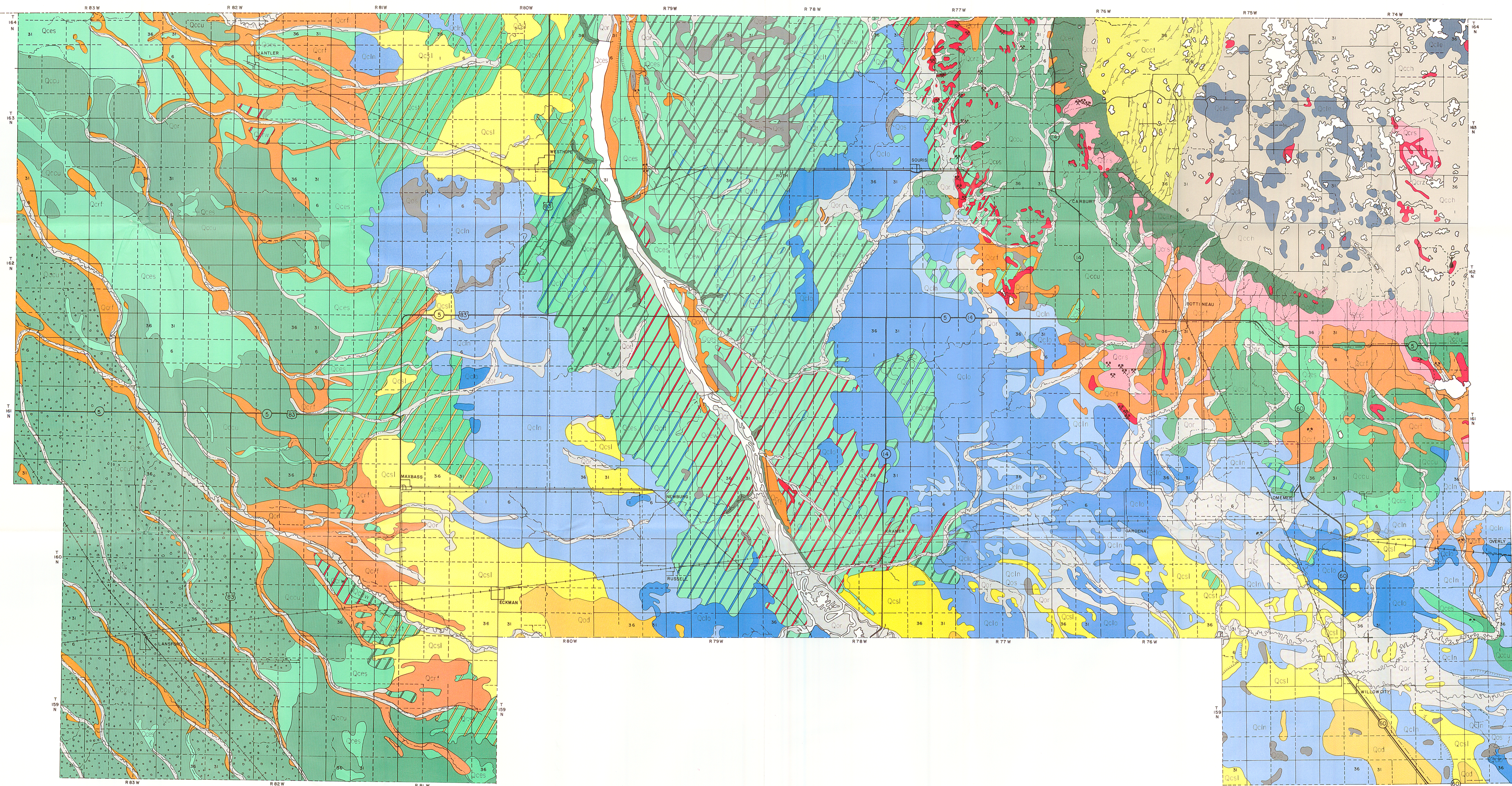


PLATE 1. GEOLOGIC MAP OF BOTTINEAU COUNTY

PART 1 PLATE 1
BULLETIN 78
COUNTY GROUNDWATER STUDIES NO. 35

by
S. R. Moran, K. L. Harris, D. E. Deal and J. P. Bluemle

NORTH DAKOTA GEOLOGICAL SURVEY
NORTH DAKOTA STATE WATER COMMISSION



ROCK UNITS	LEGEND	DESCRIPTION
FORMATION AND FACIES	Symbol	Texture, color, topography or landform, and origin.
OAHE FORMATION	Qo	Clay, silt, sand, and gravel with dispersed, organic material.
Clay Facies	Qos	Pond and slough sediment. Dark, obscurely bedded clay and silt; in modern ephemeral ponds.
Silt and Sand Facies	Qor	River sediment. Dark, obscurely bedded clay and silt; overbank sediment.
	Qod	Windblown sediment. Well-sorted, fine sand and black silt with obscure bedding and weak paleosols; undulating to slightly rolling in most places, except strongly rolling in areas of dunes.
COLEHARBOR GROUP	Qc	Pebbly, sandy, silty clay with limestone, dolomite, granite, gneiss, and basalt pebbles and associated nonorganic, bedded clay, silt, sand, and gravel.
Silt Facies	Qcle	Offshore to nearshore lake sediment elevated above the surrounding topography. Flat to steeply sloping areas of silt to fine sand, except gravelly near the margins of the deposits.
	Qcln	Nearshore to offshore lake sediment. Flat to undulating areas of silt to fine sand, generally obscured by a covering of collian material.
	Qclo	Offshore lake sediment (mainly turbidity-current sediment). Flat to gently undulating areas of silt and well-sorted, very fine to medium grained sand with flat bedding. Blowout topography common.
	Qclt	Offshore to nearshore lake sediment overlying glacial sediment. Flat to undulating topography.

Sand and Gravel Facies	Till Facies
Qesl	Qecu
Qesf	Qech
Qesr	Qesw
Qesv	Qesr
Qesx	Qesr
Qesy	Qesr
Qesz	Qesr

River and lake shore sediment. Moderately well-sorted, cross-bedded sand and plane-bedded gravel, including sediment of meltwater rivers.

Nearshore lake sediment. Shoreline deposits with some poorly defined beach elements. Undulating areas of medium-grained sand.

Nearshore lake sediment overlying glacial sediment. Same as Qesl except till is commonly present at shallow depths.

Fluvial plains. Areas of flat to gently undulating topography; flat-bedded sand and gravel; commonly with braided channel scars.

Collapsed fluvial plains. Areas of undulating to rolling topography; faulted and contorted beds of sand and gravel.

Patches of gravel or sand overlying glacial sediment. Water-worn till surface overlain by a nearly continuous veneer of fluvial sediment.

Eskers and kames (shown as red areas on the map). Ridges and hills of gravel and sand; cobbles and boulders common; chunks of till common. Ice-contact fluvial deposits.

Glacial sediment. Unsorted, unbedded mixture of angular, subangular, and rounded blocks of rock, gravel, and sand, generally in a stiff matrix of silt and clay; yellowish-brown to olive-gray in exposures depending on weathering intensity; contains discontinuous lenses of gravel and sand.

Undulating surface of glacial sediment with poorly integrated to fairly well integrated drainage, low local relief, and subdued disintegration markings.

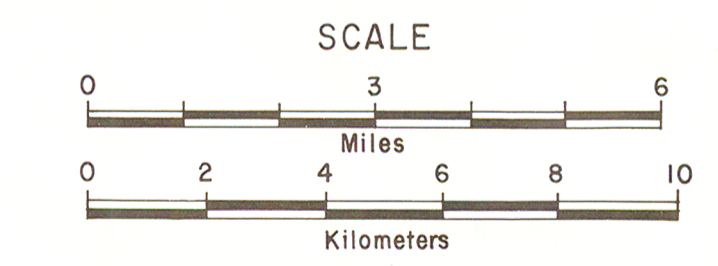
Hilly surface of glacial sediment with nonintegrated drainage, high local relief, and abundant disintegration features.

Wave-planed surface of glacial sediment. Nearly smooth, bouldery surface veneered by sand or gravel in places.

Stream-eroded surface of glacial sediment. Steeply sloping, bouldery surface found mainly along the slopes to the Turtle Mountains.

Stream-eroded surface of glacial sediment. Nearly level surface, bouldery in places, found mainly in western Bottineau County.

Ice-thrust masses. Glacial sediment that has been draped over glacial or preglacial sediment or rock that has been sheared up into thrust slabs or folds near the ice margin; hilly areas with intense internal linearity; local concentrations of boulders exist in places.



Map Symbols	
	Geologic contacts.
	Areas of conspicuous, low-relief, ring-shaped hummocks.
	Ice-thrust ridges.
	Gravel pits.
	Ponds and lakes.
	Roads.
	Scarp
	Partly buried meltwater valley