



## Roads Go Ever On

By JRR Tolkein

Roads go ever ever on,  
Over rock and under tree,  
By caves where never sun has shone,  
By streams that never find the sea;

Over snow by winter sown,  
And through the merry flowers of June,  
Over grass and over stone,  
And under mountains in the moon.



**Here we are talking about dirt roads again.** The reason: Roads have such a huge, often adverse impact on our lakes and streams. In this newsletter we share the latest information about the roads in Calais and provide information on methods that property owners can use on their driveways and private roads to protect our natural waters .

## Calais Roads

### 2012 Study Rates their Impact on Lakes and Streams

Dirt roads are typically located on steeper grades in narrower valleys and are often located in very close proximity to streams. As a result, erosion and sediment flow to the streams can be common. In addition to damaging streams, ponds and lakes, these roads are often an ongoing maintenance issue for the town. In 2012, the Central Vermont Regional Planning Commission, with assistance from the Friends of the Winooski River, conducted an assessment of dirt roads to locate and identify water quality impairments, prioritize restoration projects and develop recommendations for remediation. The assessment covered Calais, East Montpelier, Worcester, Woodbury and Middlesex.

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55 miles of Calais's 67 miles of class 3 and 4 dirt roads were analyzed. In summary, it was found that many miles of Calais roads have an adverse impact on lakes and streams. This analysis examined stream crossings, width of buffers beside streams and Class II wetlands, soil susceptibility to erosion, and the steepness of the road slope. A geographic information system (GIS) tool, which uses satellites to precisely identify location in the landscape, was used to determine priority locations for the field assessment. The roads were examined in 100 foot segments. Based on the factors above, each segment of roadway was scored. For example, if the buffers were narrow, the slope was steep and the soils were soft and fine, then the potential for a detrimental impact on an adjacent stream or pond would score high compared to a level stretch of road with wide buffers and few stream crossings. Each section was ranked as **very high, high, moderate** or **low** respect to potential impact on waterways.

In Calais, this broke down as follows:

- **3.04 miles—very high;**
- **24.68 miles—high; 1**
- **13.6 miles—moderate;**
- **6.33 miles—low.**

The remaining 7 miles were deemed not to have any potential impact on waterways.

Field crews used a series of field priority indicators to further evaluate all of the sections that ranked 'very high'. These priority indicators included volume of runoff expected through the erosion area, the steepness of the area, the condition of the ground cover, and finally the opportunity for sediment deposition to surface waters. Individual erosion areas were scored in the field as high, medium, and low, for each of these indicators. In Calais, a site plan with erosion treatment plan was developed for the six highest priority sites in Calais. These along with a full summary of the assessment were presented to the Select Board and road foreman.

The full report can be found at:

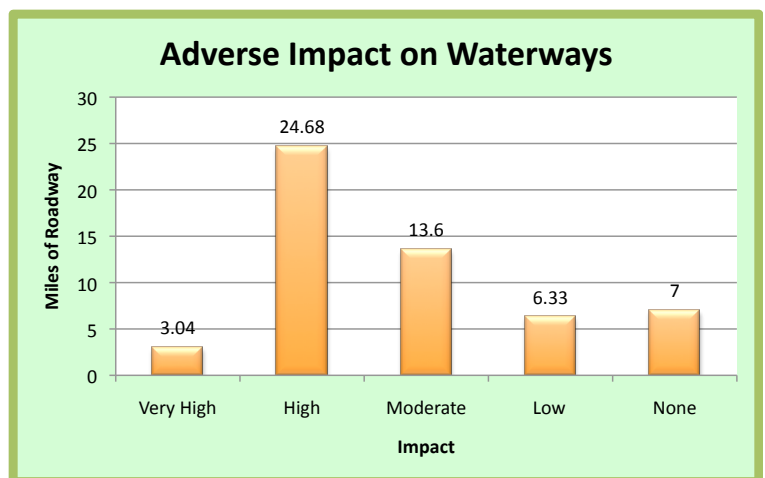
<http://centralvtplanning.org/wp-content/uploads/2012/03/Class-Three-and-Four-Road-Erosion-Assessment-Report-Final.pdf>

Contributed by: [Ann Smith- Executive Director of the Friends of the Winooski River](#)

Friends of the Winooski River can be found at: [www.winooskiriver.org](http://www.winooskiriver.org)



**Proximity of this road to the lake combined with the narrow buffer zone contribute to risk of negative impact on water quality**



**Many of the dirt roads in Calais have potential negative impact on water quality of Calais lakes and streams**

## Preventing Driveway Erosion

Have you looked at your driveway lately? Recent attention has focused on gravel roads and driveways as sources of sediment and phosphorus to lakes and streams. Every road or driveway can become a conduit for rainwater or snowmelt, eroding the road material and introducing it to nearby streams or lakes. The runoff brings damaging sediment and nutrients into water. It is critical to properly maintain driveways in the shoreland area due to their proximity to the lake. Here are some tips on evaluating your lakeshore driveway or private road to ensure it is not an erosion problem.



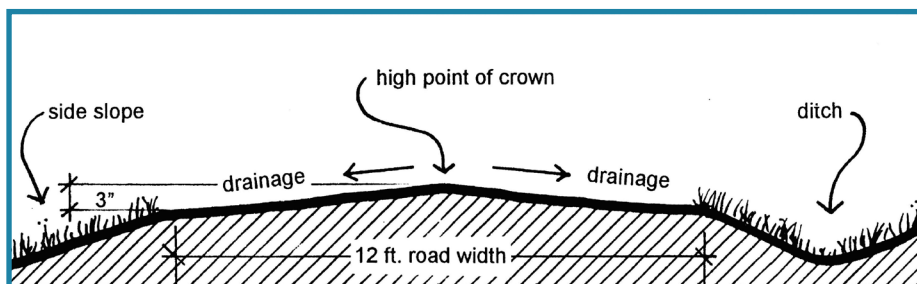
**This driveway is sunken and eroding, running directly downhill toward the lake. Steps are needed to improve this situation to protect the lake from sediment pollution**

First, walk your driveway or road during a heavy rainfall or during the snowmelt period. Observe the flow of water along the road and its edges and note the following:

- ☛ Does any water run as channelized flow directly into the lake or to an inlet stream? If so, this problem is the highest priority to fix.
- ☛ Examine how the flow becomes channelized and concentrated. As the flow increases in volume it can erode more material.
- ☛ Is the runoff carrying eroded soil or gravel? Is the runoff water turbid during rain events? This situation indicates there are ditches, banks or backslopes that need stabilizing, or some other uphill erosion source.
- ☛ Does the driveway or road have eroding gullies down the length of it? Does the water flow down the tire tracks? The driveway surface should not be eroding significantly each rainstorm.

Sketch out your driveway and note the flow of water alongside, onto and off of your driveway. Start at the top and think about the alternative ways to divert water into vegetated areas, improve the crown, and divide up the flow into smaller volumes. Extreme situations may warrant moving the driveway back or redesigning it. There are four basic principles to good road or driveway maintenance:

1. **Get water off the road as soon as possible.** Maintain a good crown on the road surface so that water runs off the edges of the road, rather than down the length of it. Consider the quality of any new gravel you may add periodically; ask for quality “crusher run” gravel which will pack into a hard surface and resist erosion. Waterbars are a good trick to use on steep slopes (where crowning is not enough on its own) often found in private road or driveway situations. Waterbars keep the volume of flow on the road from increasing and send it off to the side and into a vegetated area for absorption.



**A properly crowned road or driveway allows water to flow immediately off the road into surrounding vegetation or a stabilized ditch. Water running lengthwise down a road is likely to cause erosion of the road surface.**



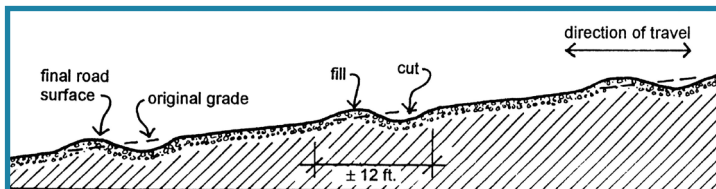
2. **Stabilize and revegetate bare areas.** Unstable areas often crop up around culverts, in ditches, and along the uphill bank of the road. Simple rock headers can be built by hand on smaller culverts. Ditches should be seeded and mulched. Ditches with slopes greater than 5% should be rock-lined with angular riprap for stability. Banks should be sloped back so they are not too steep to be stabilized with vegetation (no steeper than 2:1, horizontal to vertical).



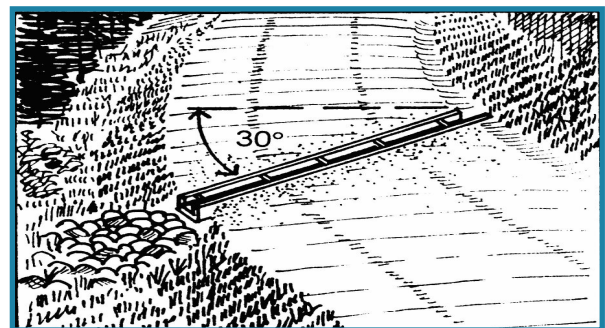
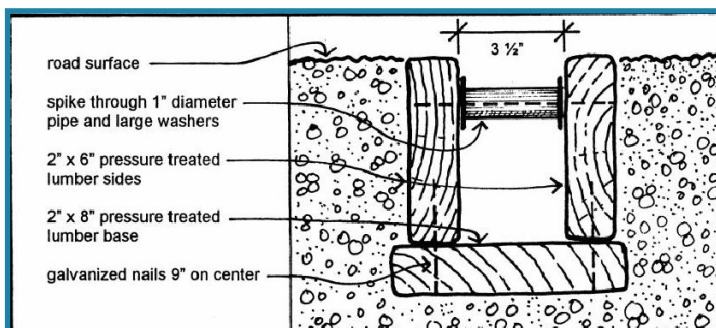
At left, lake association members seed and mulch a newly cleaned ditch. At right, a steep road that serves several camps has had a rock lining installed to prevent the previous on-going erosion of the ditch.



3. **Divert as much runoff as possible into vegetated areas.** A wooded area can absorb quite a bit of runoff, reducing surface flow and removing sediment. Divert the road runoff as often as possible by using turnouts, waterbars, and culverts. By doing this often, runoff volume can be kept low, increasing the effectiveness of vegetation and duff layers that absorb it. Install "rock aprons" (rip rap flow spreaders) to fan out and slow discharge from a culvert or waterbar.



A waterbar (cross-section) intercepts water flowing lengthwise down the road and transfers it off the side into vegetation or a ditch.



An open-top box culvert is an alternative to a waterbar that will hold its shape better. Be sure to make it wide enough to allow periodic cleaning out with a tool you have such as a mattock. Install both waterbars and open top culverts at a 30° angle to the road width. Note the rock apron at the culvert outlet above to prevent erosion at this location.

4. **Good maintenance saves money over the long run.** Putting adequate money into a road improvement project at the beginning increases its longevity, thereby saving you money in the future. Plus, you will have the satisfaction of knowing you are protecting nearby streams and lakes.

For more information or to obtain other topics in the Lake Protection Series, contact the Lakes and Ponds Section at (802)828-1535 or visit <http://www.vtwaterquality.org/lakes.htm>

## BASICS OF A GOOD ROAD

Vermonters spend a lot of local tax dollars on roads; perhaps more than any single item besides education. Yet, most of us do not realize what it takes to make a good road good and a bad road bad. For the property owner who is planning to construct or repair a driveway or road, here are some helpful tips.

This abridged version of St. Michael's College (Colchester, VT) explains what goes into the making of a good gravel road.

### GET WATER AWAY FROM THE ROAD

Drainage cannot be over emphasized. Water allowed to remain on top of a road weakens the surface and, when combined with traffic, causes potholes, cracking, and rutting. Whether it's mud in spring or frost heaves in winter, the presence of water in roads is nothing but trouble. Proper surface drainage is essential. It has three components.

1. A crown in the road allows water to run off to the side ditches.
2. Ditches are used to carry water away from the roadway. They need to be kept clean and protected from erosion. Water in the ditch has to be directed away from the roadway at frequent intervals..
3. Culverts are used to channel water from one side of the road to the other, helping to control the flow of water and slowing it down to reduce erosion. Three simple principles are good guides:
  - Water runs down hill
  - Water needs outlets at the bottom of all grades
  - Puddles mean problems

### BUILD ON A FIRM FOUNDATION

A highway wears from the top, but it falls apart from the bottom. The base supports everything above it including traffic. If heavy equipment will be using your driveway or private road, the base needs to be designed to carry the load.

### COMPACT SOILS WELL

The more dense the materials are, the stronger the base is. When soil is improperly compacted, future traffic loads or changes in moisture content can cause settlement and failure of the roadway.

### DESIGN FOR WINTER MAINTENANCE

Grades and road width should be designed to accommodate the plow that will be used in the winter. Adequate turn-arounds may need to be included when designing a driveway or private road.

### PROTECT YOUR INVESTMENT

Regular road maintenance preserves your road investment and prevents costly major rehabilitation later on. Protect the road surface. Be sure the crown is in place. Clean and repair culverts and ditches. Prevent erosion on the roadside.

#### Links to more information

VT Better Backroads <http://www.nvtrecd.org/custom-2/2009%20Better%20Backroads%20Manual.pdf>

The VA document <http://culpeperswcd.org/Guide%20to%20Driveway%20Best%20Management%20Practices.pdf>

VT Local Road Program <http://www.vermontlocalroads.org/Materials/thebasicsofagoodroad.pdf>



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# Calais Lakes and Streams COMMITTEE

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