

VT DEC and Agency of Digital Services methodology for determining GIS-derived municipal roads hydrologic connectivity proximity analysis

Background: As required by Act 64, the Vermont Clean Water Act, DEC developed and issued a Municipal Roads General Permit (MRGP) in January 2018. Towns applied for coverage under the permit in July 2018. As part of the development of the MRGP, new municipal road practice standards were developed. The required MRGP standards apply to all hydrologically-connected municipal roads.

The Hydrologically Connected Roads Segments layer was developed as a proximity analysis to identify priority roads segments where erosion (sediments and nutrients) could impact waters of the State. Towns covered by the MRGP will have to complete road erosion inventories (REIs) on all hydrologically-connected roads by December 2020, to see if applicable standards are in place. Those organizations conducting REIs have the ability to add or remove roads as hydrologically-connected, based on specific field criteria within the MRGP. Towns will have until December 2036 to bring all their hydrologically-connected road segments up to MRGP standards.

Data Processing Steps: The hydrologically-connected layer was built from a Road Erosion Risk Ranking (RERR) layer developed by Stone Environmental (2014) for unpaved municipal Class 3, Class 4 and private driveways. Original guidance for determining connectivity asked municipalities to reference the RERR layer. The Hydrologically Connected Roads Segments layer now replaces that layer. The general steps developing the new layer are as follows:

Specific hydrologic connectivity proximity analysis methodology and timeline:

7/8/2016

1. Removed private roads from the Stone Environmental Road Erosion Risk layer
2. Applied the same protocol from the 'Class 3 and 4 Road Analysis Project' completed by Stone Environmental to the Paved Class 1, 2 and 3 Town Highways to determine road erosion risk. Roads completed in this step have IDs ending in *.1.
3. Merged the datasets into one
4. Created 3 additional fields to help determine connectivity using GIS
 - o HydroBisect_Criteria – If a 100-meter road segment intersects a NHD Stream, NHD Lake or VSWI wetland then value = yes
 - o HydroParallel_Criteria – if a 100-meter road segment is within 100ft of a NHD Stream, NHD Lake or VSWI wetland then value = yes. No steps were completed to determine if road was up gradient of stream.
 - o HydroRivCorr_Criteria – if a 100-meter road segment intersected the River Corridor layer then value = yes
5. Developed process for identifying potential intermittent channels based on 10m DEM using a USGS protocol: Flow-Based Method for Stream Generation in a GIS (<http://md.water.usgs.gov/posters/flowGIS/>)
6. Applied the same proximity criteria using the potential intermittent channels layer and added two additional fields

- HydroIntBisect_Criteria - If a 100-meter road segment intersects a potential intermittent channel then value = yes
 - HydroIntParallel_Criteria - If a 100-meter road segment is within 100ft of a potential intermittent channel then value = yes
7. Applied proximity criteria using Stormwater Infrastructure Data managed by DEC
 - Selected outfalls within 500 feet of NHD and VSWI
 - Selected piped Stormwater Systems based on connectivity with selected outfall
 - Added the field HydroStorm_Criteria - if road segment was within 38 feet of piped storm network then value = yes. This number, while slightly arbitrary, is based on the graph below. With that number we are slightly over the inflection.
 8. Added the field HydroConnected and when any of the six criteria were met the road segment was determined to be a "road connected by direct surface drainage" at the GIS level (value=yes).

June 1, 2017

Applied new connected road criteria including:

9. Grabbing adjacent segments to bisected connected segments if 8% or greater slopes (if not already connected)
10. 24in culverts as bisects (if not already connected)
11. Non-connected segments that were bordered on either side by a connected segment.
12. New stormwater infrastructure mapping completed between the original release (7/8/2016) and infrastructure data acquired from MS4 areas was used in areas, primarily urban, to further define municipal roads that could potentially impact waterways.

January 2018

13. Data has been cleaned up by remove micro slivers less 1 meter in length and segments between 1 and 10 meters in length were unsplit and merged into adjacent larger segments. Segments are now identified if they occur in Village areas.