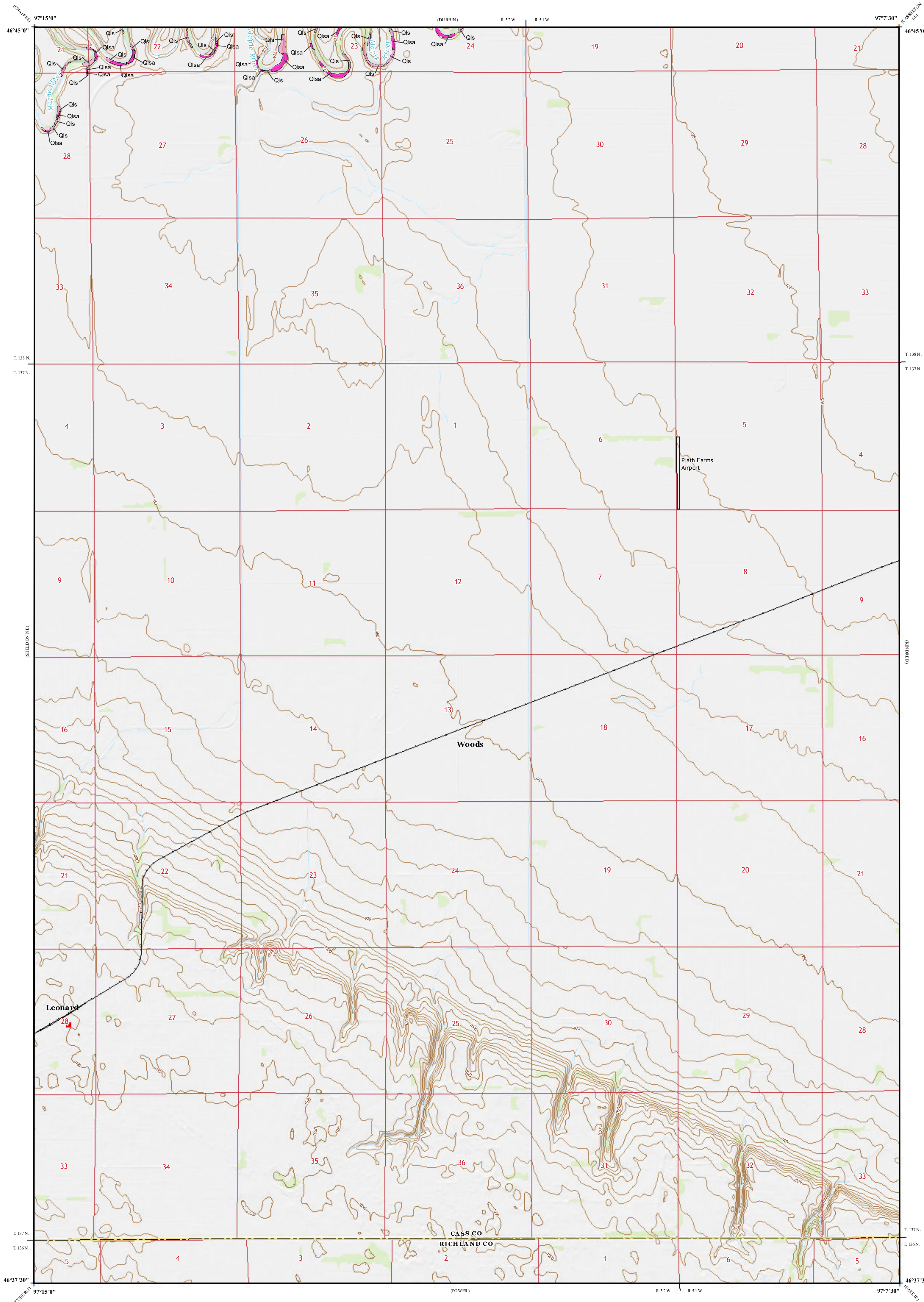
Areas of recently active landslides (Qlsa) mapped on this quadrangle were identified from changes between the 2008 and 2019 LiDAR elevation datasets observed on an elevation subtraction raster. Noise introduced from data precision (typically within a foot between the LiDAR datasets) is removed on this raster by excluding the signal from elevation change in the +/- 1 foot interval. Geologists interpret areas of landslide movement in geomorphic context (typically a decrease in elevation near a landslide headscarp paired with an increase in elevation downslope near the toe) and delineate those areas within the larger landslide dataset. Landslides not identified as recently active may have also experienced movement relatively recently, but did not show discernable signs of movement during the 2008 to 2019 window between LiDAR collects.

ROAD CLASSIFICATION

- Expressway Local C connector
- Secondary Hwy Local Road
- Ramp 4WD
- Interstate Route US Route State Route

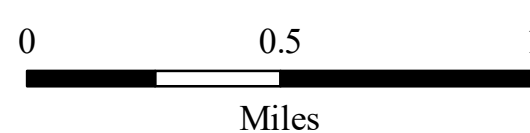
Slope Failure Statistical Summary				
Map Unit	No. of Landslides	Mapped Landslide Area		Map Area %
		acres	m ²	
Total Landslides (Qls & Qlsa)	39	40	160,122	0.12
Recently Active Landslides (Qlsa)	20	17	70,669	0.05

44.13% of the mapped landslide area was active between 2008 and 2019



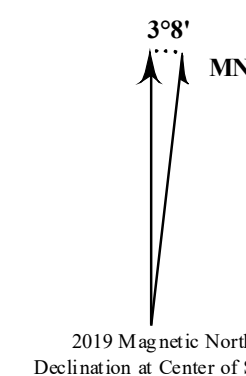
Leonard Quadrangle, North Dakota

Scale 1:24,000



Lambert Conformal Conic Projection
North American 1983 Datum
USGS 7.5 Minute Topo Map

Standard Parallels: 46°37'30"N, 46°45'0"N
NGVD 1988
Contour Interval 5 Feet



2019 Magnetic North
Declination at Center of Sheet