

Trip A-5

APPLIED GEOMORPHOLOGY FOR LAND USE AND PLANNING IN CORTLAND, NEW YORK

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INTRODUCTION

The “science of landforms”, geomorphology, is critical in the use of land. Through the last forty years, environmental geomorphology has come to the forefront of geology/physical geology because of the rapid growth of suburbia and the recognition of the impact of land use on stream flow. Central New York experienced rapid growth in the early 1970s because of many employment possibilities. In Cortland, we had Smith Corona Marchant (which was the world’s largest manufacturer of portable typewriters at the time), Mack Trucks, Wilson Sporting Goods and Chris Craft (which manufactured pleasure boats). The Cortland-Homer valley was easy to develop because of its relatively flat landscape and the strength and thickness of the materials making up the landscape. After the 1970s, the county had a net loss in population when these companies left the area.

A GEOMORPHOLOGIST’S EXPERIENCE IN LAND USE AND PLANNING

Cortland County was extensively glaciated in the Pleistocene such that erosion created deep valleys which received thick glacial outwash forming flat or gently sloping valley train topography. In places this outwash has a thickness reaching 235 feet. Much of this sediment is very permeable and serves as the sole-source aquifer for Cortland and Homer. Soils developed on the outwash, when coupled with the shape of the land and their permeability, are the best agricultural soils in New York State. Cortland County has been a leading agricultural producer since the mid-nineteenth century. No farm located on the valley floor has had a failing year because of lack of water due to the proximity to the water table. However, farms on the hill-slopes average failing years once in every three years.

The factors that allow for excellent agricultural productivity also make for ideal urban expansion. The soils have the strength to support urban structures and the permeability does not allow for standing water after rain or snowmelt. Excavations are easy in the outwash so that foundations, basements, and underground utilities are not prohibitively expensive.

Cortland County has an extensive mining program for its mineral resource: sand and gravel. Most of the mining today is confined to the southeast and southwest of Cortland because of the recognition that the best agricultural, urban, and mining lands are all the same tracts of land and are mutually exclusive. Mining had occurred north of Homer, but planning boards have not allowed for further mining while encouraging agriculture to continue. Many housing developments have been proposed on the farmland, but these too have been rejected.

The geomorphologist/geologist can become involved in sand and gravel mining in New York State by preparing a Geological Source Report. To more fully evaluate and ensure the quality of all material produced from granular deposits, a Geological Source Report must be submitted from each sand and gravel operation furnishing material for New York State Department of Transportation contracts. Also included in the Source Report are geologic cross-sections and petrographic analyses. Since April 1st, 1975, mines in New York State have been required to submit a Mined Land Reclamation plan to the New York State Department of Conservation. The Mined Land Reclamation Law seeks to foster and encourage the development of the state’s

mining industry and mineral resources, prevent pollution associated with mining activity, and assure the reclamation of mined lands in a way that makes such lands suitable for future productive use.

The geomorphologist is an ideal person to write or, at least, to make a significant contribution to an environmental impact statement. The environmental impact statement is designed to help applicants and agencies determine, in an orderly manner, whether a project or an action may be significant. The question of whether or not an action may be significant is not always an easy one to answer, but the geomorphologist certainly can contribute to “impact on land” and “impact on water.” For example, this writer was a contributor to a Generic Environmental Impact Statement on Sand and Gravel Mining in the Cortland-Tully Valley. This Generic Environmental Impact Statement was prepared to provide a single comprehensive document that addressed the impacts associated with a typical mining operation. The format allowed consideration of long-term, cumulative impacts, especially the loss of prime agricultural lands.

Many years ago several farm owners to the southwest of Cortland sold their lands for development. The Town of Cortlandville then zoned this land as “industrial.” Much controversy has arisen from this action because the land overlies the aquifer for the Town of Cortlandville and the City of Cortland’s aquifer recharge zone. Large industrial development both reduced the recharge and introduced contaminants to the aquifer. Development in Cortlandville has had a negative impact on the environment, but most often on the water supply. Problems such as trichloroethylene (TCE) and e. coli contamination developed, and solutions to these problems had to be found after the fact.

In 1987, for example, water tests showed fecal coliform bacteria in the private wells of 18 homes in a newly developed neighborhood. A week later the pollution had reached a total of 37 homes (Cortland Standard, August 25, 1987). Pollution testing expanded into the Town of Cortlandville and 27 more wells, close to the private wells, were found to be polluted. These homes were located on lots that had been deemed large enough for individual homes with septic systems. Engineers from the county Health Department had determined the lot size, and each homeowner or developer had been required to have a percolation test performed before the septic system was installed. However, the percolation was too fast because of the high permeability of the soil and lot size on that particular landscape, lateral moraine, should have been larger. As geomorphologists, we should be seeking to prevent problems from occurring by directing development in a sound environment way.

In 1992, Wendy’s restaurant wanted to build on a vacant section of the then new Wal-Mart store property on Route 13, using just over 0.7 acres of land. The town’s aquifer area is located along this already heavily developed area along Route 13, and the Cortland County groundwater management coordinator stated: “Eventually, you’re going to hit the straw that breaks the camel’s back” (Cortland Standard, June 18, 1992). A month later The Cortland County Planning Board recommended that Wendy’s franchise not be built on this property. However, by 2007, the philosophy of the planning board had changed. Wal-Mart intends to build a super center on 33.7 acres (contingent on their getting all necessary permits) in close proximity to the 0.7 acres that Wendy’s wished to develop and was turned down for. Despite the protests of a number of individuals and committees, the project will likely go forward. In this case, however, impact statements and snow collection and storm water management plans were scrutinized for three years before permits were issued. Storm water cannot be entered into Otter Creek before on site treatment. Also, Wal-Mart’s tire and lube department will not be allowed on this property. Another major aspect before the permits were granted was the allowance for a landscaped green space between the Wal-Mart property and the adjacent assisted living facility. The planning board is currently in negotiation for outparcels of the project to be used as additional green space, rather than to be developed. It is possible to reduce the impact of development on the environment with sound planning.

ROAD LOG FOR TRIP A-5

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Most of the stops on this field trips are located on private property. The leader of this trip has received permission to be on these sites for observations and measurements. The following individuals or companies should be contacted before on-site visits are made at a time other than this NYSGA field trip:

Steven G. Cleason, P.E.
APD Engineering
3445 Winton Place - Suite 208
Rochester, NY 14623
(Wal-Mart Supercenter)

Ralph Roe, Superintendent
Cortlandville Sand & Gravel
765 Route 13
Cortland, NY 13045

Richard E. Schutz,
Operations Manager
Suit-Kote
P.O. Box 5160
1911 Lorings Crossing
Cortland, NY 13045

CUMULATIVE MILEAGE	MILES FROM LAST POINT	ROUTE DESCRIPTION
0.0	0.0	Leave SUNY Cortland parking lot and proceed to Tompkins Street (Route 13). Turn right and cross railroad tracks.
1.2	1.2	STOP 1

STOP 1. THE USGS WELL, CT11.

The U.S. Geological Survey drilled a number of wells into the Cortland aquifer in the mid-1970s. Well CT11 is located nearest the City of Cortland wells. The U.S. Geological Survey has a number of reasons for drilling wells. The Survey may contract with communities to determine water supply potential or to develop a computer model of the aquifer based on the configuration and composition of the aquifer.

Before we begin our measurements, examine the well log and the landscape. What is the origin of this landscape?

TABLE 1—Log of Well CT11.

<i>Depth (ft)</i>	<i>Description</i>
10	coarse sand and pebbles
15	clay, sand and pebbles
20	medium to coarse sand and pebbles
25	coarse sand and pebbles
30	fine to coarse sand and pebbles
35	some clay, fine to coarse sand and pebbles
40	fine to coarse sand and pebbles
45	fine to coarse sand and pebbles
50	fine to coarse sand and pebbles
55	coarse sand and pebbles
60	medium to coarse sand and pebbles
65	silt and fine sand
70	fine to coarse sand and pebbles
75	fine to coarse sand and pebbles
80	fine to coarse sand pebbles
85	coarse sand and pebbles
95	medium to coarse sand and pebbles
100	clay, coarse sand and pebbles
105	clay and coarse sand

Measured data:

Surface altitude: _____ Depth to water: _____ Water table altitude: _____

Return to vehicles and continue southwest on Tompkins Street (Route 13). Development has progressed along Route 13 as strip development, which allows for easy access but is more costly with respect to utilities.

2.5	1.3	Route 13 bends at the intersection with Route 281.
2.7	0.2	Continue on Route 13 to the southwest, passing the existing Wal-Mart on your left.
3.4	0.7	Turn left onto Bennie Road.
3.7	0.3	Proceed past Walden Place Assisted Living to STOP 2.

STOP 2. SITE KNOWN AS THE POLO GROUNDS, SOON TO BE A WAL-MART SUPERCENTER

In March of 2003 preliminary plans for a proposed Wal-Mart Supercenter were submitted to the Town of Cortlandville to be located on this site. However, the site was not zoned for “big box” development and the project was put on hold pending changes in zoning. Wal-Mart requested that its project be termed a “Planned Unit Development” (PUD) and the request was granted after considerable controversy. A PUD can over-ride existing zoning, allowing Wal-Mart to submit a Draft Environmental Impact Statement (DEIS) for the project before a change in zoning occurred. The Final Environmental Impact Statement was submitted in November of 2006. The final approval by the Town was given in August of 2007. Throughout the four-year process, a local environmental organization fought the project, even bring a lawsuit against the Town. The problem with this site is that it is the most important tract of land over the aquifer.

Examine the test-pit data and the landscape. What is the origin of the landscape? The developers contend that the site is not a major recharge area because Otter Creek transports all of the runoff from the hills. We need to evaluate that contention.

TABLE 2—Test pit data.

<i>Depth (ft)</i>	<i>Description</i>
0-5	Gray-brown silt, little gravel, little sand, gravel pocket at four feet
5-6	Brown sandy silt and gravel
6-8	Gray silty sand and gravel

Measured data:

Surface altitude: _____ Depth to water: _____ Water table altitude: _____

Return to vehicles and drive back towards Route 13.

3.9	0.3	Turn left onto Route 13.
4.1	0.2	STOP 3 at 765 Route 13.

STOP 3 SOUTH CORTLAND SAND AND GRAVEL

To more fully evaluate and ensure the quality of all material produced from granular deposits, a Geological Source Report shall be submitted for each sand and gravel operation furnishing material to New York State Department of Transportation contracts. In the Source Report there must be a discussion of mode of deposition, a geologic cross-section, and a petrographic analysis.

What is the origin of this landscape?

We will analyze approximately 100 representative samples of gravel.

Measured data:

Clastics: _____% Carbonates: _____% Crystallines: _____%

Return to vehicles and drive back towards Cortland on Route 13.

5.1 1.0 Turn left at Lime Hollow Road.
5.3 0.2 Proceed to Stupke Road for STOP 4.

STOP 4. USGS TEST WELL #381

In 1986 trichloroethylene (TCE) was discovered in water of private wells near this site. Well #381 was established to monitor water chemistry and provide data to determine the source of the TCE.

TABLE 3—Log of Well #381

<i>Depth (ft)</i>	<i>Description</i>
0-106	sand and gravel
106-110	till
110-175	varved silt and clay
175-216	sand and gravel
216-220	silt and clay
220-245	sand and gravel
245	bedrock

Measured data:

Surface altitude: _____ Depth to water: _____ Water table altitude: _____

With three (3) measurements of the water table altitude, we may determine the slope of the water table and the direction of flow of the water and any contaminants. How is this done?

Return to vehicles and continue northwest on Stupke Road.

6.0 0.7 Turn right at McLean Road.
6.6 0.6 Left on Fairview Road crossing Route 222 to Highland Road.
7.6 1.0 STOP 5.

STOP 5. HIGHLAND ROAD DEVELOPMENT

This development was considered to be ideal for many years until wells became contaminated. The County is now attempting to require much larger building lots in these “rural” areas. Larger building lots will allow for the owners to have wells adequately spaced for septic systems and avoid future contamination. When this development was completed, the lot size was deemed adequate.

Continue north on Highland Road.

8.2 0.6 Right on Hoy Road and a quick left on to Kinney Gulf Road.
8.3 0.1 Right on Sweeny Road.
8.7 0.4 Right on Blue Creek Road.
9.1 0.4 STOP 6.

STOP 6. BLUE CREEK ROAD SUBDIVISION

When the Blue Creek Road Subdivision was first proposed, it had 16 building lots. The subdivision was then resubmitted to the Cortlandville Planning Board with 14 building lots. The problem with the subdivision was in the slope of the land and storm water runoff. At the conclusion of a extensive discussion regarding storm water, a motion was made by a planning board member to approve the subdivision, as requested, incorporating the disclaimer: “The design and Town of Cortlandville acceptance is not to be construed as a guarantee, expressed or implied, that the storm water management facilities will function properly, and the Town of Cortlandville assumes no liability should the storm water management system fail to function properly.” The motion was seconded and the vote recorded with three “ayes” and two “nays”.

Continue east on Blue Creek Road.

9.6	0.5	Turn left on Cosmos Hill Road.
11.3	1.7	Proceed to Route 90.
12.9	1.6	Turn right on Route 90 and continue to Route 11.
14.4	1.5	Turn left on to Route 11 and on to Suit-Kote gravel pits on the north side of the Village of Homer for STOP 7.

STOP 7. SUIT-KOTE HOMER GRAVEL PIT

Many gravel pits exist in this vicinity. The dollar value of aggregate in Cortland County is greater than what California has realized from gold; however, mining has prevented future agricultural activities or residential development. This is a major problem in land-use planning. If we don’t mine here, where do we?

At this site we want to compare and contrast the aggregate with our sample analyzed at Stop 3.

Measured data:

Clastics: ____% Carbonates: ____% Crystallines: ____%

Return south through the Village of Homer.

16.0	1.6	Turn left at Albany Street.
16.6	0.6	At the Y-intersection, turn left and continue on Lighthouse Hill Road.
16.7	0.1	Turn right on to Route 13 and very shortly turn left on to Loring Crossing Road.

STOP 8. SUIT-KOTE LORINGS CROSSING PLANT.

Here we want to examine the location of the plant with respect to the Tioughnioga River. What safe-guards are in place to protect the river in case of the failure of an asphalt storage tank?

17.2	0.2	Continue on Route 112, over the Tioughnioga River, to East River Road.
19.3	2.1	Turn right on to East River Road and southward to Route 11.
20.0	0.7	Turn left on to Route 11 and proceed to the Polkville Plant.

STOP 9. SUIT-KOTE POLKVILLE PLANT

Suit-Kote is the largest producer of asphalt in central New York. Although business is important for the welfare of any community, this type of business creates problems for the community. We will examine such problems as: noise, dust, odor, loss of land from excavation, and water pollution.

Source Reports submitted to the Department of Transportation must contain a petrographic analysis of the materials before crushing. In addition to examining potential problems, we will compare aggregates from the face of the deposit to processed materials ready for market.

Measured data:

Clastics: _____%

Carbonates: _____%

Crystallines: _____%

We have now examined several aggregate sites from which gravels are mined for road construction.

What are the qualities we want in a durable aggregate?

What could have been the provenance for each of these deposits?

Return to SUNY Cortland.

END OF FIELD TRIP

