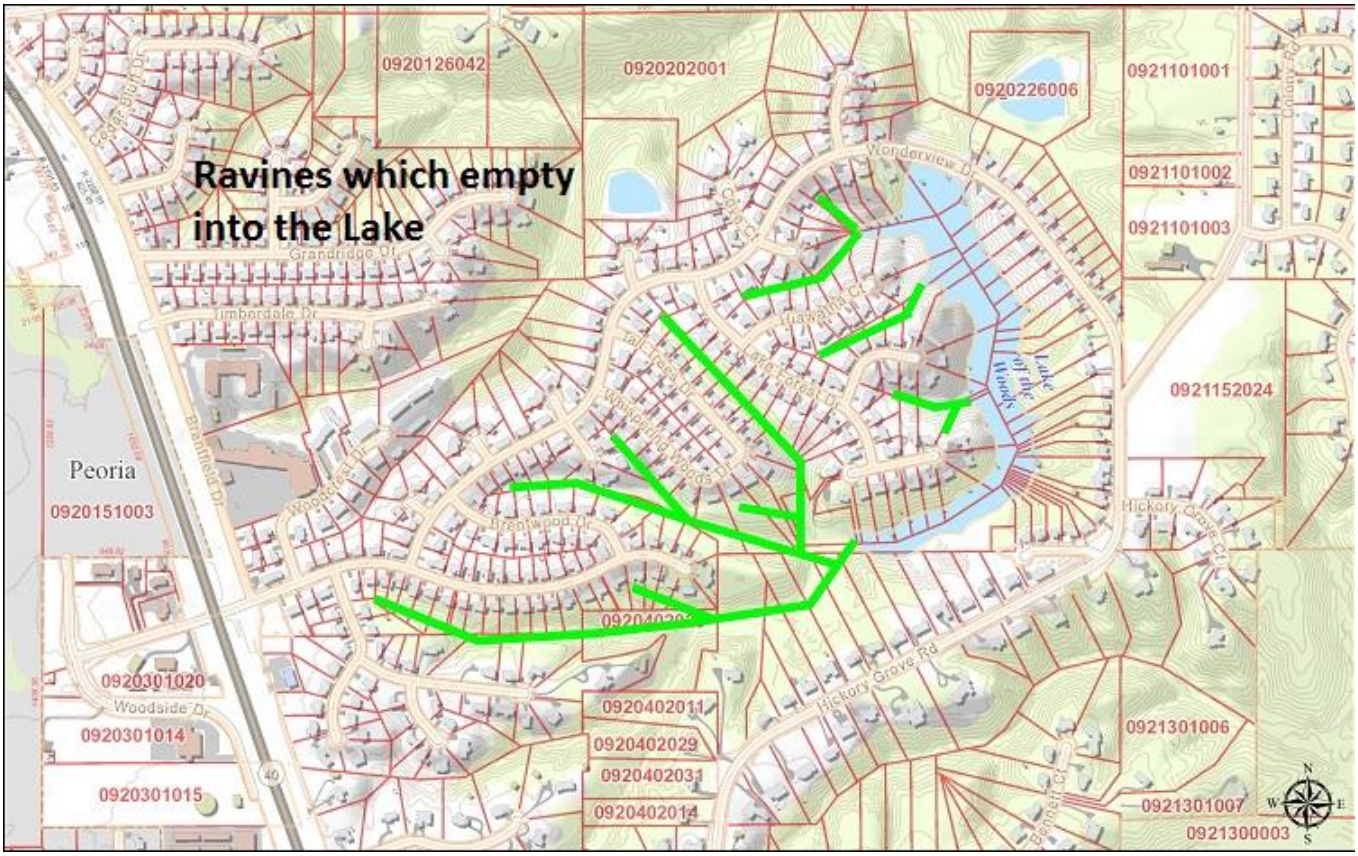
A Homeowner's Guide to Ravine Management

Storm water runoff is a significant cause of erosion and slope instability in Lake of the Woods. Erosion is compromising our wonderful neighborhood lake and may be placing some of your own property in peril! Read on to learn what we can do as homeowners to protect our personal and community assets.



TYPES OF EROSION ON YOUR PROPERTY

Rill erosion is the result of city storm water and homeowner gutter pipes at the sides of ravines and bluffs. The flow of storm water causes soils to erode at the discharge point of the pipe as the concentrated waterflow carves a gully as it moves downhill. Rill erosion can also be caused by fallen trees that lie up and down the slope, rather than across the slope. Storm water runoff creates a channel along the tree, and a rill erosion problem begins.

- Causes **Vertical cutting** of the channel, deepening a ravine through the removal of soils at the bottom. In ravines that convey storm sewer, the vertical cutting of the channel bottom is accelerated when the volume of storm water and the speed of the water increase. Logs and debris can create obstructions and reduce the width of the bottom of the ravine. Obstructions cause an increase in the speed of the flow of water creating even greater potential for vertical cutting.
- Alleviated by methods of slowing down water speed and volume

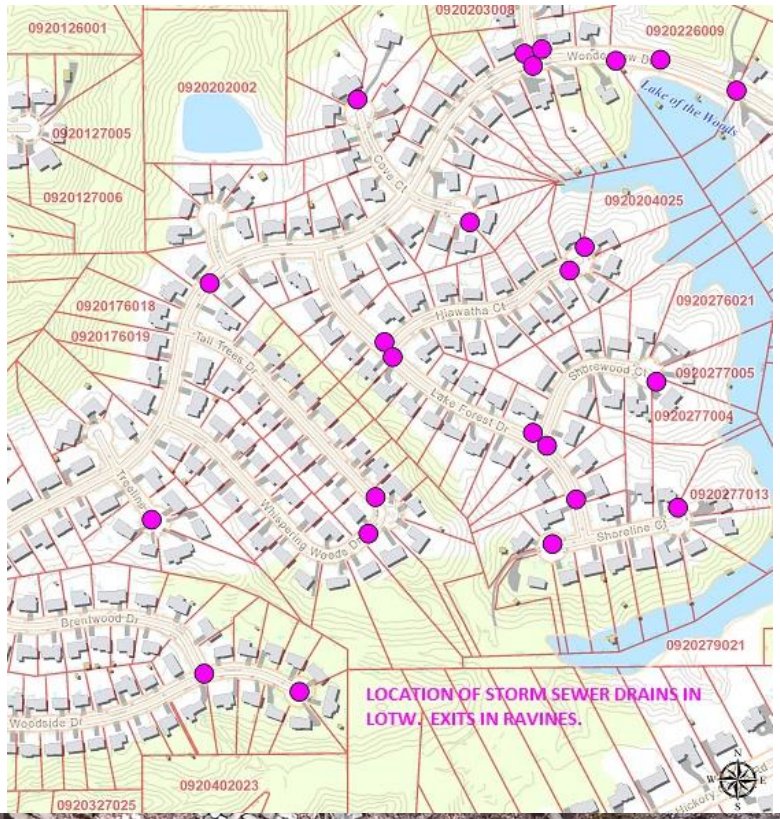
Sheet erosion and loss of vegetation can be caused when soil and debris layers prevent rainfall from reaching the ground water table and instead, conduct the water over the surface to the edge of a ravine or bluff. Weathered soil becomes saturated and the strength and stability of the soil is reduced. Eventually, the slope of the ravine or bluff sloughs off and slides down to the bottom of the ravine.

- Causes **Horizontal cutting** of the channel, widening the ravine through the removal of soils along the top of the ravine slope. Horizontal cutting that occurs at the base of trees eventually causes trees to fall. When a tree falls, more soil is exposed and there is increased potential for erosion and slope failure.
- ***Leaves, limbs, and other debris that are dumped on the slopes of the ravines and bluffs hold moisture in the weathered soil, prevent herbaceous plant grown, and accelerate the sloughing-off process.***
- Alleviated through structural walls and appropriate vegetation covering the slope.

Homeowners can help eliminate erosion on their property in two ways: Stormwater management, and appropriate slope stewardship.

A. STORMWATER AND RUN-OFF MANAGEMENT

1. **Roadway run-off -** Medina responsibility, but we need to be proactive
    a. Primary source of vertical cutting of the ravine system
    b. **Sites of road drains - Do you have an outlet behind your property?** *Inspect area for cutting of the hillside, inadequate extension of pipe to a flat region, and inadequate rip-rap installation.*
    c. **Contact Medina Township - Frank Sturm (franksturm@medinatownship.org)** for issues behind your property due to road run-off**.**



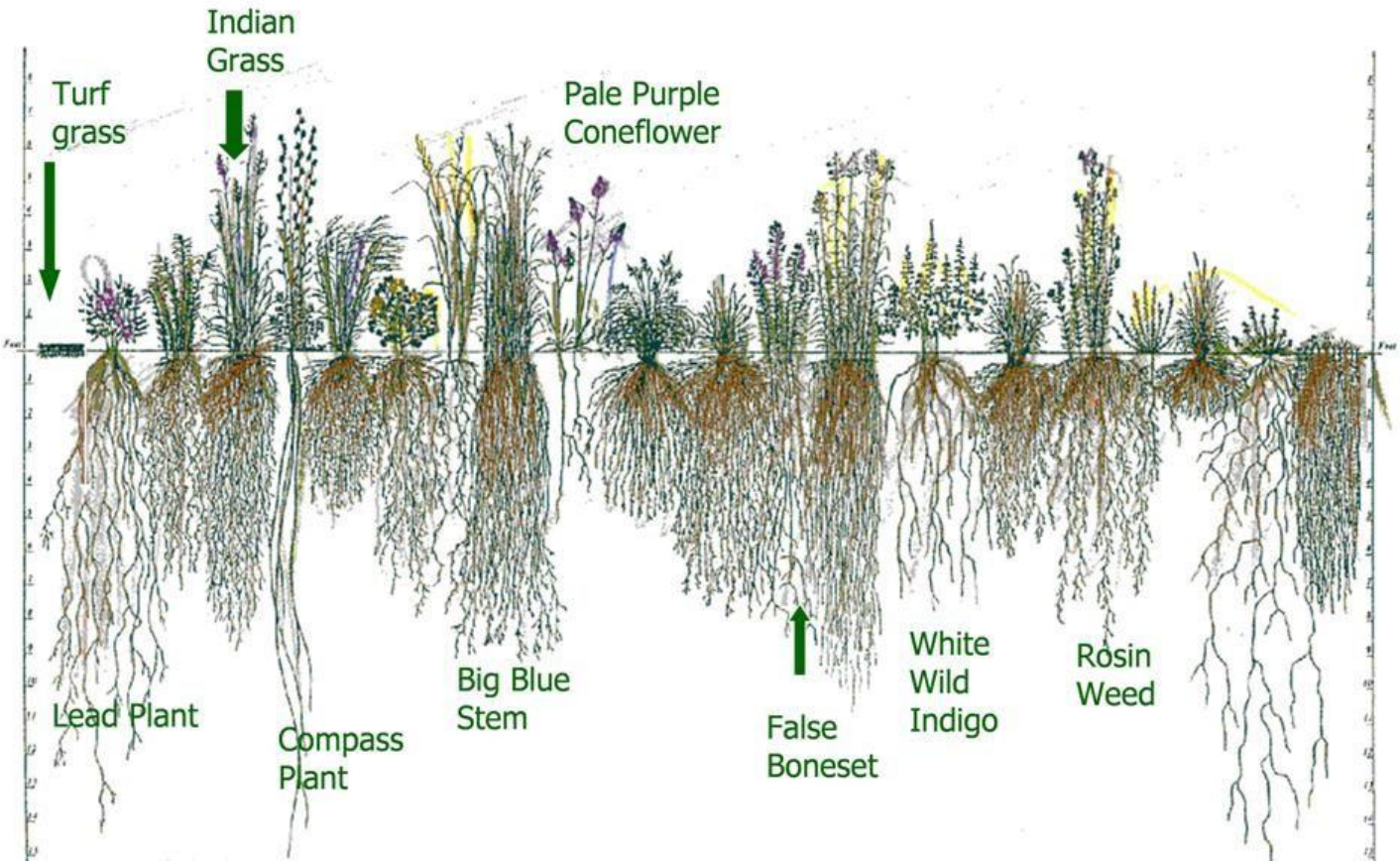
2. **Gutter/Downspout run-off -** individual homeowner responsibility
    a. Secondary source of water onto street
    b. Secondary source of vertical cutting of the ravine
    c. Never stop a gutter extension on the top or middle of a hillside -- Redirect downspout run-off to flat, vegetated surfaces covered in perennial, deep rooted plants.
    d. **Best Management Practices: Dry wells, swales, rain gardens, rain barrels, permeable pavement**
    e. **ideas@http://www.epa.state.il.us/water/tmdl/implementation/illinois-river/mossville-bluff-bmp-guide.pdf**

***High speed water carries soil down the ravine system into the lake, deepening and widening the ravines in the process**

B. SLOPE STABILIZATION - “Biotechnical” Slope Protection - Structural solutions and vegetation can function together to provide slope protection and prevent horizontal cutting of the ravine.

1. Vegetation prevents surface erosion and shallow slides. Vegetation reduces rainfall erosion by slowing the speed of rainfall runoff and binding and holding soil particles in place. Deeply rooted woody vegetation prevents slumps and slides through stabilization from the root systems. Vegetation also removes moisture in the soil. Plant ravine-specific plant species in safe, stable ravine reaches
2. Conversely, dense tree canopies have a large and potentially devastating effect by reducing ground vegetation and exposing vulnerable soils to erosion. A managed forest has greater species diversity and a greater ability to absorb stormwater to prevent erosion of slopes
3. Dumping leaves and grass clippings prevent native plant growth, channel water into the saturated soil layer, and add weight to the slope surface... DO NOT DUMP YARD WASTE INTO RAVINES!
4. Retaining walls protect and stabilize steep slopes at the base and flatten the slope near the wall. Rock breast walls, gabions, crib walls, and welded wire walls are all structures that can be used in the ravines. These structures are flexible, easily constructed, and cost-effective. Each of these types of construction can benefit from the incorporation of vegetation.
5. Contour Wattling is the placement of bundles of plant materials in shallow, contoured trenches on either a cut or an area of fill. The bundles or “wattles” are staked in place on the down slope side of the trenches. Ideally, the bundles consist of woody live plant stems from a species that is in plentiful supply near the job site. Wattles slow the flow of water down the slope, trap sediments in the fibers, stabilize the surface soils, and help establish vegetation

A restored Ravine: Improved light penetration, decelerated water in the channel, slope planted with native species plants, e



*Turf grass only roots a few inches. A diverse selection of perennials which do well on our slopes have extensive root systems.

Gabion basket wall

Contour wattling on a steep hillside.

A managed forest has greater species diversity and a greater ability to absorb stormwater to prevent erosion of slopes.

C. INVASIVE and NON-NATIVE SPECIES MANAGEMENT

NORWAY MAPLES

- The dense canopy formed by maple inhibits the sprouting of other tree seedlings, reducing forest diversity.
- Has shallow roots and out-competes other plants in the landscape.
- Decreases light penetration to the forest floor and reduces population of deep-rooting native perennials.
- Homeowners must establish appropriate tree canopy and ensure light levels are sufficient for herbaceous vegetation growth -- CUT ANY SAPLINGS LESS THAN 5 INCHES IN DIAMETER AND APPLY HERBICIDE TO THE STUMP!!

GARLIC MUSTARD

- Taproot plant which spreads rapidly and displaces native plants in a relatively short period of time.
- Biennial - produce flowers in their second year and then die. An average plant produces 400-500 seeds that germinate readily in both well-lit and shaded environments.
- Eradicating garlic mustard is easy work, but takes time. It will take some vigilance over a few years. The ultimate goal in removing garlic mustard is to prevent seed development and spreading until the existing seed bank is depleted.
- It's important to know when pulling garlic mustard you should always make sure that the taproot is completely removed or the plant will re-sprout. All cutting MUST be bagged, dried and then burned or buried deep into the ground. If you leave a pulled plant on the ground it will continue to mature into seed stage and drop its seeds!!

BUSH HONEYSUCKLE

- It rapidly moves in an area and takes over, forming a dense shrub layer that crowds and shades out native species.
- Produces an allelopathic chemical that suppresses the growth of surrounding vegetation.
- Berries low in nutrition but highly desired by birds due to sweetness.
- It out competes native vegetation: Their leaves appear early in the spring and remain into late fall, giving bush honeysuckle a competitive advantage over native plants.
- Bush honeysuckle can be removed any time of the year. However, *early spring and late fall are ideal* for locating and removing this invasive shrub, since it has leaves when our native shrubs and trees do not. CUT TRUNK TO GROUND AND APPLY HERBICIDE TO PREVENT RE-SPROUTING.

Just because you don't live on the lake doesn't mean your soil doesn't end up in the lake! All of our ravines are connected and many go into the lake watershed. Furthermore, your unstable slopes may be putting your own yard or structures in peril. How can we become responsible homeowners?

1. **Extend downspout extensions to the base of the ravine, never ON the hill**
2. **NEVER throw yard waste on/in the ravine.**
3. **Contact Medina if a roadway discharge pipe is causing erosion on your property**
4. **Consider building a retaining wall or utilizing wattling**
5. **Clear enough of the tree canopy through pruning and selective tree removal to get light to forest floor. (if you don't have green plants growing on your hillside, it is eroding!)**
6. **Plant native species 'buffer strips' on top of steep ravines and on shallow ravine slopes.**
7. **Control invasive species of non-native plants**
8. **Consider ways to reduce stormwater run-off from your home/driveway/lawn.**

****PHOTOS TAKEN SAME TIME OF YEAR, 2 YEARS APART**